COM 2009 – 1374

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Counter Services
- 9 APR 2010

As Built Drainage Plan

Waitakere City Council
Te Taitau o Waitakere

Building Consent Number: COM-2009-1374 Inspector: _____

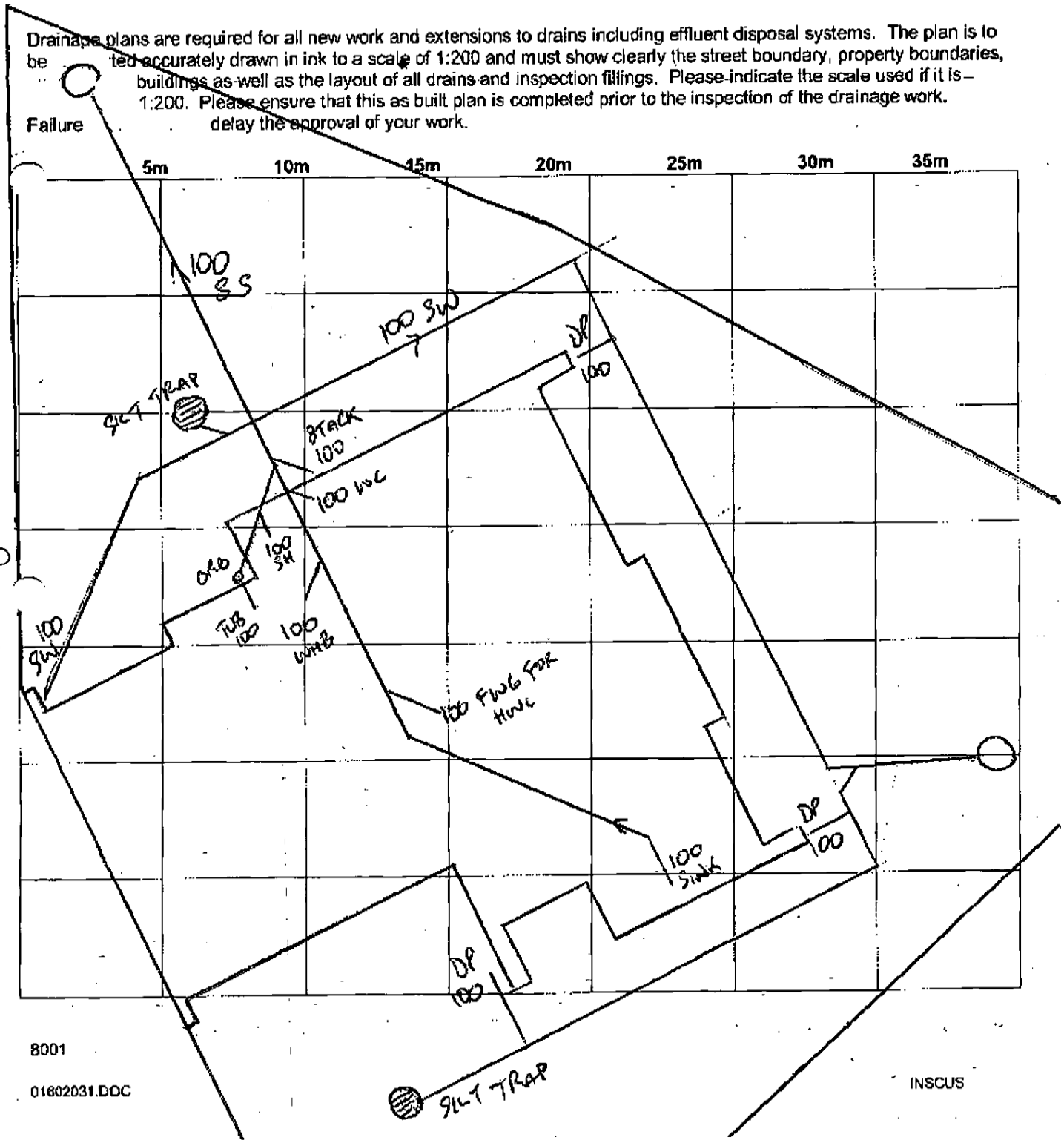
Owner's Name: NEW ZEALAND HOUSING FOUNDATION Drainlayer's Name: BRYAN CHAPMAN

Site Address: 19 Titch Place, Glen Eden

Lot & DP: LOT 32 DP 389289 Date Inspected: _____

Drainage plans are required for all new work and extensions to drains including effluent disposal systems. The plan is to be accurately drawn in ink to a scale of 1:200 and must show clearly the street boundary, property boundaries, buildings as well as the layout of all drains and inspection fittings. Please indicate the scale used if it is – 1:200. Please ensure that this as built plan is completed prior to the inspection of the drainage work.

Failure delay the approval of your work.



Prop Key: 327306.

8001

01602031.DOC

INSCUS

D O C U M E N T T R A N S F E R

To:	**Waitakere City Council** Civic Admin Building 6 Wailpareira Avenue, Henderson Waitakere City 1231 Auckland New Zealand	***Job No:***	42608/C
Attention:	Kristen Spyve	***File:***	
From:	Fiona Keir	***Date:***	1 December 2006
Copy to:			

Babbage CONSULTANTS

BABBAGE CONSULTANTS LIMITED
109 FANSHAWE STREET, AUCKLAND
PO BOX 2027, AUCKLAND 1, NEW ZEALAND
PHONE 0-9-379 9980, FAX 0-9-377 1170
EMAIL: admin@babbage.co.nz

Housing Development
West Coast Rd (No. 423-429), Henderson
Engineering Approval Application

DOCUMENTS: Please find attached six sets of drawings as follows:

42608 C01 Topographical Plan (Sheet 1) – REV A
42608 C02 Topographical Plan (Sheet 2) – REV A
42608 C03 Earthworks Plan (Sheet 1) – REV B
42608 C04 Earthworks Plan (Sheet 2) – REV B
42608 C05 Erosion & Sediment Control Plan (Sheet 1) – REV B
42608 C06 Erosion & Sediment Control Plan (Sheet 2) – REV B
42608 C07 Sediment Control Details – REV A
42608 C08 Decanting Bund Details – REV -
42608 C10 Drainage Plan (Sheet 1) – REV C
42608 C11 Drainage Plan (Sheet 2) – REV A
42608 C15 Stage 2 Swale Layout – REV -
42608 C16 Stage 3 Swale Layout – REV A
42608 C17 Wetland & Detention Basin 1 Layout – REV A
42608 C18 Pond Details Plan - REV B
42608 C19 Detention Basin 2 Layout - REV -
42608 C20 Roading Plan (Sheet 1) – REV A
42608 C21 Roading Plan (Sheet 2) – REV A
42608 C22 Road Longitudinal Sections (Sheet 1) – REV -
42608 C23 Road Longitudinal Sections (Sheet 2) – REV -
42608 C24 Road Longitudinal Sections (Sheet 3) – REV -
42608 C25 Road Cross Sections (Sheet 1) – REV A
42608 C26 Road Cross Sections (Sheet 2) – REV A
42608 C35 Services Plan (Sheet 1) – REV A
42608 C36 Services Plan (Sheet 2) – REV A
42608 C37 Stormwater Longitudinal Sections (Sheet 1) – REV -
42608 C38 Stormwater Longitudinal Sections (Sheet 2) – REV A
42608 C39 Stormwater Longitudinal Sections (Sheet 3) – REV -
42608 C40 Stormwater Longitudinal Sections (Sheet 4) – REV –
42608 C41 Sanitary Sewer Longitudinal Sections (Sheet 1) – REV A
42608 C42 Sanitary Sewer Longitudinal Sections (Sheet 2) – REV A
42608 C43 Sanitary Sewer Longitudinal Sections (Sheet 3) – REV -
42608 C45 Stormwater Catchment Plan (Sheet 1) – REV A
42608 C46 Stormwater Catchment Plan (Sheet 2) – REV A
42608 C50 Retaining Wall Plan (Sheet 1) – REV -
42608 C51 Retaining Wall Plan (Sheet 2) – REV –
42608 C52 Retaining Wall Details – REV A

Six copies of the stormwater, swale and pond calculations.

SENT: ✓ SURFACE MAIL FAST POST COURIER OTHER

ACTION REQUIRED: For engineering approval.

Regards

Fiona Keir
Babbage Consultants Ltd

WEST COAST ROAD

MEDIUM INTENSITY HOUSING SUBDIVISION

EARTHWORKS AND CIVIL CONSTRUCTION

for

NZ HOUSING FOUNDATION

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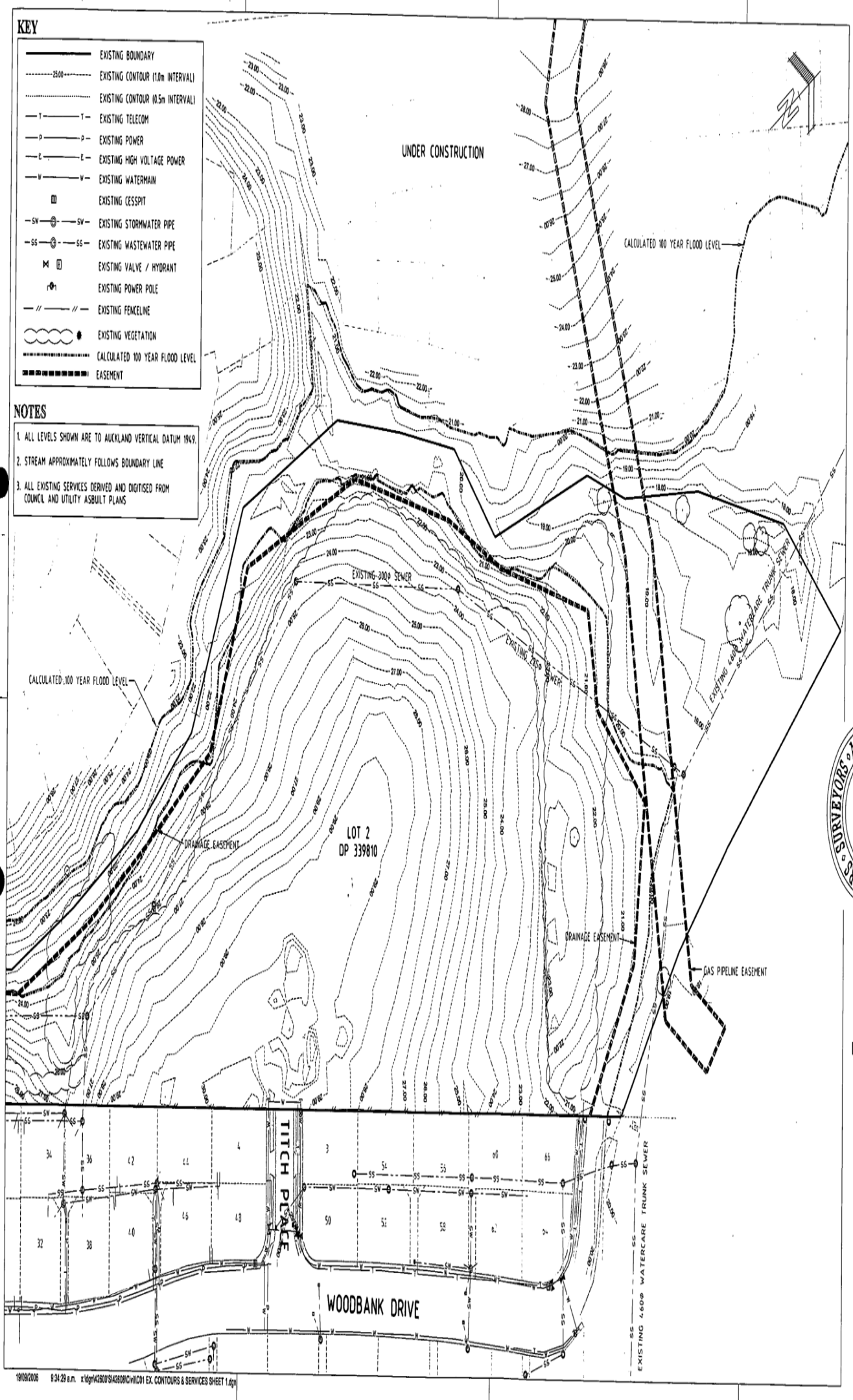
JOB No.	42608
NOVEMBER 2006	
DRAWING No.	42608 C00
REVISION:	ENGINEERING APPROVAL

30/11/2006 4:07:07 p.m. X:\dgn\42600's\42608\Civil\C00 Titlesht.dgn



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	7.09.06	CONTOURS AMENDED	FK	DMR

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

TOPOGRAPHICAL PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED		
DRAWN	JUNE 2006	FK
CHECKED	Sept 06	DMR
APPROVED	Sept 06	

SCALE (A1)

1:500

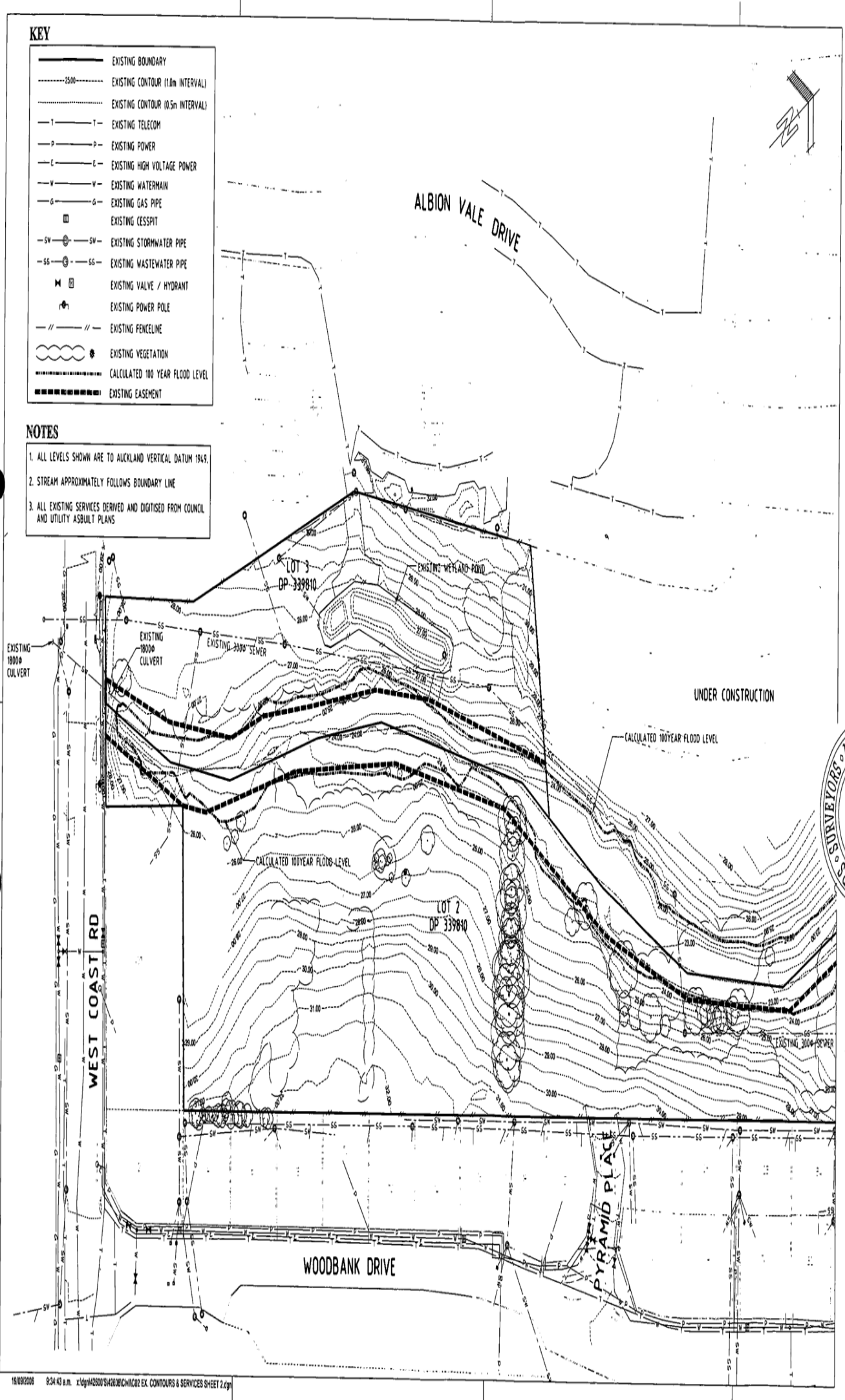
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C01	A

KEY

- EXISTING BOUNDARY
- EXISTING CONTOUR (1.0m INTERVAL)
- EXISTING CONTOUR (0.5m INTERVAL)
- EXISTING TELECOM
- EXISTING POWER
- EXISTING HIGH VOLTAGE POWER
- EXISTING WATERMAIN
- EXISTING GAS PIPE
- EXISTING CESSPIT
- EXISTING STORMWATER PIPE
- EXISTING WASTEWATER PIPE
- EXISTING VALVE / HYDRANT
- EXISTING POWER POLE
- EXISTING FENCELINE
- EXISTING VEGETATION
- CALCULATED 100 YEAR FLOOD LEVEL
- EXISTING EASEMENT

NOTES

1. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949.
2. STREAM APPROXIMATELY FOLLOWS BOUNDARY LINE
3. ALL EXISTING SERVICES DERIVED AND DIGITISED FROM COUNCIL AND UTILITY ASBUILT PLANS



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REV	DATE	DESCRIPTION	DRAWN	CHECK
A	15.09.06	GENERAL AMENDMENTS	GNB	DMR

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

TOPOGRAPHICAL PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED		
DRAWN	JUNE 2006	FK
CHECKED	Sept 06	DMR
APPROVED	Sept 06	IP

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C02	A

KEY

- EXISTING BOUNDARY
- EXISTING CONTOUR (1.0m INTERVAL)
- EXISTING CONTOUR (0.5m INTERVAL)
- 22.00 EARTHWORK CONTOUR (1m INTERVAL)
- EARTHWORK CONTOUR (0.5m INTERVAL)
- CALCULATED 100 YEAR FLOOD LEVEL
- LIMIT OF EARTHWORKS
- ZERO CUT/FILL BOUNDARY
- RETAINING WALL
- RL 26.8 FINISHED GROUND LEVEL
- 31 LOT NUMBER

NOTES

1. ALL WORKS TO COMPLY WITH WAITAKERE CITY COUNCIL CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. FOR EROSION AND SEDIMENT CONTROL REFER TO DRAWINGS C05 AND C06 EROSION AND SEDIMENT CONTROL PLAN SHEETS 1 AND 2.
3. ALL EARTHWORKS LEVELS SHOWN ARE TO FINISHED LEVEL.
4. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949.
5. ALL STEEP FILL EMBANKMENTS ARE TO BE CONSTRUCTED EARTH REINFORCED WITH GEOTEXTILE GRID TO THE DIRECTION OF THE ENGINEER.

CALCULATED 100 YEAR FLOOD LEVEL

PROPOSED DETENTION BASIN REFER SHEET C19

DRAINAGE EASEMENT

PROPOSED WETLAND POND AND DETENTION BASIN REFER SHEET C17

GAS PIPELINE EASEMENT

INDICATIVE TOPSOIL/CLAY STOCKPILE AREA TO BE USED AS REQUIRED WITH SILT FENCE AS DIRECTED BY ENGINEER

TITCH PLACE

WOODBANK DRIVE

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
B	07.09.06	POND AND WALLS AMENDED	FK	DR
A	150803	VARIOUS AMENDMENTS	FK	DR

DRAWING REVISIONS

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WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

EARTHWORKS PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED	Sept 06	DAR
APPROVED	Sept 06	IDP

SCALE (A1)

1:500

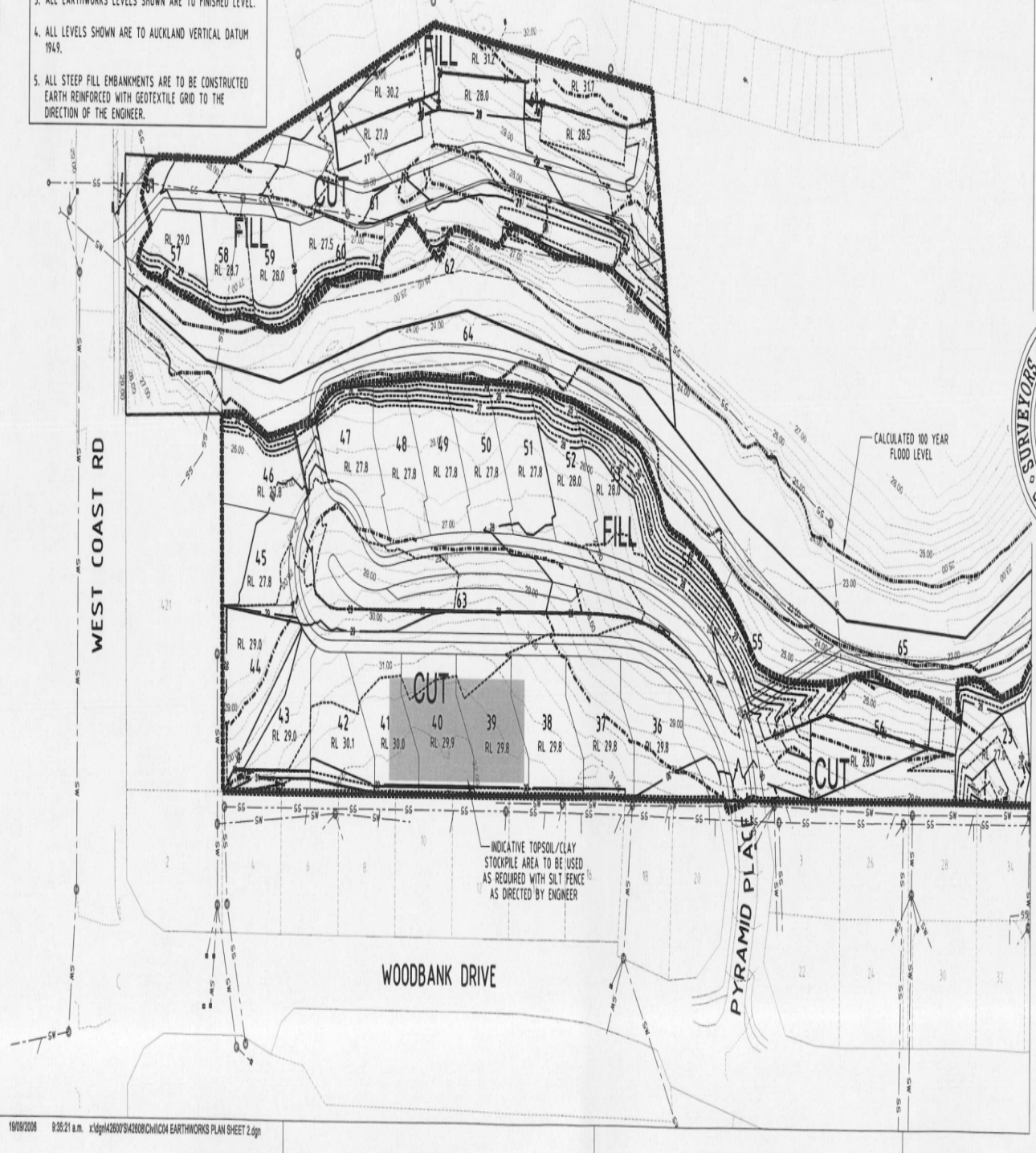
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C03	B

KEY

- EXISTING BOUNDARY
- EXISTING CONTOUR (1.0m INTERVAL)
- EXISTING CONTOUR (0.5m INTERVAL)
- EARTHWORK CONTOUR (1m INTERVAL)
- EARTHWORK CONTOUR (0.5m INTERVAL)
- CALCULATED 100 YEAR FLOOD LEVEL
- LIMIT OF EARTHWORKS
- ZERO CUT/FILL BOUNDARY
- RETAINING WALL
- RL 26.8 FINISHED GROUND LEVEL
- 58 LOT NUMBER

NOTES

1. ALL WORKS TO COMPLY WITH WAITAKERE CITY COUNCIL CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. FOR EROSION AND SEDIMENT CONTROL REFER TO DRAWINGS C05 AND C06 EROSION AND SEDIMENT CONTROL PLAN SHEETS 1 AND 2.
3. ALL EARTHWORKS LEVELS SHOWN ARE TO FINISHED LEVEL.
4. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949.
5. ALL STEEP FILL EMBANKMENTS ARE TO BE CONSTRUCTED EARTH REINFORCED WITH GEOTEXTILE GRID TO THE DIRECTION OF THE ENGINEER.



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
B	07.09.06	POND AND WALLS AMENDED	FK	DR
A	150806	VARIOUS AMENDMENTS	FK	DR

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WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

EARTHWORKS PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED	Sept 06	DWL
APPROVED	Sept 06	IP

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C04	B

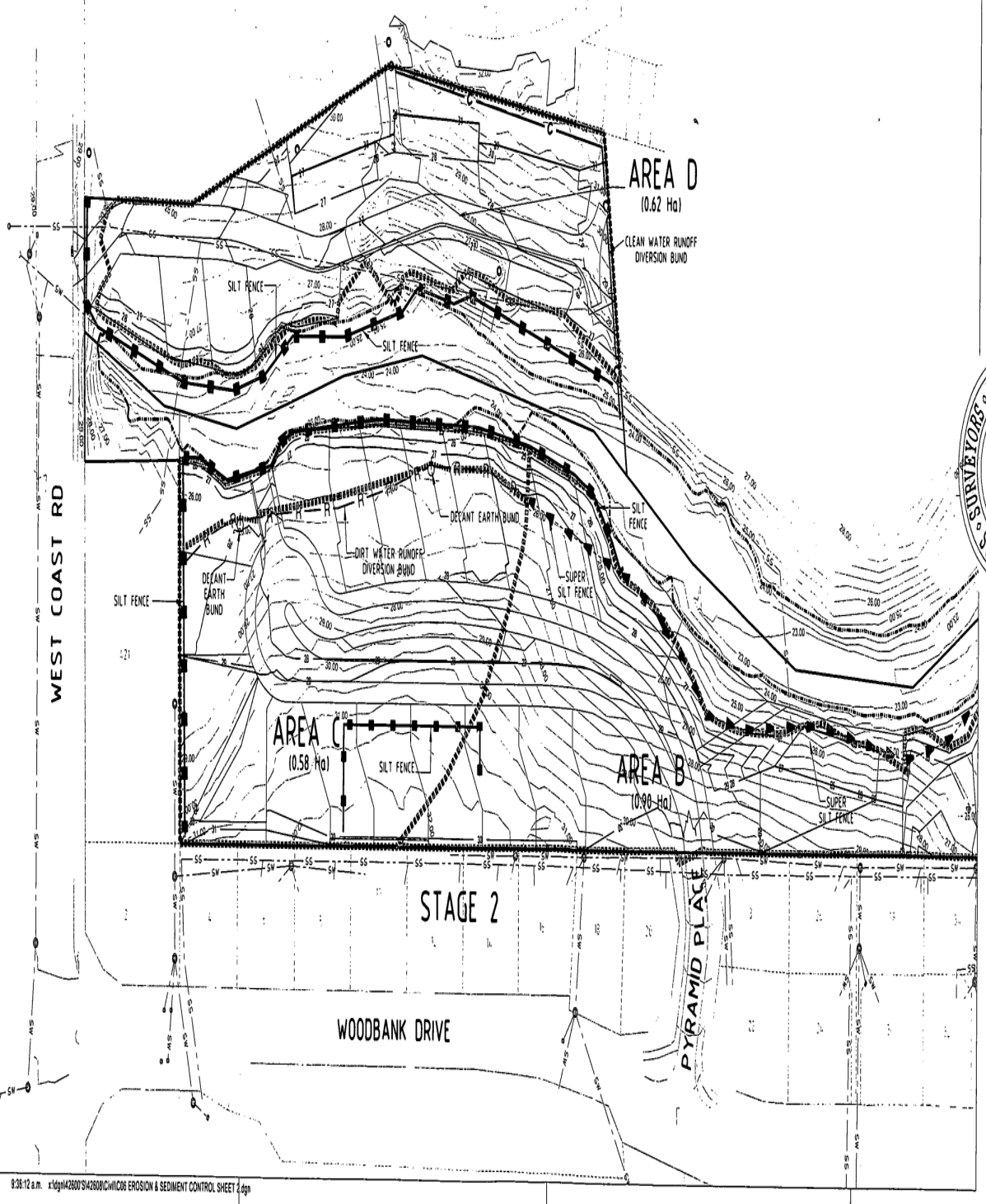
19/09/2006 9:35:21 a.m. x:\dgn\42600'S\42608\Civil\C04 EARTHWORKS PLAN SHEET 2.dgn

KEY

- EXISTING BOUNDARY
- 23.00 EXISTING CONTOUR (1.0m INTERVAL)
- EXISTING CONTOUR (0.5m INTERVAL)
- 27.00 EARTHWORK CONTOUR (1.0m INTERVAL)
- R — R DIRTY WATER RUNOFF DIVERSION BUND
- SILT FENCE
- CALCULATED 100% AEP FLOOD LEVEL
- EARTHWORKS CATCHMENT
- SUPER SILT FENCE
- C — C CLEAN WATER RUNOFF DIVERSION BUND
- DECANT EARTH BUND

NOTES

1. ALL EROSION AND SEDIMENT CONTROL FACILITIES TO BE CONSTRUCTED IN ACCORDANCE WITH ARC TP90 PUBLICATION.
2. ALL EXCAVATION AREAS TO BE STABILISED WITH MULCH OR TOPSOIL PRIOR TO OPENING NEW EXCAVATION SECTION. TO THE DIRECTION OF THE ENGINEER.
3. EROSION AND SEDIMENT CONTROL FACILITIES ARE TO BE CHECKED DAILY AND MONITORED DURING PERIODS OF RAIN.
4. ANY FURTHER EROSION AND SEDIMENT CONTROL MEASURES TO BE CONSTRUCTED AS DIRECTED BY ENGINEER AT TIME OF CONSTRUCTION.



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B	07.09.06	LEVELS AMENDED	FK	DR
A	150806	VARIOUS AMENDMENTS	FK	DR

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

EROSION & SEDIMENT CONTROL PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED		
DRAWN	JUNE 2006	GW
CHECKED	JUNE 2006	GW
APPROVED	Sept 06	

SCALE (A1)

1:500

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42608	C06	B

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DRAWING NOTES

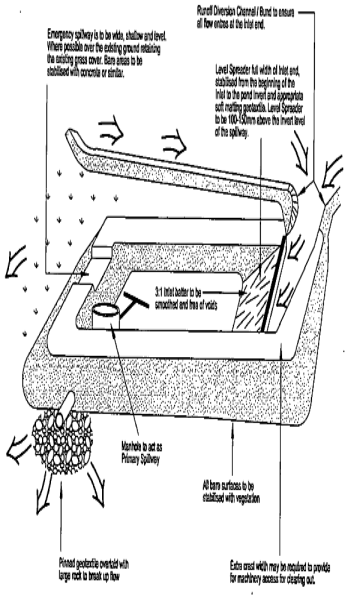
1. ALL EROSION AND SEDIMENT CONTROL MEASURES MUST BE OPERATIONAL PRIOR TO ANY OTHER WORKS COMMENCING ON SITE. THE CONTRACTOR SHALL ARRANGE AND ATTEND A PRELIMINARY SEDIMENT CONTROL MEETING WITH THE ENGINEER AND COUNCIL.

2. A COPY OF THE EROSION AND SEDIMENT CONTROL PLAN SHALL BE AVAILABLE ON SITE DURING WORK HOURS AND ALL PERSONNEL INVOLVED IN THE EARTHWORKS ACTIVITIES ON SITE INCLUSIVE OF SUB-CONTRACTORS SHALL BE FAMILIAR WITH THE CONSENT AND PLAN REQUIREMENTS AS THE RELATE TO EROSION AND SEDIMENT CONTROL.

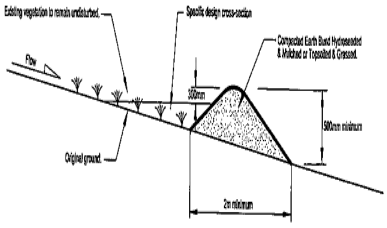
3. ALL "CLEAN WATER" RUNOFF FROM THE STABILISED SURFACES, INCLUDING CATCHMENT AREAS ABOVE THE SITE, SHALL BE DIVERTED AWAY FROM THE EARTHWORKS AREAS VIA A STABILISED SYSTEM, SO AS TO PREVENT EROSION.

4. ALL EROSION AND SEDIMENT CONTROL SHALL COMPLY WITH "EROSION AND SEDIMENT GUIDELINES FOR LAND DISTURBING ACTIVITIES: AUC TECHNICAL PUBLICATION No.90, UPDATED MARCH 1999 AND ANY AMENDMENTS TO THIS DOCUMENT. DIVERSION OF "CLEAN WATER" FROM THE UPSTREAM CATCHMENTS AROUND THE EARTHWORKS AREA SHALL BE BY MEANS OF DIVERSION DRAINS AND / OR OTHER APPROVED METHODS.

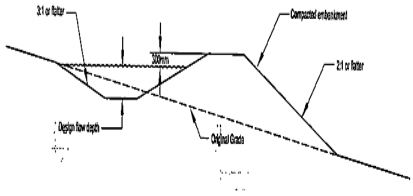
5. FURTHER SEDIMENT CONTROL WORKS MAY BE REQUIRED BY THE ENGINEER AS THE PROJECT ADVANCES. THESE WILL BE INSTALLED AS AND WHERE REQUIRED BY THE ENGINEER. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ENSURING THAT THE SITE HAS EFFECTIVE SILT DETENTION FACILITIES OPERATING AT ALL TIMES.



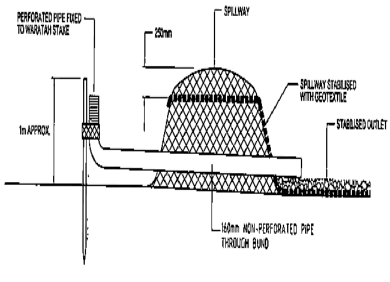
LAYOUT



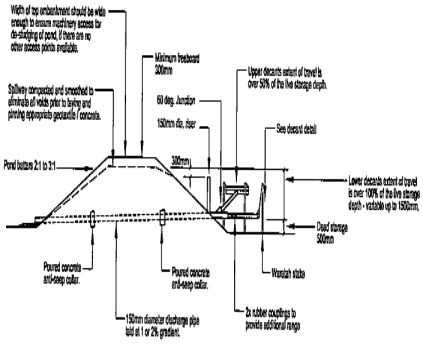
CLEANWATER RUNOFF DIVERSION BUND CROSS-SECTION



DIRTY WATER DIVERSION BUND CROSS-SECTION



CROSS SECTION OF DECANT EARTH BUND



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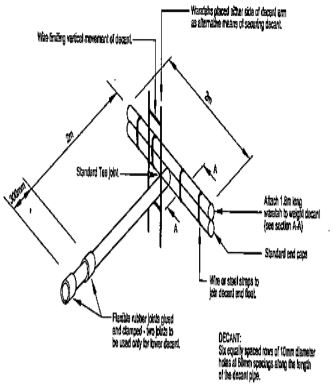
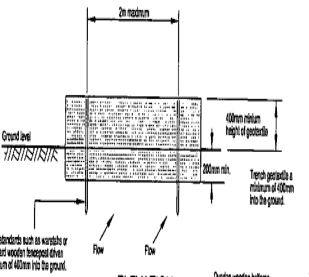
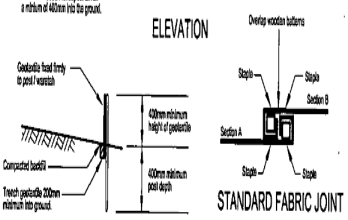


PERSPECTIVE VIEW

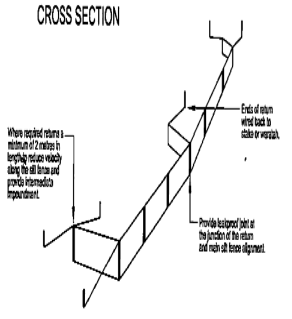


ELEVATION

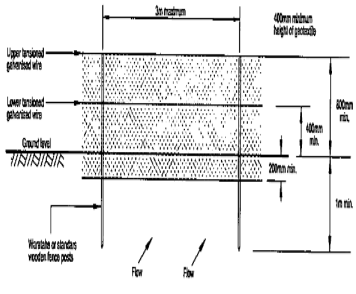


CROSS SECTION

STANDARD FABRIC JOINT



PERSPECTIVE VIEW

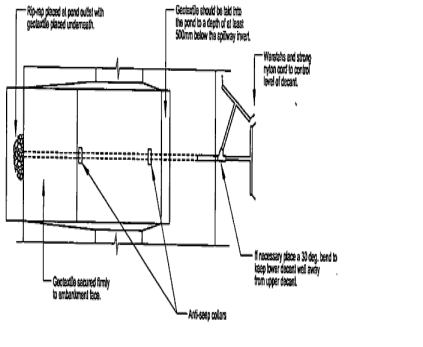


ELEVATION

SILT FENCE DETAIL

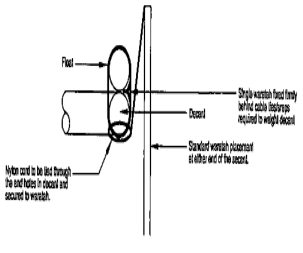
REV	DATE	DESCRIPTION	DRAWN	CHECK
A	19/09/06	SUPER SILT FENCE DETAILS ADDED	GB	FK

DRAWING REVISIONS



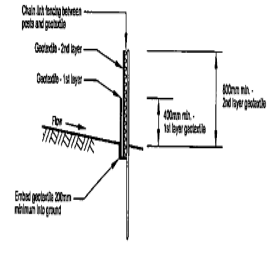
PLAN

SEDIMENT RETENTION POND



SECTION A - A

DECANT DETAIL



CROSS SECTION

SUPER SILT FENCE DETAIL

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AUCKLAND 1 - NEW ZEALAND
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admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

SEDIMENT CONTROL DETAILS

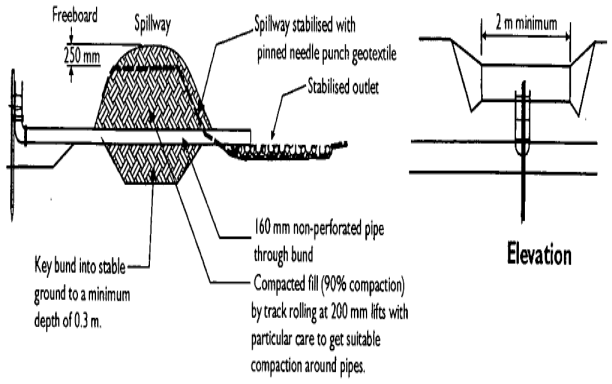
	DATE	INITIAL
DESIGNED		
DRAWN	JUNE 2006	FK
CHECKED	Sept 06	DM.
APPROVED	Sept 06	IP

SCALE (A1)

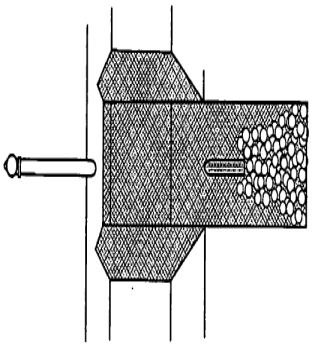
NTS

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C07	A

Cross Section



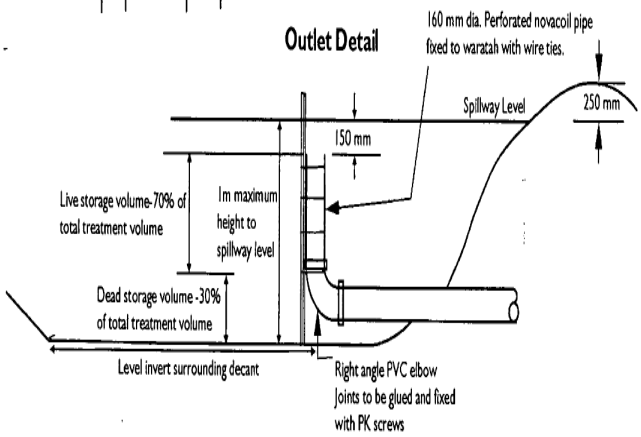
Elevation

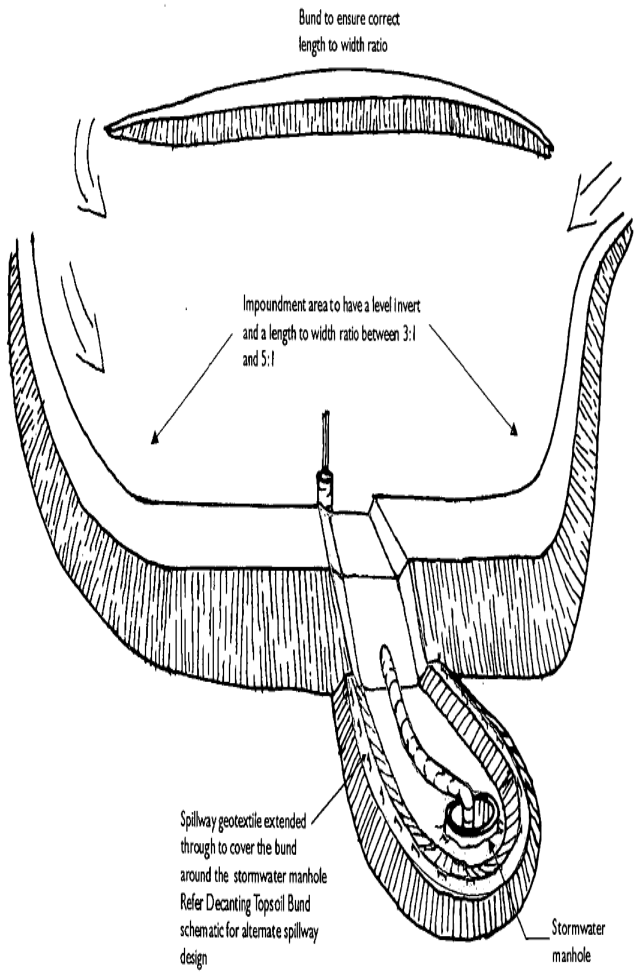


Plan

Decanting Earth Bund
Maximum Catchment 0.3 ha
2% volume
($60m^3$ per 0.3 ha catchment)

Outlet Detail





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admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

DECANTING BUND DETAILS

	DATE	INITIAL
DESIGNED		
DRAWN	NOV 2006	FK
CHECKED		
APPROVED		

SCALE (A1)

1:250

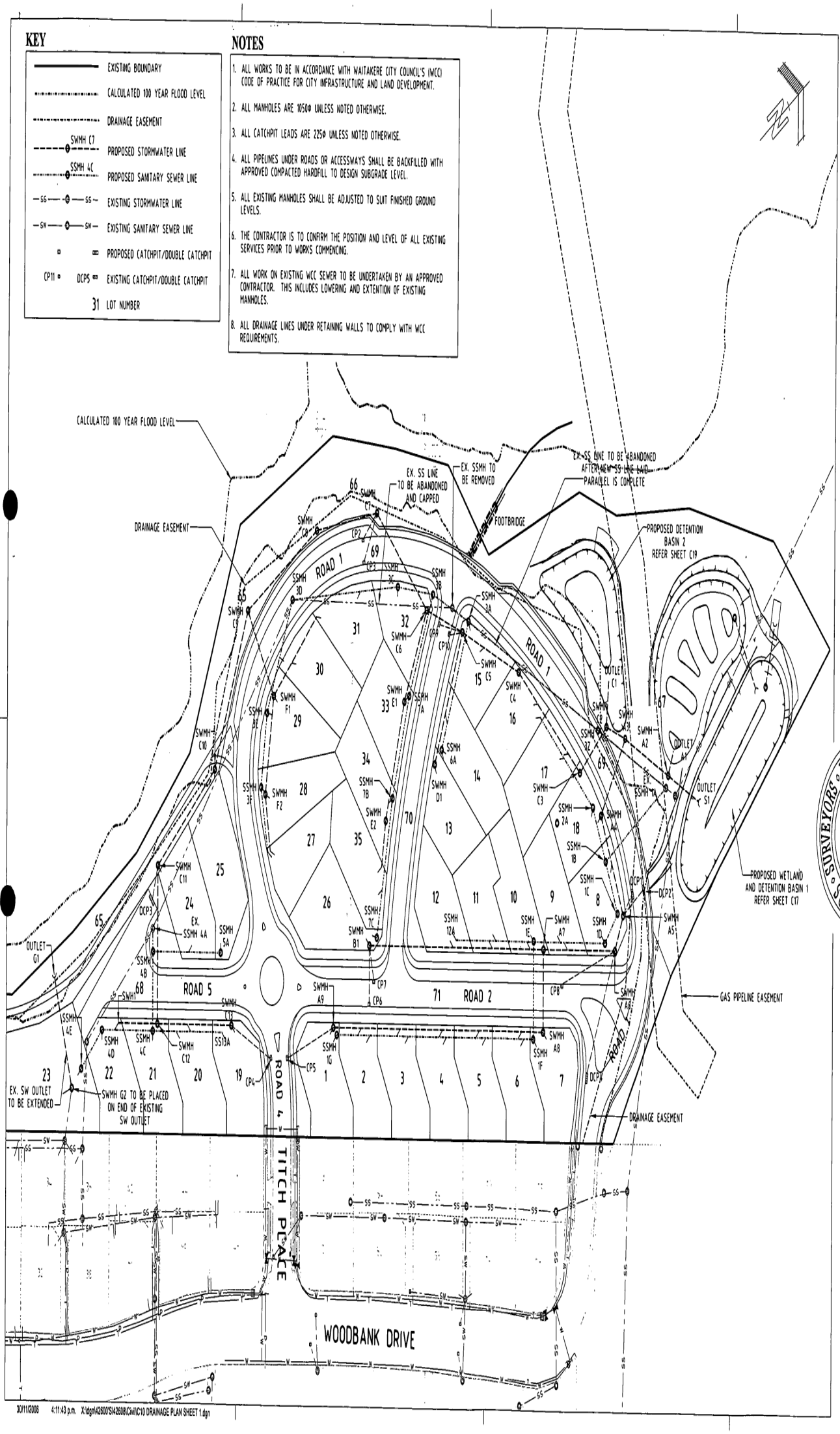
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C08	-

KEY

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- DRAINAGE EASEMENT
- SWMH C7 — PROPOSED STORMWATER LINE
- SSMH 4C — PROPOSED SANITARY SEWER LINE
- EXISTING STORMWATER LINE
- EXISTING SANITARY SEWER LINE
- PROPOSED CATCHPIT/DOUBLE CATCHPIT
- CP11 DCP5 — EXISTING CATCHPIT/DOUBLE CATCHPIT
- 31 LOT NUMBER

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050ø UNLESS NOTED OTHERWISE.
3. ALL CATCHPIT LEADS ARE 225ø UNLESS NOTED OTHERWISE.
4. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
5. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
6. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
7. ALL WORK ON EXISTING WCC SEWER TO BE UNDERTAKEN BY AN APPROVED CONTRACTOR. THIS INCLUDES LOWERING AND EXTENTION OF EXISTING MANHOLES.
8. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.



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REV	DATE	DESCRIPTION	DRAWN	CHECK
D	091006	TEXT AMENDED FOR SS LINE 3A TO 1A	FK	DR
C	210906	SSMH 3Z ADDED	FK	DR
B	150806	POND ADDED	FK	DR
A	150806	VARIOUS AMENDMENTS	FK	DR

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

DRAINAGE PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED	30-11-06	

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C10	C

KEY

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- DRAINAGE EASEMENT
- SWMH L5 — PROPOSED STORMWATER LINE
- SSMH 9C — PROPOSED SANITARY SEWER LINE
- EXISTING STORMWATER LINE
- EXISTING SANITARY SEWER LINE
- PROPOSED CATCHPIT/DOUBLE CATCHPIT
- (P11 DCPS) EXISTING CATCHPIT/DOUBLE CATCHPIT
- PROPOSED SWALE
- 58 LOT NUMBER

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050ø UNLESS NOTED OTHERWISE.
3. ALL CATCHPIT LEADS ARE 225ø UNLESS NOTED OTHERWISE.
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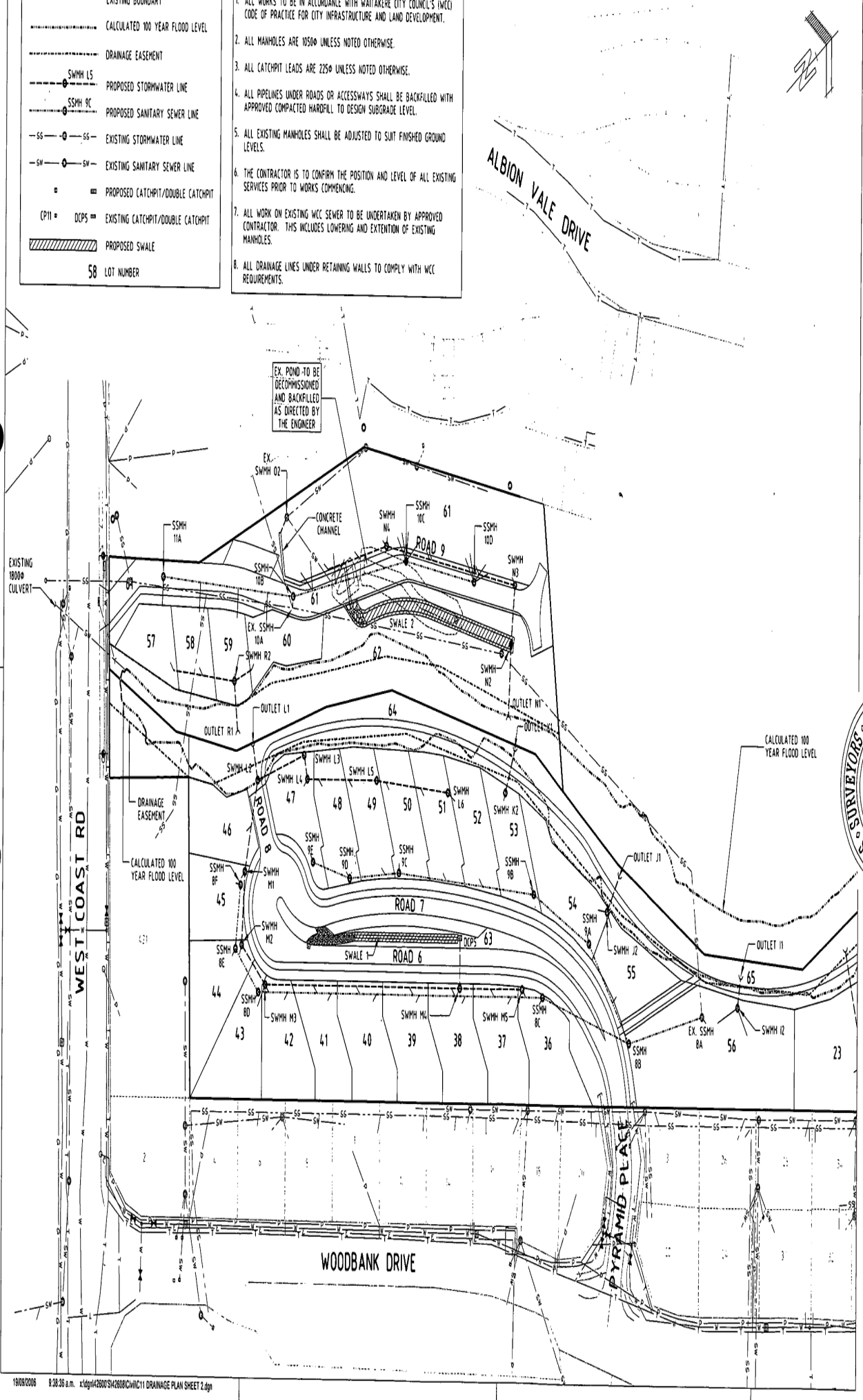
7. ALL WORK ON EXISTING WCC SEWER TO BE UNDERTAKEN BY APPROVED CONTRACTOR. THIS INCLUDES LOWERING AND EXTENTION OF EXISTING MANHOLES.
8. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.



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REV	DATE	DESCRIPTION	DRAWN	CHECK
A	07.09.06	SWALE ADDED	FK	DR

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

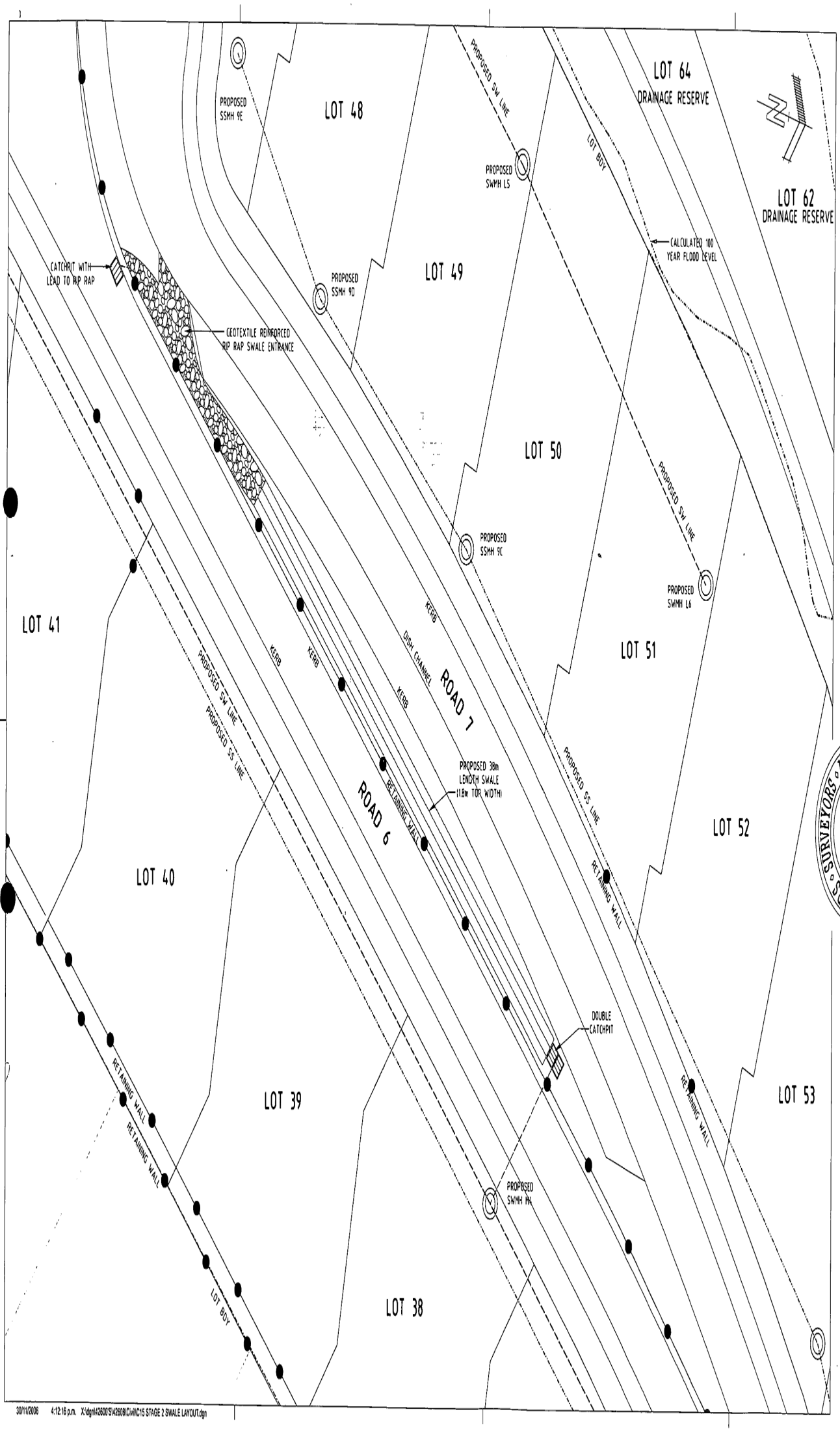
DRAINAGE PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED	Sept 06	DM
APPROVED	Sept 06	FK

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C11	A



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CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE

STAGE 2
SWALE LAYOUT

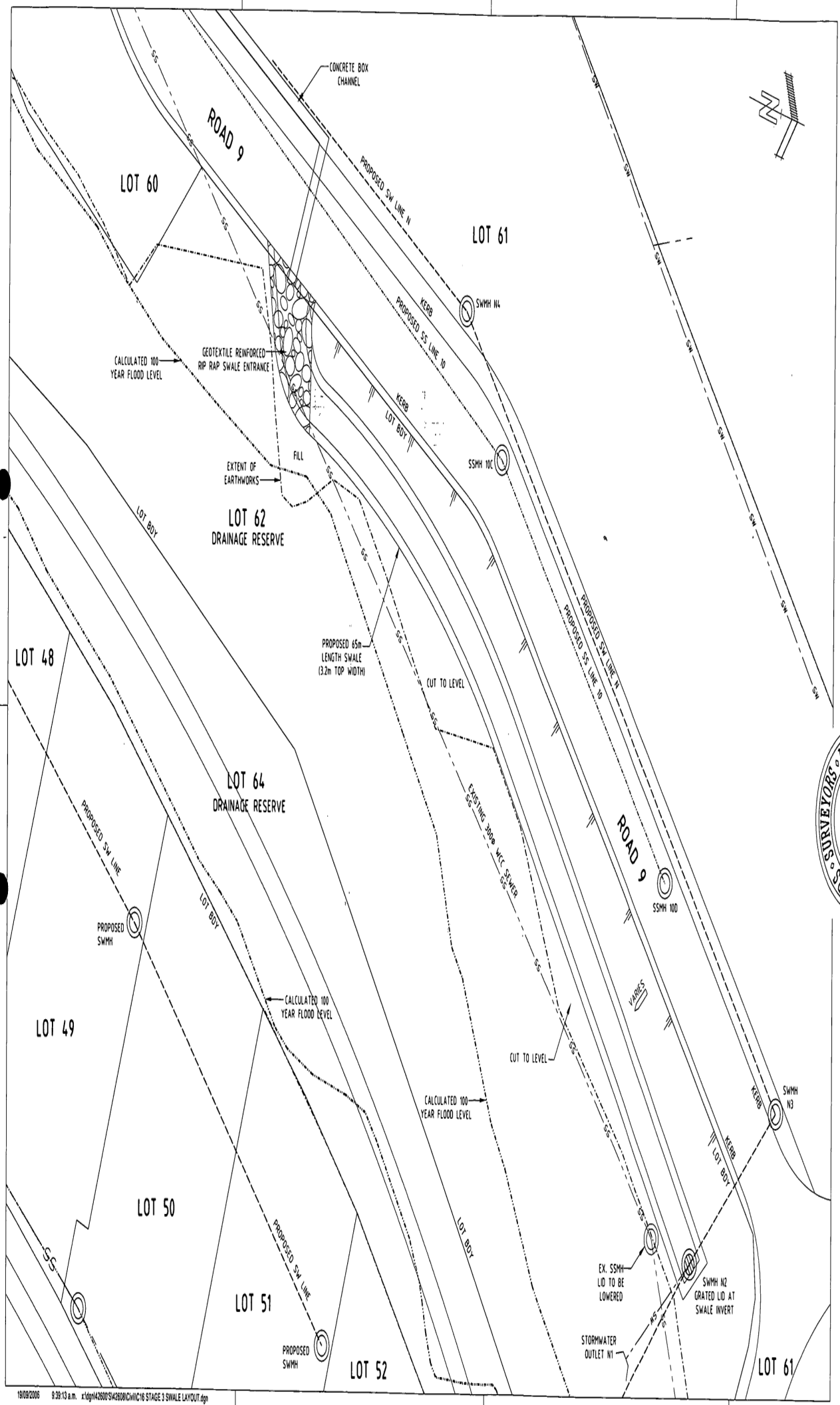
	DATE	INITIAL
DESIGNED	SEPT 2006	FK
DRAWN	SEPT 2006	FK
CHECKED		
APPROVED		30-11-06

SCALE (A1)

1:125

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C15	-

30/11/2006 4:12:16 p.m. X:\dgn\42600'S\42608\Civil\C15 STAGE 2 SWALE LAYOUT.dgn



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REV	DATE	DESCRIPTION	DRAWN	CHECK
A	07.07.06	SWALE REPLACES POND	FK	DMR

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WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

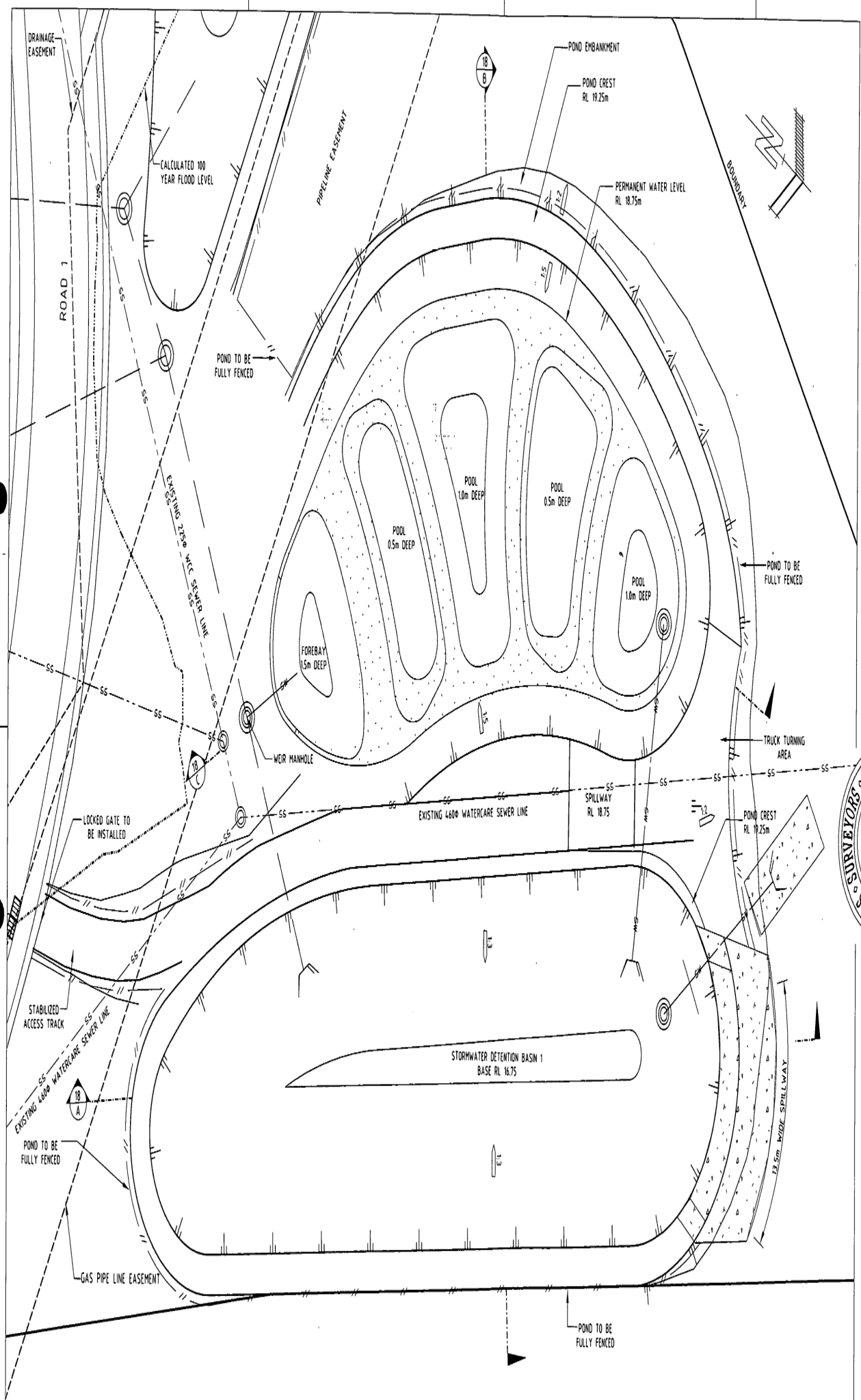
STAGE 3 SWALE LAYOUT

	DATE	INITIAL
DESIGNED	JUNE 2006	DMR
DRAWN	JUNE 2006	MJD
CHECKED	5/07/06	DMR.
APPROVED	5/07/06	IP

SCALE (A1)

1:125

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C16	A



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REV	DATE	DESCRIPTION	DRAWN	CHECK
A	0606	VARIOUS AMENDMENTS	FK	

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

WETLAND & DETENTION BASIN 1 LAYOUT

	DATE	INITIAL
DESIGNED	JUNE 2006	DMR
DRAWN	JUNE 2006	GW
CHECKED	Sept 2006	DMR
APPROVED	Sept 06	IP

SCALE (A1)

1:125

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C17	A

19/09/2006 9:40:12 a.m. x:\dgn\42600'S\42608C\wlC17 WETLAND & DETENTION BASIN 1 LAYOUT.dgn

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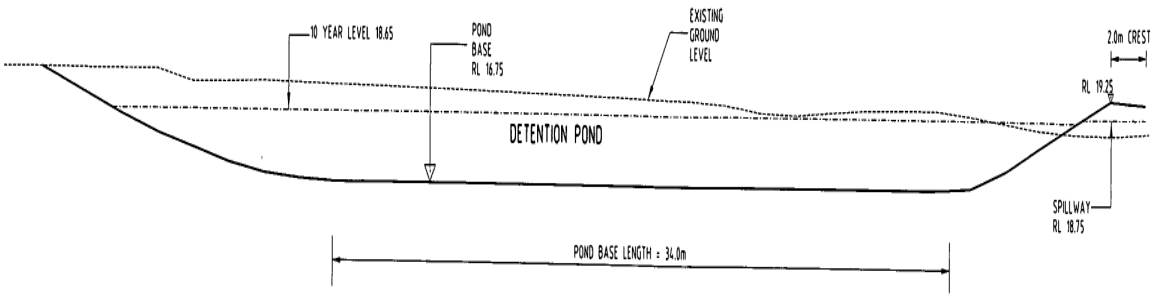
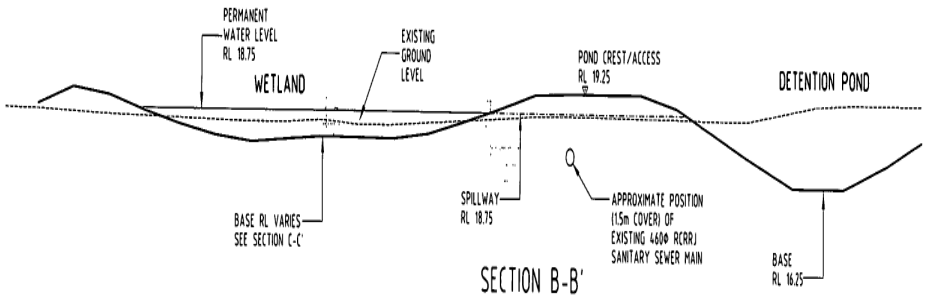
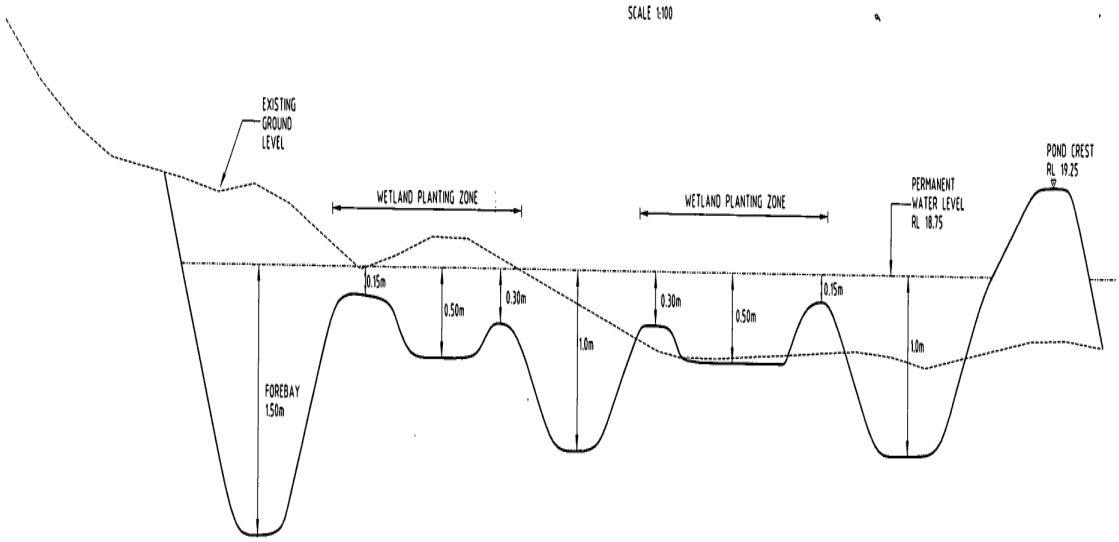


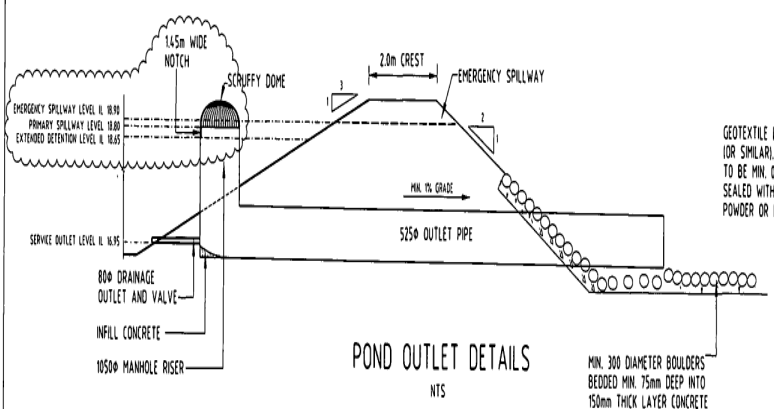
SECTION A-A'
SCALE 1:100



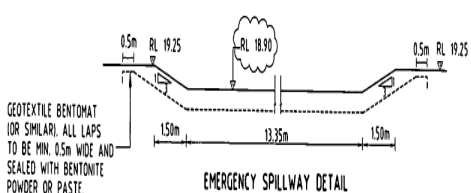
SECTION B-B'
SCALE 1:100



SECTION C-C' - BANDED BATHYMETRY
SCALE HORT 1:100 VERT 1:20



POND OUTLET DETAILS
NTS



EMERGENCY SPILLWAY DETAIL
NTS

REV	DATE	DESCRIPTION	DRAWN	CHECK
B	19.09.06	WORDING AMENDED	FK	
A	29.06.06	WORDING AMENDED	DMR	

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

POND DETAILS PLAN

	DATE	INITIAL
DESIGNED	JUNE 2006	DMR
DRAWN	JUNE 2006	GW
CHECKED	Sept 06	DMR
APPROVED	Sept 06	MP

SCALE (A1)

AS SHOWN

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C18	B

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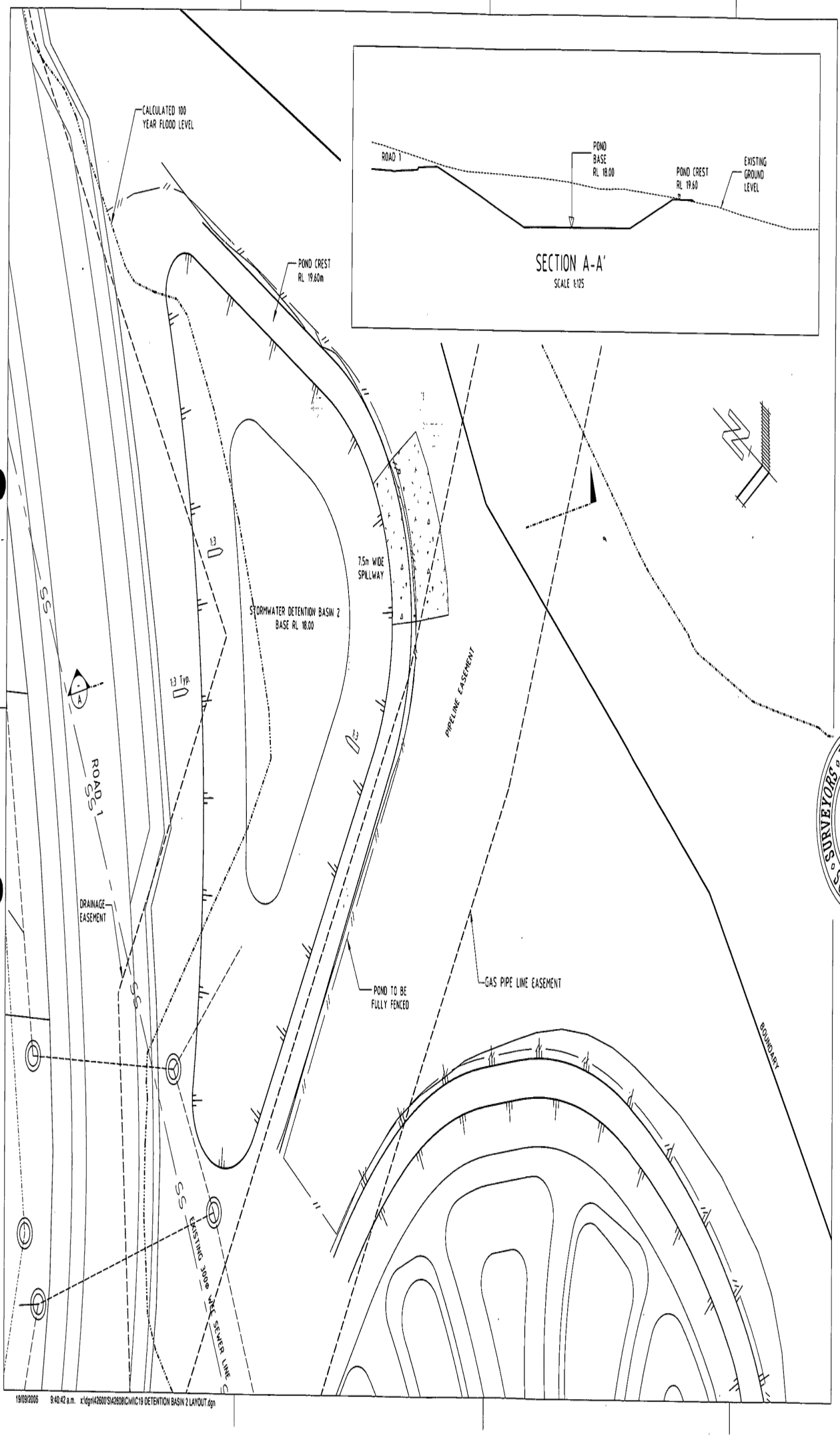

SECTION A-A'
SCALE 1:125

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WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

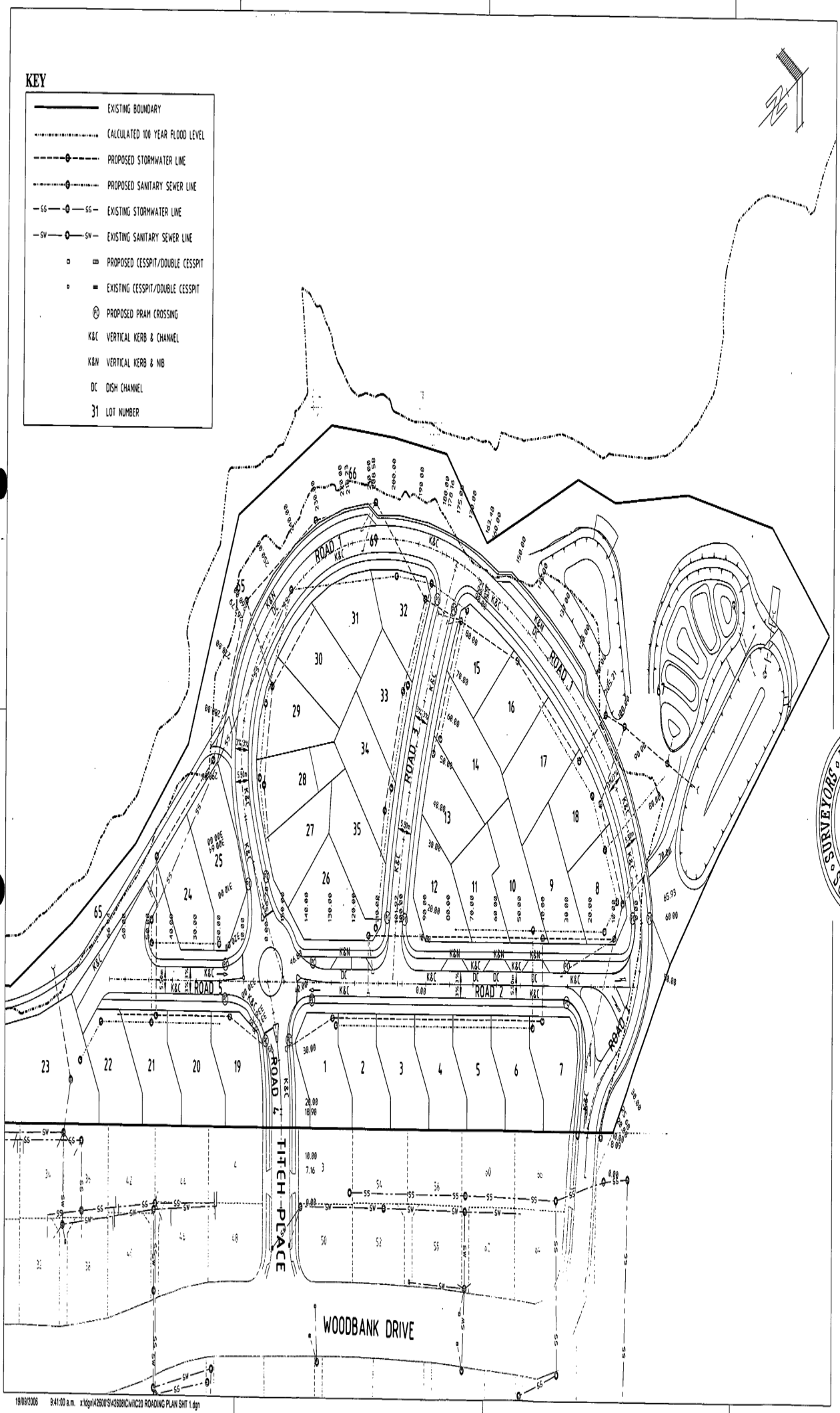
DETENTION BASIN 2 LAYOUT

	DATE	INITIAL
DESIGNED	AUG 2006	DMR
DRAWN	AUG 2006	FK
CHECKED	Sept 06	DMR
APPROVED	Sept 06	IP

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C19	-



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A	07.09.06	INTERSECTIONS AMENDED	FK	DMR

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROADING PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GW
CHECKED	Sept 06	DMR
APPROVED	Sept 06	

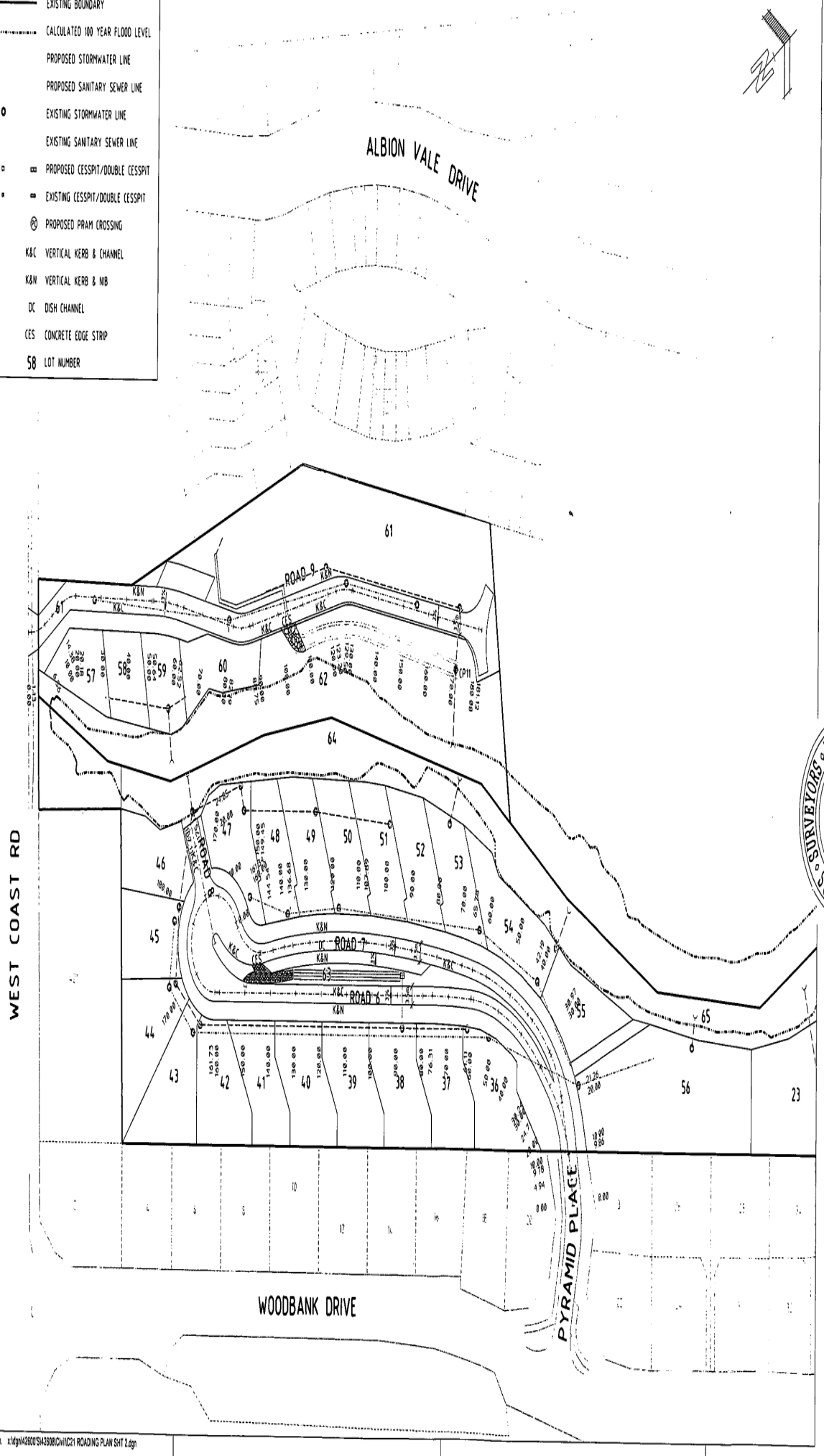
SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C20	A

KEY

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- PROPOSED STORMWATER LINE
- PROPOSED SANITARY SEWER LINE
- EXISTING STORMWATER LINE
- EXISTING SANITARY SEWER LINE
- PROPOSED CESSPIT/DOUBLE CESSPIT
- EXISTING CESSPIT/DOUBLE CESSPIT
- PROPOSED PRAM CROSSING
- K&C VERTICAL KERB & CHANNEL
- K&N VERTICAL KERB & NIB
- DC DISH CHANNEL
- CES CONCRETE EDGE STRIP
- 58 LOT NUMBER



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REV	DATE	DESCRIPTION	DRAWN	CHECK
A	07.09.06	SWALE ADDED	FK	DMR

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CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROADING PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GW
CHECKED	Sept 06	DMR
APPROVED	Sept 06	

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42808	C21	A

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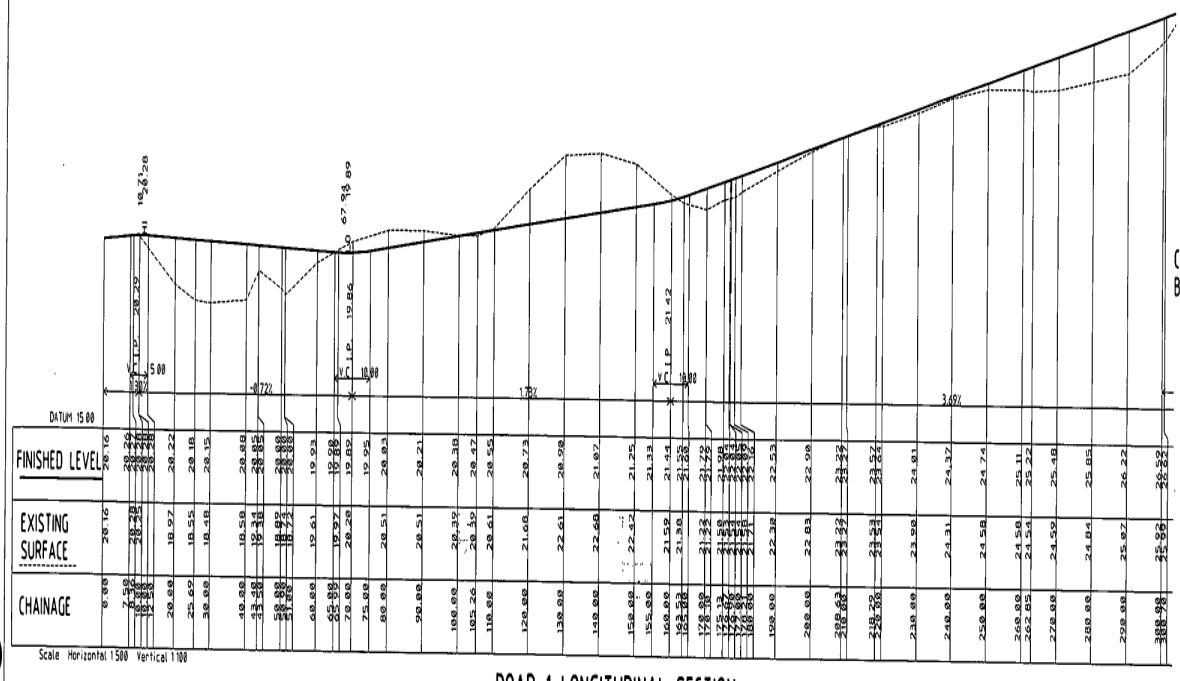
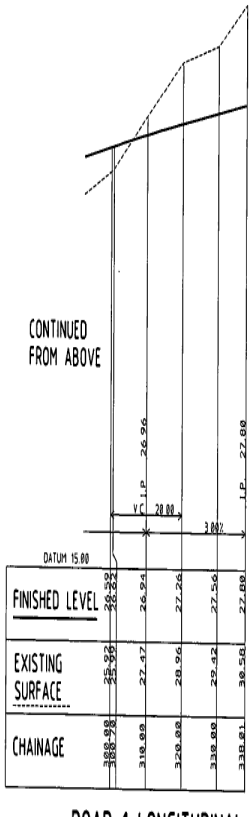
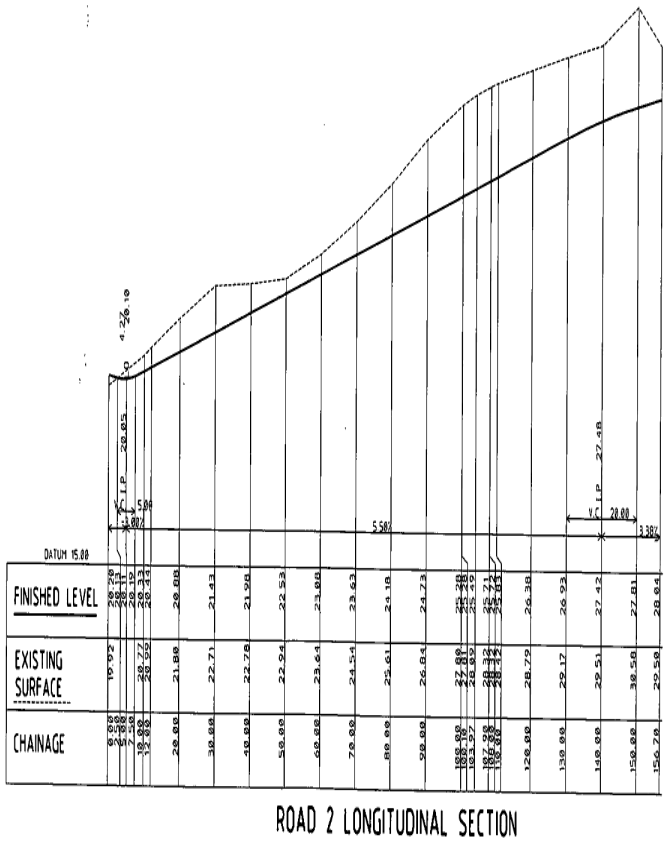


ROAD 1 LONGITUDINAL SECTION



ROAD 1 LONGITUDINAL SECTION CONTINUED



ROAD 2 LONGITUDINAL SECTION

REV	DATE	DESCRIPTION	DRAWN	CHECK

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WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROAD LONGITUDINAL SECTIONS (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 06	FK
DRAWN	JUNE 06	GW
CHECKED	Sept 06	DM.
APPROVED	Sept 06	

SCALE (A1)

HORT 1:500 VERT 1:100

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C22	-

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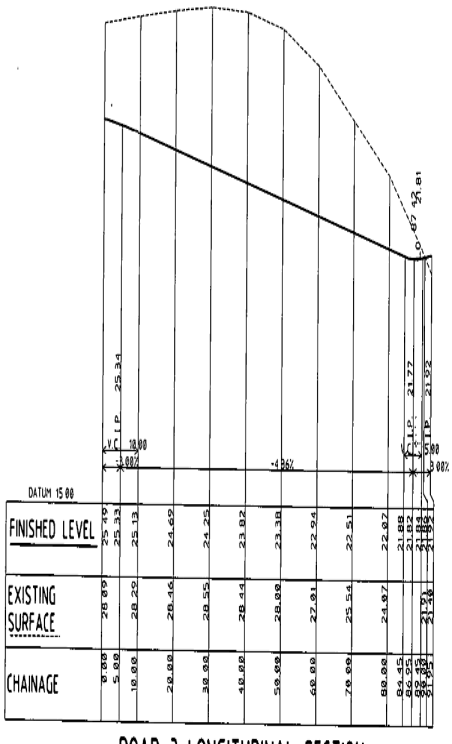
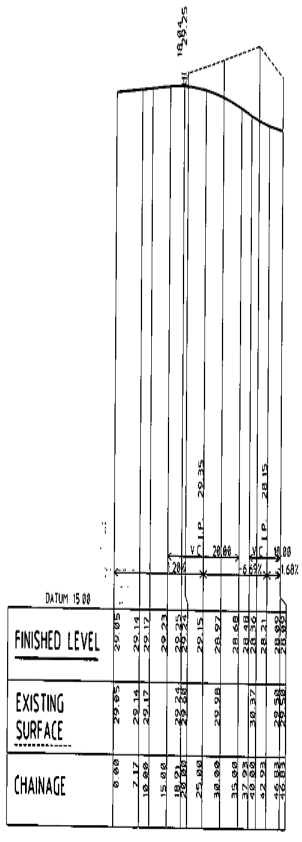
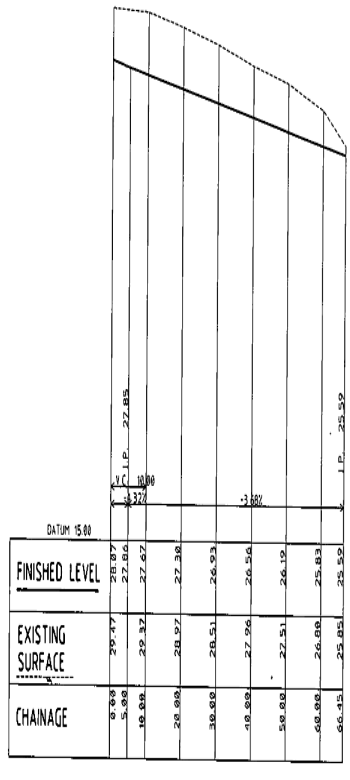


ROAD 3 LONGITUDINAL SECTION



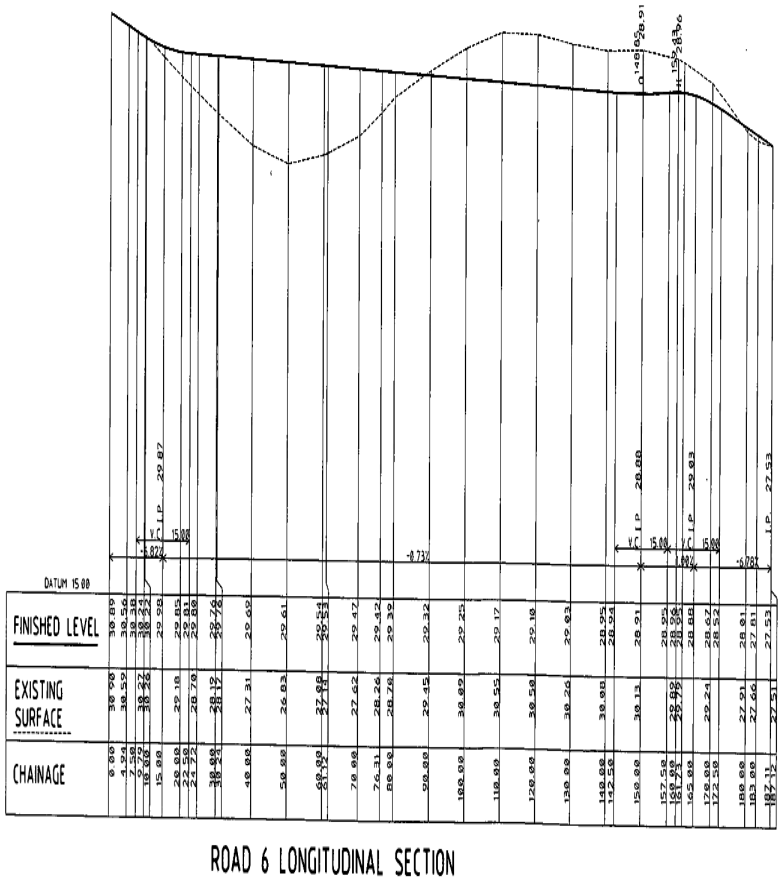
ROAD 4 LONGITUDINAL SECTION



ROAD 5 LONGITUDINAL SECTION

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS



ROAD 6 LONGITUDINAL SECTION

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROAD LONGITUDINAL SECTIONS (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 06	FK
DRAWN	JUNE 06	GW
CHECKED	Sept 06	Dark.
APPROVED	Sept 06	IP

SCALE (A1)

HORT 1:500 VERT 1:100

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C23	-

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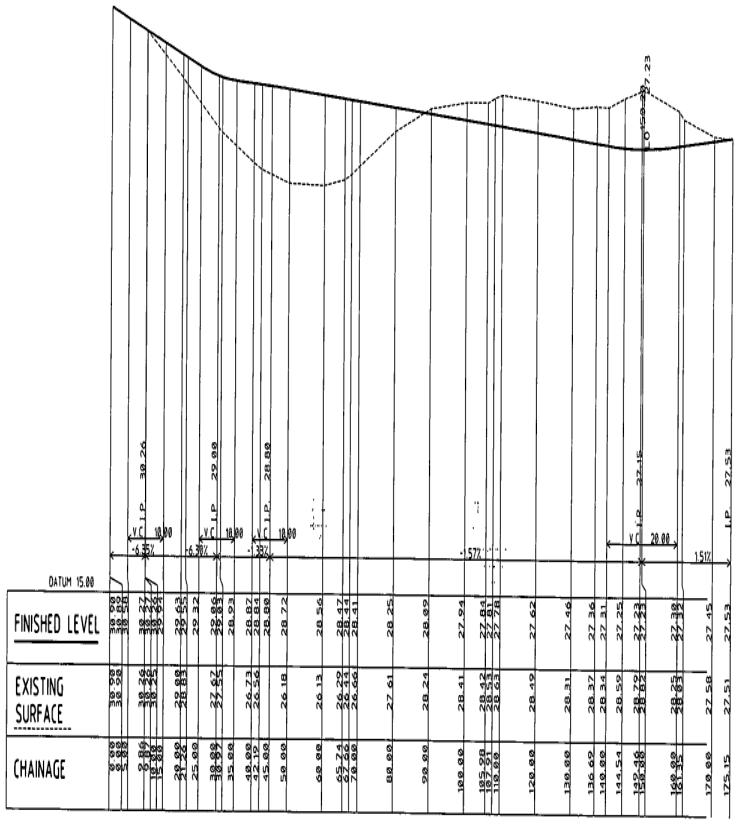
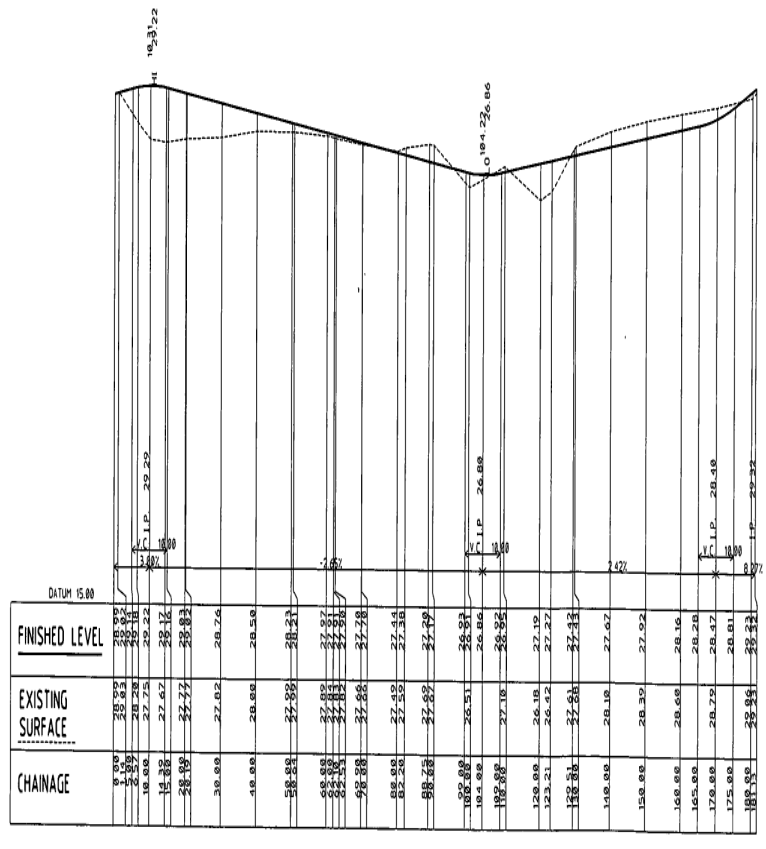


ROAD 7 LONGITUDINAL SECTION



ROAD 9 LONGITUDINAL SECTION

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROAD LONGITUDINAL SECTIONS (SHEET 3)

	DATE	INITIAL
DESIGNED	JUNE 06	FK
DRAWN	JUNE 06	GW
CHECKED	Sept 06	DMH
APPROVED	Sept 06	IP

SCALE (A1)

HORT 1:500 VERT 1:100

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C24	-

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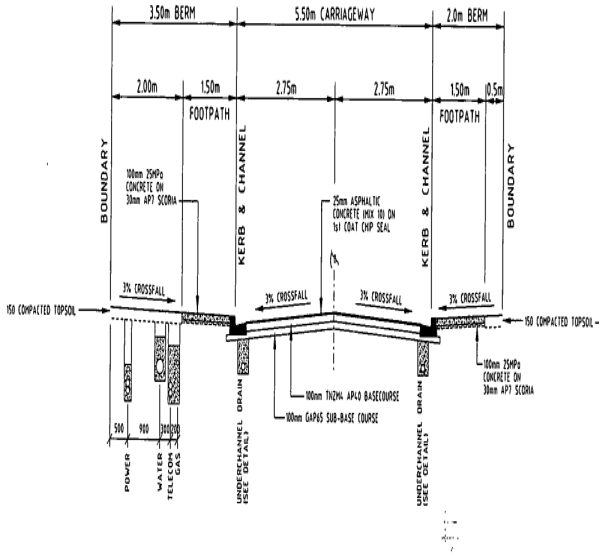
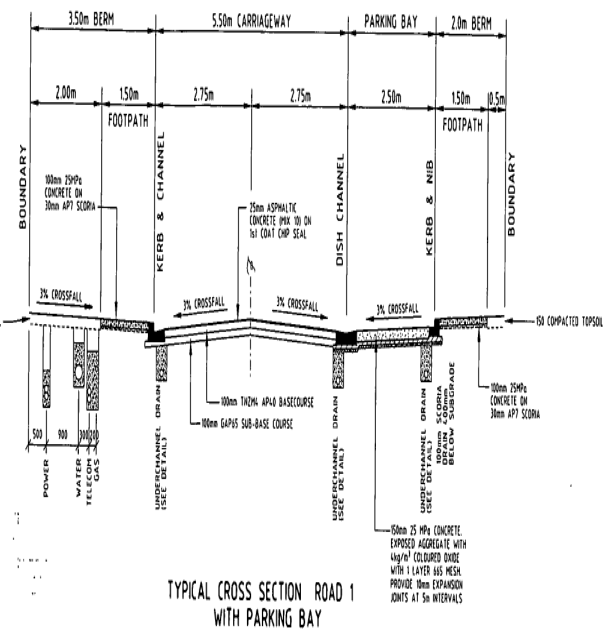
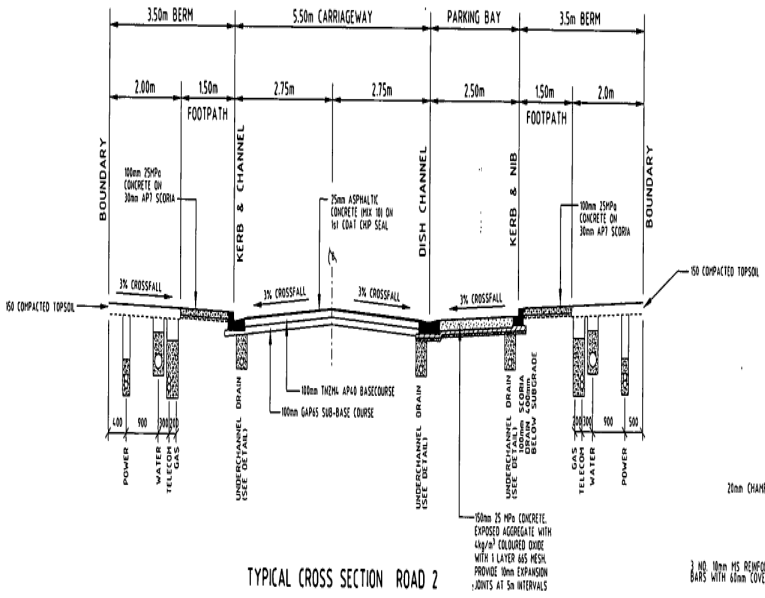
1. PAVEMENT CONSTRUCTION DEPTHS HAVE BEEN CALCULATED USING AN ASSUMED CBR VALUE OF 3. FINAL PAVEMENT CONSTRUCTION DEPTHS TO BE CONFIRMED FOLLOWING ON SITE SUBGRADE TESTING.



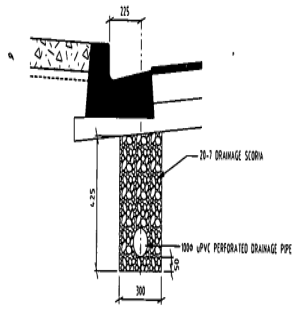
TYPICAL CROSS SECTION ROAD 1
WITHOUT PARKING BAY



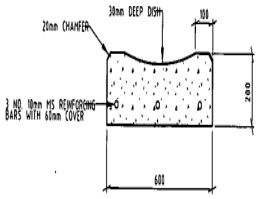
TYPICAL CROSS SECTION ROAD 1
WITH PARKING BAY



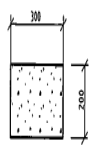
TYPICAL CROSS SECTION ROAD 2



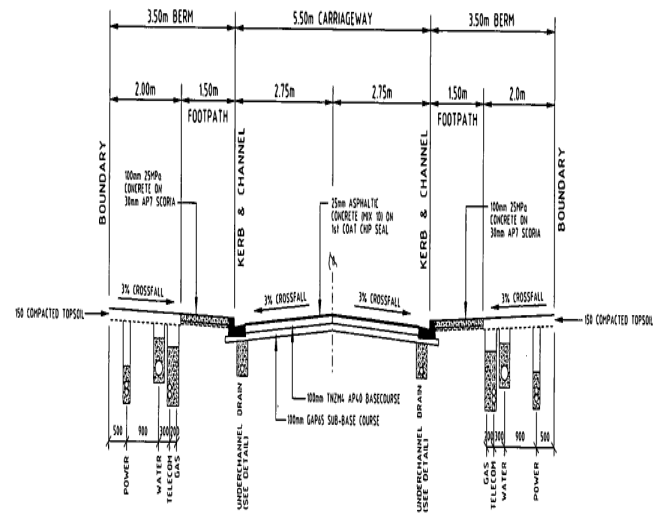
UNDERCHANNEL DRAIN



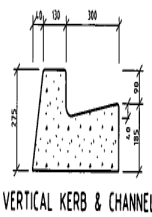
DISH CHANNEL



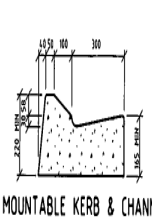
CONCRETE EDGE STRIP



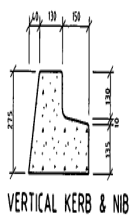
TYPICAL CROSS SECTION ROAD 3



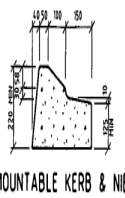
VERTICAL KERB & CHANNEL



MOUNTABLE KERB & CHANNEL



VERTICAL KERB & NIB



MOUNTABLE KERB & NIB

INSITU KERB DETAILS
SCALE 1:10

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	7.09.06	VARIOUS		FK

DRAWING REVISIONS

SURVEYORS • ARCHITECTS • ENGINEERS
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CLIENT / PROJECT
WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE
ROAD
CROSS SECTIONS
(SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GB
CHECKED	Sept 06	DWL
APPROVED	6/9/06	

SCALE (A1)
1:50

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C25	A

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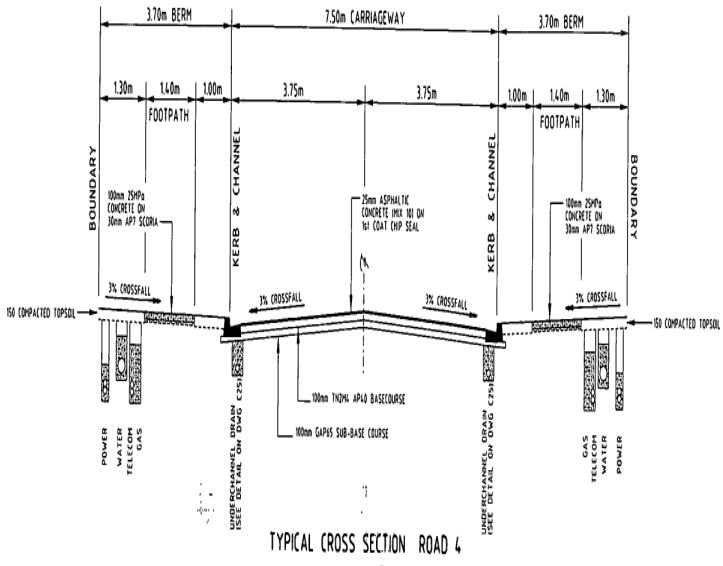
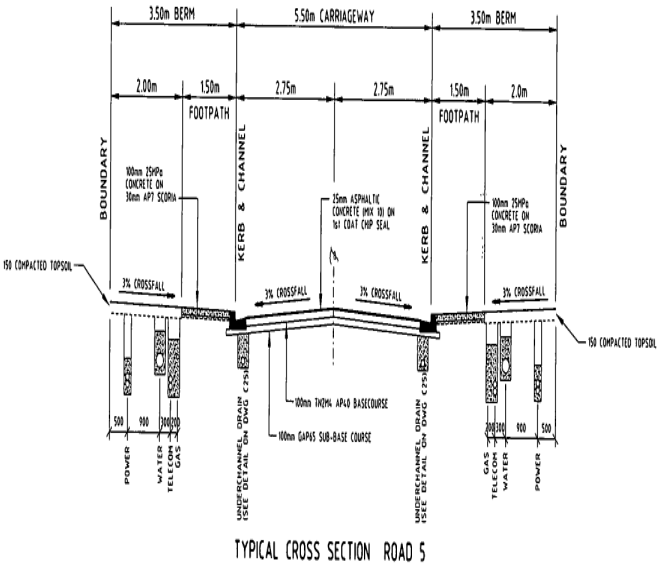
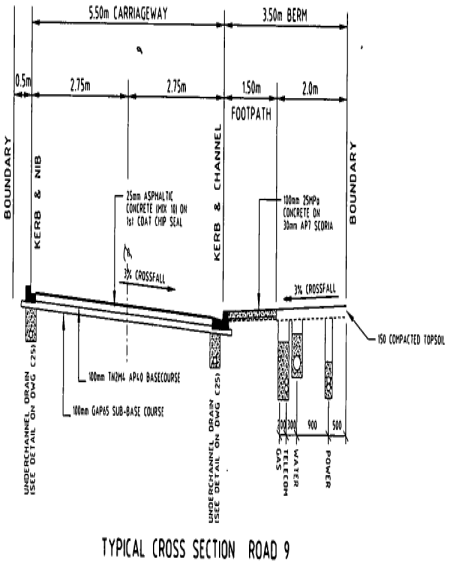
1. PAVEMENT CONSTRUCTION DEPTHS HAVE BEEN CALCULATED USING AN ASSUMEND CBR VALUE OF 3. FINAL PAVEMENT CONSTRUCTION DEPTHS TO BE CONFIRMED FOLLOWING ON SITE SUBGRADE TESTING.



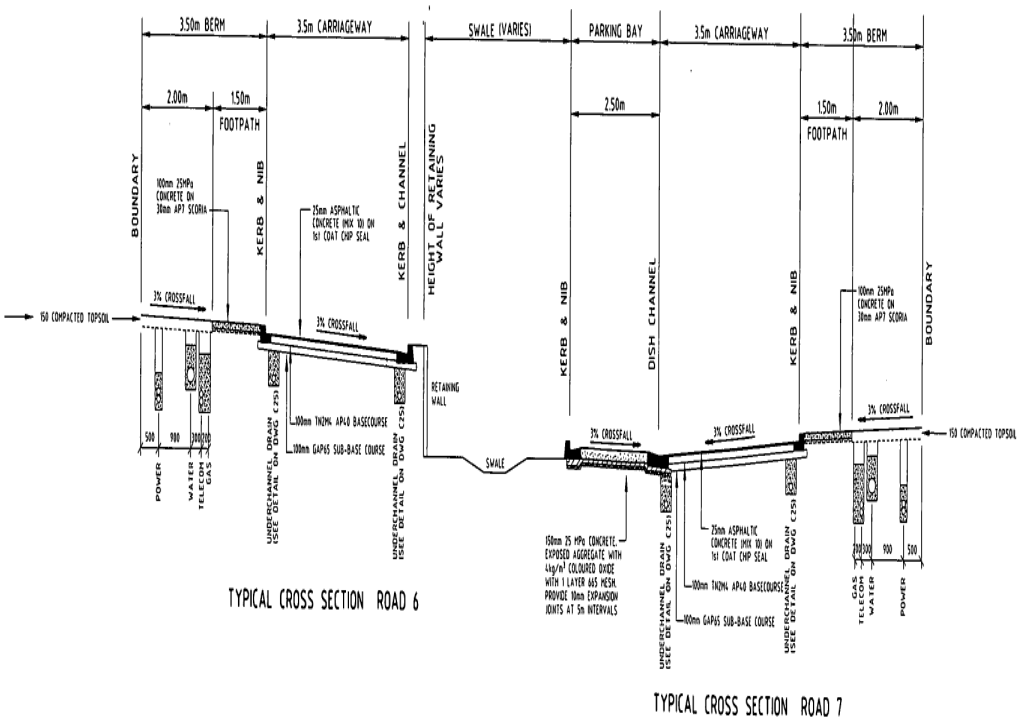
TYPICAL CROSS SECTION ROAD 4



TYPICAL CROSS SECTION ROAD 5



TYPICAL CROSS SECTION ROAD 9



TYPICAL CROSS SECTION ROAD 6

TYPICAL CROSS SECTION ROAD 7

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	07.09.06	VARIOUS AMENDMENTS	FK	DMR

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROAD CROSS SECTIONS (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GB
CHECKED	Sept 06	DMR.
APPROVED	Sept 06	IP

SCALE (A1)

1:50

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C26	A

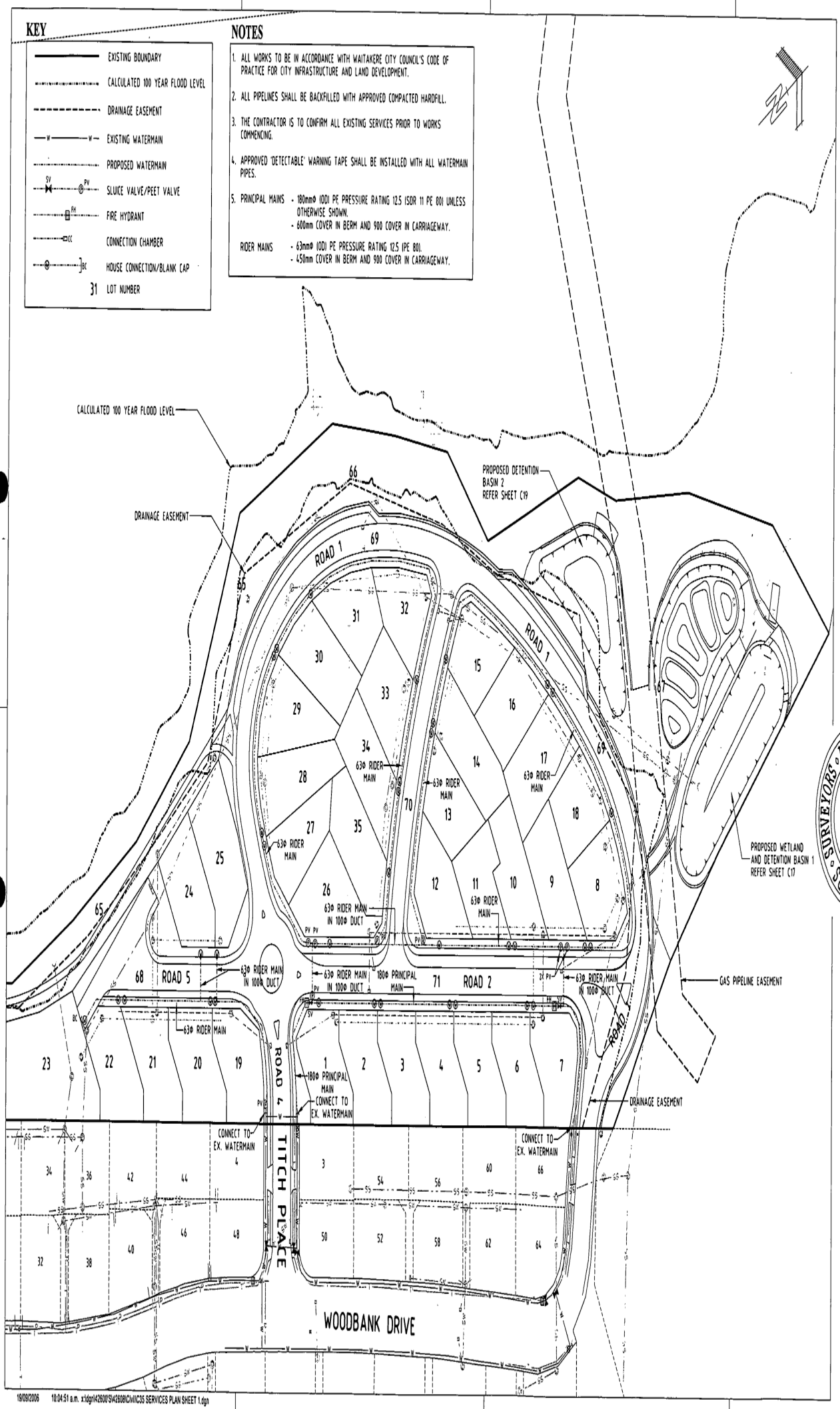
KEY

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- DRAINAGE EASEMENT
- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- SLUICE VALVE/PEET VALVE
- FIRE HYDRANT
- CONNECTION CHAMBER
- HOUSE CONNECTION/BLANK CAP
- 31 LOT NUMBER

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL PIPELINES SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL.
3. THE CONTRACTOR IS TO CONFIRM ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
4. APPROVED 'DETECTABLE' WARNING TAPE SHALL BE INSTALLED WITH ALL WATERMAIN PIPES.
5. PRINCIPAL MAINS - 180mmØ (OD) PE PRESSURE RATING 12.5 (SDR 11 PE 80) UNLESS OTHERWISE SHOWN.
   - 600mm COVER IN BERM AND 900 COVER IN CARRIAGEWAY.

   RIDER MAINS - 63mmØ (OD) PE PRESSURE RATING 12.5 (PE 80).
   - 450mm COVER IN BERM AND 900 COVER IN CARRIAGEWAY.



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	07.09.06	ROADING AMENDED	FK	DMR

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

SERVICES PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED	Sept 06	DMR
APPROVED	Sept 06	

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C35	A

KEY

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- DRAINAGE EASEMENT
- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- SLUICE VALVE/PEET VALVE
- FIRE HYDRANT
- CONNECTION CHAMBER
- HOUSE CONNECTION/BLANK CAP
- 31 LOT NUMBER

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
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3. THE CONTRACTOR IS TO CONFIRM ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
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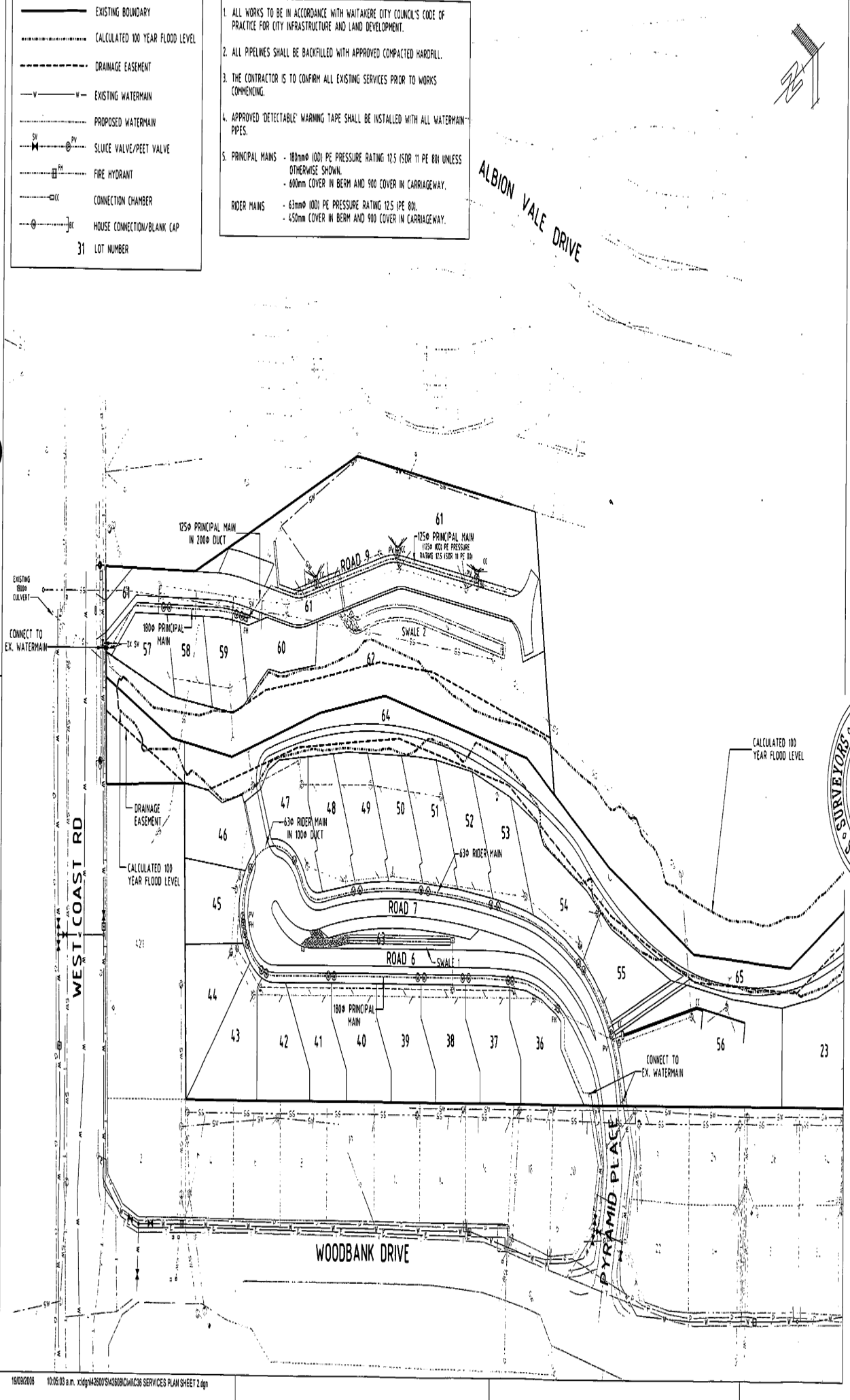
   - 600mm COVER IN BERM AND 900 COVER IN CARRIAGEWAY.

   RIDER MAINS - 63mmØ (OD) PE PRESSURE RATING 12.5 (PE 80).
   - 450mm COVER IN BERM AND 900 COVER IN CARRIAGEWAY.



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REV	DATE	DESCRIPTION	DRAWN	CHECK
A	07.09.06	ROADING AMENDED	FK	DMR

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

SEVICES PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED	Sept 06	DMR
APPROVED	Sept 06	

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C36	A

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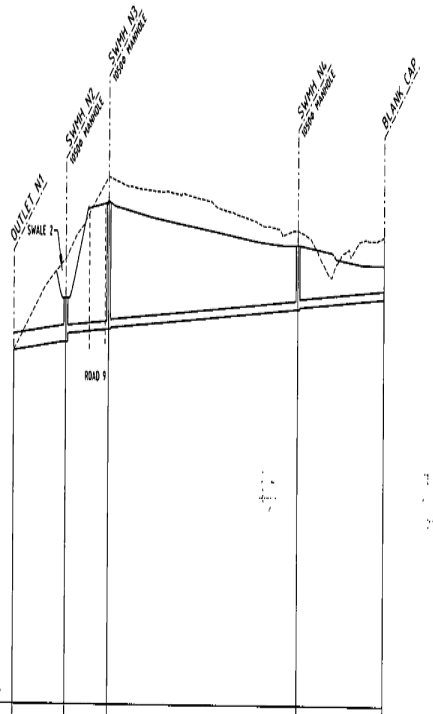
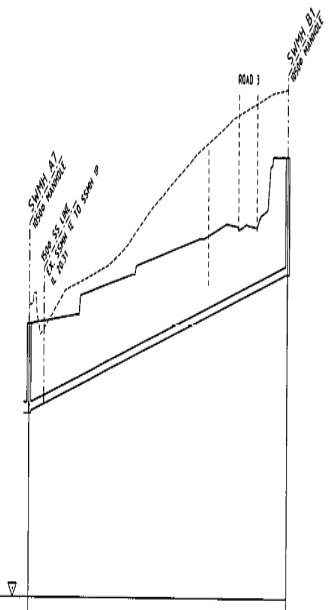


DATUM RL 15.0m

PIPE	450Ø	225Ø	225Ø	225Ø
DEPTH TO INVERT	0.73	3.17	1.52	0.70
INVERT LEVEL	24.69 / 24.93	25.15 / 25.32	25.85 / 25.90	26.14
GROUND LEVEL	24.69 / 26.11	28.66	27.59	27.06
DISTANCE	14.5	12.0	53.1	24.2
GRADE	1.6%	1.0%	1.0%	1.0%
DESIGN FLOW l/sec CAPACITY l/sec	309.2 363	23.2 45.6	23.2 45.6	2.5 45.6

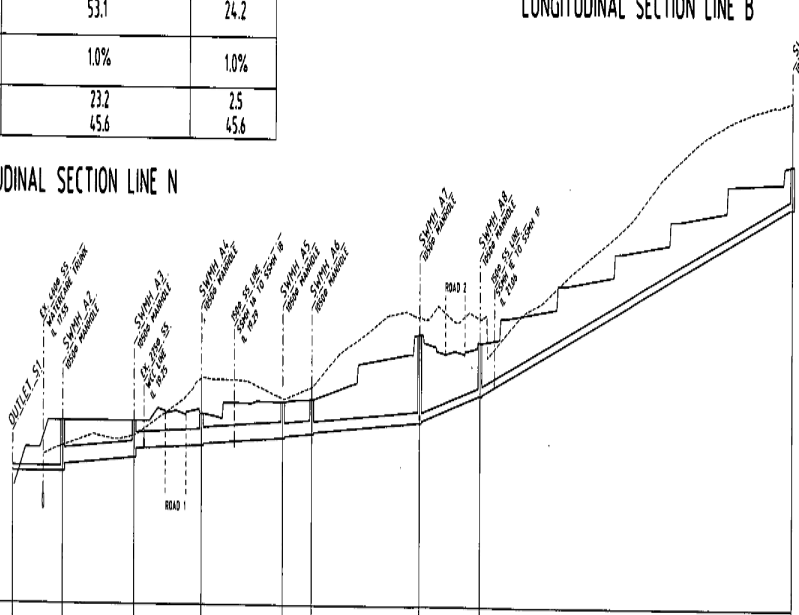
LONGITUDINAL SECTION LINE N



DATUM RL 15.0m

PIPE	225Ø	
DEPTH TO INVERT	2.43	3.18
INVERT LEVEL	20.02 / 20.10	23.82
GROUND LEVEL	22.45	27.0
DISTANCE	73.8	
GRADE	5.0%	
DESIGN FLOW l/sec CAPACITY l/sec	32.1 102	

LONGITUDINAL SECTION LINE B



DATUM RL 15.0m

PIPE	225Ø	450Ø	450Ø	450Ø	375Ø	300Ø	225Ø	225Ø
DEPTH TO INVERT	0.75	0.56	0.88	0.99	0.95	2.42	1.48	1.50
INVERT LEVEL	18.75 / 18.75 / 18.80	18.99 / 19.24	19.33 / 19.38	19.55 / 19.62	19.68 / 19.73	20.02 / 20.10	20.76 / 20.81	26.00
GROUND LEVEL	20.00	20.00	20.21	20.54	20.63	22.44	22.24	27.50
DISTANCE	14.0	20.0	19.0	22.8		30.4	17.0	88.8
GRADE		1.0%	0.5%	0.7%	0.7%	1.0%	3.9%	5.8%
DESIGN FLOW l/sec CAPACITY l/sec	50.0 50.0	186.5 287	186.5 203	182.7 240	128.8 148	87.2 98	51.0 90	51.0 110

LONGITUDINAL SECTION LINE A

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE

STORMWATER LONGITUDINAL SECTIONS (SHEET 1)

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED	Sept 2006	DMG
APPROVED	27.07.06	

SCALE (A1)

1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C37	-

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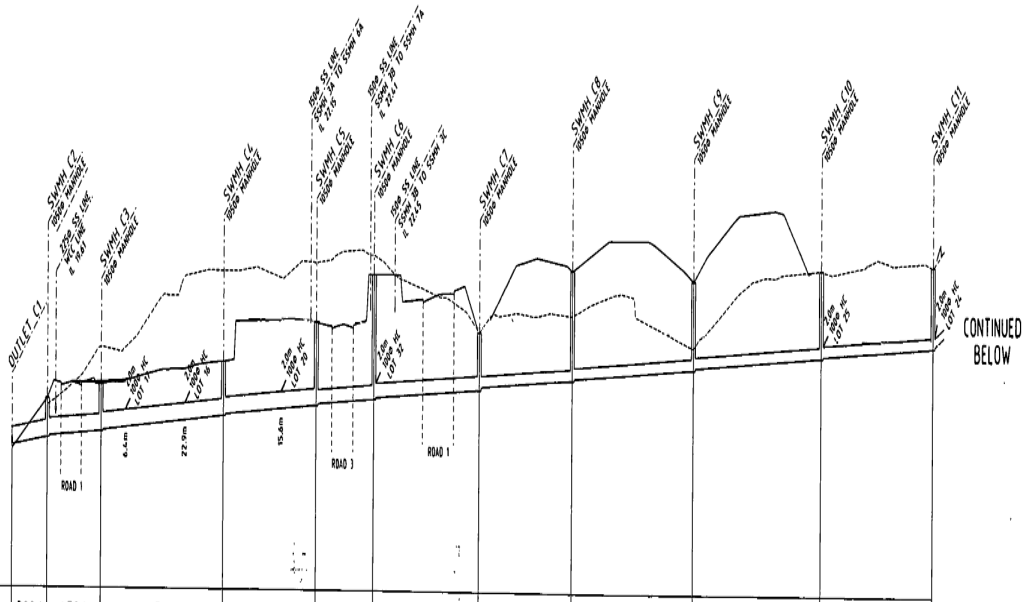
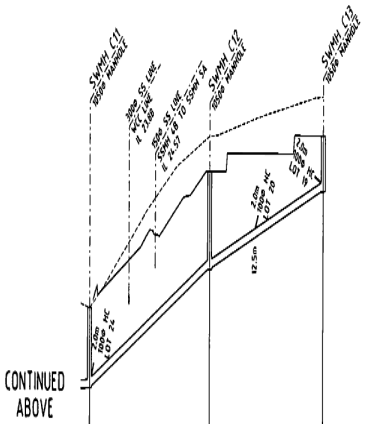


DATUM RL 15.0m ▽										
PIPE	300ϕ	450ϕ	450ϕ	450ϕ	375ϕ	375ϕ	300ϕ	300ϕ	300ϕ	300ϕ
DEPTH TO INVERT		1.06	1.39	2.21	3.30	1.53	2.91	2.34	2.33	2.15
INVERT LEVEL	18.80	19.36 / 19.20 / 19.23	19.37 / 19.40	19.67 / 19.71	19.89 / 19.91 / 19.98	20.09 / 20.10 / 20.15 / 20.20	20.38 / 20.46	20.67 / 20.72	20.99 / 21.04	21.33 / 21.36 / 21.63 / 21.71
GROUND LEVEL	18.50	20.04	20.43	21.06	22.12	23.4	21.91	23.58	23.33	23.66 / 23.78
DISTANCE	9.6	14.7	33.4	25.3	15.8	28.9	25.6	33.4	35.8	31.0
GRADE	5.8%	1.2%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
DESIGN FLOW l/sec	171.9	191.9	191.9	183.1	140.4	124.9	82.6	82.6	62.3	62.3
CAPACITY l/sec	269.0	314.0	256.0	256.0	158.0	158.0	87.6	87.6	87.6	87.6

LONGITUDINAL SECTION LINE C

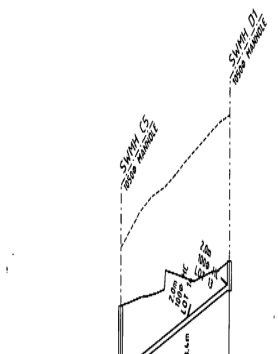
B	NOV06	C2-C1 DATA AMENDED	FK	DRM
A	210606	VARIOUS AMENDMENTS	FK	DRM
REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS



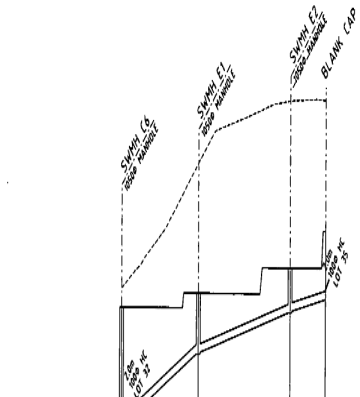
	225ϕ	225ϕ	
23.78	2.15	2.64	1.50
21.63 / 21.71	23.42	24.86 / 24.91	27.00
23.78	27.5		28.5
	32.6	31.1	
	9.7%	6.7%	
	22.2	14.2	
	143	118	

LINE C CONTINUED



DATUM RL 15.0m ▽		
PIPE	150ϕ	
DEPTH TO INVERT	2.21	0.80
INVERT LEVEL	19.91 / 20.21	22.58
GROUND LEVEL	22.12	23.38
DISTANCE	29.9	
GRADE	7.9%	
DESIGN FLOW l/sec	8.0	
CAPACITY l/sec	44	

LONGITUDINAL SECTION LINE D



DATUM RL 15.0m ▽			
PIPE	225ϕ	225ϕ	150ϕ
DEPTH TO INVERT	3.30	1.63 / 1.20	1.83
INVERT LEVEL	20.10 / 20.25	22.17 / 22.22 / 23.30 / 23.38	23.67
GROUND LEVEL	23.4	23.8 / 24.5	25.5
DISTANCE	21.2	25.9	9.7
GRADE	9.1%	4.2%	3.0%
DESIGN FLOW l/sec	11.7	7.9	3.9
CAPACITY l/sec	138	94	27

LONGITUDINAL SECTION LINE E

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

STORMWATER LONGITUDINAL SECTIONS (SHEET 2)

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		20-11-06

SCALE (A1)

1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C38	B

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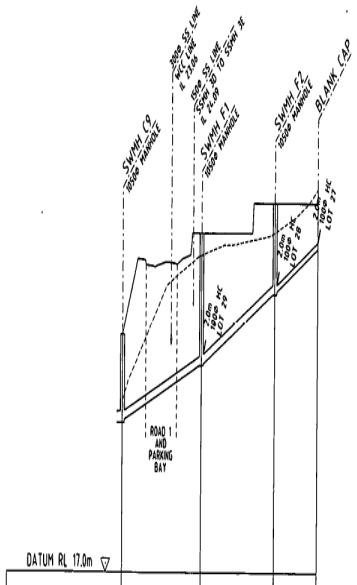
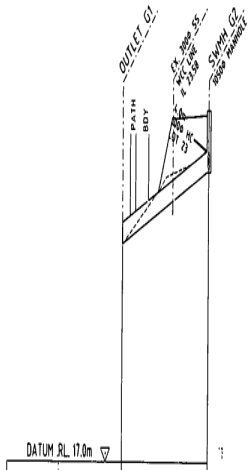
DRAWING NOTES



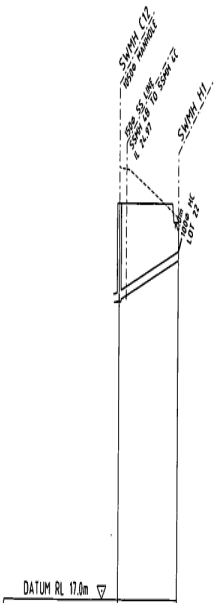
DATUM RL 17.0m			
PIPE 150ø	225ø	225ø	150ø
DEPTH TO INVERT	2.34 / 3.49		2.38 / 1.20
INVERT LEVEL	20.99 / 21.07	22.51 / 22.56	24.42 / 24.50 / 25.60
GROUND LEVEL	23.33	26.0	26.8 / 26.8
DISTANCE	20.7	20.7	11.9
GRADE	5.5%	9.0%	9.2%
DESIGN FLOW l/sec	20.3	8.1	3.8
CAPACITY l/sec	107	137	4.7

LONGITUDINAL SECTION LINE F



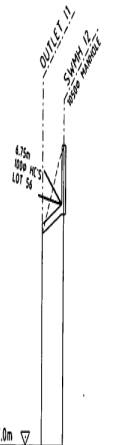
DATUM RL 17.0m			
PIPE	525ø		
DEPTH TO INVERT		1.63	
INVERT LEVEL	22.80	23.91	24.70
GROUND LEVEL	00.0		26.33
DISTANCE	23.8		
GRADE	8.2%		
DESIGN FLOW l/sec			
CAPACITY l/sec	1237.2		

LONGITUDINAL SECTION LINE G



DATUM RL 17.0m		
PIPE	225ø	
DEPTH TO INVERT	2.59	1.00
INVERT LEVEL	24.91 / 25.04	26.00
GROUND LEVEL	27.50	27.00
DISTANCE	16.3	
GRADE	6.9%	
DESIGN FLOW l/sec	4.1	
CAPACITY l/sec	120.2	

LONGITUDINAL SECTION LINE H

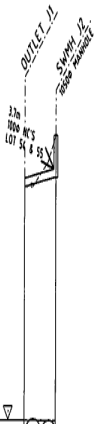


DATUM RL 17.0m		
PIPE	225ø	
DEPTH TO INVERT	1.82	
INVERT LEVEL	22.65 / 23.18	
GROUND LEVEL	0.00 / 25.00	
DISTANCE	5.9	
GRADE	9.9%	
DESIGN FLOW l/sec	13.5	
CAPACITY l/sec	144.0	

LONGITUDINAL SECTION LINE I

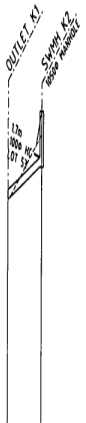
REV	DATE	DESCRIPTION	DRAWN	CHECK
A	NOV06	VARIOUS AMENDMENTS	FK	DMR

DRAWING REVISIONS



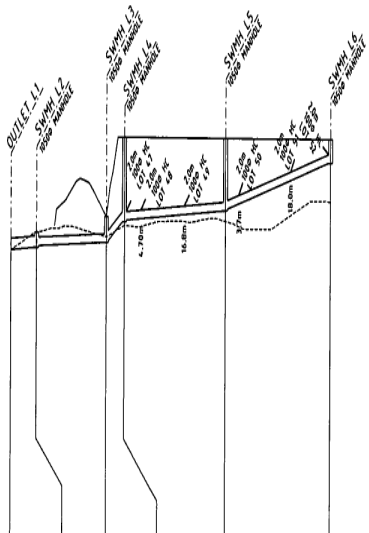
DATUM RL 17.0m	
PIPE	225ø
DEPTH TO INVERT	1.14
INVERT LEVEL	23.23 / 23.68
GROUND LEVEL	0.00 / 24.62
DISTANCE	8.4
GRADE	3.2%
DESIGN FLOW l/sec	8.0
CAPACITY l/sec	81.8

LONGITUDINAL SECTION LINE J



DATUM RL 17.0m	
PIPE	225ø
DEPTH TO INVERT	1.69
INVERT LEVEL	23.00 / 23.88
GROUND LEVEL	0.00 / 25.37
DISTANCE	9.3
GRADE	10.0%
DESIGN FLOW l/sec	4.3
CAPACITY l/sec	105.8

LONGITUDINAL SECTION LINE K



DATUM RL 17.0m					
PIPE	375ø	225ø	225ø	225ø	225ø
DEPTH TO INVERT		0.69	2.28	1.95	0.64
INVERT LEVEL	24.73 / 24.80	24.87 / 25.06	25.11 / 25.50	25.55 / 25.83	25.88 / 27.14
GROUND LEVEL	0.00	25.40 / 25.63	27.78	27.78	27.78
DISTANCE	7.1	19.6	5.0	28.10	29.20
GRADE	1.1%	1.0%	9.9%	1.0%	4.5%
DESIGN FLOW l/sec	161.3	20.2	20.2	16.6	9.8
CAPACITY l/sec	186.0	45.6	144.0	45.6	97.0

LONGITUDINAL SECTION LINE L

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CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE

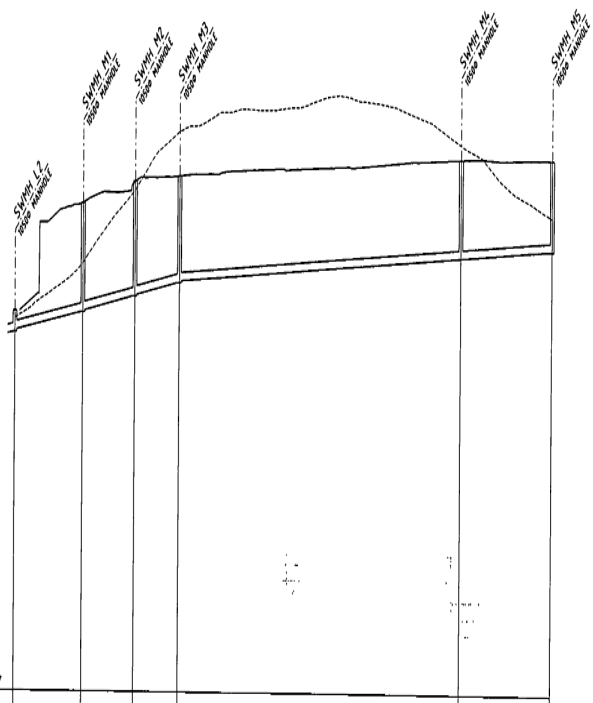
STORMWATER
LONGITUDINAL
SECTIONS (SHEET 3)

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		30-11-06

SCALE (A1)

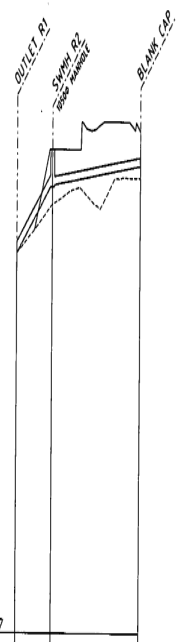
1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C39	A



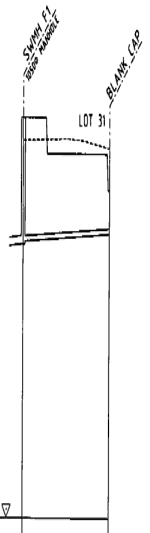
DATUM RL 15.0m ▽										
PIPE	375Ø		375Ø		375Ø		375Ø		225Ø	
DEPTH TO INVERT	0.57	2.96		3.11		2.88		2.32		2.46
INVERT LEVEL	24.80 24.87	25.35 25.40		25.79 25.84		26.17 26.22		26.89 26.94		27.14
GROUND LEVEL	25.37	28.31		28.90		29.05		29.58		29.60
DISTANCE	19.0		14.6		12.4		79.2		25.7	
GRADE	2.5%		2.7%		2.7%		0.8%		0.8%	
DESIGN FLOW l/sec CAPACITY l/sec	141.1 292		133.8 292		129.4 292		120.7 158		8.4 40.8	

LONGITUDINAL SECTION LINE M



DATUM RL 15.0m ▽				
PIPE	225Ø		225Ø	
DEPTH TO INVERT		1.50		0.93
INVERT LEVEL	25.34	26.65 26.70		27.71
GROUND LEVEL	25.34	28.15		28.64
DISTANCE	10.1		24.9	
GRADE	13.0%		2.0%	
DESIGN FLOW l/sec CAPACITY l/sec	10.3 >145		10.3 64.6	

LONGITUDINAL SECTION LINE R



DATUM RL 15.0m ▽			
PIPE	150Ø		
DEPTH TO INVERT			
INVERT LEVEL	22.59		22.80
GROUND LEVEL	26.00		24.00
DISTANCE	0.0	24.5	24.5
GRADE	0.9%		
DESIGN FLOW l/sec CAPACITY l/sec	8.1 15		

LONGITUDINAL SECTION LINE Q

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

STORMWATER LONGITUDINAL SECTIONS (SHEET 4)

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED	Sept 2006	
APPROVED	Sept 06	

SCALE (A1)

1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C40	-

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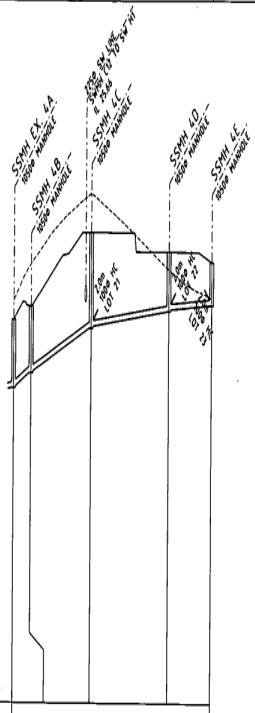
SSMH EX. 4A
1050ø MANHOLE
SSMH 4B
1050ø MANHOLE
SSMH 4C
1050ø MANHOLE
SSMH 4D
1050ø MANHOLE
150ø PVC
1.0m
1.0m
1.0m

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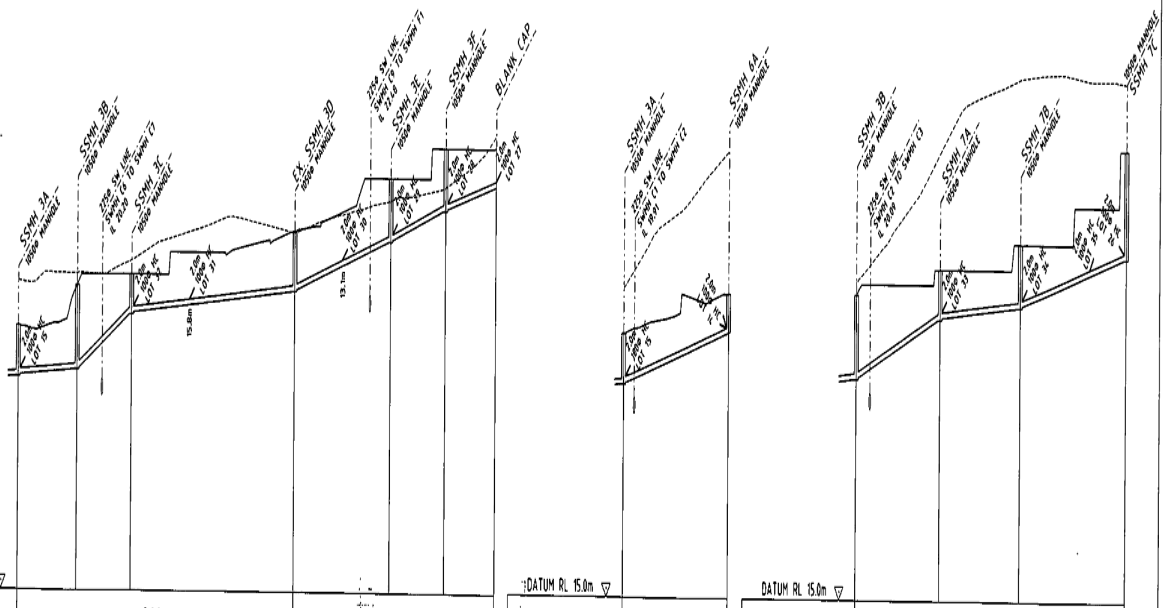
DRAWING NOTES



DATUM RL 15.0m

PIPE	300ø				150ø	
DEPTH TO INVERT	1.30	2.23	1.05	1.17	1.68	1.64	1.04
INVERT LEVEL	20.68 / 20.73	20.89 / 20.94	22.35 / 22.40	22.99 / 23.04	24.32 / 24.37	25.16 / 25.21	25.80
GROUND LEVEL	22.03	23.12	23.40	25.16	26.00	26.80	26.84
DISTANCE	16.0	14.8	44.5	26.2	15.0	13.8	
GRADE	1.00%	9.53%	1.03%	5.07%	5.64%	4.78%	

LONGITUDINAL SECTION LINE 3

DATUM RL 15.0m

PIPE	150ø	
DEPTH TO INVERT	1.30	1.00
INVERT LEVEL	20.69 / 20.73	22.09
GROUND LEVEL	22.03	23.09
DISTANCE	29.0	
GRADE	4.69%	

LONGITUDINAL SECTION LINE 6

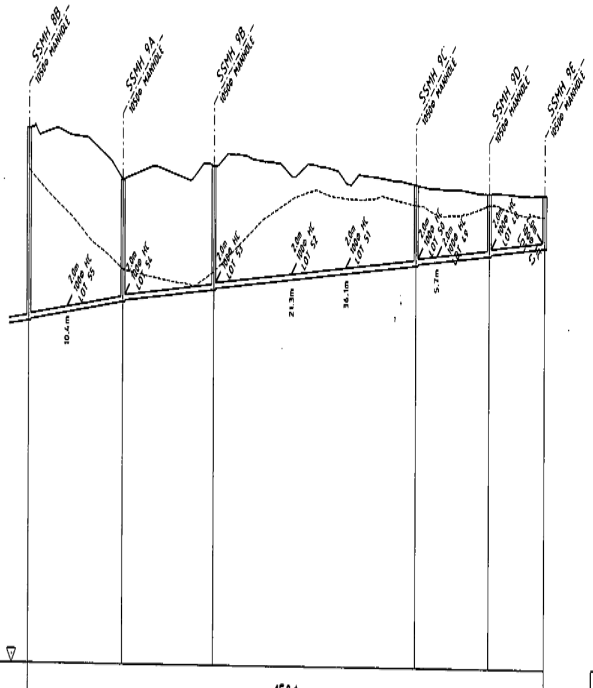
DATUM RL 15.0m

PIPE	150ø		
DEPTH TO INVERT	2.18	1.32	1.68	2.87
INVERT LEVEL	20.89 / 20.94	22.48 / 22.53	22.82 / 22.87	24.13
GROUND LEVEL	23.12	23.80	24.50	27.00
DISTANCE	23.3	22.4	29.6	
GRADE	6.61%	1.29%	4.26%	

LONGITUDINAL SECTION LINE 7

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	19/06	PIPE SIZE AMENDED	FK	FK

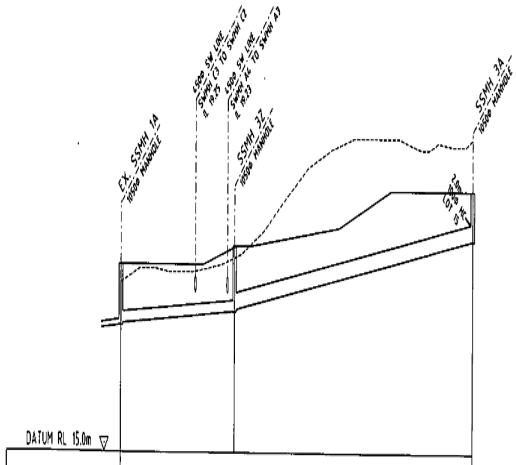
DRAWING REVISIONS



DATUM RL 15.0m

PIPE	150ø				
DEPTH TO INVERT	4.26	2.64	2.73	1.69	1.24	1.00
INVERT LEVEL	25.01 / 25.06	25.32 / 25.37	25.62 / 25.67	26.22 / 26.27	26.67 / 26.52	26.67
GROUND LEVEL	29.32	27.96	28.35	27.91	27.71	27.67
DISTANCE	25.6	24.8	55.5	20.1	15.2	141.17
GRADE	1.95%	1.26%	1.23%	1.26%	1.27%	

LONGITUDINAL SECTION LINE 9



DATUM RL 15.0m

PIPE	300ø		
DEPTH TO INVERT	1.52	1.71	1.32
INVERT LEVEL	18.63 / 18.48	18.75 / 18.80	20.68 / 20.73
GROUND LEVEL	20.00	20.46	22.00
DISTANCE	31.6	66.5	
GRADE	0.85%	2.83%	

LONGITUDINAL SECTION - LINE TO BE RELAID

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CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE

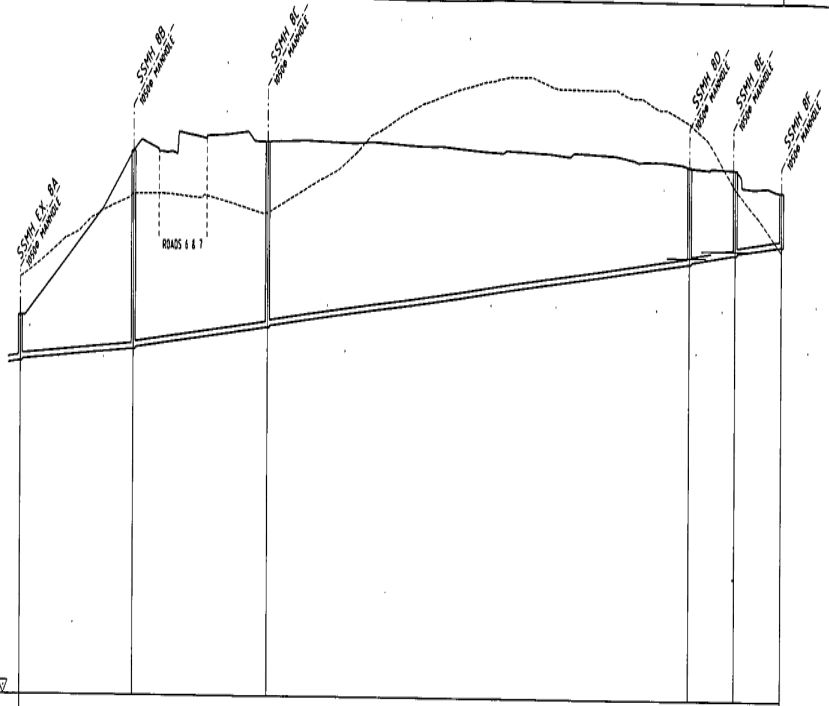
SANITARY SEWER LONGITUDINAL SECTIONS (SHEET 2)

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		30-11-06

SCALE (A1)

1:500(H) 1:100(V)

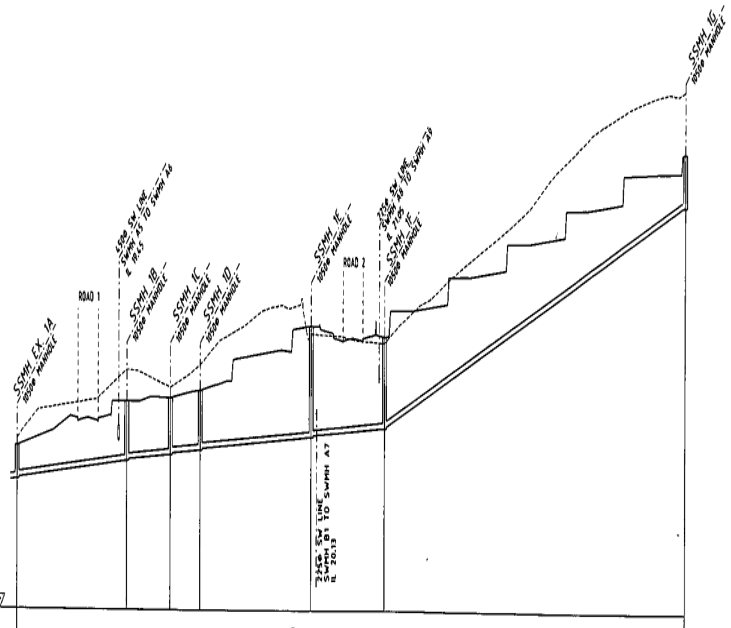
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C42	A



DATUM RL 15.0m ▽

PIPE	150Ø												
DEPTH TO INVERT	1.37		4.42		4.57					2.36	2.18		1.00
INVERT LEVEL	23.80 23.85		25.01 25.06		25.43 25.48					26.64 26.69	26.82 26.87		27.00
GROUND LEVEL	25.17		29.43		30.00					29.00	29.00		28.00
DISTANCE	0.00	31.0	31.0	36.6	67.6		116.2			183.7	12.6	196.3	12.9	209.2
GRADE		3.7%		1.0%			1.0%				1.0%		1.0%	

LONGITUDINAL SECTION LINE 8



DATUM RL 15.0m ▽

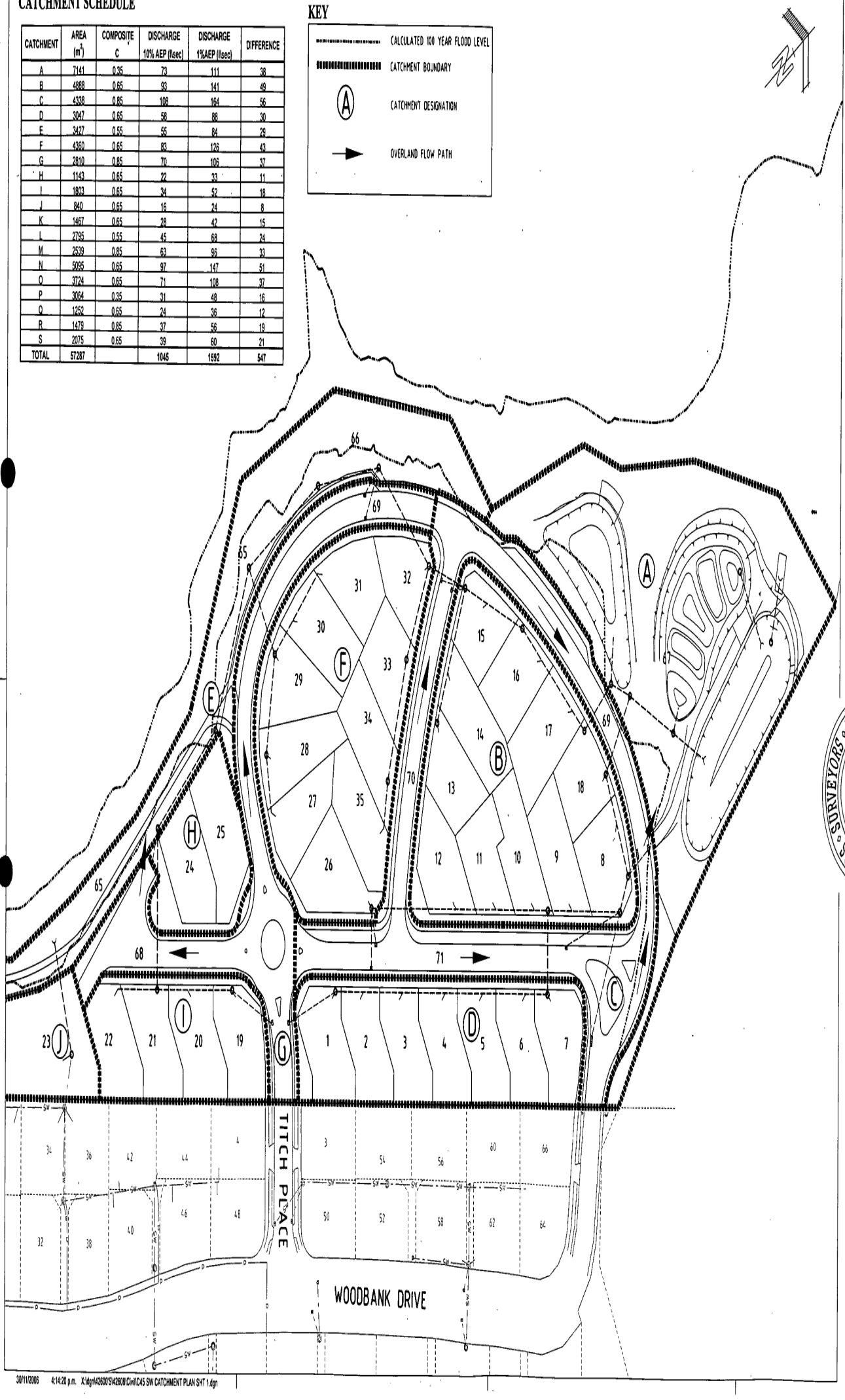
| | | | | | | | | | | | | |

CATCHMENT SCHEDULE

CATCHMENT	AREA (m^2)	COMPOSITE C	DISCHARGE 10% AEP (l/sec)	DISCHARGE 1%AEP (l/sec)	DIFFERENCE
A	7141	0.35	73	111	38
B	4888	0.65	93	141	49
C	4338	0.85	108	164	56
D	3047	0.65	58	88	30
E	3427	0.55	55	84	29
F	4360	0.65	83	126	43
G	2810	0.85	70	106	37
H	1143	0.65	22	33	11
I	1803	0.65	34	52	18
J	840	0.65	16	24	8
K	1467	0.65	28	42	15
L	2795	0.55	45	68	24
M	2539	0.85	63	96	33
N	5085	0.65	97	147	51
O	3724	0.65	71	108	37
P	3064	0.35	31	48	16
Q	1252	0.65	24	36	12
R	1479	0.85	37	56	19
S	2075	0.65	39	60	21
TOTAL	57287		1045	1592	547

KEY

- CALCULATED 100 YEAR FLOOD LEVEL
- CATCHMENT BOUNDARY
- (A) CATCHMENT DESIGNATION
- OVERLAND FLOW PATH



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	SEPT 06	OLFP'S SHOWN	FK	DRM

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

STORMWATER CATCHMENT PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		30-11-06

SCALE (A1)

1:500

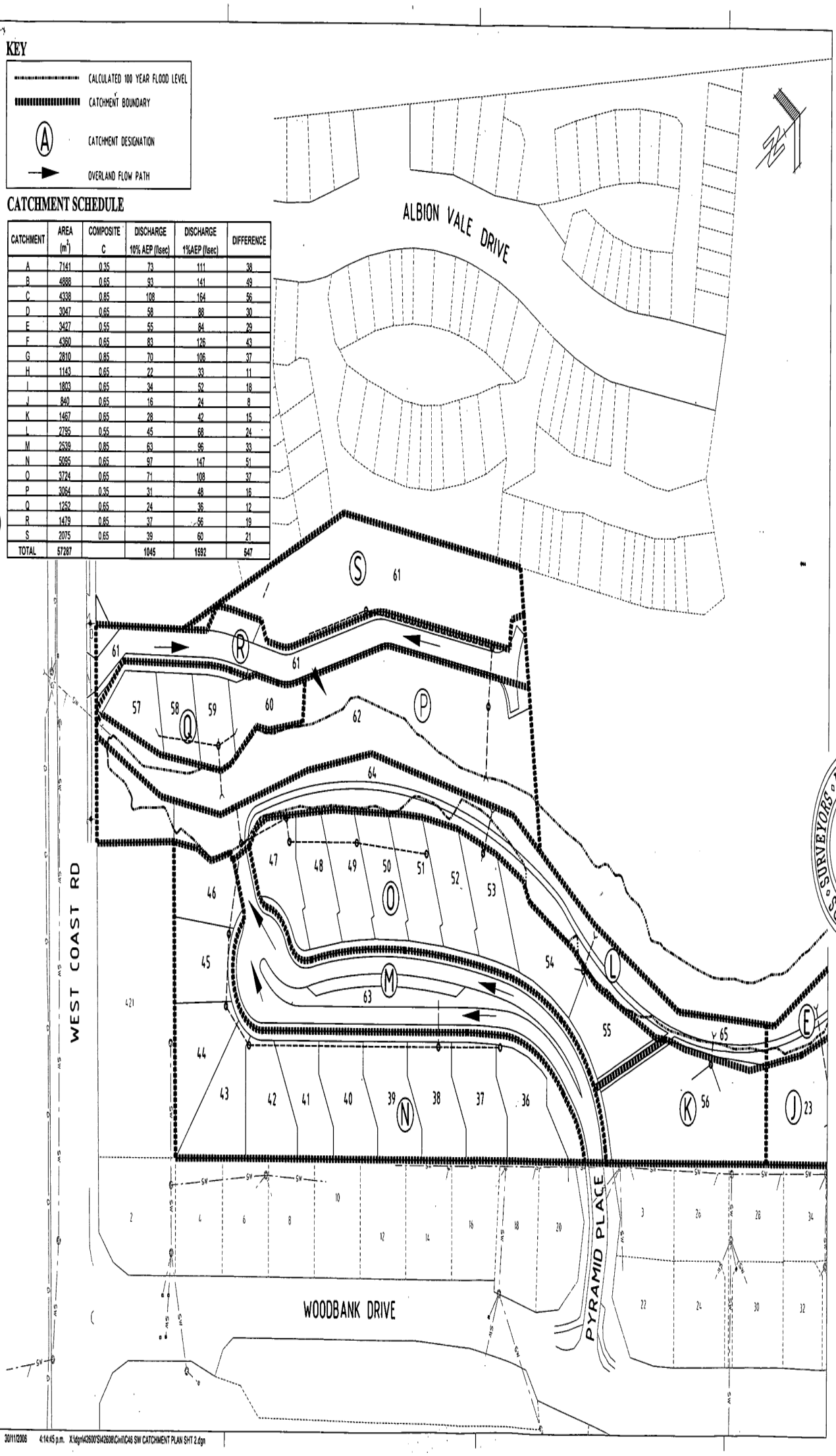
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C45	A

KEY

- CALCULATED 100 YEAR FLOOD LEVEL
- CATCHMENT BOUNDARY
- (A) CATCHMENT DESIGNATION
- OVERLAND FLOW PATH

CATCHMENT SCHEDULE

CATCHMENT	AREA (m^2)	COMPOSITE C	DISCHARGE 10% AEP (l/sec)	DISCHARGE 1%AEP (l/sec)	DIFFERENCE
A	7141	0.35	73	111	38
B	4888	0.65	93	141	49
C	4338	0.85	108	164	56
D	3047	0.65	58	88	30
E	3427	0.55	55	84	29
F	4360	0.65	83	126	43
G	2810	0.85	70	106	37
H	1143	0.65	22	33	11
I	1803	0.65	34	52	18
J	840	0.65	16	24	8
K	1467	0.65	28	42	15
L	2795	0.55	45	68	24
M	2539	0.85	63	96	33
N	5095	0.65	97	147	51
O	3724	0.65	71	108	37
P	3064	0.35	31	48	16
Q	1252	0.65	24	36	12
R	1479	0.85	37	56	19
S	2075	0.65	39	60	21
TOTAL	57287		1045	1592	547



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	SEPT 06	OLFP'S SHOWN	FK	ORM

DRAWING REVISIONS

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admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

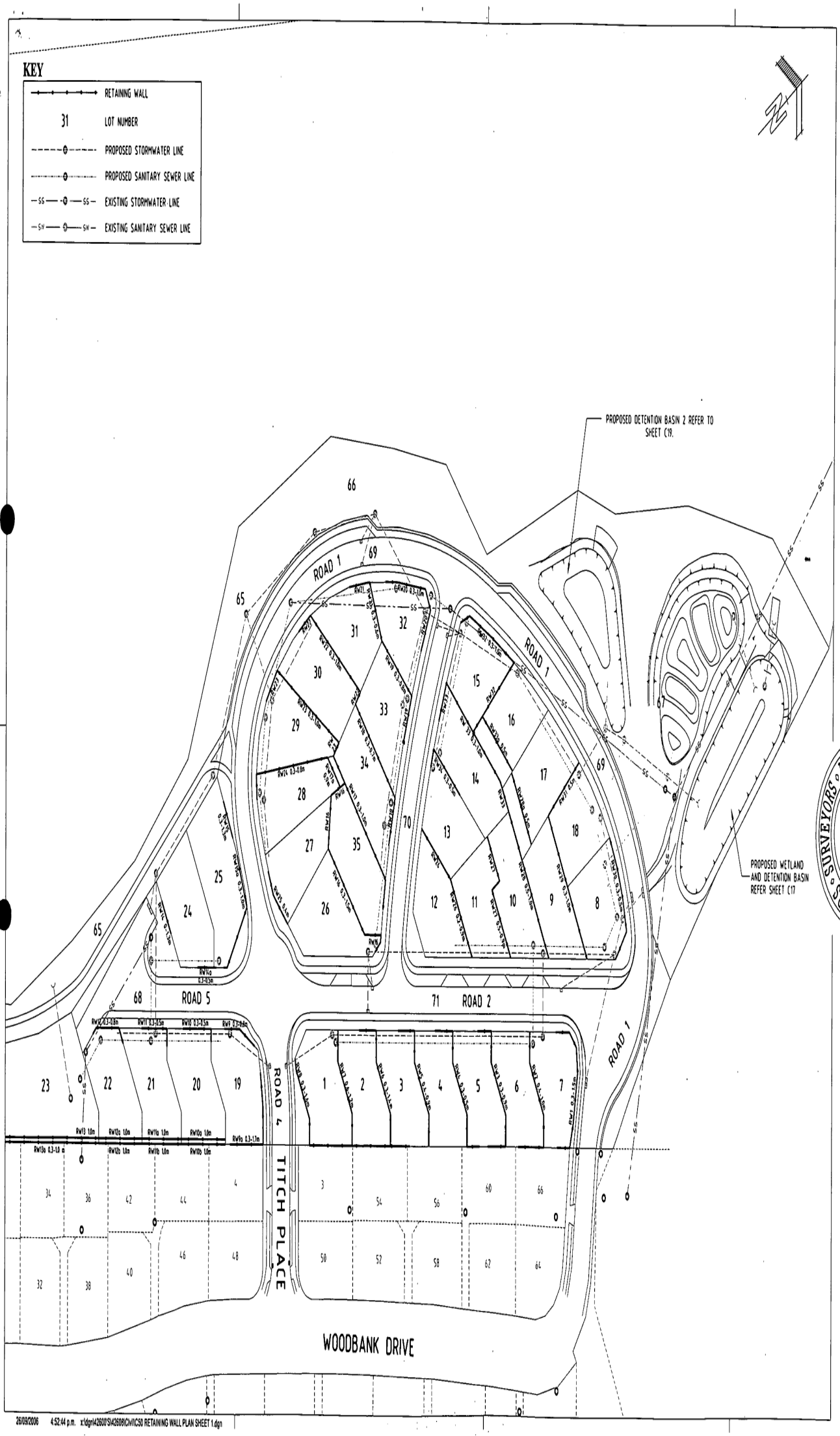
STORMWATER CATCHMENT PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C46	A



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

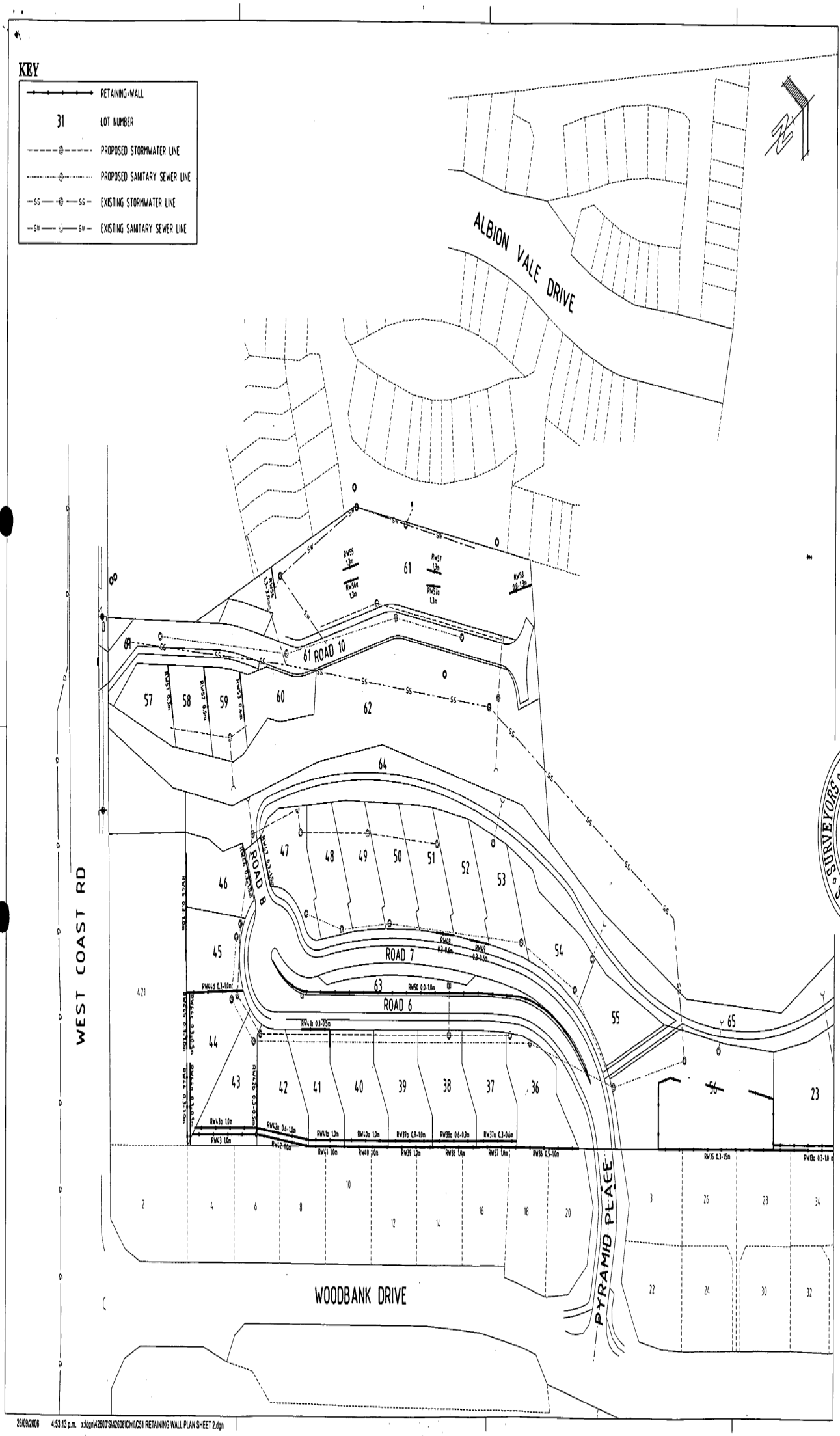
RETAINING WALL PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED	26/09/06	

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C50	-



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

RETAINING WALL PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED	29/09/06	

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C51	-

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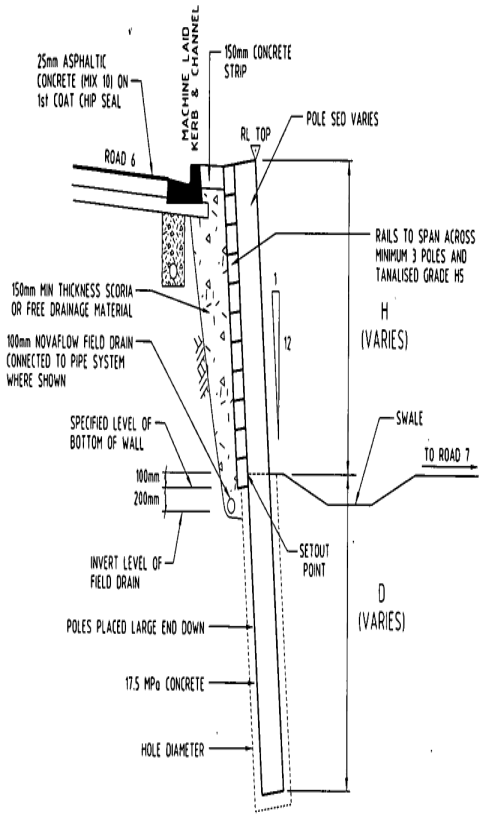
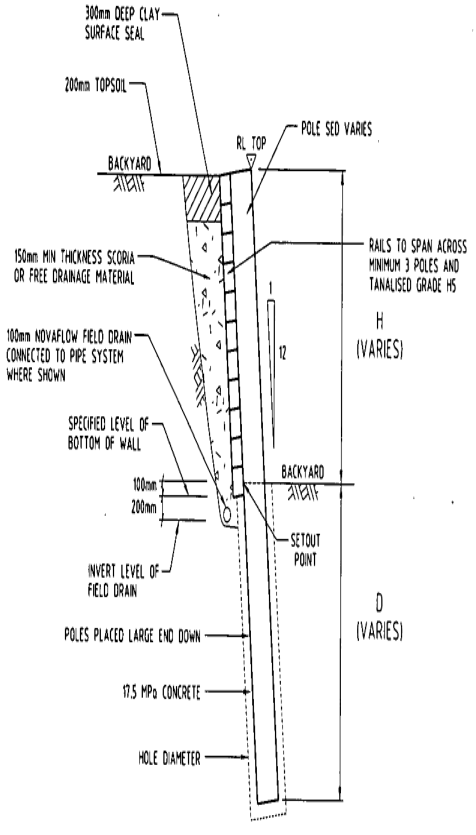
DRAWING NOTES



TYPICAL SECTION OF POLE RETAINING WALL BETWEEN ROAD 6 AND SWALE

(NOT TO SCALE)



TYPICAL SECTION OF POLE RETAINING WALL BETWEEN BACKYARDS

(NOT TO SCALE)

NOTES:

1. ALL RETAINING WALL POLES TO BE HIGH DENSITY.
2. FINAL DESIGN OF RETAINING WALLS TO BE DETERMINED ON SITE AT TIME OF CONSTRUCTION.

TYPE A (NO SURCHARGE)

MAXIMUM RETAINED HEIGHT (m)	POLE SIZE SED (mm)	HOLE DIAMETER (mm)	POLE SPACING (m)	EMBEDMENT DEPTH (m)	RAIL THICKNESS (mm)
0.00-1.00	100	300	1.0	1.0	45
1.00-1.50	150	350	1.0	1.5	45
1.50-2.00	200	400	1.0	2.0	45
2.00-2.50	250	450	1.0	2.5	90
2.50-3.00	300	600	1.0	3.0	90

TYPE B (5kPa SURCHARGE)

MAXIMUM RETAINED HEIGHT (m)	POLE SIZE SED (mm)	HOLE DIAMETER (mm)	POLE SPACING (m)	EMBEDMENT DEPTH (m)	RAIL THICKNESS (mm)
0.00-0.80	100	300	1.0	1.0	45
0.80-1.30	150	350	1.0	1.3	45
1.30-1.80	200	450	1.0	1.8	45

RETAINING WALL NO.	WALL TYPE
1	A
2	A
3	A
4	A
5	A
6	A
7	A
8	A
9	A
9a	A
10b	A
11b	A
12b	A
13a	A
16	A
17	A
17a	A
18	A
35	A

RETAINING WALL NO.	WALL TYPE
36	A
37	A
38	A
39	A
40	A
41	A
42	A
43	A
44	A
44B	A
46	A
47	A
50	B
54	A
55	A
56a	A
57	A
57a	A
58	A

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	210906	TABLES ADDED	FK	DMR

DRAWING REVISIONS

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admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

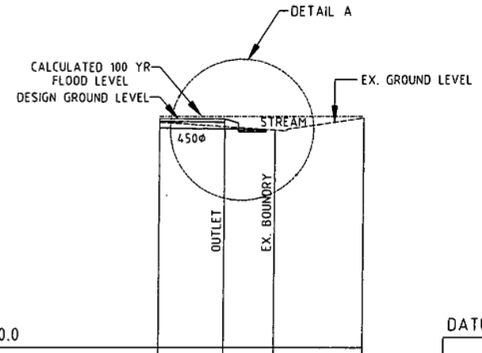
RETAINING WALL DETAILS

	DATE	INITIAL
DESIGNED		
DRAWN	19.07.06	GNB
CHECKED		
APPROVED	26/09/06	

SCALE (A1)

NTS

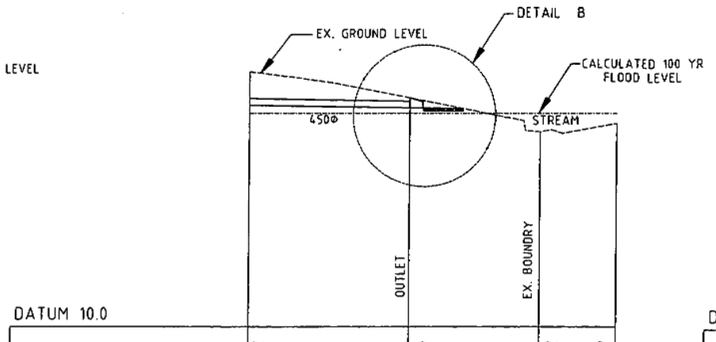
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C52	A



DATUM 10.0				
EXISTING GROUND LEVEL	25.2	24.9	24.7	25.5
DESIGN GROUND LEVEL	25.4	25.4	24.7	25.5
CHAINAGE	0.0	4.3	7.7	13.6

STORMWATER OUTLET L1 CROSS SECTION

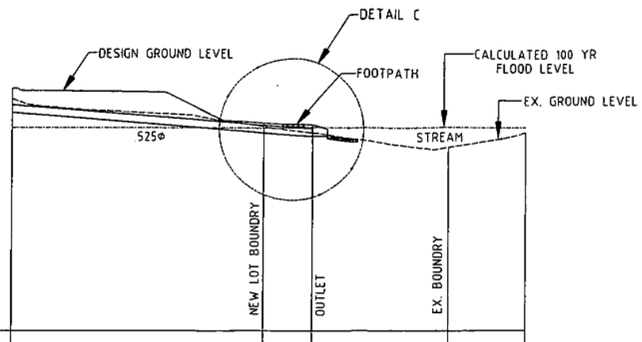
SCALE 1:200 (A1)



DATUM 10.0				
EXISTING GROUND LEVEL	27.2	25.4	23.2	23.7
DESIGN GROUND LEVEL	27.2	25.4	23.2	23.7
CHAINAGE	0.0	10.8	19.5	24.5

STORMWATER OUTLET N1 CROSS SECTION

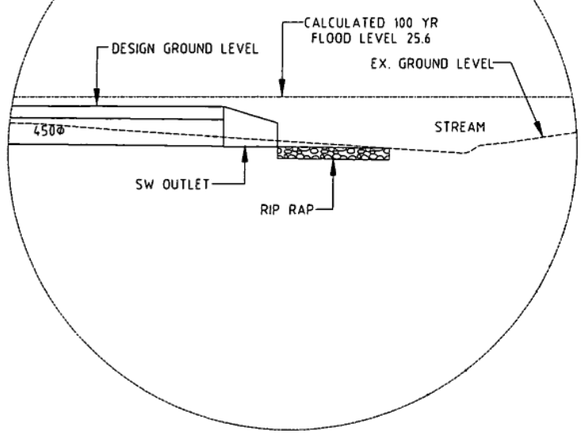
SCALE 1:200 (A1)



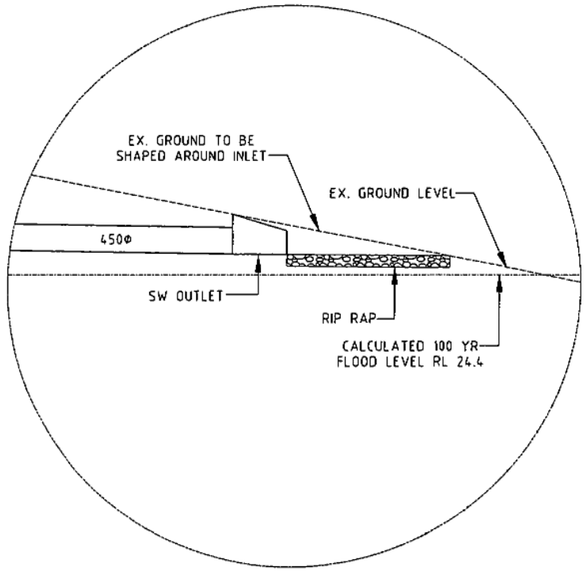
DATUM 10.0					
EXISTING GROUND LEVEL	25.6	23.8	23.3	22.4	23.4
DESIGN GROUND LEVEL	26.3	24.0	23.9	22.4	23.4
CHAINAGE	0.0	16.6	19.8	28.7	33.8

STORMWATER OUTLET G1 CROSS SECTION

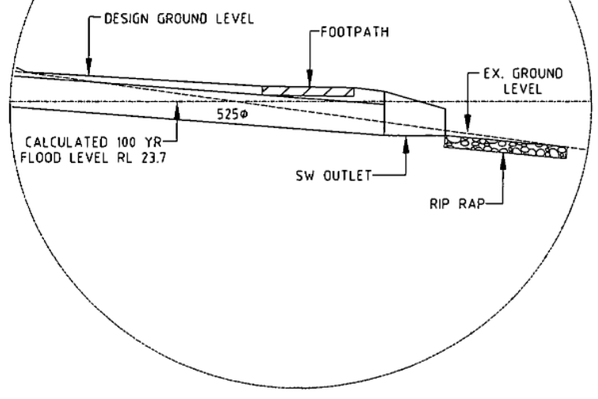
SCALE 1:200 (A1)



DETAIL A



DETAIL B



DETAIL C

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DRAWING NOTES

APPROVED 24/07

REV	DATE	DESCRIPTION	DRAWN	CHEC

DRAWING REVISIONS

ENGINEERS · SURVEYORS · ARCHITECTS
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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

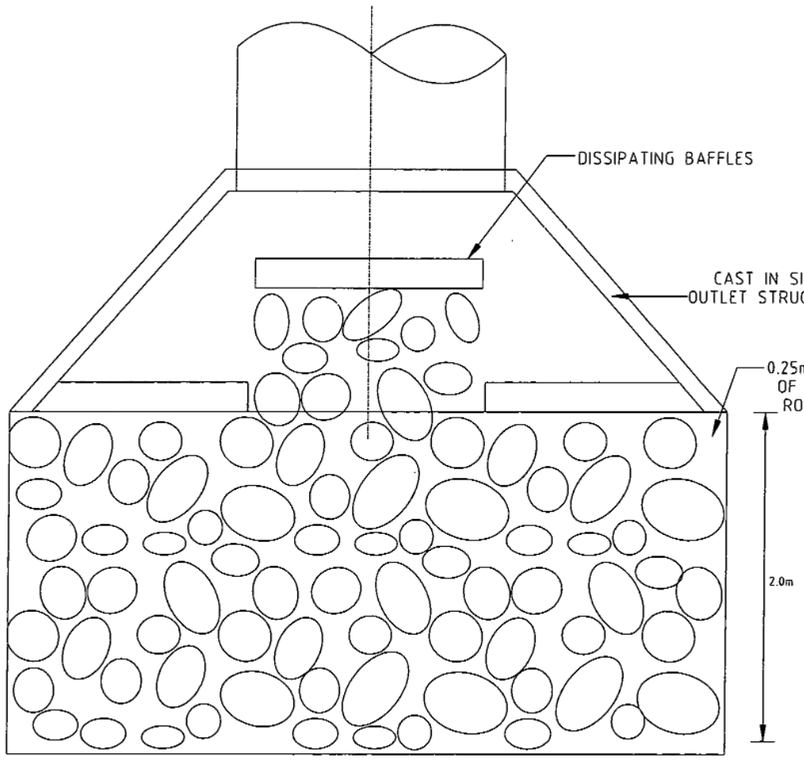
STORMWATER OUTLET STRUCTURE DETAILS

	DATE	INITIAL
DESIGNED	FEB 2007	FK
DRAWN	FEB 2007	FK
CHECKED	FEB 2007	NSL
APPROVED		

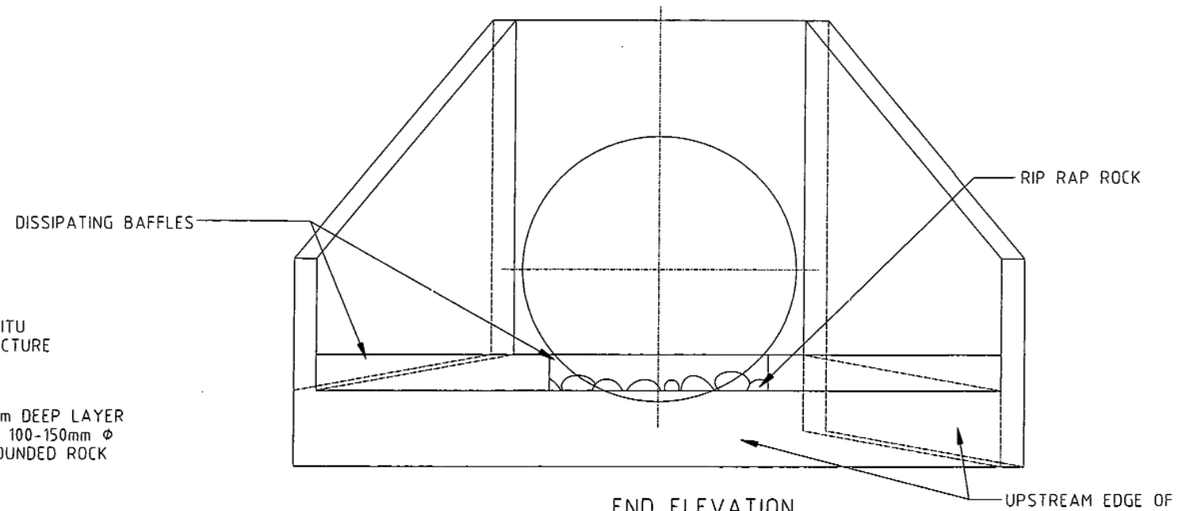
SCALE (A1)

AS SHOWN

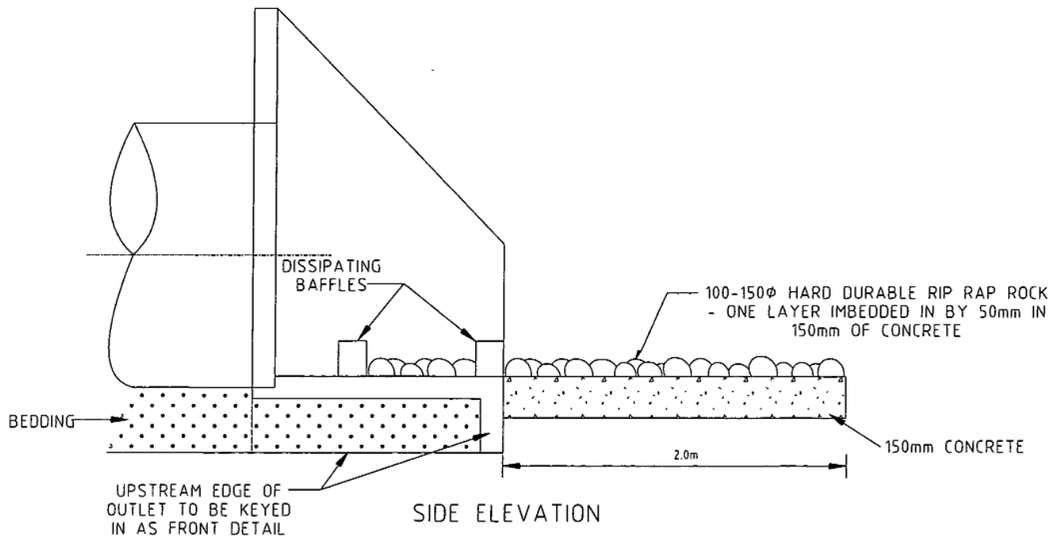
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C12	-



PLAN



END ELEVATION



SIDE ELEVATION

L1, N1 AND G1 STORMWATER OUTLET CONFIGURATION

NOT TO SCALE

NOTES:

1. DIMENSIONS AND REINFORCING ARE TO BE IN ACCORDANCE WITH WCC's CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT. (SEE DWG SD4.05)

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DRAWING NOTES

APPROVED 2/4/07

REV	DATE	DESCRIPTION	DRAWN	CHE
A	300307	UPSTREAM EDGE OF OUTLET AMENDED TO SHOW KEY	FK	NSI

DRAWING REVISIONS

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admin@babbage.co

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN

FOR

NZ HOUSING FOUNDATIO

DRAWING TITLE

STORMWATER OUTLET DETAIL

	DATE	INITIAL
DESIGNED	FEB 2007	FK
DRAWN	FEB 2007	FK
CHECKED	FEB 2007	NSL
APPROVED		

SCALE (A1)

NOT TO SCALE

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C13	A

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
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Henderson 0650
Waitakere

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24Hr Call Centre
09 839 0400

Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

F.Y.I

2 April 2007

BABBAGE CONSULTANTS LTD
PO Box 2027
Shortland Street
AUCKLAND 1140

Dear Fiona

Application Number: SUB-2006-1078
Applicant Name: NEW ZEALAND HOUSING FOUNDATION
Application Address: 423-429 West Coast Road, GLEN EDEN

ENGINEERING PLAN APPROVAL

The engineering plans submitted by Babbage Consultants Ltd, and as listed below are hereby APPROVED FOR CONSTRUCTION, subject to the engineering conditions noted below each subdivision condition in BOLD. Prior to commencing construction arrange a QA Pre-Start Meeting.

Ref	42608	Sheet	C12	Revision	-	Dated	Feb 2007
Ref	42608	Sheet	C13	Revision	A	Dated	30.03.07

The engineering plans have been assessed against the subdivision consent conditions and Council's Code of Practice for City Infrastructure and Land Development

Engineering Plan Approval is valid for 6 months from the date of issue to cater for technical updates to the Code of Practice. This engineering plan approval will lapse on (2/10/2007), unless a QA Pre-Start Meeting has been held, and construction has commenced prior to the lapse date.

PUBLIC DRAINAGE INFRASTRUCTURE – ECOWATER SECTION 224 CONDITIONS

(DE 1) Provide a catchment analysis detailing any 1 in 100 year overland flowpaths that will exist through the proposed residential Lots upon completion of earthworks, including a possible overland flowpath occurring over proposed Lots 44-46. Wherever possible, keep all overland flowpaths contained within the legal road reserve and discharge to the drainage reserve with a minimum of nuisance. Provide an As-Built plan, long section and cross sections, prepared by a Licenced Cadastral Surveyor to demonstrate that completed overland flowpath(s) meets the design requirements. Provide a drainage easement in favour of Council over all areas required to maintain unobstructed overland flow. All buildings are required to be located entirely outside the 1 in 100 year overland flowpath area, and with a finished floor level not less than 500mm above the 1 in 100 year overland flowpath level for catchments over 2 hectares (200mm for catchments less than 2 hectares). This information will be recorded on Council's Hazards and Special Features Register.

(DE 1) Design, provide and install a complete public wastewater reticulation system to serve all Lots in compliance with Councils Code of Practice for City Infrastructure and Land Development (Refer Section 5.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Locate all drainage lines in the front of Lots where possible to provide ease of access for future maintenance requirements.

(iii) Re-route the existing public drainage lines passing through Lot(s) 31-32 to provide more adequate building sites for those Lots. At the stage of engineering approval a quote will be obtained from Councils contractor for the new manholes required on the existing wastewater network.

(DE 2) Design, provide and install a complete public stormwater drainage system to serve all Lots in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Collect all existing stormwater discharges onto the land and provide for these catchments in the capacity of the new systems. This includes the existing public stormwater drains discharging at proposed Lots 44 and 23, and any others encountered during construction.

(iii) Clearance between the proposed stormwater pipes and the existing Watercare Services Ltd trunk wastewater drain is required to be a minimum of 0.5m, and no pipe points are permitted above the trunk wastewater drain, in accordance with the conditions of Watercare Services Ltd consent number D1415/06.

(iv) Abandoned public drainage is required to be either removed and backfilled with certified engineered fill, or grout filled. If grout filled, then foundations of future buildings will need to bridge over the trench and abandoned pipes.

(v) New stormwater outlets to the stream are required to discharge in the direction of flow to minimise erosion on the opposite bank.

(DE 3) Design, provide and install a complete stormwater quality treatment system for the site in accordance with the Auckland Regional Council's TP10 '*Stormwater Management Devices Design Guideline Manual*', and WCC Code of Practice for City Infrastructure and Land Development (refer Section 4). Provide a copy of the engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All stormwater treatment and detention devices are required to be located clear of existing or proposed public drainage lines.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain. This includes provision of a 0.5m thick impermeable compacted clay liner under the pond base, embankment and spillway to avoid seepage of pond water into the trenching material surrounding the drain. Provide evidence that this has been completed in the geotechnical completion report. Heavy machinery is required to be kept 2m clear of the Watercare Services Ltd trunk

wastewater drain at all times during construction.

(ii) Provide in the design of the device for treatment of a fully developed upstream catchment. Detain the 2 year storm event and discharge at pre-development levels as required by the Parrs Stream Catchment Management Plan.

(iii) The existing pond on Lot 3 DP 339810 can be replaced by a quality treatment device that provides the equivalent level of treatment. Provide engineering plans and calculations to demonstrate that the proposed swale can achieve this, or alternatively provide written confirmation from ARC that the proposed swale is an acceptable form of treatment in this situation.

(iv) Provide a planting plan, including species list, quantities, and methodology to EcoWater and Parks for approval prior to commencing planting.

(v) Provide a surveyed as-built plan of the device showing all lid and invert levels, permanent water level, and contours at 200mm intervals below water level.

(vi) Provide a geotechnical completion report certifying construction of the pond.

(vii) Provide a maintenance manual for the treatment device.

(viii) Provide a drainage reserve over the entire area occupied by the treatment device, associated maximum flood water levels, and all areas necessary to access and maintain the treatment device.

(DE 4) Waitakere City Council holds a Comprehensive Discharge Consent from the ARC for the Parrs Stream catchment, and this proposal meets the recommendations of the Parrs Stream Catchment Management Plan subject to these conditions being met. It is the applicant's responsibility to obtain all other necessary consents, or evidence of dispensation, from the Auckland Regional Council, pay all associated costs and comply with any conditions imposed by the Regional Council.

(DE 5) Design, provide and install a complete public water supply reticulation system and fire fighting services to serve all Lots/Units in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 6). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All Lots/Units are to be individually metered at the road reserve boundary. Ducting of private lines is recommended where they cross driveways.

(i) Locate all water connections at the same position as the power and telephone connection to each Lot/Unit.

(ii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(iii) Pay to the Council the cost of supervising the shut down of Council's water supply mains. This service includes Council providing written advice to all affected property owners and tenants.

(iv) Provide fire hydrants within 135m of the furthest point on any property, and within 65m of the end of a cul-de-sac.

(v) Where the required public system is on private property, easements over the course of such system in favour of Council will be necessary.

(DE 6) Design, provide and install a complete ICT Network along all new public roads for the future provision of ICT services within the development in compliance

with Council's Code of Practice for City Infrastructure and Land Development (Refer section 8). Provide engineering plans to Council for approval prior to commencing works.

(DE 7) **Engineering Approval and Quality Assurance Process:** Public infrastructure works, as conditioned above, require Council's approval of engineering plans and specifications prepared by the applicant's engineer in accordance with Council's Code of Practice for City Infrastructure and Land Development.

(i) Submit full engineering plans, long sections and calculations, prepared in accordance with Council's Code of Practice, to Council for approval.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain.

(ii) Advise the name of the appointed developer's representative fulfilling engineering responsibilities as detailed in section 1.4.1 of the Code of Practice.

(iii) After engineering approval has been given and prior to commencing construction, contact Council's Call Centre on 839 0400 to arrange a QA Pre-Start Meeting. Allow 3 working days for the QA Pre-Start Meeting to be booked.

(iv) The applicant is required to ensure that the contracted drainlayer and developer's representative attend the QA Pre-Start Meeting, and that construction materials are on-site for inspection.

(v) EcoWater's QA Supervisor will then undertake random site inspections throughout the construction process.

(vi) Upon completion of construction the applicant's surveyor is required to prepare As-Built plans in accordance with the Code of Practice, and CCTV inspection of the drains are to be carried out.

(vii) The developer's representative is required to fully inspect the drainage including overseeing the drainage tests, view the cctv's and check against the as-builts, and ensure that any remedial works are completed.

(viii) When the developer's representative is satisfied that all works meet Council standards, they are required to complete the 'QA Final Inspection Request Form' and lodge this at Council together with As-Builts, CCTV (all footage on one DVD), log sheets, chlorination certificate for watermains, and inspection reports.

(ix) EcoWater's QA Supervisor will check all information against the approved design and Code of Practice, then undertake a field check and testing of the new drainage systems in conjunction with Council's approved maintenance contractor.

(x) When all public works and documentation are completed to Council's satisfaction the QA Completion Certificate will be issued to the applicant.

(xi) Submit a copy of the QA Completion Certificate with the application for s224c Certificate as evidence of compliance with the conditions of consent requiring construction of infrastructure to public standards.

(xii) Pay all of Council's engineering fees and costs associated with engineering approvals, quality assurance site inspections, as-built & cctv approvals, final inspections, testing and bond management.

FEES, BONDS & CONTRIBUTIONS

(FC 1) Pursuant to Sections 407 & 409 of the Resource Management Act, the following financial contributions have been assessed for the proposed

development, and are required to be paid in full prior to issue of the 224c:

(i) Twin Streams Contribution (Oratia catchment) totalling $207,492.01 inclusive of GST - calculated based on 18 medium density Units @ $1,670.63 (incl. GST) per additional Unit, and 59 residential Lots @ $3,007.13 (incl. GST) per additional Lot.

(FC 1) Pursuant to Section 108(2)(b) and Section 108A, and in accordance with Council's Code of Practice for City Infrastructure and Land Development, the applicant is required to provide a maintenance bond to Council, equivalent to 2½% (minimum $500.00) of the value of works being taken over by Council. This maintenance bond will be held for six months from the date of 224c issue, or until 31 October, whichever is longer. Maintenance of these assets are the responsibility of the developer during the maintenance period. At the end of the maintenance period the QA Supervisor will undertake a maintenance inspection to ascertain whether the assets are still in satisfactory condition and if so, will instruct the bond to be released, and Council will take over maintenance responsibilities from that time forward. Where defects occur during the developer's maintenance liability period, the costs of repairing such defects are the full responsibility of the developer. Where the developer does not repair the defects, Council will retain the bond monies for use in repairing the defects, and refund any residual monies held to the developer. The developer's liability is not limited to the amount of the maintenance bond, and any additional costs will be invoiced to the developer and will become a debt due to the Council.

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
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Henderson 0612

Private Bag 93109
Henderson 0650
Waitakere

Telephone
09 836 8000

24Hr Call Centre
09 839 0400

Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

4 July 2007

FYI
- letter sent direct, still not the end of stage 1.
Steven.

BABBAGE CONSULTANTS LTD
PO Box 2027
Shortland Street
AUCKLAND 1140

Dear Sir / Madam

Application Number: SUB-2006-1078
Applicant Name: NEW ZEALAND HOUSING FOUNDATION
Application Address: 423-429 West Coast Road, GLEN EDEN

ENGINEERING PLAN APPROVAL

The engineering plans submitted by Babbage Consultants Ltd, and as listed below are hereby APPROVED FOR CONSTRUCTION, subject to the engineering conditions noted below each subdivision condition in BOLD.

Ref	42608	Sheet	C15	Revision	C	Dated	030707

The engineering plans have been assessed against the subdivision consent conditions and Council's Code of Practice for City Infrastructure and Land Development, ARC's TP10 Stormwater Treatment Devices Design Guideline Manual 2003.

Engineering Plan Approval is valid for 6 months from the date of issue to cater for technical updates to the Code of Practice. This engineering plan approval will lapse on (4/1/2008), unless a QA Pre-Start Meeting has been held, and construction has commenced prior to the lapse date.

PUBLIC DRAINAGE INFRASTRUCTURE – ECOWATER SECTION 224 CONDITIONS

(DE 1) Provide a catchment analysis detailing any 1 in 100 year overland flowpaths that will exist through the proposed residential Lots upon completion of earthworks, including a possible overland flowpath occurring over proposed Lots 44-46. Wherever possible, keep all overland flowpaths contained within the legal road reserve and discharge to the drainage reserve with a minimum of nuisance. Provide an As-Built plan, long section and cross sections, prepared by a Licenced Cadastral Surveyor to demonstrate that completed overland flowpath(s) meets the design requirements. Provide a drainage easement in favour of Council over all areas required to maintain unobstructed overland flow. All buildings are required to be located entirely outside the 1 in 100 year overland flowpath area, and with a finished floor level not less than 500mm above the 1 in 100 year overland flowpath level for catchments over 2 hectares (200mm for catchments less than 2 hectares). This information will be recorded on Council's Hazards and Special Features Register.

(DE 1) Design, provide and install a complete public wastewater reticulation system to serve all Lots in compliance with Councils Code of Practice for City Infrastructure and Land Development (Refer Section 5.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point

within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Locate all drainage lines in the front of Lots where possible to provide ease of access for future maintenance requirements.

(iii) Re-route the existing public drainage lines passing through Lot(s) 31-32 to provide more adequate building sites for those Lots. At the stage of engineering approval a quote will be obtained from Councils contractor for the new manholes required on the existing wastewater network.

(DE 2) Design, provide and install a complete public stormwater drainage system to serve all Lots in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Collect all existing stormwater discharges onto the land and provide for these catchments in the capacity of the new systems. This includes the existing public stormwater drains discharging at proposed Lots 44 and 23, and any others encountered during construction.

(iii) Clearance between the proposed stormwater pipes and the existing Watercare Services Ltd trunk wastewater drain is required to be a minimum of 0.5m, and no pipe points are permitted above the trunk wastewater drain, in accordance with the conditions of Watercare Services Ltd consent number D1415/06.

(iv) Abandoned public drainage is required to be either removed and backfilled with certified engineered fill, or grout filled. If grout filled, then foundations of future buildings will need to bridge over the trench and abandoned pipes.

(v) New stormwater outlets to the stream are required to discharge in the direction of flow to minimise erosion on the opposite bank.

(DE 3) Design, provide and install a complete stormwater quality treatment system for the site in accordance with the Auckland Regional Council's TP10 '*Stormwater Management Devices Design Guideline Manual*', and WCC Code of Practice for City Infrastructure and Land Development (refer Section 4). Provide a copy of the engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All stormwater treatment and detention devices are required to be located clear of existing or proposed public drainage lines.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain. This includes provision of a 0.5m thick impermeable compacted clay liner under the pond base, embankment and spillway to avoid seepage of pond water into the trenching material surrounding the drain. Provide evidence that this has been completed in the geotechnical completion report. Heavy machinery is required to be kept 2m clear of the Watercare Services Ltd trunk wastewater drain at all times during construction.

(ii) Provide in the design of the device for treatment of a fully developed upstream catchment. Detain the 2 year storm event and discharge at pre-development levels as required by the Parrs Stream Catchment Management Plan.

(iii) The existing pond on Lot 3 DP 339810 can be replaced by a quality treatment device that provides the equivalent level of treatment. Provide engineering plans and calculations to demonstrate that the proposed swale can achieve this, or alternatively provide written confirmation from ARC that the proposed swale is an acceptable form of treatment in this situation.

(iv) Provide a planting plan, including species list, quantities, and methodology to EcoWater and Parks for approval prior to commencing planting.

(v) Provide a surveyed as-built plan of the device showing all lid and invert levels, permanent water level, and contours at 200mm intervals below water level.

(vi) Provide a geotechnical completion report certifying construction of the pond.

(vii) Provide a maintenance manual for the treatment device.

(viii) Provide a drainage reserve over the entire area occupied by the treatment device, associated maximum flood water levels, and all areas necessary to access and maintain the treatment device.

Approval for stormwater quality treatment swale located between Road 6 and Road 7

(DE 4) Waitakere City Council holds a Comprehensive Discharge Consent from the ARC for the Parrs Stream catchment, and this proposal meets the recommendations of the Parrs Stream Catchment Management Plan subject to these conditions being met. It is the applicant's responsibility to obtain all other necessary consents, or evidence of dispensation, from the Auckland Regional Council, pay all associated costs and comply with any conditions imposed by the Regional Council.

(DE 5) Design, provide and install a complete public water supply reticulation system and fire fighting services to serve all Lots/Units in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 6). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All Lots/Units are to be individually metered at the road reserve boundary. Ducting of private lines is recommended where they cross driveways.

(i) Locate all water connections at the same position as the power and telephone connection to each Lot/Unit.

(ii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(iii) Pay to the Council the cost of supervising the shut down of Council's water supply mains. This service includes Council providing written advice to all affected property owners and tenants.

(iv) Provide fire hydrants within 135m of the furthest point on any property, and within 65m of the end of a cul-de-sac.

(v) Where the required public system is on private property, easements over the course of such system in favour of Council will be necessary.

(DE 6) Design, provide and install a complete ICT Network along all new public roads

for the future provision of ICT services within the development in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 8). Provide engineering plans to Council for approval prior to commencing works.

(DE 7) **Engineering Approval and Quality Assurance Process:** Public infrastructure works, as conditioned above, require Council's approval of engineering plans and specifications prepared by the applicant's engineer in accordance with Council's Code of Practice for City Infrastructure and Land Development.

(i) Submit full engineering plans, long sections and calculations, prepared in accordance with Council's Code of Practice, to Council for approval.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain.

(ii) Advise the name of the appointed developer's representative fulfilling engineering responsibilities as detailed in section 1.4.1 of the Code of Practice.

(iii) After engineering approval has been given and prior to commencing construction, contact Council's Call Centre on 839 0400 to arrange a QA Pre-Start Meeting. Allow 3 working days for the QA Pre-Start Meeting to be booked.

(iv) The applicant is required to ensure that the contracted drainlayer and developer's representative attend the QA Pre-Start Meeting, and that construction materials are on-site for inspection.

(v) EcoWater's QA Supervisor will then undertake random site inspections throughout the construction process.

(vi) Upon completion of construction the applicant's surveyor is required to prepare As-Built plans in accordance with the Code of Practice, and CCTV inspection of the drains are to be carried out.

(vii) The developer's representative is required to fully inspect the drainage including overseeing the drainage tests, view the cctv's and check against the as-builts, and ensure that any remedial works are completed.

(viii) When the developer's representative is satisfied that all works meet Council standards, they are required to complete the 'QA Final Inspection Request Form' and lodge this at Council together with As-Builts, CCTV (all footage on one DVD), log sheets, chlorination certificate for watermains, and inspection reports.

(ix) EcoWater's QA Supervisor will check all information against the approved design and Code of Practice, then undertake a field check and testing of the new drainage systems in conjunction with Council's approved maintenance contractor.

(x) When all public works and documentation are completed to Council's satisfaction the QA Completion Certificate will be issued to the applicant.

(xi) Submit a copy of the QA Completion Certificate with the application for s224c Certificate as evidence of compliance with the conditions of consent requiring construction of infrastructure to public standards.

(xii) Pay all of Council's engineering fees and costs associated with engineering approvals, quality assurance site inspections, as-built & cctv approvals, final inspections, testing and bond management.

FEES, BONDS & CONTRIBUTIONS

(FC 1) Pursuant to Sections 407 & 409 of the Resource Management Act, the

following financial contributions have been assessed for the proposed development, and are required to be paid in full prior to issue of the 224c:

(i) Twin Streams Contribution (Oratia catchment) totalling $207,492.01 inclusive of GST - calculated based on 18 medium density Units @ $1,670.63 (incl. GST) per additional Unit, and 59 residential Lots @ $3,007.13 (incl. GST) per additional Lot.

(FC 1) Pursuant to Section 108(2)(b) and Section 108A, and in accordance with Council's Code of Practice for City Infrastructure and Land Development, the applicant is required to provide a maintenance bond to Council, equivalent to 2½% (minimum $500.00) of the value of works being taken over by Council. This maintenance bond will be held for six months from the date of 224c issue, or until 31 October, whichever is longer. Maintenance of these assets are the responsibility of the developer during the maintenance period. At the end of the maintenance period the QA Supervisor will undertake a maintenance inspection to ascertain whether the assets are still in satisfactory condition and if so, will instruct the bond to be released, and Council will take over maintenance responsibilities from that time forward. Where defects occur during the developer's maintenance liability period, the costs of repairing such defects are the full responsibility of the developer. Where the developer does not repair the defects, Council will retain the bond monies for use in repairing the defects, and refund any residual monies held to the developer. The developer's liability is not limited to the amount of the maintenance bond, and any additional costs will be invoiced to the developer and will become a debt due to the Council.

Waitakere City Council
Te Tatao o Waitakere

Memorandum

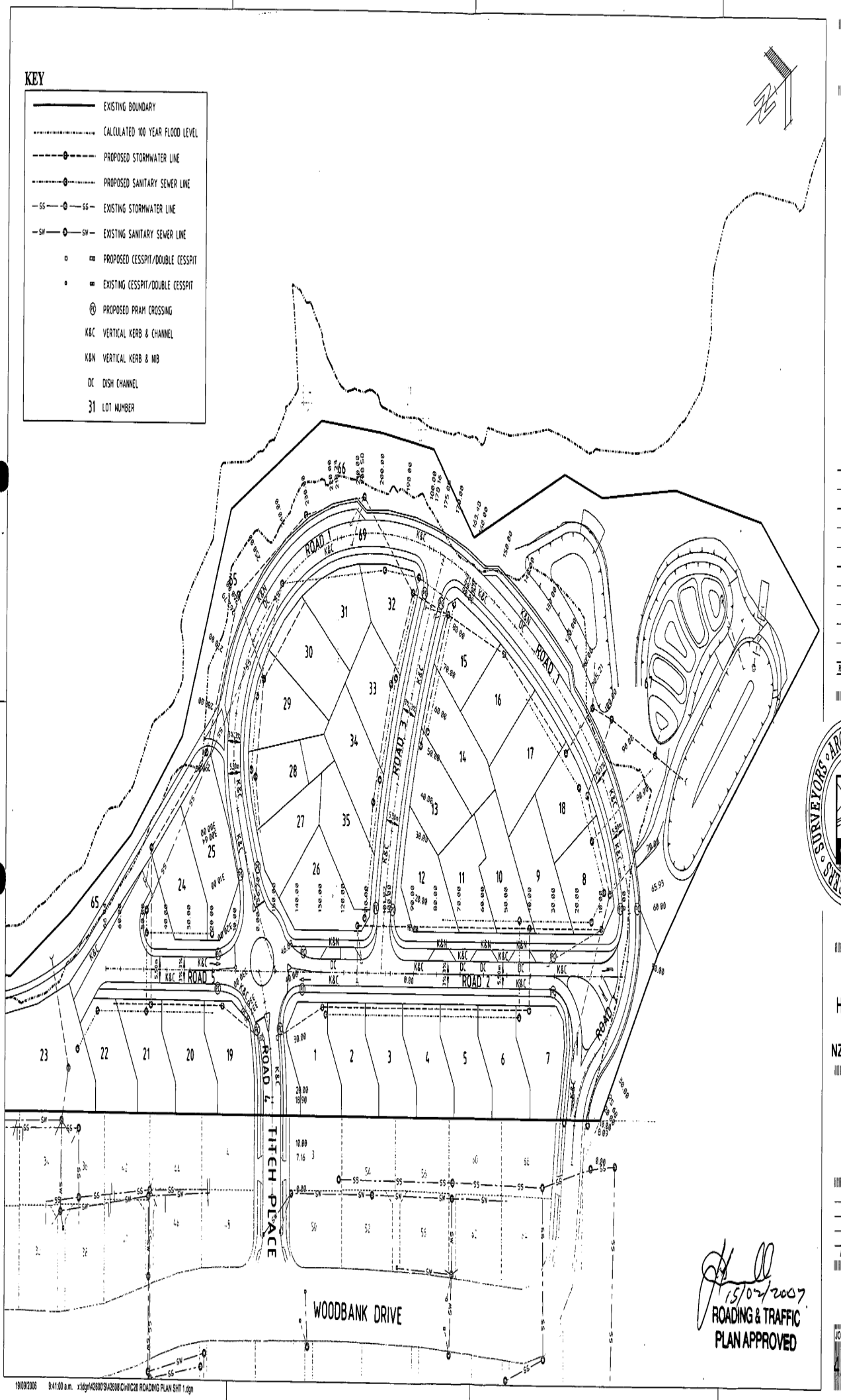
To	TRANSPORT ASSETS – Attn: Adam Moller		
From	SUBDIVISION CONSENTS	Kristin Spyve	
Date	2/2/2007	ADDRESS	423-429 West Coast Road
Subject	SPW	RMA 20061078 ENG.DWG.NO.	

Request for engineering approval.

Please contact the Consultant directly for further information. Once approval is given complete pathway task, add approval decision/ conditions to pathway and send a hard copy and two sets of approved plans to myself.

Kind regards
Kristin

15/02/2007.
ROADING & TRAFFIC
PLAN APPROVED



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	07.09.06	INTERSECTIONS AMENDED	FK	DMR

DRAWING REVISIONS

Babbage CONSULTANTS
SURVEYORS • ARCHITECTS • ENGINEERS
109 FANSHAWE STREET
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AUCKLAND 1 · NEW ZEALAND
PHONE 09 - 379 9580 · FAX 09 - 377 1170
admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROADING PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GW
CHECKED	Sept 06	DMR
APPROVED	Sept 06	

SCALE (A1)

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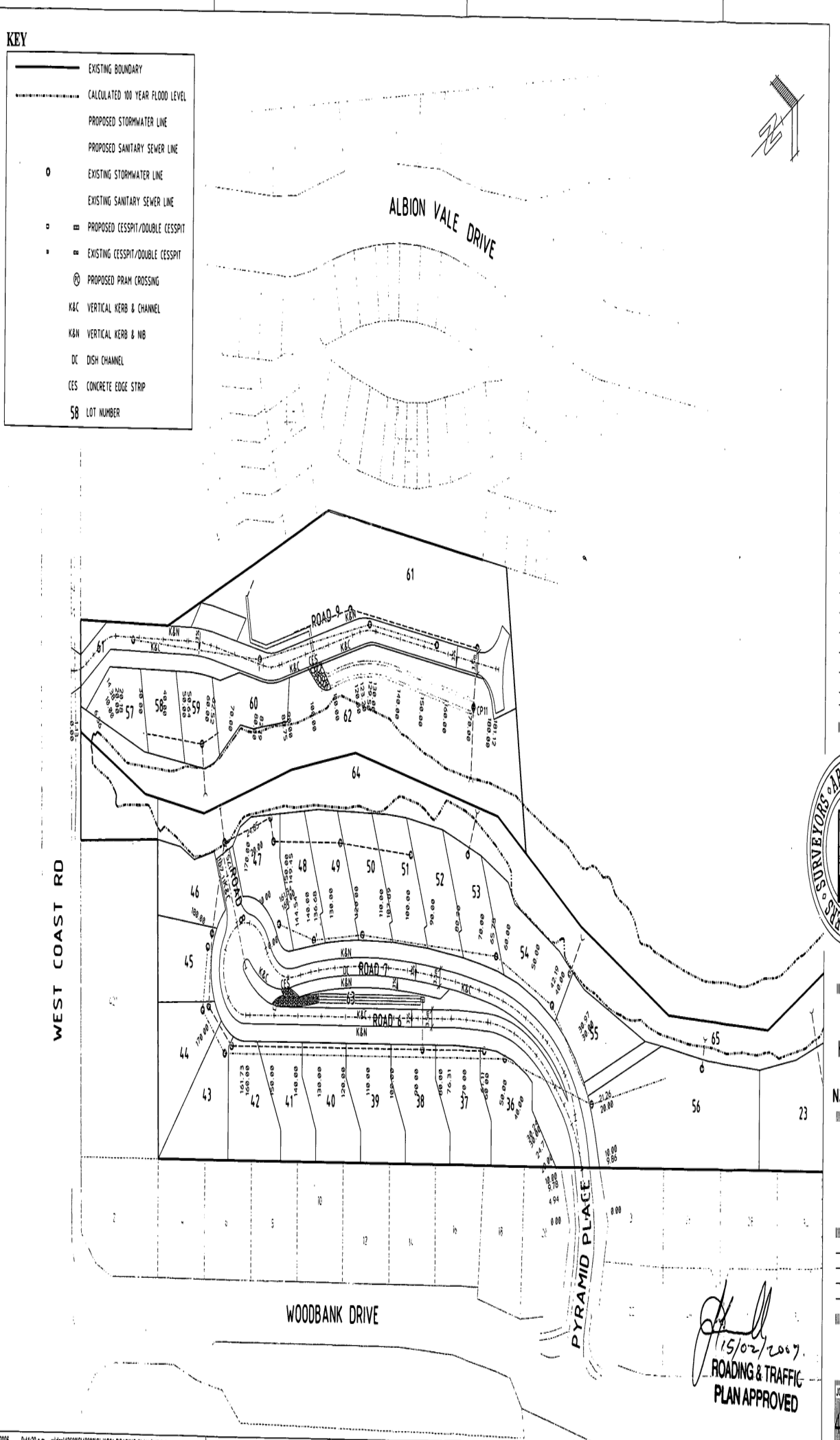
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C20	A

15/09/2007
ROADING & TRAFFIC
PLAN APPROVED



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	07.09.06	SWALE ADDED	FK	DMR

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROADING PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GW
CHECKED	Sept 06	DMR
APPROVED	Sept 06	"

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C21	A

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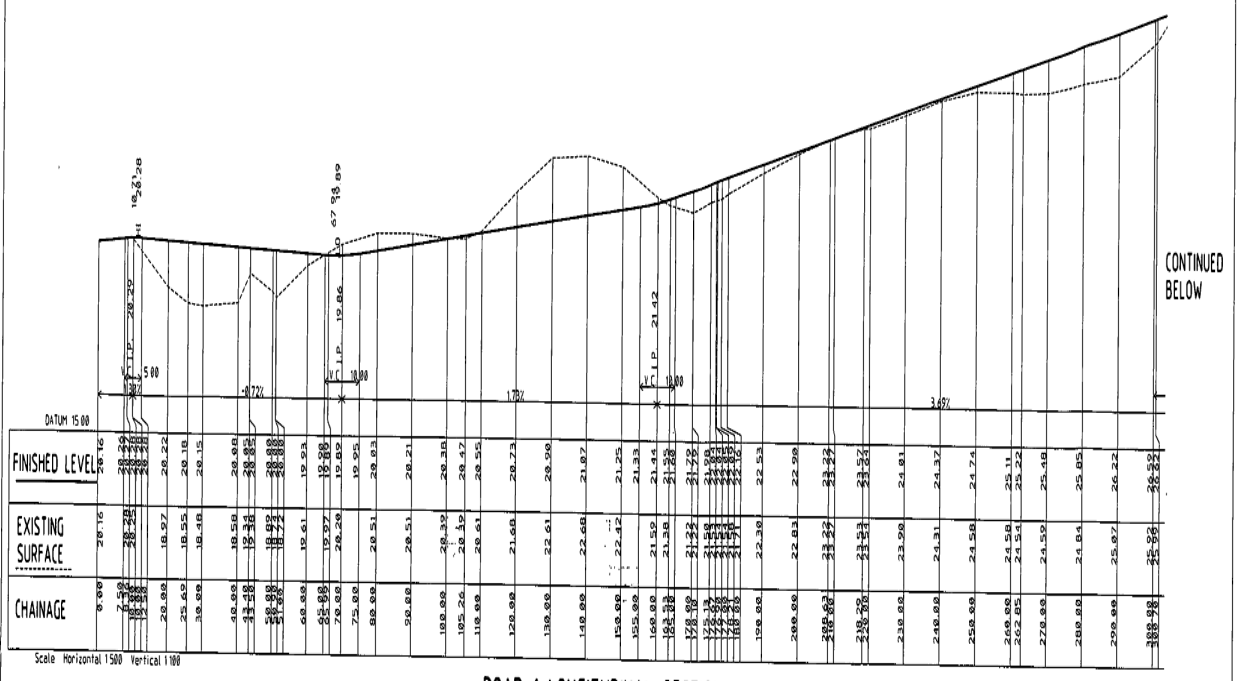

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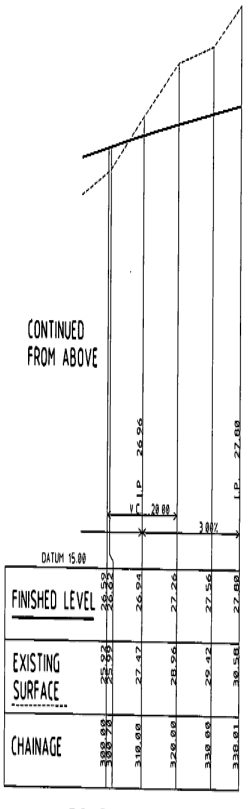

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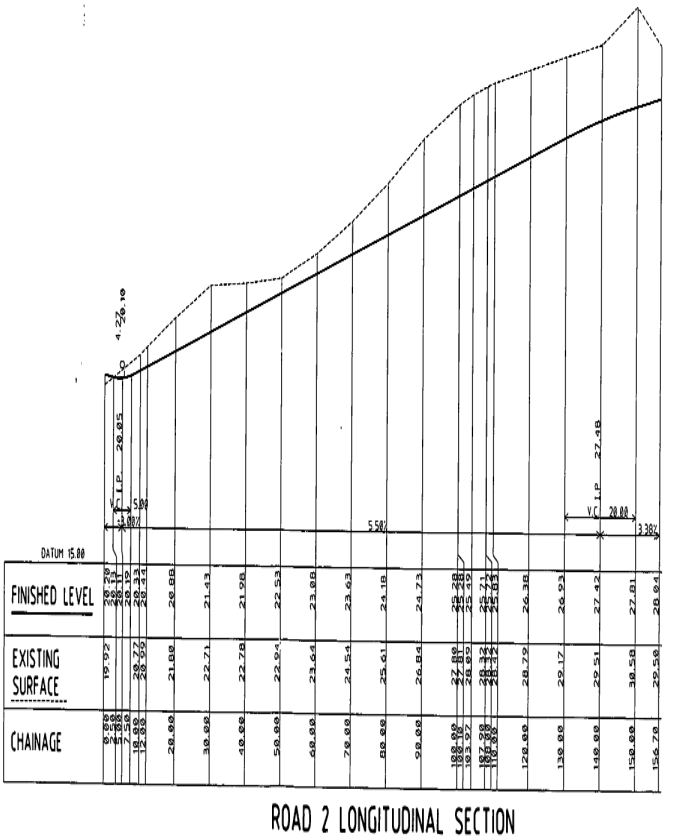

ROAD 2 LONGITUDINAL SECTION

15/02/2007.
ROADING & TRAFFIC PLAN APPROVED

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS

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admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROAD LONGITUDINAL SECTIONS (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 06	FK
DRAWN	JUNE 06	GW
CHECKED	Sept 06	DM
APPROVED	Sept 06	

SCALE (A1)

HORT 1:500 VERT 1:100

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C22	-

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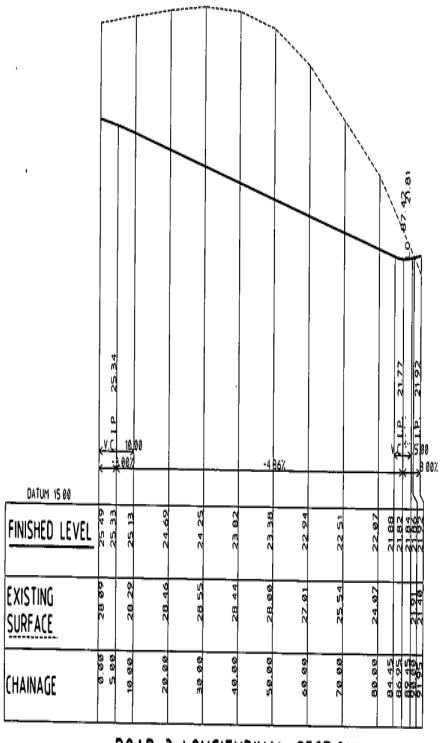

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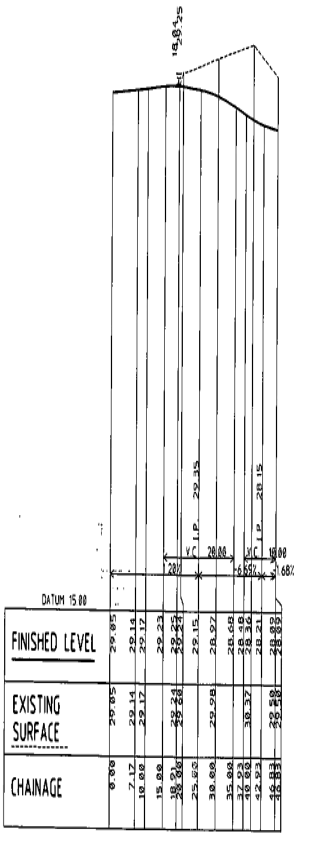

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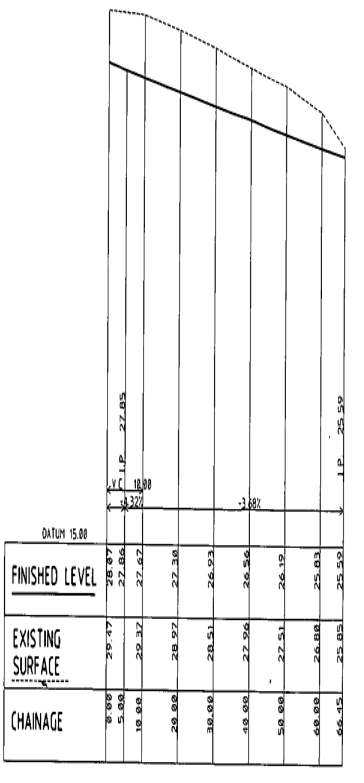

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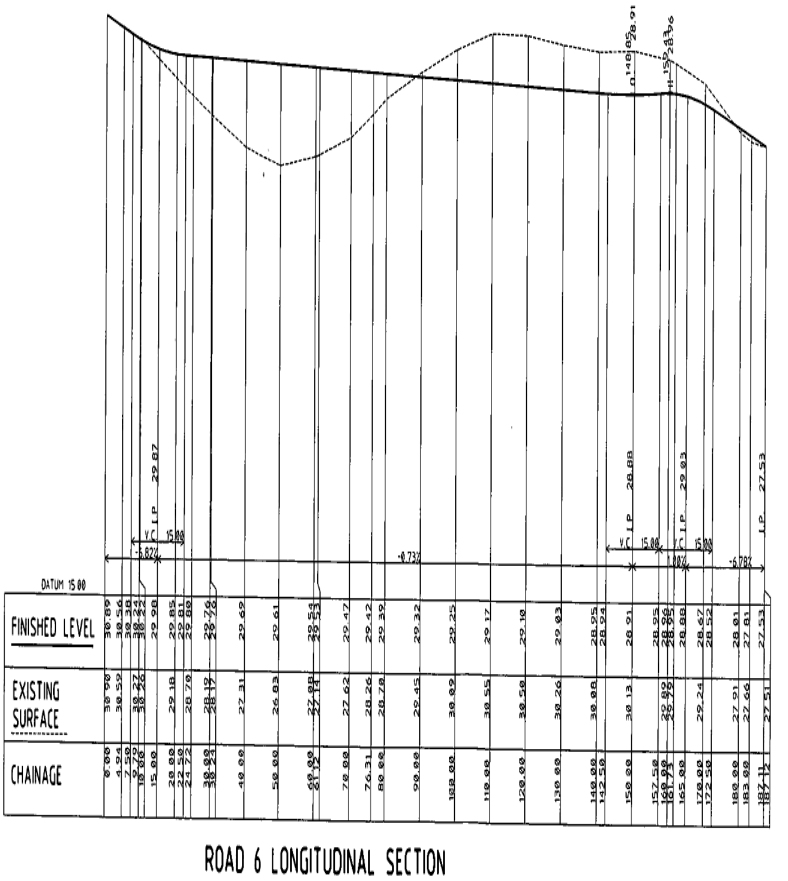

ROAD 6 LONGITUDINAL SECTION

15/02/2007.
ROADING & TRAFFIC
PLAN APPROVED

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS

Babbage CONSULTANTS
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AUCKLAND 1 · NEW ZEALAND
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admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROAD LONGITUDINAL SECTIONS (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 06	FK
DRAWN	JUNE 06	GW
CHECKED	Sept 06	dmf.
APPROVED	Sept 06	TP

SCALE (A1)

HORT 1:500 VERT 1:100

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C23	-

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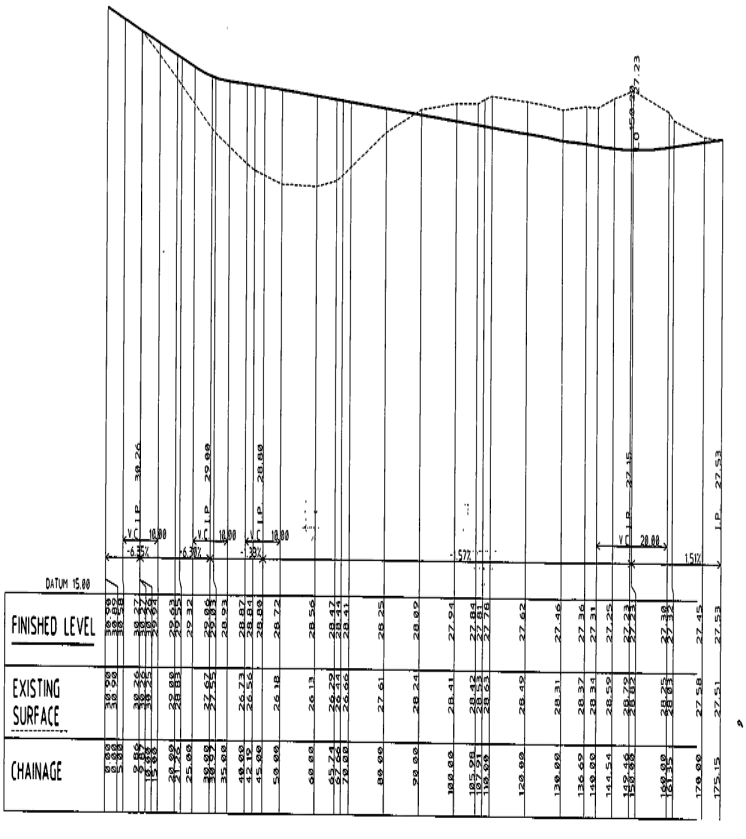

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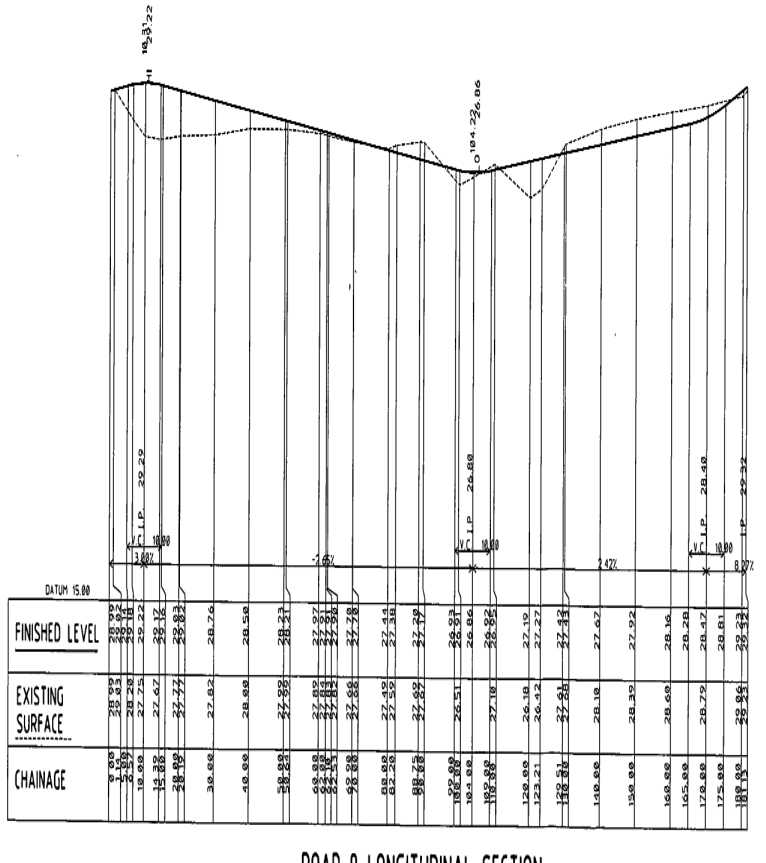

ROAD 9 LONGITUDINAL SECTION

15/02/2007.
ROADING & TRAFFIC
PLAN APPROVED

REV	DATE	DESCRIPTION	DRAWN	CHECK

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROAD LONGITUDINAL SECTIONS (SHEET 3)

	DATE	INITIAL
DESIGNED	JUNE 06	FK
DRAWN	JUNE 06	GW
CHECKED	Sept 06	DMR
APPROVED	Sept 06	

SCALE (A1)

HORT 1:500 VERT 1:100

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C24	-

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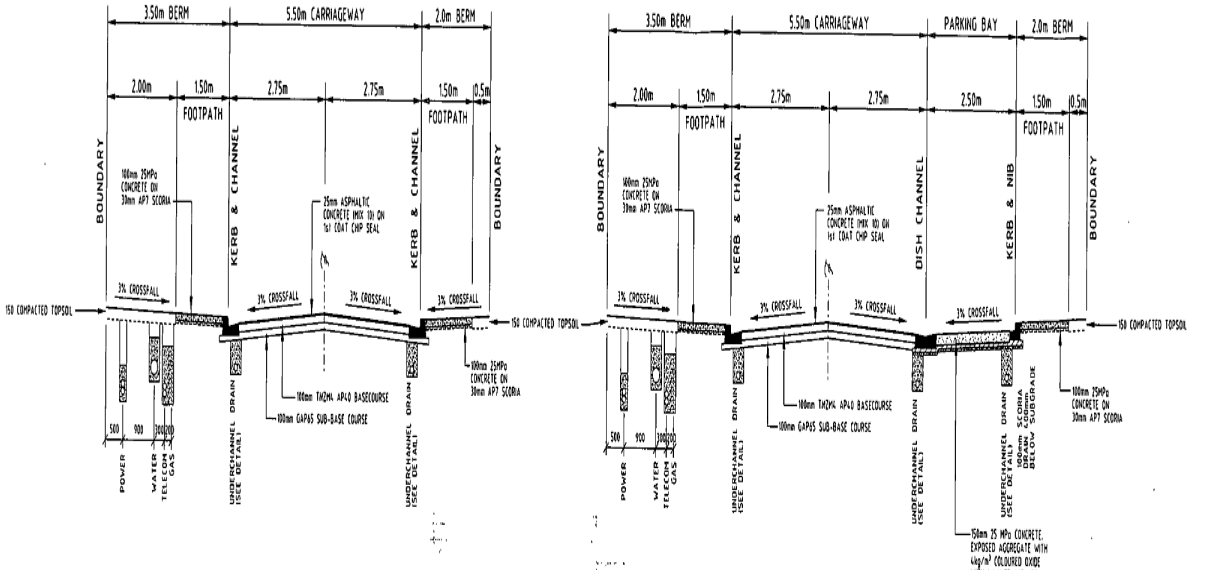
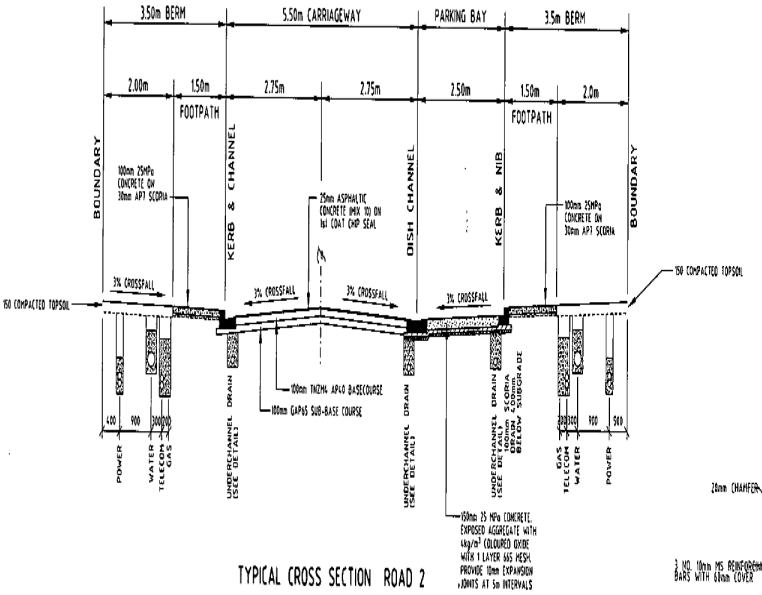
DRAWING NOTES

1. PAVEMENT CONSTRUCTION DEPTHS HAVE BEEN CALCULATED USING AN ASSUMED CBR VALUE OF 3. FINAL PAVEMENT CONSTRUCTION DEPTHS TO BE CONFIRMED FOLLOWING ON SITE SUBGRADE TESTING.



TYPICAL CROSS SECTION ROAD 1
WITHOUT PARKING BAY

TYPICAL CROSS SECTION ROAD 1
WITH PARKING BAY



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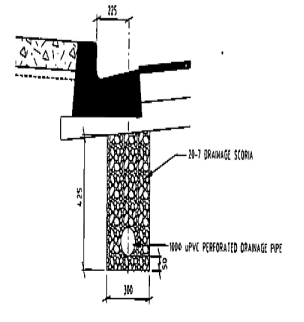
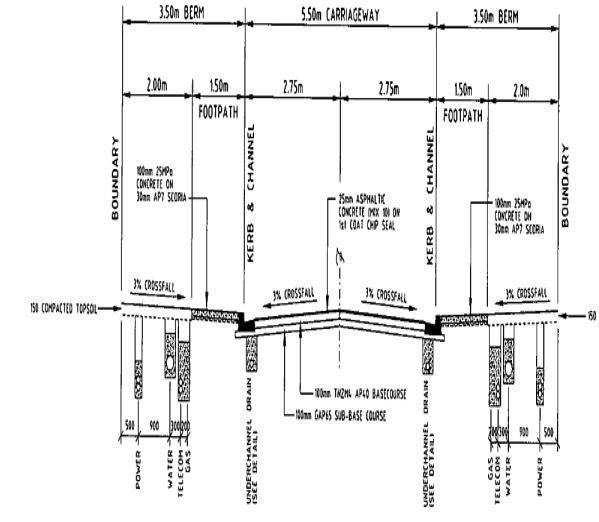
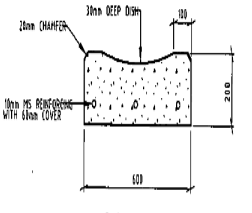


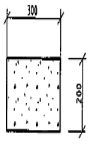
UNDERCHANNEL DRAIN



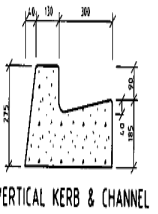
TYPICAL CROSS SECTION ROAD 3



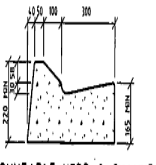
DISH CHANNEL



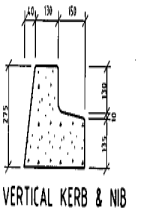
CONCRETE EDGE STRIP



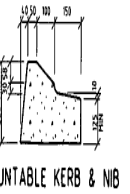
VERTICAL KERB & CHANNEL



MOUNTABLE KERB & CHANNEL



VERTICAL KERB & NIB



MOUNTABLE KERB & NIB

15/02/2007.
ROADING & TRAFFIC
PLAN APPROVED

INSITU KERB DETAILS
SCALE 1:10

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	7.09.06	VARIOUS	FK	

DRAWING REVISIONS

Babbage CONSULTANTS
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admin@babbage.co.nz

CLIENT / PROJECT
WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE
ROAD
CROSS SECTIONS
(SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GB
CHECKED	Sept 06	DWC
APPROVED	Sept 06	

SCALE (A1)
1:50

JOB NUMBER	DRAWING NUMBER	REVISION
42808	C25	A

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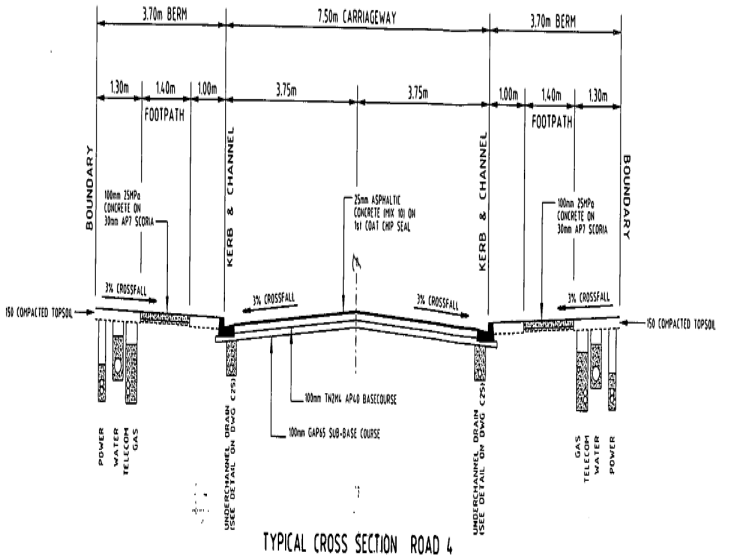
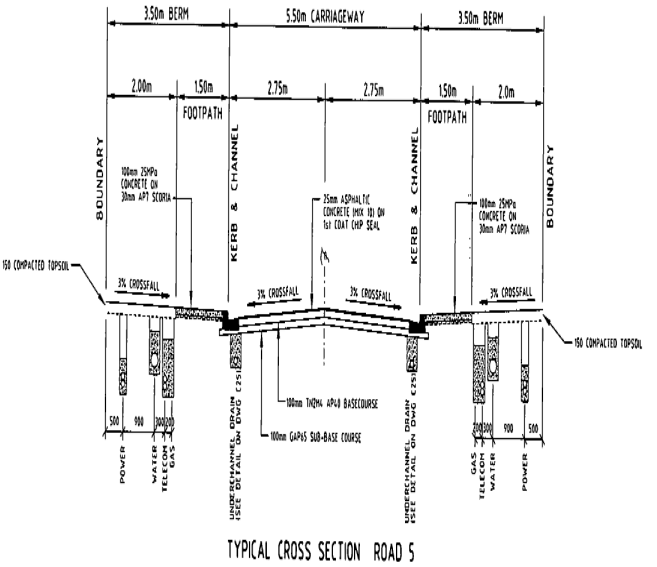
DRAWING NOTES

1. PAVEMENT CONSTRUCTION DEPTHS HAVE BEEN CALCULATED USING AN ASSUMEND CBR VALUE OF 3. FINAL PAVEMENT CONSTRUCTION DEPTHS TO BE CONFIRMED FOLLOWING ON SITE SUBGRADE TESTING.



TYPICAL CROSS SECTION ROAD 4



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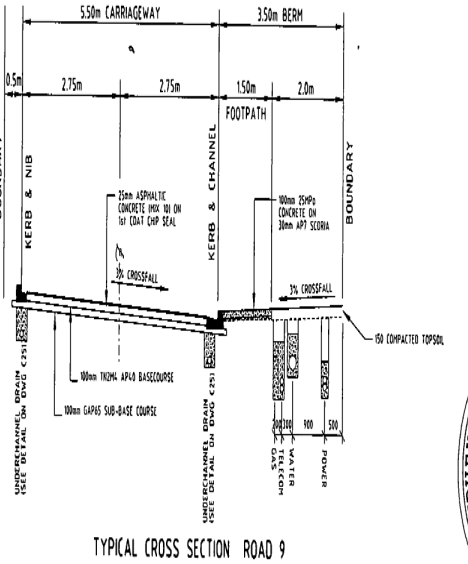
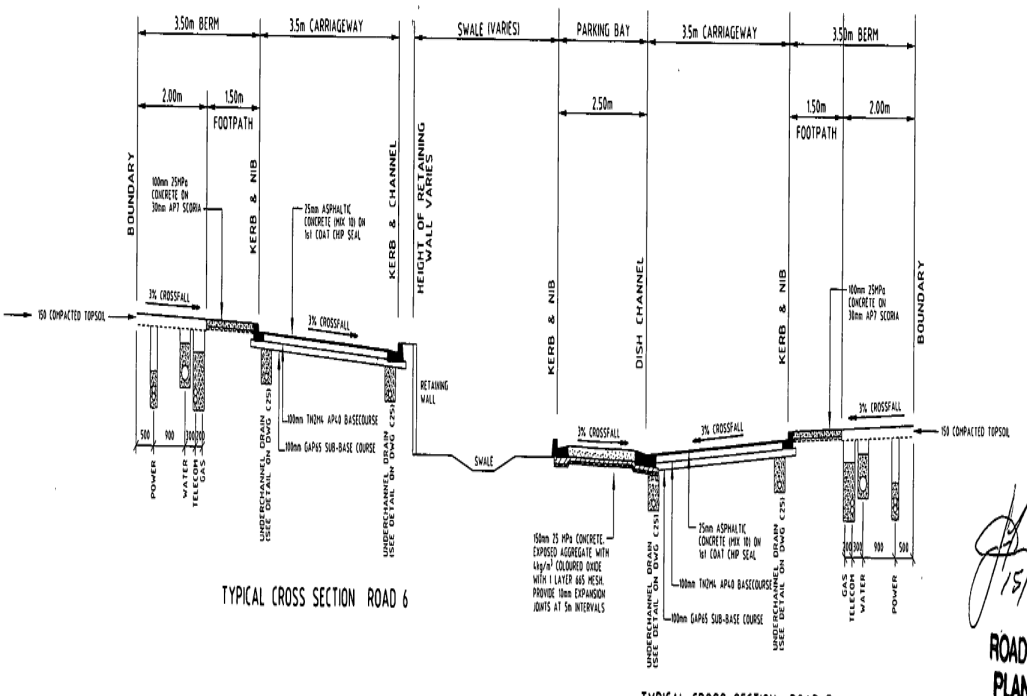


TYPICAL CROSS SECTION ROAD 9



TYPICAL CROSS SECTION ROAD 6

TYPICAL CROSS SECTION ROAD 7

15/02/2007.

ROADING & TRAFFIC PLAN APPROVED

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	07.09.06	VARIOUS AMENDMENTS	FK	DWR

DRAWING REVISIONS

Babbage CONSULTANTS
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admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

ROAD CROSS SECTIONS (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GB
CHECKED	Sept 06	DWR
APPROVED	Sept 06	IP

SCALE (A1)

1:50

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C26	A

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
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Henderson

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Waitakere City 0612

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20 February 2007

BABBAGE CONSULTANTS LTD
PO Box 2027
Shortland Street
AUCKLAND 1140

21/2/07.

Dear Sir / Madam

Application Number: SUB-2006-1078
Applicant Name: NEW ZEALAND HOUSING FOUNDATION
Application Address: 423-429 West Coast Road, GLEN EDEN

ENGINEERING PLAN APPROVAL

The engineering plans submitted by Babbage Consultants Ltd, and as listed below are hereby APPROVED FOR CONSTRUCTION, subject to the engineering conditions noted below each subdivision condition in BOLD. Prior to commencing construction contact Council's to arrange a QA Pre-Start Meeting.

Ref	42608	Sheet	C10	Revision	I	Dated	190207
Ref	42608	Sheet	C11	Revision	E	Dated	190207
Ref	42608	Sheet	C14	Revision	A	Dated	230107
Ref	42608	Sheet	C37	Revision	C	Dated	230107
Ref	42608	Sheet	C38	Revision	F	Dated	190207
Ref	42608	Sheet	C39	Revision	F	Dated	190207
Ref	42608	Sheet	C40	Revision	F	Dated	190207
Ref	42608	Sheet	C41	Revision	D	Dated	120207
Ref	42608	Sheet	C42	Revision	D	Dated	050207
Ref	42608	Sheet	C43	Revision	B	Dated	050207

The engineering plans have been assessed against the subdivision consent conditions and Council's Code of Practice for City Infrastructure and Land Development,
Engineering Plan Approval is valid for 6 months from the date of issue to cater for technical updates to the Code of Practice. This engineering plan approval will lapse on (20/08/2007), unless a QA Pre-Start Meeting has been held, and construction has commenced prior to the lapse date.

PUBLIC DRAINAGE INFRASTRUCTURE – ECOWATER SECTION 224 CONDITIONS

(DE 1) Provide a catchment analysis detailing any 1 in 100 year overland flowpaths that will exist through the proposed residential Lots upon completion of earthworks, including a possible overland flowpath occurring over proposed Lots 44-46. Wherever possible, keep all overland flowpaths contained within the legal road reserve and discharge to the drainage reserve with a minimum of nuisance. Provide an As-Built plan, long section and cross sections, prepared by a Licenced Cadastral Surveyor to demonstrate that completed overland flowpath(s) meets the design requirements. Provide a drainage easement in favour of Council over all areas required to maintain unobstructed overland flow. All buildings are required to be located entirely outside the 1 in 100 year overland flowpath area, and with a finished floor level not less than 500mm

above the 1 in 100 year overland flowpath level for catchments over 2 hectares (200mm for catchments less than 2 hectares). This information will be recorded on Council's Hazards and Special Features Register.

(DE 1) Design, provide and install a complete public wastewater reticulation system to serve all Lots in compliance with Councils Code of Practice for City Infrastructure and Land Development (Refer Section 5.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Locate all drainage lines in the front of Lots where possible to provide ease of access for future maintenance requirements.

(iii) Re-route the existing public drainage lines passing through Lot(s) 31-32 to provide more adequate building sites for those Lots. At the stage of engineering approval a quote will be obtained from Councils contractor for the new manholes required on the existing wastewater network.

RELAY REQUIREMENTS – Contact WCC call centre immediately and advise of any difficulties and/or complications, EcoCity City Services shall be advised and action taken as required/directed.

Relay approval is subject to Eric Williams satisfaction prior to the commencement of works, a pre relay meeting is required.

(DE 2) Design, provide and install a complete public stormwater drainage system to serve all Lots in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Collect all existing stormwater discharges onto the land and provide for these catchments in the capacity of the new systems. This includes the existing public stormwater drains discharging at proposed Lots 44 and 23, and any others encountered during construction.

(iii) Clearance between the proposed stormwater pipes and the existing Watercare Services Ltd trunk wastewater drain is required to be a minimum of 0.5m, and no pipe points are permitted above the trunk wastewater drain, in accordance with the conditions of Watercare Services Ltd consent number D1415/06.

(iv) Abandoned public drainage is required to be either removed and backfilled with certified engineered fill, or grout filled. If grout filled, then foundations of future buildings will need to bridge over the trench and abandoned pipes.

(v) New stormwater outlets to the stream are required to discharge in the direction of flow to minimise erosion on the opposite bank.

No stormwater outlet structures other than the outlet detailed on C14 have

been approved, structures differing from these require specific approval

Approval excludes stormwater ponds, swales, and wetland

(DE 3) Design, provide and install a complete stormwater quality treatment system for the site in accordance with the Auckland Regional Council's TP10 '*Stormwater Management Devices Design Guideline Manual*', and WCC Code of Practice for City Infrastructure and Land Development (refer Section 4). Provide a copy of the engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All stormwater treatment and detention devices are required to be located clear of existing or proposed public drainage lines.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain. ~~This includes provision of a 0.5m thick impermeable compacted clay liner under the pond base, embankment and spillway to avoid seepage of pond water into the trenching material surrounding the drain~~. Provide evidence that this has been completed in the geotechnical completion report. Heavy machinery is required to be kept 2m clear of the Watercare Services Ltd trunk wastewater drain at all times during construction.

(ii) Provide in the design of the device for treatment of a fully developed upstream catchment. Detain the 2 year storm event and discharge at pre-development levels as required by the Parrs Stream Catchment Management Plan.

(iii) The existing pond on Lot 3 DP 339810 can be replaced by a quality treatment device that provides the equivalent level of treatment. Provide engineering plans and calculations to demonstrate that the proposed swale can achieve this, or alternatively provide written confirmation from ARC that the proposed swale is an acceptable form of treatment in this situation.

(iv) Provide a planting plan, including species list, quantities, and methodology to EcoWater and Parks for approval prior to commencing planting.

(v) Provide a surveyed as-built plan of the device showing all lid and invert levels, permanent water level, and contours at 200mm intervals below water level.

(vi) Provide a geotechnical completion report certifying construction of the pond.

(vii) Provide a maintenance manual for the treatment device.

(viii) Provide a drainage reserve over the entire area occupied by the treatment device, associated maximum flood water levels, and all areas necessary to access and maintain the treatment device.

(DE 4) Waitakere City Council holds a Comprehensive Discharge Consent from the ARC for the Parrs Stream catchment, and this proposal meets the recommendations of the Parrs Stream Catchment Management Plan subject to these conditions being met. It is the applicant's responsibility to obtain all other necessary consents, or evidence of dispensation, from the Auckland Regional Council, pay all associated costs and comply with any conditions imposed by the Regional Council.

(DE 5) Design, provide and install a complete public water supply reticulation system and fire fighting services to serve all Lots/Units in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 6). Provide engineering plans and calculations to Council for approval prior to

commencing works. Specific requirements:

(i) All Lots/Units are to be individually metered at the road reserve boundary. Ducting of private lines is recommended where they cross driveways.

(i) Locate all water connections at the same position as the power and telephone connection to each Lot/Unit.

(ii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(iii) Pay to the Council the cost of supervising the shut down of Council's water supply mains. This service includes Council providing written advice to all affected property owners and tenants.

(iv) Provide fire hydrants within 135m of the furthest point on any property, and within 65m of the end of a cul-de-sac.

(v) Where the required public system is on private property, easements over the course of such system in favour of Council will be necessary.

(DE 6) Design, provide and install a complete ICT Network along all new public roads for the future provision of ICT services within the development in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 8). Provide engineering plans to Council for approval prior to commencing works.

(DE 7) **Engineering Approval and Quality Assurance Process:** Public infrastructure works, as conditioned above, require Council's approval of engineering plans and specifications prepared by the applicant's engineer in accordance with Council's Code of Practice for City Infrastructure and Land Development.

(i) Submit full engineering plans, long sections and calculations, prepared in accordance with Council's Code of Practice, to Council for approval.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain.

(ii) Advise the name of the appointed developer's representative fulfilling engineering responsibilities as detailed in section 1.4.1 of the Code of Practice.

(iii) After engineering approval has been given and prior to commencing construction, contact Council's Call Centre on 839 0400 to arrange a QA Pre-Start Meeting. Allow 3 working days for the QA Pre-Start Meeting to be booked.

(iv) The applicant is required to ensure that the contracted drainlayer and developer's representative attend the QA Pre-Start Meeting, and that construction materials are on-site for inspection.

(v) EcoWater's QA Supervisor will then undertake random site inspections throughout the construction process.

(vi) Upon completion of construction the applicant's surveyor is required to prepare As-Built plans in accordance with the Code of Practice, and CCTV inspection of the drains are to be carried out.

(vii) The developer's representative is required to fully inspect the drainage including overseeing the drainage tests, view the cctv's and check against the as-builts, and ensure that any remedial works are completed.

(viii) When the developer's representative is satisfied that all works meet Council standards, they are required to complete the 'QA Final Inspection Request Form' and lodge this at Council together with As-Builts, CCTV (all footage on one DVD), log sheets, chlorination

certificate for watermains, and inspection reports.

(ix) EcoWater's QA Supervisor will check all information against the approved design and Code of Practice, then undertake a field check and testing of the new drainage systems in conjunction with Council's approved maintenance contractor.

(x) When all public works and documentation are completed to Council's satisfaction the QA Completion Certificate will be issued to the applicant.

(xi) Submit a copy of the QA Completion Certificate with the application for s224c Certificate as evidence of compliance with the conditions of consent requiring construction of infrastructure to public standards.

(xii) Pay all of Council's engineering fees and costs associated with engineering approvals, quality assurance site inspections, as-built & cctv approvals, final inspections, testing and bond management.

FEES, BONDS & CONTRIBUTIONS

(FC 1) Pursuant to Sections 407 & 409 of the Resource Management Act, the following financial contributions have been assessed for the proposed development, and are required to be paid in full prior to issue of the 224c:

(i) Twin Streams Contribution (Oratia catchment) totalling $207,492.01 inclusive of GST - calculated based on 18 medium density Units @ $1,670.63 (incl. GST) per additional Unit, and 59 residential Lots @ $3,007.13 (incl. GST) per additional Lot.

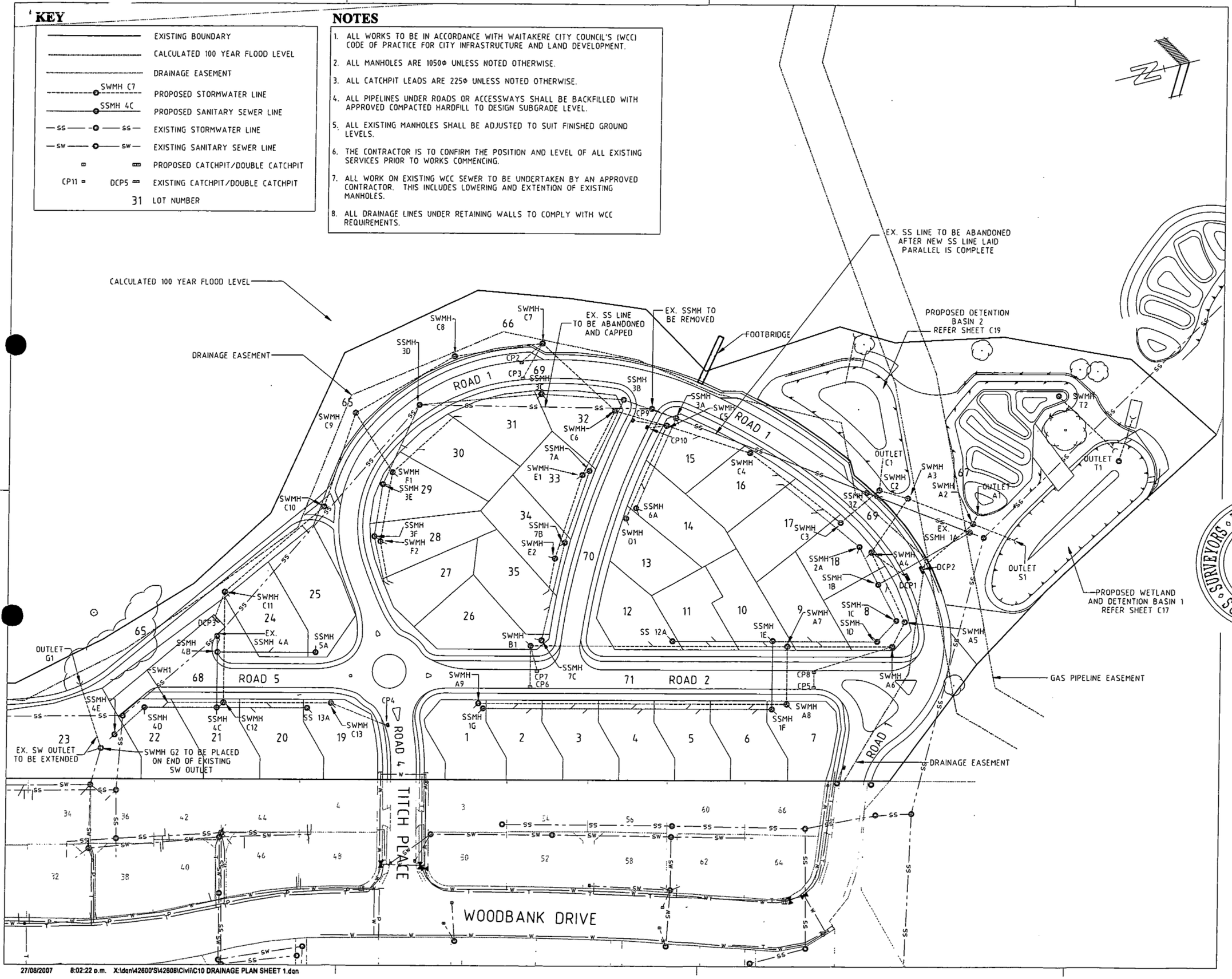
(FC 1) Pursuant to Section 108(2)(b) and Section 108A, and in accordance with Council's Code of Practice for City Infrastructure and Land Development, the applicant is required to provide a maintenance bond to Council, equivalent to 2½% (minimum $500.00) of the value of works being taken over by Council. This maintenance bond will be held for six months from the date of 224c issue, or until 31 October, whichever is longer. Maintenance of these assets are the responsibility of the developer during the maintenance period. At the end of the maintenance period the QA Supervisor will undertake a maintenance inspection to ascertain whether the assets are still in satisfactory condition and if so, will instruct the bond to be released, and Council will take over maintenance responsibilities from that time forward. Where defects occur during the developer's maintenance liability period, the costs of repairing such defects are the full responsibility of the developer. Where the developer does not repair the defects, Council will retain the bond monies for use in repairing the defects, and refund any residual monies held to the developer. The developer's liability is not limited to the amount of the maintenance bond, and any additional costs will be invoiced to the developer and will become a debt due to the Council.

KEY

———	EXISTING BOUNDARY
———	CALCULATED 100 YEAR FLOOD LEVEL
———	DRAINAGE EASEMENT
SWMH C7 ——o———	PROPOSED STORMWATER LINE
SSMH 4C ——o———	PROPOSED SANITARY SEWER LINE
— ss — o — ss —	EXISTING STORMWATER LINE
— sw — o — sw —	EXISTING SANITARY SEWER LINE
▫ ▫▫	PROPOSED CATCHPIT/DOUBLE CATCHPIT
CP11 ▫ DCP5 ▫▫	EXISTING CATCHPIT/DOUBLE CATCHPIT
31	LOT NUMBER

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Φ UNLESS NOTED OTHERWISE.
3. ALL CATCHPIT LEADS ARE 225Φ UNLESS NOTED OTHERWISE.
4. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
5. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
6. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
7. ALL WORK ON EXISTING WCC SEWER TO BE UNDERTAKEN BY AN APPROVED CONTRACTOR. THIS INCLUDES LOWERING AND EXTENTION OF EXISTING MANHOLES.
8. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.



27/08/2007 8:02:22 p.m. X:\dan\42600'S\42608\Civil\C10 DRAINAGE PLAN SHEET 1.dan

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DRAWING NOTES

APPROVED 20/7/07

REV	DATE	DESCRIPTION	DRAWN	CHEC
O	220807	WETLAND POND AMENDED	FK	
N	300407	CP ADDED TO BEGINNING OF ROAD 1	FK	NSL
M	160407	SWMH C10 MOVED	FK	NSL
L	270307	CP5 MOVED TO RD 2 DCP1 & 2 MOVED	FK	
K	090307	FOOTBRIDGE ALIGNMENT AMENDED	FK	
J	280207	SSMH 3C AND HC'S FOR LOTS 31 AND 32 AMENDED	FK	
I	190207	REV H REVERSED	FK	
H	120207	SS LINE 4B TO 5A DELETED HC TO LOTS 24/25 AMENDED	FK	
G	050207	MH'S ADDED TO LINES SS12 AND SS13	FK	
F	310107	VARIOUS AMENDMENTS	FK	
E	17.01.07	VARIOUS AMENDMENTS	MSO	
D	091006	TEXT AMENDED FOR SS LINE 3A TO 1A	FK	DR
C	210906	SSMH 3Z ADDED	FK	DR
B	150806	POND ADDED	FK	DR
A	150806	VARIOUS AMENDMENTS	FK	DR

DRAWING REVISIONS

SURVEYORS · ARCHITECTS · ENGINEERS
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admin@babbage.co.

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATIO

DRAWING TITLE

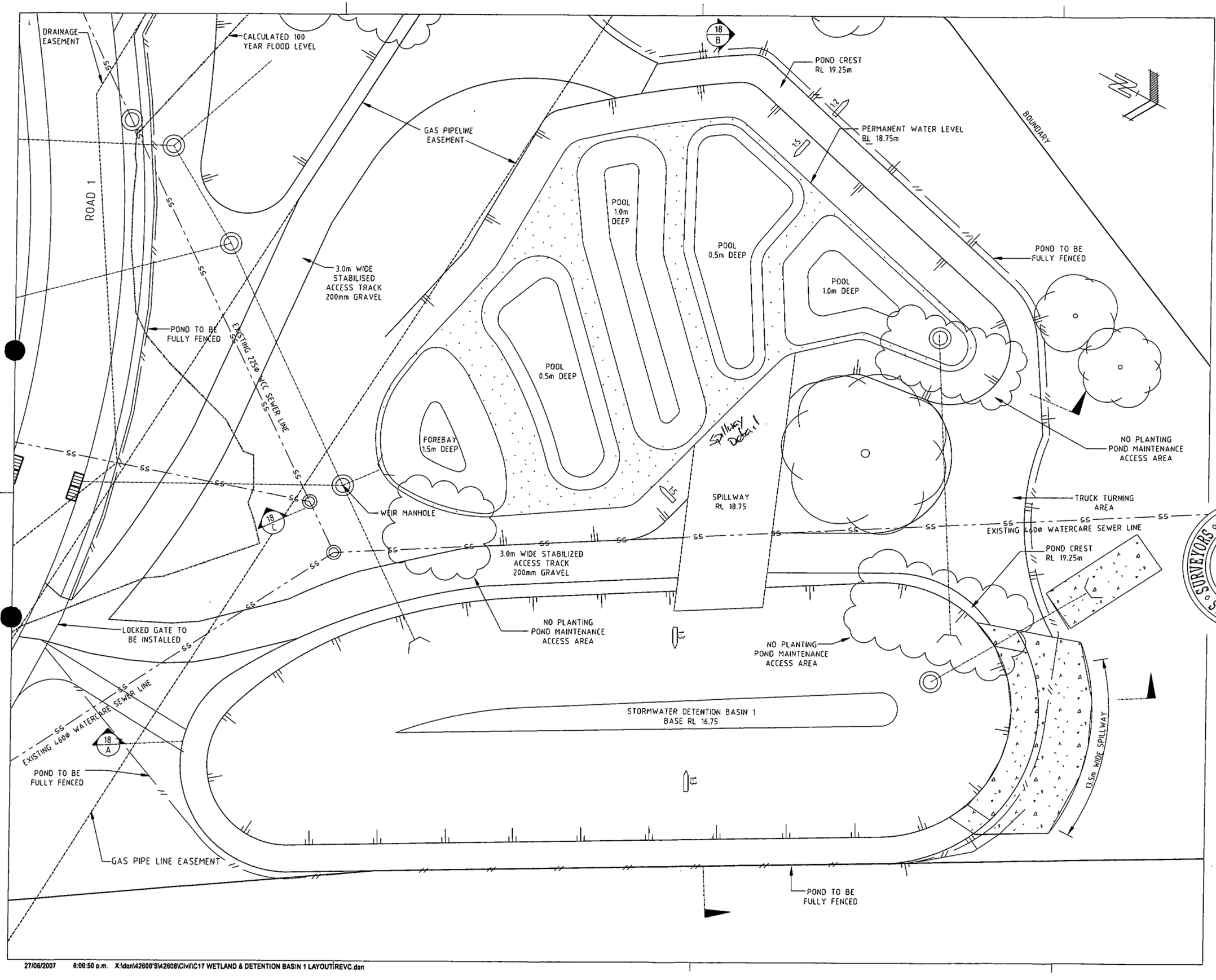
DRAINAGE PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C10	N



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DRAWING NOTES

1. ALL WORKS TO BE IN ACCORDANCE WIT WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. SAFETY SIGNS TO BE ERECTED AS WCC STANDARD DRAWING SD 4.22.

APPROVED
20/7/07.

REV	DATE	DESCRIPTION	DRAWN	CHE
C	220607	WETLAND AMENDED	FK	
B	020407	VARIOUS AMENDMENTS	FK	
A	0808	VARIOUS AMENDMENTS	FK	

DRAWING REVISIONS

ENGINEERS ARCHITECTS SURVEYORS
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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN

FOR

NZ HOUSING FOUNDATIO

DRAWING TITLE

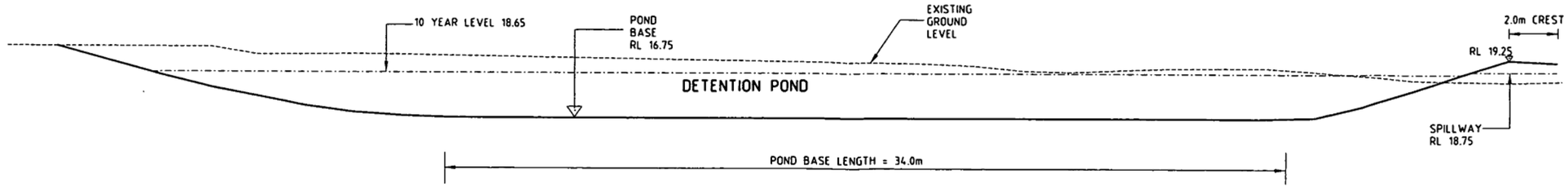
WETLAND & DETENTION BASIN 1 LAYOUT

	DATE	INITIAL
DESIGNED	JUNE 2006	DMR
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

SCALE (A1)

1:125

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C17	C



SECTION A-A'
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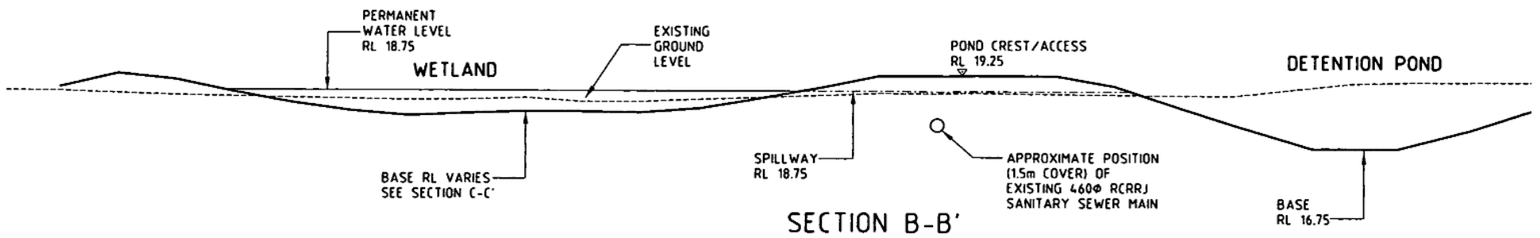

SECTION B-B'
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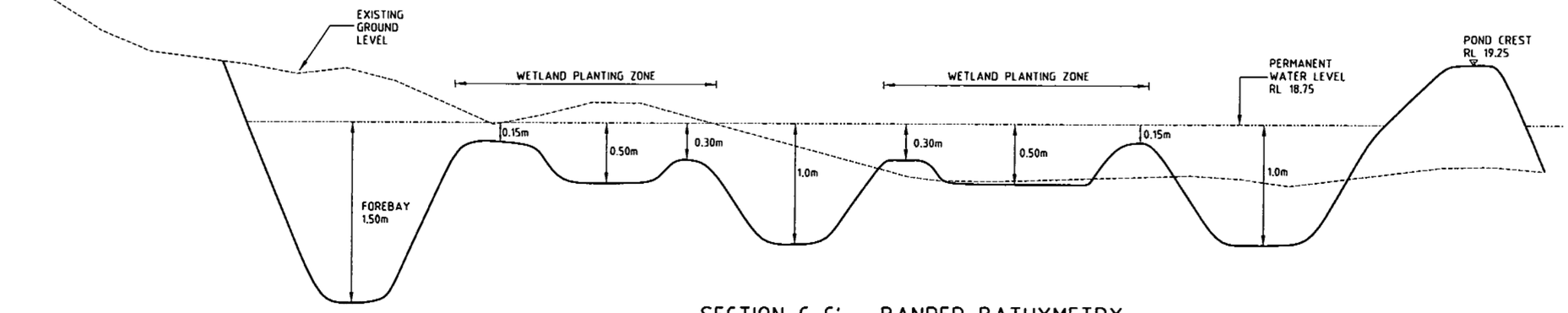
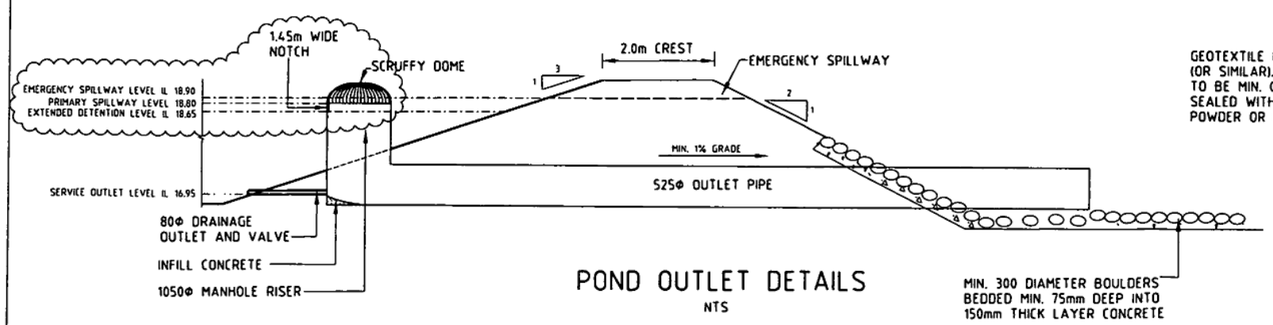
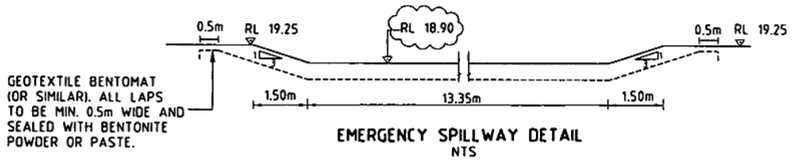


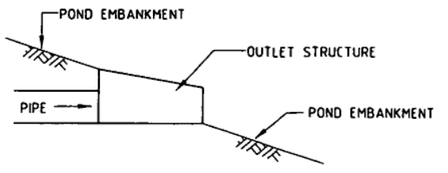
SECTION C-C' - BANDED BATHYMETRY
SCALE HORT 1:100 VERT 1:20



POND OUTLET DETAILS
NTS



EMERGENCY SPILLWAY DETAIL
NTS



TYPICAL OUTLET STRUCTURE SITING ON POND BANK
NTS

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DRAWING NOTES

APPROVED
20/7/07

REV	DATE	DESCRIPTION	DRAWN	CHECK
B	16.08.06	WORDING AMENDED	FK	
A	29.06.06	WORDING AMENDED	DMR	

DRAWING REVISIONS

Babbage CONSULTANTS
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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

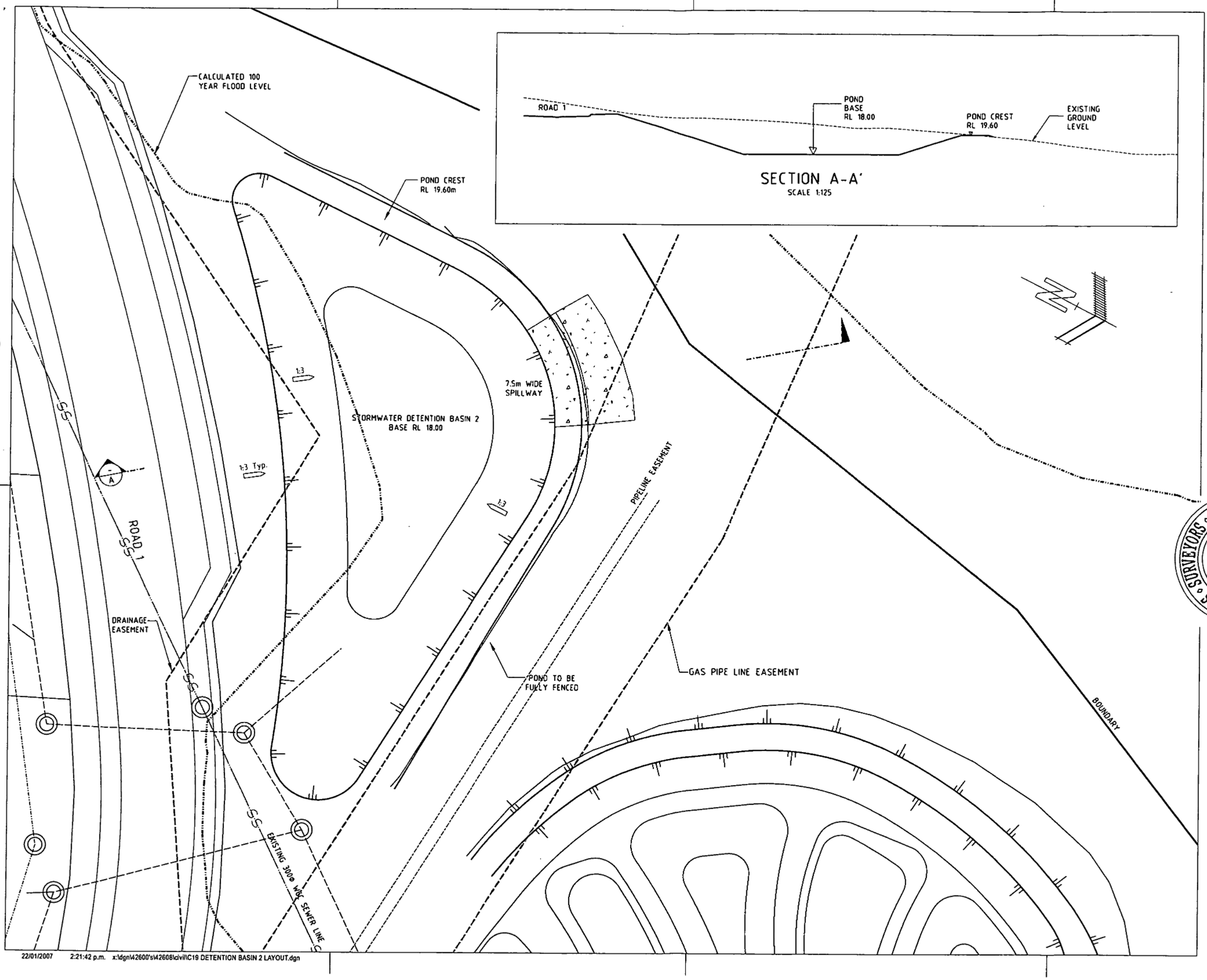
DRAWING TITLE

POND DETAILS PLAN

	DATE	INITIAL
DESIGNED	JUNE 2006	DMR
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

SCALE (A1)
AS SHOWN

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C18	B



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DRAWING NOTES

APPROVED 20/7/07

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE

DETENTION BASIN 2 LAYOUT

	DATE	INITIAL
DESIGNED	AUG 2006	DMR
DRAWN	AUG 2006	FK
CHECKED		
APPROVED		

SCALE (A1)
1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C19	-

22/01/2007 2:21:42 p.m. x:\dgn\42600's\42608\civil\C19 DETENTION BASIN 2 LAYOUT.dgn

Planting Schedules for Stormwater Pond No.1

423-429 West Coast Road, Henderson - Housing Development

Margin Zone
135.3 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Bau art	*Baumea articulata*	PB3	30-40	20%	10-20	2/m²	<1m	54	
Bau ter	*Baumea teretifolia*	PB3	30-40	20%	10-20	2/m²	<100	54	
Car vir	*Carex virgata*	PB3	20-40	20%	10-20	2/m²	<100	54	
Car tes	*Carex lessoniana*	PB3	20-40	20%	10-20	2/m²	<100	54	
Apo sim	*Apodasmia similis*	PB3	20-40	20%	10-20	2/m²	<150	54	
TOTAL				100%				270	

Lower Bank
160.4 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Ble nov	*Blechnum novae-zelandiae*	PB3	20-30	20%	15-20	0.5		128	Good coloniser
Cyp ust	*Cyperus ustulatus*	PB3	20-40	15%	10+	1.0	<100	24	
Pho ono	*Phormium tenax*	PB3	30-40	20%	5+	1.5	<100	14	
Cor ful	*Cortaderia fulvida*	PB3	20-40	20%	3+	2.0		8	Periodic Imersion
Cop pro	*Coprosma propinqua*	PB3	20	15%	7+	1.0		24	Periodic Imersion
Lep sco	*Leptospermum scoparium*	PB3	20+	10%	5-15	1.0		16	
TOTAL				100%				204	

Upper bank
164.4 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Art cir	*Arthropodium cirratum*	PB3	20+	5%	10+	0.5		33	
Cop rob	*Coprosma robusta*	PB3	25+	20%	5+	1.0		33	
Cor aus	*Cordyline australis*	PB3	30+	20%	3-7	1.0		33	
Dia nig	*Dianella nigra*	PB3	20+	5%	10+	0.5		33	
Heb str	*Hebe stricta*	PB3	20+	10%		1.0		16	
Myr aus	*Myrsine australis*	PB3	30+	20%	5+	1.5		15	
Pse arb	*Pseudopanax arboreus*	PB3	25+	20%	5+	1.0		33	
TOTAL				100%				165	

Specimen Trees

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Dac dac	*Dacrycarpus dacrioides*	PB18	0.5+		3-5	5.0		6	Plant on lower bank
Pod tot	*Podocarpus totara*	PB18	0.5+		3-5	5.0		2	
Syz mal	*Syzygium maire*	PB18	0.5+		3-5	5.0		2	Plant on lower bank
Vit luc	*Vitex lucens*	PB18	0.5+		3-5	5.0		3	
TOTAL				0%				13	

LEGEND:

- Margin Zone
- Lower Bank
- Upper Bank

NORTH

APPROVED 20/7/07

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REVISION	DATE:	DESCRIPTION:	DRAWN:	CHECKED
A	31.5.07	planting	AH	

DRAWING STATUS: DRAFT

PRODUCED BY:

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LANDSCAPE ARCHITECTURE
ENVIRONMENTAL PLANNING

CLIENT:

PROJECT TITLE:
West Coast Road
Housing Development

PROJECT NUMBER:	PLOT DATE:
SOUL-161	31.05.07

DRAWING TITLE:
Storm Water Pond No.1
PLANTING PLAN

DRAWING NUMBER:	SHEET NO:	REVISION
161-PP01	1/5	A

DRAWING SCALE: 1:100	APPROVED BY: CH
PAPER SIZE: A1	DRAWN BY: AH

DRAWING FILE LOCATION:
W:\Babbage - West Coast Road\CAD

Planting Schedules for Stormwater Pond No.2

423-429 West Coast Road, Henderson - Housing Development

Margin Zone

546.8 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Bau art	*Baumea articulata*	PB3	30-40	20%	10-20	0.7	<1m	223	
Bau ter	*Baumea teretifolia*	PB3	30-40	20%	10-20	0.7	<100	223	
Car vir	*Carex virgata*	PB3	20-40	20%	10-20	0.7	<100	223	
Car les	*Carex lessoniana*	PB3	20-40	20%	10-20	0.7	<100	223	
Typ ori	*Typha orientalis*	PB3	20-40	20%	10-20	0.7	<150	223	
TOTAL				100%				1116	

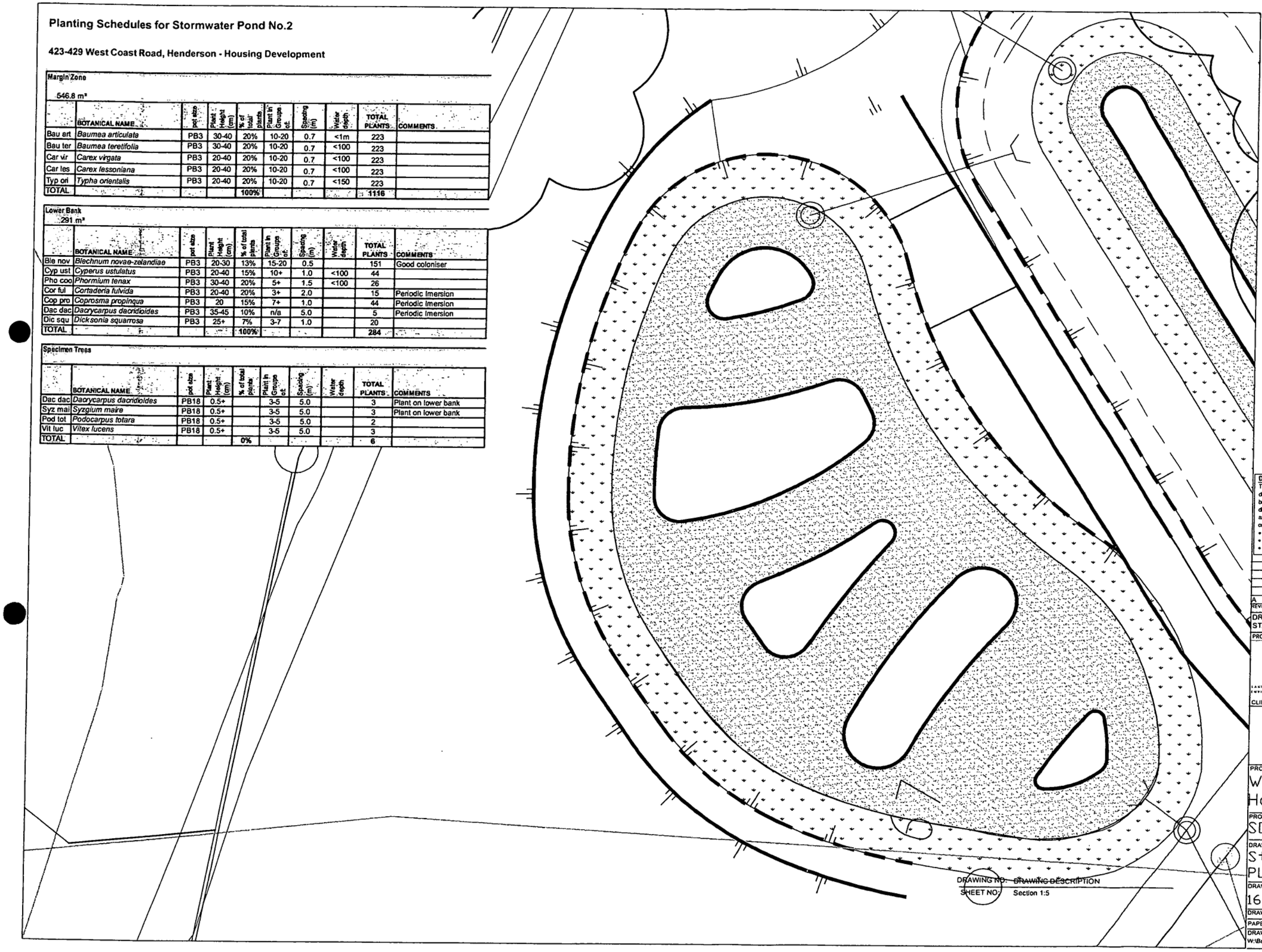
Lower Bank

291 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Ble nov	*Blechnum novae-zelandiae*	PB3	20-30	13%	15-20	0.5		151	Good coloniser
Cyp ust	*Cyperus ustulatus*	PB3	20-40	15%	10+	1.0	<100	44	
Pho coo	*Phormium tenax*	PB3	30-40	20%	5+	1.5	<100	26	
Cor ful	*Cortaderia fulvida*	PB3	20-40	20%	3+	2.0		15	Periodic Imersion
Cop pro	*Coprosma propinqua*	PB3	20	15%	7+	1.0		44	Periodic Imersion
Dac dac	*Dacrycarpus dacridioides*	PB3	35-45	10%	n/a	5.0		5	Periodic Imersion
Dic squ	*Dicksonia squarrosa*	PB3	25+	7%	3-7	1.0		20	
TOTAL				100%				284	

Specimen Trees

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Dac dac	*Dacrycarpus dacridioides*	PB18	0.5+		3-5	5.0		3	Plant on lower bank
Syz mai	*Syzgium maire*	PB18	0.5+		3-5	5.0		3	Plant on lower bank
Pod tot	*Podocarpus totara*	PB18	0.5+		3-5	5.0		2	
Vit luc	*Vitex lucens*	PB18	0.5+		3-5	5.0		3	
TOTAL				0%				6	



DRAWING NO: ~~DRAWING DESCRIPTION~~
SHEET NO: Section 1:5

LEGEND:

- Margin Zone
- Lower Bank
- Upper Bank

NORTH

APPROVED 20/7/07

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A	31.5.07	planting	AH	

DRAWING STATUS: DRAFT

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CLIENT:

PROJECT TITLE:
West Coast Road Housing Development

PROJECT NUMBER: SOUL-161
PLOT DATE: 31.05.07

DRAWING TITLE:
Storm Water Pond No.2 PLANTING PLAN

DRAWING NUMBER: 161-PP02
SHEET NO: 2/5
REVISION: A

DRAWING SCALE: 1:100
APPROVED BY: CH

PAPER SIZE: A1
DRAWN BY: AH

DRAWING FILE LOCATION:
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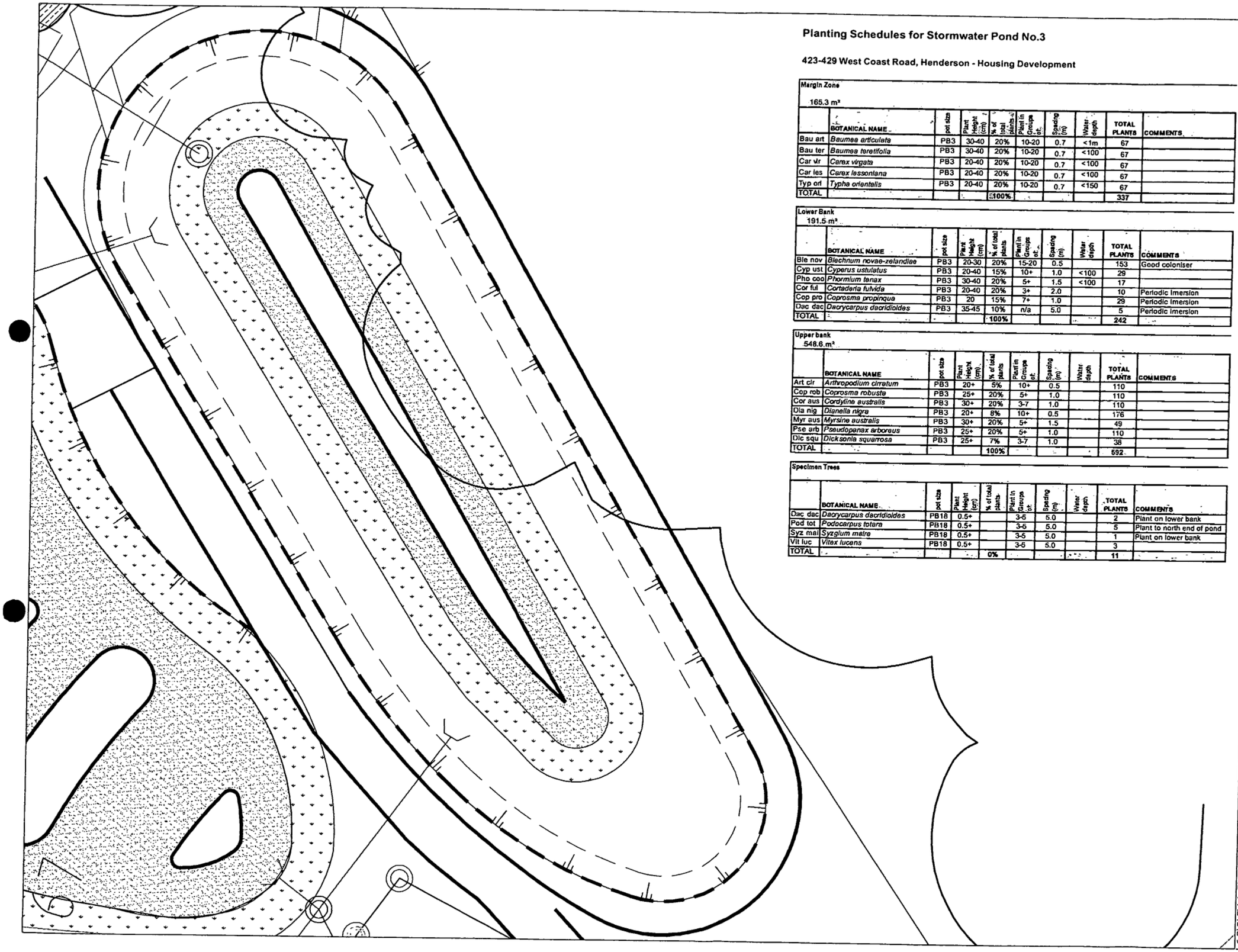

Planting Schedules for Stormwater Pond No.3

423-429 West Coast Road, Henderson - Housing Development

Margin Zone
165.3 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Bau art	*Baumea articulata*	PB3	30-40	20%	10-20	0.7	<1m	67	
Bau ter	*Baumea teretifolia*	PB3	30-40	20%	10-20	0.7	<100	67	
Car vir	*Carex virgata*	PB3	20-40	20%	10-20	0.7	<100	67	
Car les	*Carex lessoniana*	PB3	20-40	20%	10-20	0.7	<100	67	
Typ orl	*Typha orientelis*	PB3	20-40	20%	10-20	0.7	<150	67	
TOTAL				100%				337	

Lower Bank
191.5 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Ble nov	*Blechnum novae-zelandiae*	PB3	20-30	20%	15-20	0.5		153	Good coloniser
Cyp ust	*Cyperus ustulatus*	PB3	20-40	15%	10+	1.0	<100	29	
Pho coo	*Phormium tenax*	PB3	30-40	20%	5+	1.5	<100	17	
Cor ful	*Cortaderia fulvida*	PB3	20-40	20%	3+	2.0		10	Periodic Imersion
Cop pro	*Coprosma propinqua*	PB3	20	15%	7+	1.0		29	Periodic Imersion
Dac dac	*Dacrycarpus dacridioides*	PB3	35-45	10%	n/a	5.0		5	Periodic Imersion
TOTAL				100%				242	

Upper bank
548.6 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Art cir	*Arthropodium cirratum*	PB3	20+	5%	10+	0.5		110	
Cop rob	*Coprosma robusta*	PB3	25+	20%	5+	1.0		110	
Cor aus	*Cordyline australis*	PB3	30+	20%	3-7	1.0		110	
Dia nig	*Dianella nigra*	PB3	20+	8%	10+	0.5		176	
Myr aus	*Myrsine australis*	PB3	30+	20%	5+	1.5		49	
Pse arb	*Pseudopanax arboreus*	PB3	25+	20%	5+	1.0		110	
Dic squ	*Dicksonia squarrosa*	PB3	25+	7%	3-7	1.0		38	
TOTAL				100%				592	

Specimen Trees

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Dac dac	*Dacrycarpus dacridioides*	PB18	0.5+		3-5	5.0		2	Plant on lower bank
Pod tot	*Podocarpus totara*	PB18	0.5+		3-5	5.0		5	Plant to north end of pond
Syz mal	*Syzgium malre*	PB18	0.5+		3-5	5.0		1	Plant on lower bank
Vit luc	*Vitex lucens*	PB18	0.5+		3-5	5.0		3	
TOTAL				0%				11	

LEGEND:

- Margin Zone
- Lower Bank
- Upper Bank

NORTH

20/7/07

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A	31.5.07	planting	AH	

DRAWING STATUS: DRAFT

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CLIENT:

PROJECT TITLE:
West Coast Road
Housing Development

PROJECT NUMBER: SOUL-161

PLOT DATE: 31.05.07

DRAWING TITLE
Storm Water Pond No.3
PLANTING PLAN

DRAWING NUMBER: 161-PP03

SHEET NO: 3/5

REVISION: A

DRAWING SCALE: 1:100

APPROVED BY: CH

PAPER SIZE: A1

DRAWN BY: AH

DRAWING FILE LOCATION:
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20 July 2007

NEW ZEALAND HOUSING FOUNDATION
Babbage Consultants Limited
PO Box 2027
Shortland Street
AUCKLAND 1020

Dear Sir / Madam

Application Number: SUB-2006-1078
Applicant Name: NEW ZEALAND HOUSING FOUNDATION
Application Address: 423-429 West Coast Road, GLEN EDEN

ENGINEERING PLAN APPROVAL

The engineering plans submitted by Babbage Consultants Ltd, and as listed below are hereby APPROVED FOR CONSTRUCTION, subject to the engineering conditions noted below each subdivision condition in BOLD.

Ref	42608	Sheet	C10	Revision	N	Dated	22/06/07
Ref	42608	Sheet	C17	Revision	C	Dated	22/06/07
Ref	42608	Sheet	C18	Revision	B	Dated	16/08/06
Ref	42608	Sheet	C19	Revision	-	Dated	08/06
Ref	Soul 161	Sheet	1/5	Revision	A	Dated	31/5/07
Ref	Soul 161	Sheet	2/5	Revision	A	Dated	31/05/07
Ref	Soul 161	Sheet	3/5	Revision	A	Dated	31/05/07

The engineering plans have been assessed against the subdivision consent conditions and Council's Code of Practice for City Infrastructure and Land Development, ARC's TP10 Stormwater Treatment Devices Design Guideline Manual 2003, and ARC's TP124 Stormwater Low Impact Design Manual.

Engineering Plan Approval is valid for 6 months from the date of issue to cater for technical updates to the Code of Practice. This engineering plan approval will lapse on (20/01/08), unless a QA Pre-Start Meeting has been held, and construction has commenced prior to the lapse date.

PUBLIC DRAINAGE INFRASTRUCTURE – ECOWATER SECTION 224 CONDITIONS

(DE 1) Provide a catchment analysis detailing any 1 in 100 year overland flowpaths that will exist through the proposed residential Lots upon completion of earthworks, including a possible overland flowpath occurring over proposed Lots 44-46. Wherever possible, keep all overland flowpaths contained within the legal road reserve and discharge to the drainage reserve with a minimum of nuisance. Provide an As-Built plan, long section and cross sections, prepared by a Licenced Cadastral Surveyor to demonstrate that completed overland flowpath(s) meets the design requirements. Provide a drainage easement in favour of Council over all areas required to maintain unobstructed overland flow. All buildings are required to be located entirely outside the 1 in 100 year overland flowpath area, and with a finished floor level not less than 500mm above the 1 in 100 year overland flowpath level for catchments over 2

hectares (200mm for catchments less than 2 hectares). This information will be recorded on Council's Hazards and Special Features Register.

(DE 1) Design, provide and install a complete public wastewater reticulation system to serve all Lots in compliance with Councils Code of Practice for City Infrastructure and Land Development (Refer Section 5.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Locate all drainage lines in the front of Lots where possible to provide ease of access for future maintenance requirements.

(iii) Re-route the existing public drainage lines passing through Lot(s) 31-32 to provide more adequate building sites for those Lots. At the stage of engineering approval a quote will be obtained from Councils contractor for the new manholes required on the existing wastewater network.

(DE 2) Design, provide and install a complete public stormwater drainage system to serve all Lots in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Collect all existing stormwater discharges onto the land and provide for these catchments in the capacity of the new systems. This includes the existing public stormwater drains discharging at proposed Lots 44 and 23, and any others encountered during construction.

(iii) Clearance between the proposed stormwater pipes and the existing Watercare Services Ltd trunk wastewater drain is required to be a minimum of 0.5m, and no pipe points are permitted above the trunk wastewater drain, in accordance with the conditions of Watercare Services Ltd consent number D1415/06.

(iv) Abandoned public drainage is required to be either removed and backfilled with certified engineered fill, or grout filled. If grout filled, then foundations of future buildings will need to bridge over the trench and abandoned pipes.

(v) New stormwater outlets to the stream are required to discharge in the direction of flow to minimise erosion on the opposite bank.

(DE 3) Design, provide and install a complete stormwater quality treatment system for the site in accordance with the Auckland Regional Council's TP10 '*Stormwater Management Devices Design Guideline Manual*', and WCC Code of Practice for City Infrastructure and Land Development (refer Section 4). Provide a copy of the engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All stormwater treatment and detention devices are required to be located clear of existing or proposed public drainage lines.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain. This includes provision of a 0.5m thick impermeable compacted clay liner under the pond base, embankment and spillway to avoid seepage of pond water into the trenching material surrounding the drain. Provide evidence that this has been completed in the geotechnical completion report. Heavy machinery is required to be kept 2m clear of the Watercare Services Ltd trunk wastewater drain at all times during construction.

(ii) Provide in the design of the device for treatment of a fully developed upstream catchment. Detain the 2 year storm event and discharge at pre-development levels as required by the Parrs Stream Catchment Management Plan.

(iii) The existing pond on Lot 3 DP 339810 can be replaced by a quality treatment device that provides the equivalent level of treatment. Provide engineering plans and calculations to demonstrate that the proposed swale can achieve this, or alternatively provide written confirmation from ARC that the proposed swale is an acceptable form of treatment in this situation.

(iv) Provide a planting plan, including species list, quantities, and methodology to EcoWater and Parks for approval prior to commencing planting.

(v) Provide a surveyed as-built plan of the device showing all lid and invert levels, permanent water level, and contours at 200mm intervals below water level.

(vi) Provide a geotechnical completion report certifying construction of the pond.

(vii) Provide a maintenance manual for the treatment device.

(viii) Provide a drainage reserve over the entire area occupied by the treatment device, associated maximum flood water levels, and all areas necessary to access and maintain the treatment device.

NOTES –

PLANTING PLAN – Ensure access ways for pond maintenance are kept clear of vegetation, with some form of access track.

Specimen tress are not located on planting plan, ideal these should be located along the northern end to provide shading

Remove Typha orientalis (RAUPO) completely and replace with other specifies or increase the numbers of the other plants.

POND – Please construct spillways to the satisfaction of EcoWater assets and QA supervisior.

MAINTENANCE MANUAL – The draft maintenance manual has be received this will require amendments and further information prior to 224c being issued.

(DE 4) Waitakere City Council holds a Comprehensive Discharge Consent from the ARC for the Parrs Stream catchment, and this proposal meets the recommendations of the Parrs Stream Catchment Management Plan subject to these conditions being met. It is the applicant's responsibility to obtain all other necessary consents, or evidence of dispensation, from the Auckland Regional Council, pay all associated costs and comply with any conditions imposed by

the Regional Council.

(DE 5) Design, provide and install a complete public water supply reticulation system and fire fighting services to serve all Lots/Units in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 6). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All Lots/Units are to be individually metered at the road reserve boundary. Ducting of private lines is recommended where they cross driveways.

(i) Locate all water connections at the same position as the power and telephone connection to each Lot/Unit.

(ii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(iii) Pay to the Council the cost of supervising the shut down of Council's water supply mains. This service includes Council providing written advice to all affected property owners and tenants.

(iv) Provide fire hydrants within 135m of the furthest point on any property, and within 65m of the end of a cul-de-sac.

(v) Where the required public system is on private property, easements over the course of such system in favour of Council will be necessary.

(DE 6) Design, provide and install a complete ICT Network along all new public roads for the future provision of ICT services within the development in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 8). Provide engineering plans to Council for approval prior to commencing works.

(DE 7) **Engineering Approval and Quality Assurance Process:** Public infrastructure works, as conditioned above, require Council's approval of engineering plans and specifications prepared by the applicant's engineer in accordance with Council's Code of Practice for City Infrastructure and Land Development.

(i) Submit full engineering plans, long sections and calculations, prepared in accordance with Council's Code of Practice, to Council for approval.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain.

(ii) Advise the name of the appointed developer's representative fulfilling engineering responsibilities as detailed in section 1.4.1 of the Code of Practice.

(iii) After engineering approval has been given and prior to commencing construction, contact Council's Call Centre on 839 0400 to arrange a QA Pre-Start Meeting. Allow 3 working days for the QA Pre-Start Meeting to be booked.

(iv) The applicant is required to ensure that the contracted drainlayer and developer's representative attend the QA Pre-Start Meeting, and that construction materials are on-site for inspection.

(v) EcoWater's QA Supervisor will then undertake random site inspections throughout the construction process.

(vi) Upon completion of construction the applicant's surveyor is required to prepare As-Built plans in accordance with the Code of Practice, and CCTV inspection of the drains are to be carried out.

(vii) The developer's representative is required to fully inspect the drainage including overseeing the drainage tests, view the cctv's and check

against the as-builts, and ensure that any remedial works are completed.

(viii) When the developer's representative is satisfied that all works meet Council standards, they are required to complete the 'QA Final Inspection Request Form' and lodge this at Council together with As-Builts, CCTV (all footage on one DVD), log sheets, chlorination certificate for watermains, and inspection reports.

(ix) EcoWater's QA Supervisor will check all information against the approved design and Code of Practice, then undertake a field check and testing of the new drainage systems in conjunction with Council's approved maintenance contractor.

(x) When all public works and documentation are completed to Council's satisfaction the QA Completion Certificate will be issued to the applicant.

(xi) Submit a copy of the QA Completion Certificate with the application for s224c Certificate as evidence of compliance with the conditions of consent requiring construction of infrastructure to public standards.

(xii) Pay all of Council's engineering fees and costs associated with engineering approvals, quality assurance site inspections, as-built & cctv approvals, final inspections, testing and bond management.

FEES, BONDS & CONTRIBUTIONS

(FC 1) Pursuant to Sections 407 & 409 of the Resource Management Act, the following financial contributions have been assessed for the proposed development, and are required to be paid in full prior to issue of the 224c:

(i) Twin Streams Contribution (Oratia catchment) totalling $207,492.01 inclusive of GST - calculated based on 18 medium density Units @ $1,670.63 (incl. GST) per additional Unit, and 59 residential Lots @ $3,007.13 (incl. GST) per additional Lot.

(FC 1) Pursuant to Section 108(2)(b) and Section 108A, and in accordance with Council's Code of Practice for City Infrastructure and Land Development, the applicant is required to provide a maintenance bond to Council, equivalent to 2½% (minimum $500.00) of the value of works being taken over by Council. This maintenance bond will be held for six months from the date of 224c issue, or until 31 October, whichever is longer. Maintenance of these assets are the responsibility of the developer during the maintenance period. At the end of the maintenance period the QA Supervisor will undertake a maintenance inspection to ascertain whether the assets are still in satisfactory condition and if so, will instruct the bond to be released, and Council will take over maintenance responsibilities from that time forward. Where defects occur during the developer's maintenance liability period, the costs of repairing such defects are the full responsibility of the developer. Where the developer does not repair the defects, Council will retain the bond monies for use in repairing the defects, and refund any residual monies held to the developer. The developer's liability is not limited to the amount of the maintenance bond, and any additional costs will be invoiced to the developer and will become a debt due to the Council.

Waitakere City Council
Te Taiao o Waitakere

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20 July 2007

Kristin F.Y.I

NEW ZEALAND HOUSING FOUNDATION
Babbage Consultants Limited
PO Box 2027
Shortland Street
AUCKLAND 1020

Dear Sir / Madam

Application Number: SUB-2006-1078
Applicant Name: NEW ZEALAND HOUSING FOUNDATION
Application Address: 423-429 West Coast Road, GLEN EDEN

ENGINEERING PLAN APPROVAL

The engineering plans submitted by Babbage Consultants Ltd, and as listed below are hereby APPROVED FOR CONSTRUCTION, subject to the engineering conditions noted below each subdivision condition in BOLD.

Ref	42608	Sheet	C11	Revision	G	Dated	22/06/07
Ref	42608	Sheet	C16	Revision	E	Dated	22/06/07
Ref	42608	Sheet	C37	Revision	F	Dated	29/06/07
Ref	42608	Sheet	C12	Revision	A	Dated	29/06/07
Ref	Soul 06/07-161	Sheet	161-05	Revision		Dated	17/07/2007

The engineering plans have been assessed against the subdivision consent conditions and Council's Code of Practice for City Infrastructure and Land Development, ARC's TP10 Stormwater Treatment Devices Design Guideline Manual 2003, and ARC's TP124 Stormwater Low Impact Design Manual.

Engineering Plan Approval is valid for 6 months from the date of issue to cater for technical updates to the Code of Practice. This engineering plan approval will lapse on (20/01/08), unless a QA Pre-Start Meeting has been held, and construction has commenced prior to the lapse date.

PUBLIC DRAINAGE INFRASTRUCTURE – ECOWATER SECTION 224 CONDITIONS

(DE 1) Provide a catchment analysis detailing any 1 in 100 year overland flowpaths that will exist through the proposed residential Lots upon completion of earthworks, including a possible overland flowpath occurring over proposed Lots 44-46. Wherever possible, keep all overland flowpaths contained within the legal road reserve and discharge to the drainage reserve with a minimum of nuisance. Provide an As-Built plan, long section and cross sections, prepared by a Licenced Cadastral Surveyor to demonstrate that completed overland flowpath(s) meets the design requirements. Provide a drainage easement in favour of Council over all areas required to maintain unobstructed overland flow. All buildings are required to be located entirely outside the 1 in 100 year overland flowpath area, and with a finished floor level not less than 500mm above the 1 in 100 year overland flowpath level for catchments over 2 hectares (200mm for catchments less than 2 hectares). This information will be

recorded on Council's Hazards and Special Features Register.

(DE 1) Design, provide and install a complete public wastewater reticulation system to serve all Lots in compliance with Councils Code of Practice for City Infrastructure and Land Development (Refer Section 5.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Locate all drainage lines in the front of Lots where possible to provide ease of access for future maintenance requirements.

(iii) Re-route the existing public drainage lines passing through Lot(s) 31-32 to provide more adequate building sites for those Lots. At the stage of engineering approval a quote will be obtained from Councils contractor for the new manholes required on the existing wastewater network.

(DE 2) Design, provide and install a complete public stormwater drainage system to serve all Lots in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Collect all existing stormwater discharges onto the land and provide for these catchments in the capacity of the new systems. This includes the existing public stormwater drains discharging at proposed Lots 44 and 23, and any others encountered during construction.

(iii) Clearance between the proposed stormwater pipes and the existing Watercare Services Ltd trunk wastewater drain is required to be a minimum of 0.5m, and no pipe points are permitted above the trunk wastewater drain, in accordance with the conditions of Watercare Services Ltd consent number D1415/06.

(iv) Abandoned public drainage is required to be either removed and backfilled with certified engineered fill, or grout filled. If grout filled, then foundations of future buildings will need to bridge over the trench and abandoned pipes.

(v) New stormwater outlets to the stream are required to discharge in the direction of flow to minimise erosion on the opposite bank.

(DE 3) Design, provide and install a complete stormwater quality treatment system for the site in accordance with the Auckland Regional Council's TP10 '*Stormwater Management Devices Design Guideline Manual*', and WCC Code of Practice for City Infrastructure and Land Development (refer Section 4). Provide a copy of the engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All stormwater treatment and detention devices are required to be located clear of existing or proposed public drainage lines.

(i) Comply with all conditions of the approval from Watercare Services Ltd

for working close to their trunk wastewater drain. This includes provision of a 0.5m thick impermeable compacted clay liner under the pond base, embankment and spillway to avoid seepage of pond water into the trenching material surrounding the drain. Provide evidence that this has been completed in the geotechnical completion report. Heavy machinery is required to be kept 2m clear of the Watercare Services Ltd trunk wastewater drain at all times during construction.

(ii) Provide in the design of the device for treatment of a fully developed upstream catchment. Detain the 2 year storm event and discharge at pre-development levels as required by the Parrs Stream Catchment Management Plan.

(iii) The existing pond on Lot 3 DP 339810 can be replaced by a quality treatment device that provides the equivalent level of treatment. Provide engineering plans and calculations to demonstrate that the proposed swale can achieve this, or alternatively provide written confirmation from ARC that the proposed swale is an acceptable form of treatment in this situation.

(iv) Provide a planting plan, including species list, quantities, and methodology to EcoWater and Parks for approval prior to commencing planting.

(v) Provide a surveyed as-built plan of the device showing all lid and invert levels, permanent water level, and contours at 200mm intervals below water level.

(vi) Provide a geotechnical completion report certifying construction of the pond.

(vii) Provide a maintenance manual for the treatment device.

(viii) Provide a drainage reserve over the entire area occupied by the treatment device, associated maximum flood water levels, and all areas necessary to access and maintain the treatment device.

Engineering approval for Vegetated swale which replaces the previously existing WCC Treatment pond in accordance with conditions of consent. Note includes changes to drainage through area from previously approved plans

(DE 4) Waitakere City Council holds a Comprehensive Discharge Consent from the ARC for the Parrs Stream catchment, and this proposal meets the recommendations of the Parrs Stream Catchment Management Plan subject to these conditions being met. It is the applicant's responsibility to obtain all other necessary consents, or evidence of dispensation, from the Auckland Regional Council, pay all associated costs and comply with any conditions imposed by the Regional Council.

(DE 5) Design, provide and install a complete public water supply reticulation system and fire fighting services to serve all Lots/Units in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 6). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All Lots/Units are to be individually metered at the road reserve boundary. Ducting of private lines is recommended where they cross driveways.

(i) Locate all water connections at the same position as the power and telephone connection to each Lot/Unit.

(ii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream

properties.

(iii) Pay to the Council the cost of supervising the shut down of Council's water supply mains. This service includes Council providing written advice to all affected property owners and tenants.

(iv) Provide fire hydrants within 135m of the furthest point on any property, and within 65m of the end of a cul-de-sac.

(v) Where the required public system is on private property, easements over the course of such system in favour of Council will be necessary.

(DE 6) Design, provide and install a complete ICT Network along all new public roads for the future provision of ICT services within the development in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 8). Provide engineering plans to Council for approval prior to commencing works.

(DE 7) **Engineering Approval and Quality Assurance Process:** Public infrastructure works, as conditioned above, require Council's approval of engineering plans and specifications prepared by the applicant's engineer in accordance with Council's Code of Practice for City Infrastructure and Land Development.

(i) Submit full engineering plans, long sections and calculations, prepared in accordance with Council's Code of Practice, to Council for approval.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain.

(ii) Advise the name of the appointed developer's representative fulfilling engineering responsibilities as detailed in section 1.4.1 of the Code of Practice.

(iii) After engineering approval has been given and prior to commencing construction, contact Council's Call Centre on 839 0400 to arrange a QA Pre-Start Meeting. Allow 3 working days for the QA Pre-Start Meeting to be booked.

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STORMWATER CALCULATIONS

Job No *42608*
Project *West Coast Road*
Date *Jun-07* (Rev D)
By *FK*
20% AEP Rainfall Event

MH to MH	Catchment Breakdown		Catchment Area (m^2)	C	CA	Σ CA	I mm/hr	Required Q (l/s)	Adopted Pipe					Manhole		
									Size	Grade	Length	Q	V	LL	IL OUT	IL IN
Ex. 01-N6	Albionvale Catchment															
	Calc. from TP108				13730.0											
						13730.0	90	***343.5***	**525**	1.2	9.1	472.0		30.00	26.74	26.63
N6-N5						13730.0	90	***343.5***	**525**	1.1	9.4	452.0		27.90	26.58	26.48
N5-N4	Lot 61	2 Units	209.1	0.95	198.6											
		(inc balconies)			0.0											
		Road CH10-76	466.4	0.95	443.1											
		(incl carparks)	137.3	0.3	41.2											
						14412.9	90	***360.6***								
	Minus Swale Flow = 59.0l/s							***301.6***	**525**	1.1	41.2	452.0		27.50	26.66	26.21
N4-N3	Lot 61	4 Units	418.2	0.95	397.3											
		(incl balconies)														
		Grass	1267.0	0.3	380.1											
						15190.3	90	***321.1***	**525**	0.7	48.1	361.0		27.60	26.16	25.82
N3-N2						15190.3	90	***321.1***	**525**	8.0	11.5	1222.0		28.10	25.77	24.85
N2-N1	Road 9	Ch 76 to End	959.2	0.95	911.2											
(O/LET)	Wetland	Add 59.0 l/s				16101.5	90	***402.9***								

	Swale								**600**	0.7	15.4	513.0		25.80	24.80	24.70

Abercrivie Catchment

2yr ARI 24 hr depth

TP108 peak flow calculations assuming a small catchment
(Minimum time-of-concentration as specified by TP108)

Catchment Area	ha	1.756		*Enter values in yellow cells only*
Percentage of impervious cover		65%		*Result cells*
Impervious SCS Curve Number		98		
Pervious SCS Curve Number		74		
24-hour rainfall	mm	86		
Peak rainfall rate from TP108 (10-minute duration)	mm/hr	58.1		
Impervious surfaces				
Storage S	mm	5.2		
Runoff/Rainfall at peak of rainfall		0.99		
Peak runoff rate	l/s	181.92		
Pervious surfaces				
Storage S	mm	89.2		
Runoff/Rainfall at peak of rainfall		0.51		
Peak runoff rate	l/s	50.35		
Combined Flow				
Peak runoff from surfaces	l/s	232.27		
Peak outflow from catchment (allowing for lag)	l/s	206.72		

Athenvale Catchment

1/3 2yr ARI 24 hr depth

TP108 peak flow calculations assuming a small catchment
(Minimum time-of-concentration as specified by TP108)

Catchment Area	ha	1.756		*Enter values in yellow cells only*
Percentage of impervious cover		65%		*Result cells*
Impervious SCS Curve Number		98		
Pervious SCS Curve Number		74		
24-hour rainfall	mm	29		
Peak rainfall rate from TP108 (10-minute duration)	mm/hr	19.6		
Impervious surfaces				
Storage S	mm	5.2		
Runoff/Rainfall at peak of rainfall		0.93		
Peak runoff rate	l/s	57.76		
Pervious surfaces				
Storage S	mm	89.2		
Runoff/Rainfall at peak of rainfall		0.18		
Peak runoff rate	l/s	6.12		
Combined Flow				
Peak runoff from surfaces	l/s	63.88		
Peak outflow from catchment (allowing for lag)	l/s	56.85		

Stage 3 - Ch 10 - 7L

1/3 2yr ARI 24 hr depth

TP108 peak flow calculations assuming a small catchment
(Minimum time-of-concentration as specified by TP108)

Catchment Area	ha	0.06037		*Enter values in yellow cells only*
Percentage of impervious cover		77%		*Result cells*
Impervious SCS Curve Number		98		
Pervious SCS Curve Number		74		
24-hour rainfall	mm	29		
Peak rainfall rate from TP108 (10-minute duration)	mm/hr	19.6		
Impervious surfaces				
Storage S	mm	5.2		
Runoff/Rainfall at peak of rainfall		0.93		
Peak runoff rate	l/s	2.35		
Pervious surfaces				
Storage S	mm	89.2		
Runoff/Rainfall at peak of rainfall		0.18		
Peak runoff rate	l/s	0.14		
Combined Flow				
Peak runoff from surfaces	l/s	2.49		
Peak outflow from catchment (allowing for lag)	l/s	2.22		

Stage 3 CH 76 - End

1/3 2 yr ARI 24 hr depth

TP108 peak flow calculations assuming a small catchment
(Minimum time-of-concentration as specified by TP108)

Catchment Area	ha	0.20269		*Enter values in yellow cells only*
Percentage of impervious cover		47%		*Result cells*
Impervious SCS Curve Number		98		
Pervious SCS Curve Number		74		
24-hour rainfall	mm	29		
Peak rainfall rate from TP108 (10-minute duration)	mm/hr	19.6		
Impervious surfaces				
Storage S	mm	5.2		
Runoff/Rainfall at peak of rainfall		0.93		
Peak runoff rate	l/s	4.82		
Pervious surfaces				
Storage S	mm	89.2		
Runoff/Rainfall at peak of rainfall		0.18		
Peak runoff rate	l/s	1.07		
Combined Flow				
Peak runoff from surfaces	l/s	5.89		
Peak outflow from catchment (allowing for lag)	l/s	5.24		

Abbeyvale Catchment

10yr ARI 24 hr depth

TP108 peak flow calculations assuming a small catchment
(Minimum time-of-concentration as specified by TP108)

Catchment Area	ha	1.756		*Enter values in yellow cells only*
Percentage of impervious cover		65%		*Result cells*
Impervious SCS Curve Number		98		
Pervious SCS Curve Number		74		
24-hour rainfall	mm	134		
Peak rainfall rate from TP108 (10-minute duration)	mm/hr	90.5	← 5yr 20% AEP	
Impervious surfaces				
Storage S	mm	5.2		
Runoff/Rainfall at peak of rainfall		0.99		
Peak runoff rate	l/s	285.30		
Pervious surfaces				
Storage S	mm	89.2		
Runoff/Rainfall at peak of rainfall		0.65		
Peak runoff rate	l/s	100.65		
Combined Flow				
Peak runoff from surfaces	l/s	385.95		
Peak outflow from catchment (allowing for lag)	l/s	343.50		

Min duration

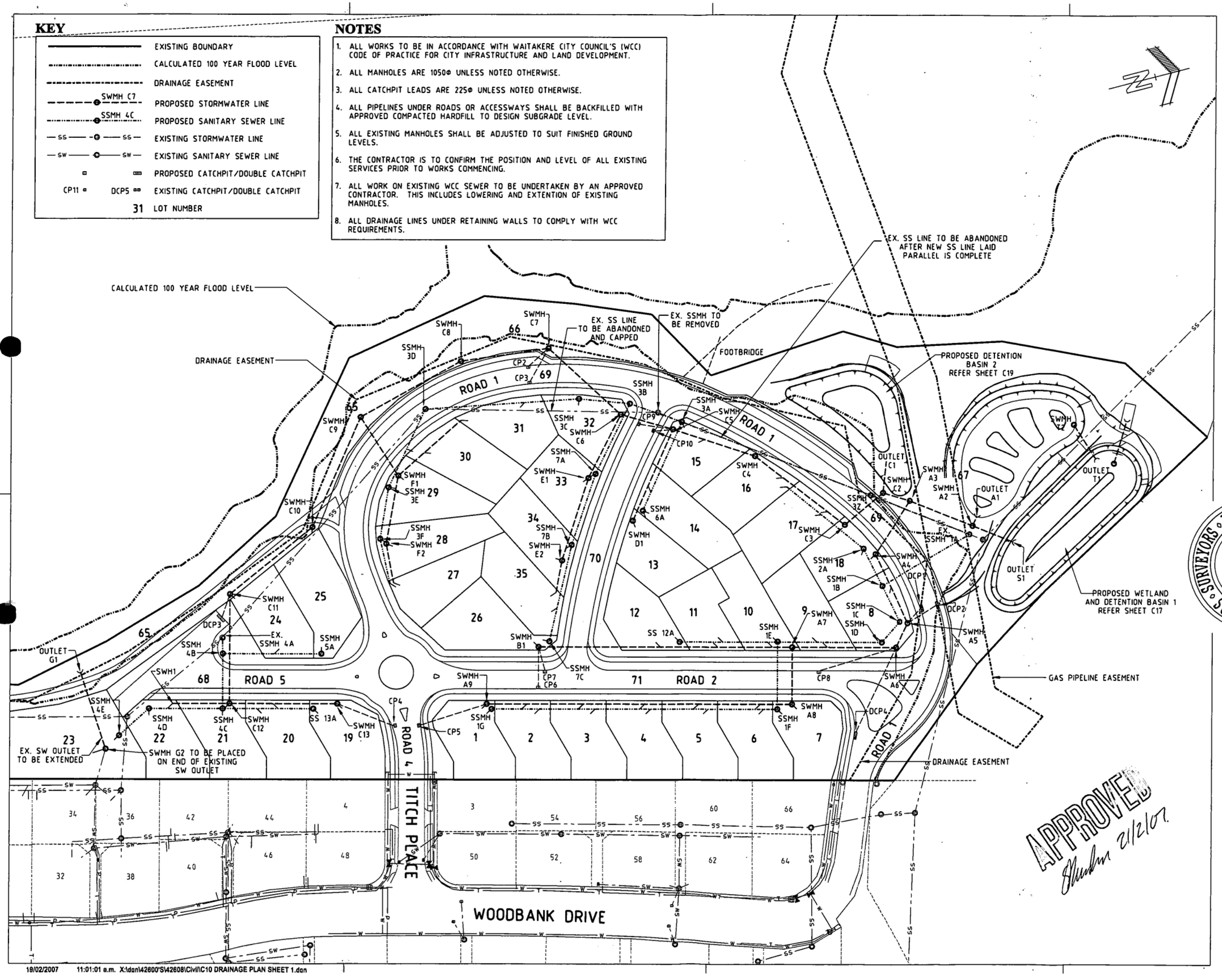
Rainfall Intensity from WCC Std Rainfall Chart

KEY

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- DRAINAGE EASEMENT
- SWMH C7 — PROPOSED STORMWATER LINE
- SSMH 4C — PROPOSED SANITARY SEWER LINE
- — SS — S — SS — EXISTING STORMWATER LINE
- — SW — S — SW — EXISTING SANITARY SEWER LINE
- PROPOSED CATCHPIT/DOUBLE CATCHPIT
- CP11 / DCP5 — EXISTING CATCHPIT/DOUBLE CATCHPIT
- 31 LOT NUMBER

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Φ UNLESS NOTED OTHERWISE.
3. ALL CATCHPIT LEADS ARE 225Φ UNLESS NOTED OTHERWISE.
4. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
5. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
6. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
7. ALL WORK ON EXISTING WCC SEWER TO BE UNDERTAKEN BY AN APPROVED CONTRACTOR. THIS INCLUDES LOWERING AND EXTENTION OF EXISTING MANHOLES.
8. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHE
I	180207	REV H REVERSED	FK	
H	120207	SS LINE 4B TO 5A DELETED HC TO LOTS 24/25 AMENDED	FK	
G	050207	NH'S ADDED TO LINES SS12 AND SS13	FK	
F	310107	VARIOUS AMENDMENTS	FK	
E	17.01.07	VARIOUS AMENDMENTS	MSO	
D	091009	TEXT AMENDED FOR SS LINE 3A TO 1A	FK	DF
C	210908	SSMH 3Z ADDED	FK	DF
B	150808	POND ADDED	FK	DF
A	150808	VARIOUS AMENDMENTS	FK	DF

DRAWING REVISIONS

ENGINEERS • SURVEYORS • ARCHITECTS
Babbage CONSULTANT
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PO BOX 2
AUCKLAND 1 - NEW ZEALA
PHONE 09 - 379 9980 - FAX 09 - 377 1
admin@babbage.co

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN

FOR

NZ HOUSING FOUNDATIO

DRAWING TITLE

DRAINAGE PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C10	I

KEY

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- DRAINAGE EASEMENT
- SWMH L5 — PROPOSED STORMWATER LINE
- SSMH 9C — PROPOSED SANITARY SEWER LINE
- SS — EXISTING STORMWATER LINE
- SW — EXISTING SANITARY SEWER LINE
- PROPOSED CATCHPIT/DOUBLE CATCHPIT
- CP11 / DCP5 — EXISTING CATCHPIT/DOUBLE CATCHPIT
- PROPOSED SWALE
- 58 — LOT NUMBER
- ABOVE GROUND FLOW DISPERSAL DEVICE (SEE COUNTRYSIDE AND FOOTHILLS STORMWATER MANAGEMENT CODE OF PRACTICE FOR DETAILS)

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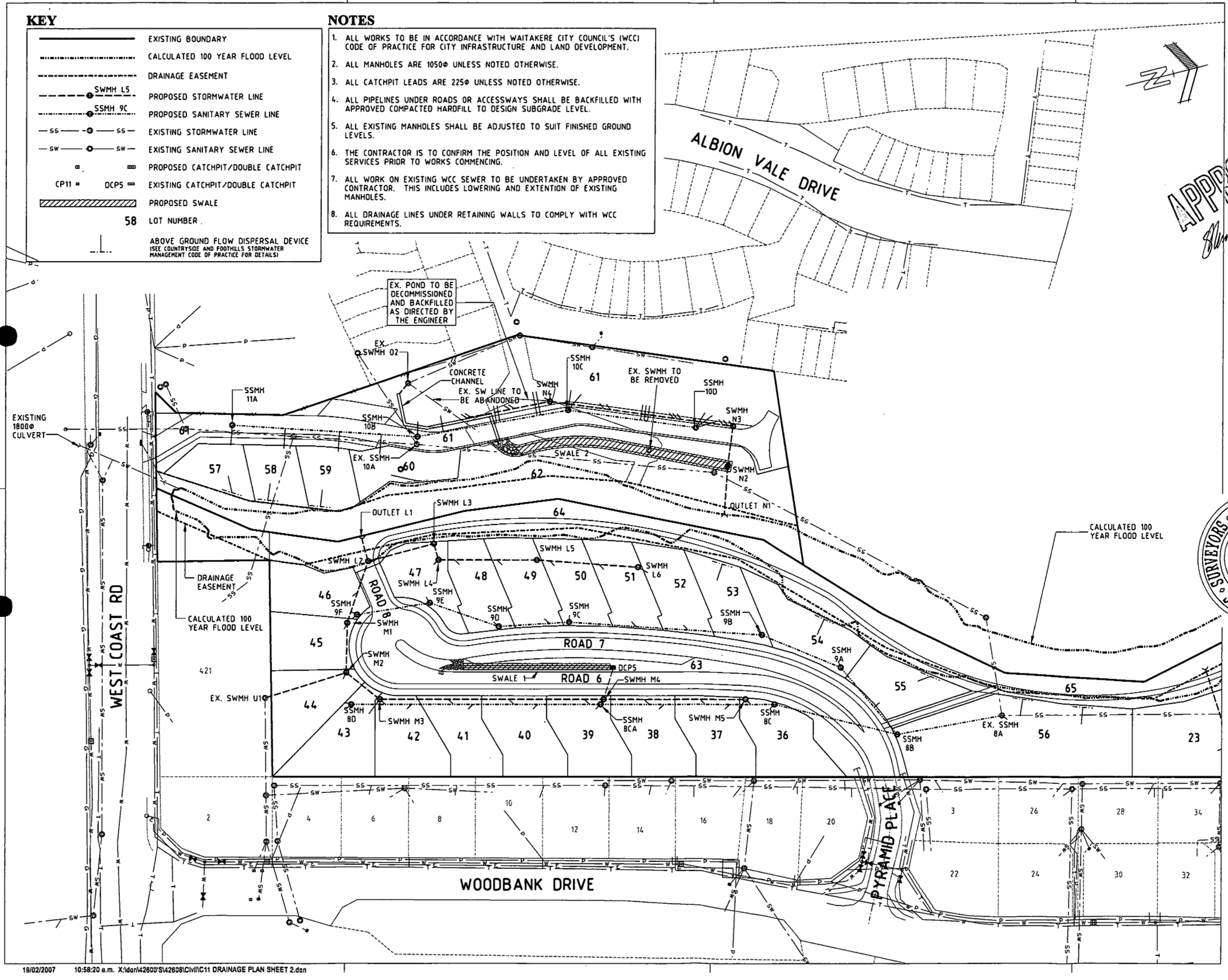

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DRAWING NOTES

APPROVED
21/2/07

REV	DATE	DESCRIPTION	DRAWN	CHE
E	160207	HC AMENDMENT FOR LOT 45	FK	
D	050207	VARIOUS AMENDMENTS	FK	
C	310107	AMENDMENTS TO SW LINE N	FK	
B	17.01.07	VARIOUS AMENDMENTS	MSO	
A	07.09.06	SWALE ADDED	FK	DR

DRAWING REVISIONS

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PHONE 09 - 379 9980 · FAX 09 - 377 11
admin@babbage.co

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN
FOR
NZ HOUSING FOUNDATIO

DRAWING TITLE

DRAINAGE PLAN (SHEET 2)

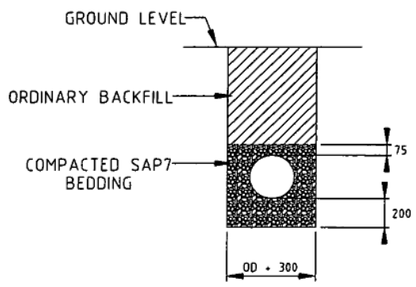
	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED		

SCALE (A1)

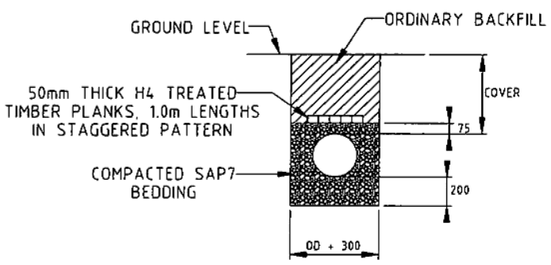
1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C11	E

19/02/2007 10:58:20 a.m. X:\dan\42600'S\42608\Civil\C11 DRAINAGE PLAN SHEET 2.dgn

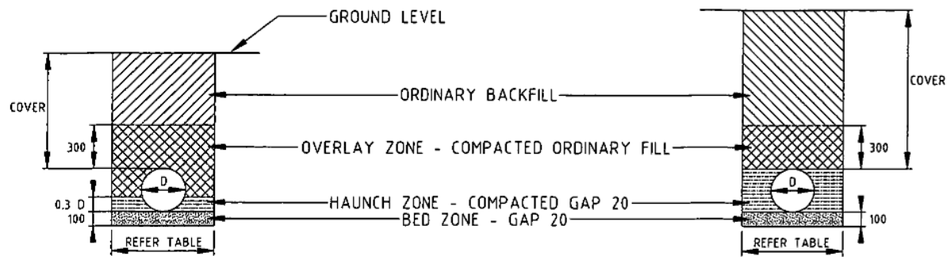


COVER >= 750mm



COVER < 750mm

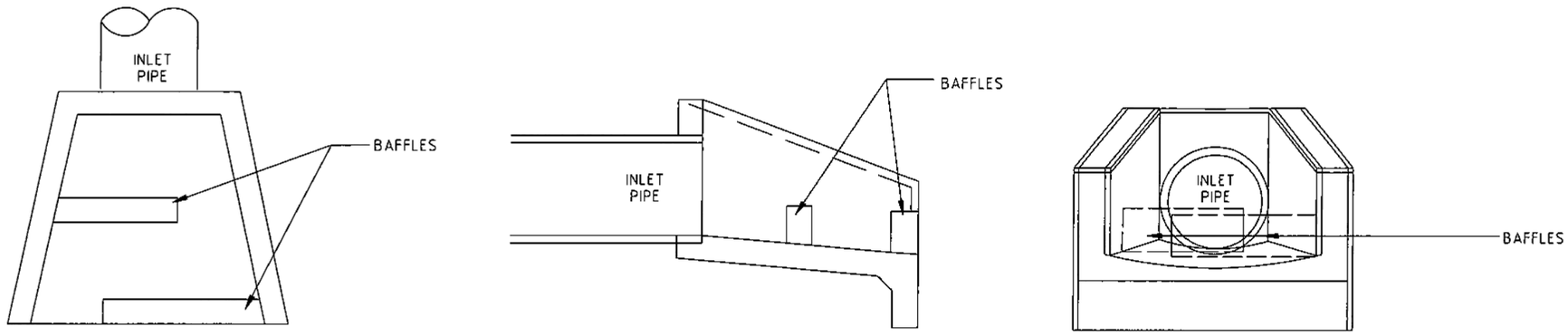
PIPE BEDDING AND PROTECTION FOR uPVC PIPES
(NOT TO SCALE)



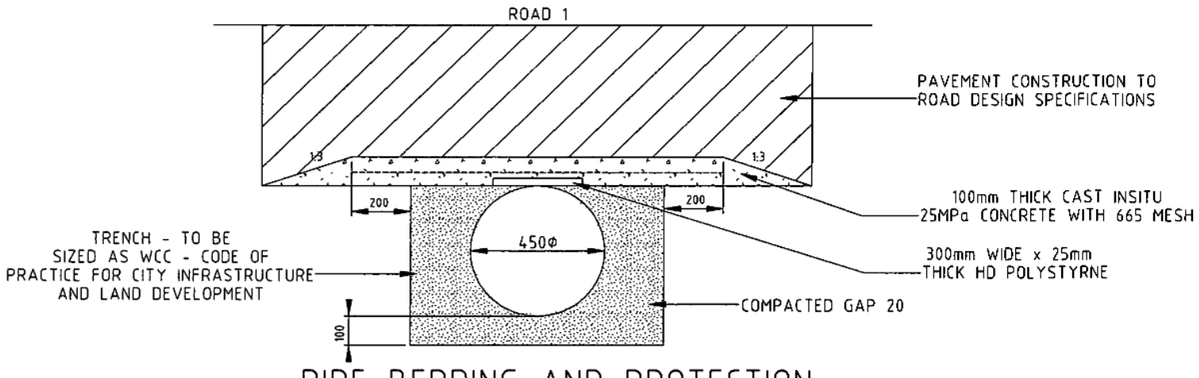
COVER >= 750mm

COVER < 750mm

PIPE BEDDING AND PROTECTION FOR CONCRETE PIPES
(NOT TO SCALE)



CAST IN SITU STORMWATER OUTLET
(NOT TO SCALE)



PIPE BEDDING AND PROTECTION FOR STORMWATER LINE A4 TO A3 CONCRETE PIPE UNDER ROAD 1
(NOT TO SCALE)

NOTE:
DIMENSIONS ARE TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S CODE OF PRATICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT

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21/2/07

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	230107	PIPE PROTECTION DETAIL ADDED	FK	NSL

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE

SANITARY SEWER & STORMWATER DETAILS

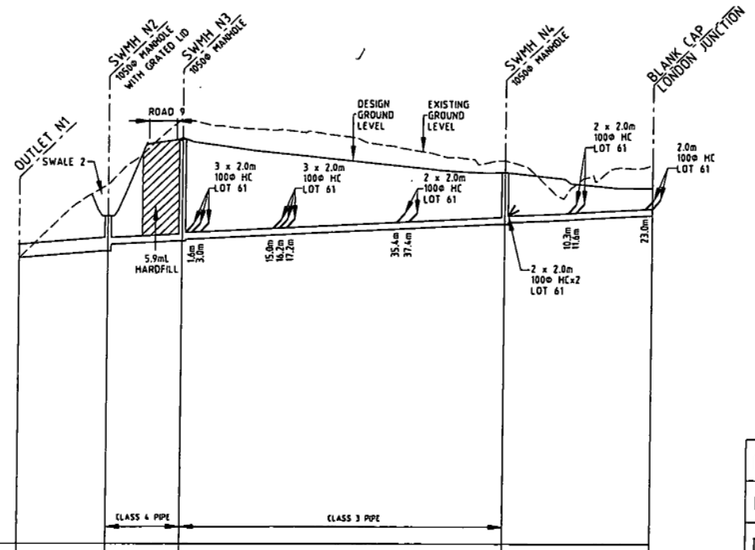
	DATE	INITIAL
DESIGNED		
DRAWN	JAN 2007	MSO
CHECKED	JAN 2007	FK
APPROVED		

SCALE (A1)
AS SHOWN

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C14	A

NOTES

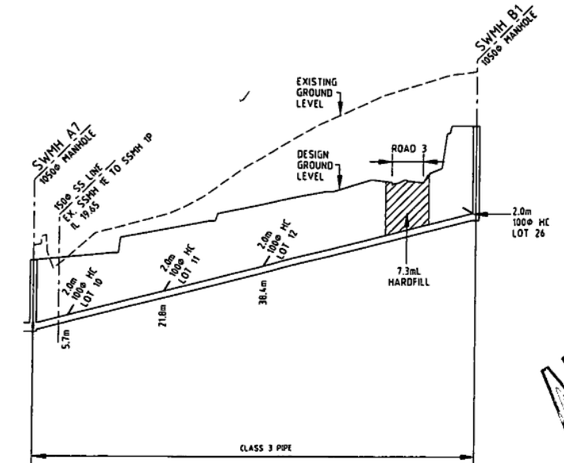
1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Φ UNLESS NOTED OTHERWISE.
3. MANHOLE LIGHT DUTY FRAMES AND LIDS SHALL BE USED EXCEPT WHERE SUBJECT TO TRAFFIC LOADING. HEAVY DUTY FRAMES AND LIDS SHALL BE USED WHEN SUBJECT TO TRAFFIC LOADING.
4. ALL CATCHPIT LEADS ARE 225Φ UNLESS NOTED OTHERWISE.
5. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
6. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
7. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
8. ALL PIPES ARE CONCRETE RUBBER RING JOINTED AND CLASS 2 UNLESS OTHERWISE SHOWN
9. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.
10. ALL OUTLETS DISCHARGING INTO THE STREAM SHALL BE PLACED SO AS TO NOT IMPED FLOW DIRECTION.
11. PIPE SEPERATION FOR RELAID SANITARY SEWER AND STORMWATER PIPE BETWEEN A4 AND A3 TO BE CONFIRMED ON SITE.
12. ALL LOT CONNECTIONS TO BE LONDON JUNCTIONS UNLESS OTHERWISE NOTED.



DATUM RL 15.0m

PIPE	450Φ		225Φ		225Φ			225Φ		
DEPTH TO INVERT		0.73		3.17			1.52		0.70	
INVERT LEVEL	24.69	24.93	25.15	25.27	25.32		25.85	25.90		26.14
GROUND LEVEL	24.69	26.11		28.66			27.59			27.06
DISTANCE	14.5		12.0		53.1			24.2		
GRADE	1.6%		1.0%		1.0%			1.0%		
DESIGN FLOW l/sec	309.2		23.2		23.2			2.5		
CAPACITY l/sec	363		45.6		45.6			45.6		

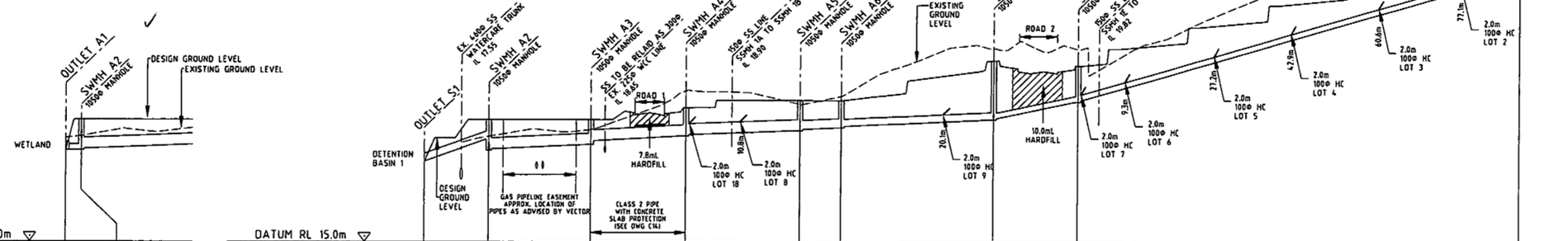
LONGITUDINAL SECTION LINE N



DATUM RL 15.0m

PIPE	225Φ			
DEPTH TO INVERT	2.43			3.18
INVERT LEVEL	20.02	20.10	23.82	
GROUND LEVEL	22.45			27.0
DISTANCE	73.8			
GRADE	5.0%			
DESIGN FLOW l/sec	32.1			
CAPACITY l/sec	102			

LONGITUDINAL SECTION LINE B



DATUM RL 15.0m

PIPE	225Φ	450Φ						
DEPTH TO INVERT		1.25						
INVERT LEVEL	18.75	18.75	18.80					
GROUND LEVEL		20.00						
DISTANCE	3.1	20.0						
GRADE	0.0%	1.0%						
DESIGN FLOW l/sec	50.0	186.5						
CAPACITY l/sec	50	287						

DATUM RL 15.0m

PIPE	300Φ	450Φ	450Φ	450Φ	375Φ	300Φ	225Φ	225Φ
DEPTH TO INVERT	0.80	1.01	1.17	1.25	1.12	2.42	1.48	1.50
INVERT LEVEL	18.65 19.20	18.80 18.99	19.14 19.33	19.38 19.55	19.62 19.68	19.73 20.02	20.10 20.76	20.81 26.00
GROUND LEVEL	20.00	20.00	20.50	20.80	20.80	22.44	22.24	27.50
DISTANCE	12.8	20.0	19.0	22.8	8.1	30.4	17.0	88.8
GRADE	4.3%	1.0%	1.0%	0.7%	0.7%	1.0%	3.9%	5.8%
DESIGN FLOW l/sec	156.5	206.5	186.5	182.7	128.8	87.2	51.0	51.0
CAPACITY l/sec	204	287	287	240	148	98	90	110

LONGITUDINAL SECTION LINE A

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DRAWING NOTES

OK
APPROVED 20/2/106
21/2/07

REV	DATE	DESCRIPTION	DRAWN	CH
B	230107	AMENDMENTS TO LS N AND B	FK	
B	230107	SW LINE BETWEEN A4-A3 AND NOTES AMENDED	FK	
A	160107	VARIOUS AMENDMENTS	MSO	

DRAWING REVISIONS

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admin@babbage.c

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN

FOR

NZ HOUSING FOUNDATIO

DRAWING TITLE

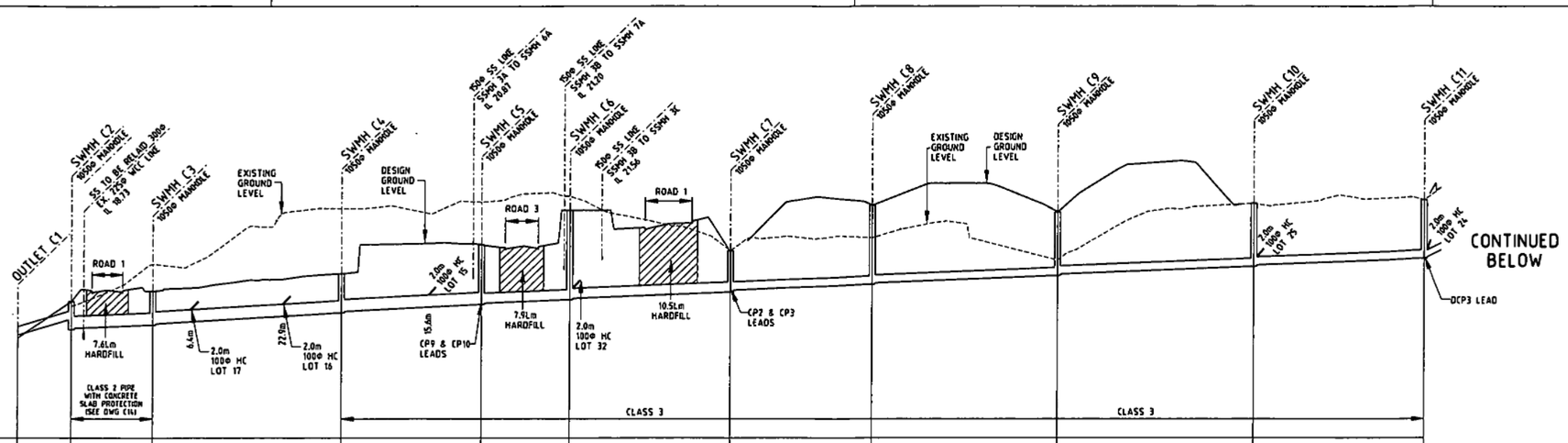
STORMWATER LONGITUDINAL SECTIONS (SHEET 1

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.08	GNB
CHECKED		
APPROVED		

SCALE (A1)

1:500(H) 1:100(V)

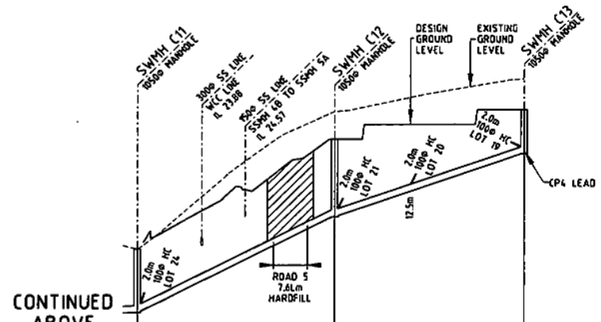
JOB NUMBER	DRAWING NUMBER	REVISIO
42608	C37	C



DATUM RL 15.0m

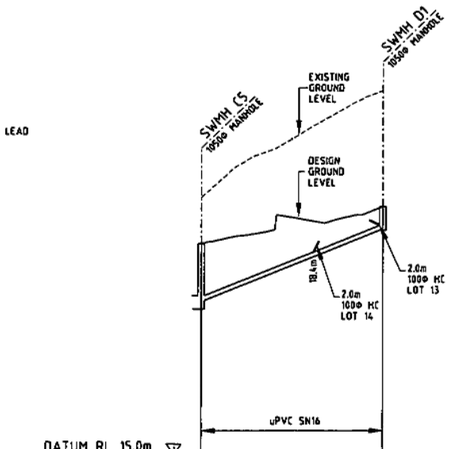
PIPE	300Ø	450Ø	450Ø	450Ø	375Ø	375Ø	300Ø	300Ø	300Ø	300Ø
DEPTH TO INVERT		1.06	1.39	2.21	3.30	1.53	2.91	2.34	2.33	2.15
INVERT LEVEL	18.80	19.36 / 19.20	19.37 / 19.40	19.67 / 19.71	19.91 / 19.98	20.10 / 20.15	20.38 / 20.46	20.67 / 20.72	20.99 / 21.04	21.33 / 21.38	21.63 / 21.71
GROUND LEVEL	18.50	20.04	20.43	21.06	22.12	23.4	21.91	23.58	23.33	23.66	23.78
DISTANCE	9.6	14.7	33.4	25.3	15.8	28.9	25.6	33.4	35.8	31.0	
GRADE	5.8%	1.2%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	
DESIGN FLOW l/sec	171.9	191.9	191.9	183.1	140.4	124.9	82.6	82.6	62.3	62.3	
CAPACITY l/sec	269.0	314.0	256.0	256.0	158.0	158.0	87.6	87.6	87.6	87.6	

LONGITUDINAL SECTION LINE C



PIPE	225Ø	225Ø
DEPTH TO INVERT	2.15	2.64 / 1.50
INVERT LEVEL	21.63 / 21.71	24.86 / 24.91 / 27.00
GROUND LEVEL	23.78	27.5 / 28.5
DISTANCE	32.6	31.1
GRADE	9.7%	6.7%
DESIGN FLOW l/sec	22.2	14.2
CAPACITY l/sec	143	118

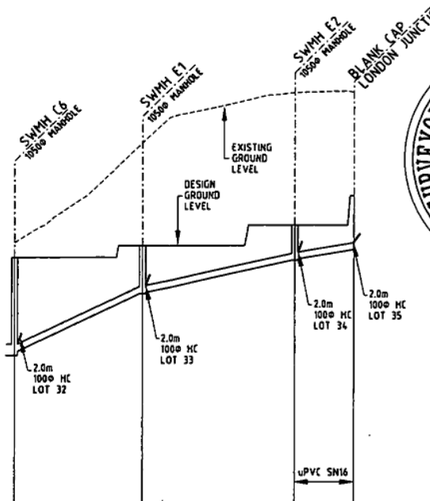
LINE C CONTINUED



DATUM RL 15.0m

PIPE		150Ø
DEPTH TO INVERT	2.21	0.90
INVERT LEVEL	19.91 / 20.21	22.48
GROUND LEVEL	22.12	23.38
DISTANCE		29.9
GRADE		7.6%
DESIGN FLOW l/sec		8.0
CAPACITY l/sec		43

LONGITUDINAL SECTION LINE D



DATUM RL 15.0m

PIPE	225Ø	225Ø	150Ø
DEPTH TO INVERT	3.30 / 1.63		1.20 / 1.83
INVERT LEVEL	20.10 / 20.25	22.17 / 22.22	23.30 / 23.38 / 23.67
GROUND LEVEL	23.4	23.8	24.5 / 25.5
DISTANCE	21.2	25.9	9.7
GRADE	9.1%	4.2%	3.0%
DESIGN FLOW l/sec	11.7	7.9	3.9
CAPACITY l/sec	138	94	27

LONGITUDINAL SECTION LINE E

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Ø UNLESS NOTED OTHERWISE.
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4. ALL CATCHPIT LEADS ARE 225Ø UNLESS NOTED OTHERWISE.
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6. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
7. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
8. ALL PIPES ARE CONCRETE RUBBER RING JOINTED AND CLASS 2 UNLESS OTHERWISE SHOWN
9. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.
10. ALL OUTLETS DISCHARGING INTO THE STREAM SHALL BE PLACED SO AS TO NOT IMPED FLOW DIRECTION.

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DRAWING NOTES

APPROVED
Auckland 21/2/07

REV	DATE	DESCRIPTION	DRAWN	CHE
F	180207	VARIOUS AMENDMENTS	FK	
E	050207	VARIOUS AMENDMENTS	FK	
D	310107	VARIOUS AMENDMENTS	FK	
C	180107	VARIOUS AMENDMENTS	MSO	
B	NOV06	C2-C1 DATA AMENDED	FK	DR
A	210906	VARIOUS AMENDMENTS	FK	DR

DRAWING REVISIONS

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admin@babbage.co

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN

FOR

NZ HOUSING FOUNDATIO

DRAWING TITLE

STORMWATER LONGITUDINAL SECTIONS (SHEET 2

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		

SCALE (A1)

1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISIO
42608	C38	F

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
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4. ALL CATCHPIT LEADS ARE 225Φ UNLESS NOTED OTHERWISE.
5. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
6. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
7. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
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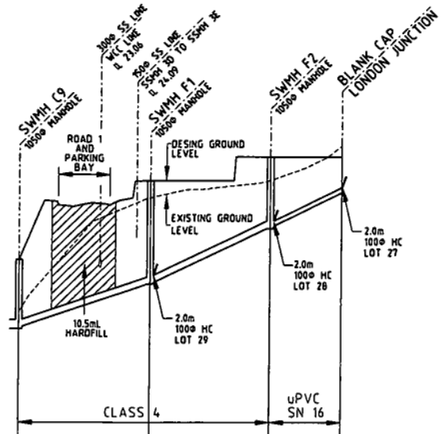
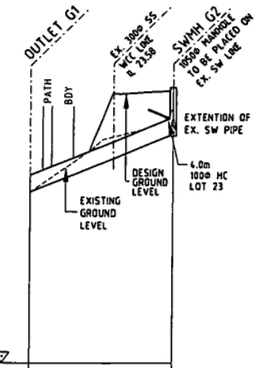
10. ALL OUTLETS DISCHARGING INTO THE STREAM SHALL BE PLACED SO AS TO NOT IMPED FLOW DIRECTION.



DATUM RL 17.0m

PIPE 150Φ	225Φ			225Φ			150Φ			
DEPTH TO INVERT	2.34		3.49			2.38		1.20		
INVERT LEVEL	20.99	21.07		22.51	22.56		24.42	24.50		25.60
GROUND LEVEL	23.33		26.0			26.8			26.8	
DISTANCE	20.7			20.7			11.9			
GRADE	7.0%			9.0%			9.2%			
DESIGN FLOW l/sec	20.3			8.1			3.8			
CAPACITY l/sec	121			137			47			

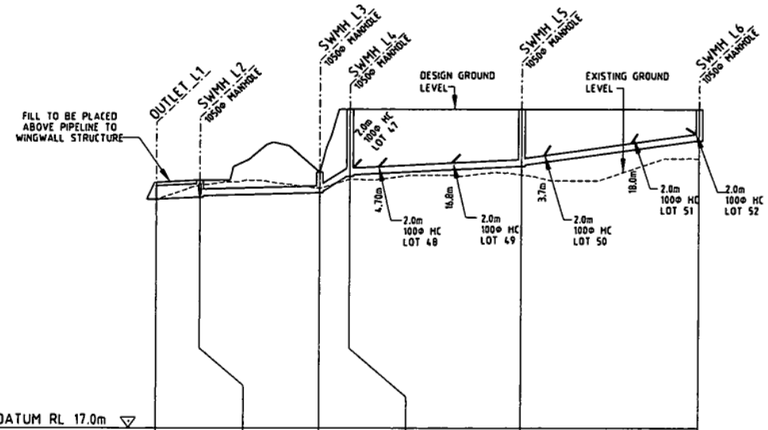
LONGITUDINAL SECTION LINE F



DATUM RL 17.0m

PIPE	525Φ		
DEPTH TO INVERT			1.63
INVERT LEVEL	22.80		24.70
GROUND LEVEL	00.0		26.33
DISTANCE	23.8		
GRADE	8.0%		
DESIGN FLOW l/sec			
CAPACITY l/sec	1222		

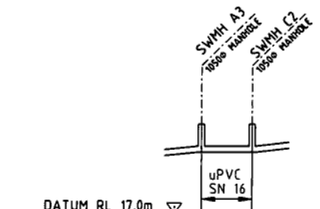
LONGITUDINAL SECTION LINE G



DATUM RL 17.0m

PIPE	450Φ			225Φ			225Φ			225Φ			225Φ		
DEPTH TO INVERT		0.60			0.69			2.28			1.95			1.08	
INVERT LEVEL	24.73		24.80	24.87		25.06	25.11		25.50	25.55		25.83	25.88		26.70
GROUND LEVEL	25.29			25.40	25.63			27.78			27.78			27.78	
DISTANCE	7.1			19.6			5.0			28.10			29.20		
GRADE	1.1%			1.0%			7.8%			1.0%			2.8%		
DESIGN FLOW l/sec	276.2			20.2			20.2			16.6			9.8		
CAPACITY l/sec	301.0			45.6			127.8			45.6			76.5		

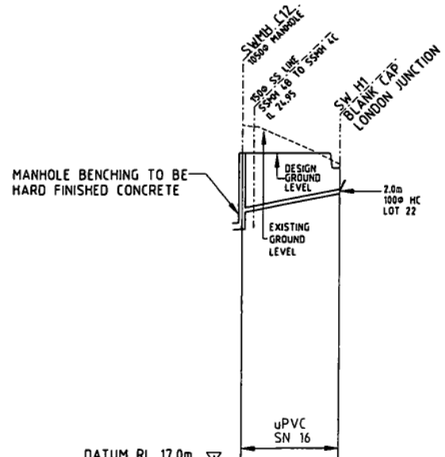
LONGITUDINAL SECTION LINE L



DATUM RL 17.0m

PIPE	200Φ		
DEPTH TO INVERT	0.94		0.94
INVERT LEVEL	19.10		19.10
GROUND LEVEL	20.00		20.04
DISTANCE	8.4		
GRADE	0.0%		
DESIGN FLOW l/sec	20.0		
CAPACITY l/sec	20.0		

LONGITUDINAL SECTION LINE C2-A3



DATUM RL 17.0m

PIPE	150Φ		
DEPTH TO INVERT	2.00		1.00
INVERT LEVEL	24.86	25.50	26.00
GROUND LEVEL	27.50		27.00
DISTANCE	16.3		
GRADE	3.1%		
DESIGN FLOW l/sec	4.1		
CAPACITY l/sec	27.3		

LONGITUDINAL SECTION LINE H

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DRAWING NOTES

DK

APPROVED
21/2/07.

REV	DATE	DESCRIPTION	DRAWN	CHE
F	190207	VARIOUS AMENDMENTS	FK	
E	050207	VARIOUS AMENDMENTS	FK	
D	310107	LINE F AND LINE L AMENDED	FK	
C	JAN07	VARIOUS AMENDMENTS	FK	
B	NOV06	VARIOUS AMENDMENTS	MSO	
A	NOV06	VARIOUS AMENDMENTS	FK	DM

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN
FOR
NZ HOUSING FOUNDATIO

DRAWING TITLE

STORMWATER LONGITUDINAL SECTIONS (SHEET 3

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		

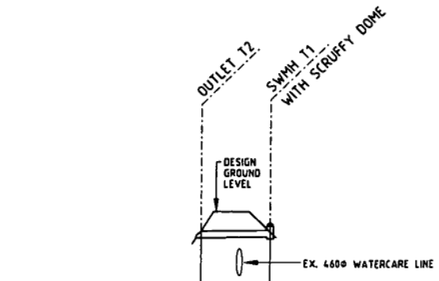
SCALE (A1)

1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C39	F

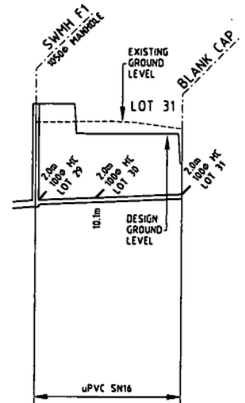
NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Φ UNLESS NOTED OTHERWISE.
3. MANHOLE LIGHT DUTY FRAMES AND LIDS SHALL BE USED EXCEPT WHERE SUBJECT TO TRAFFIC LOADING. HEAVY DUTY FRAMES AND LIDS SHALL BE USED WHEN SUBJECT TO TRAFFIC LOADING.
4. ALL CATCHPIT LEADS ARE 225Φ UNLESS NOTED OTHERWISE.
5. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
6. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
7. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
8. ALL PIPES ARE CONCRETE RUBBER RING JOINTED AND CLASS 2 UNLESS OTHERWISE SHOWN
9. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.
10. ALL OUTLETS DISCHARGING INTO THE STREAM SHALL BE PLACED SO AS TO NOT IMPED FLOW DIRECTION.
11. ALL LOT CONNECTIONS TO BE LONDON JUNCTIONS UNLESS OTHERWISE NOTED.



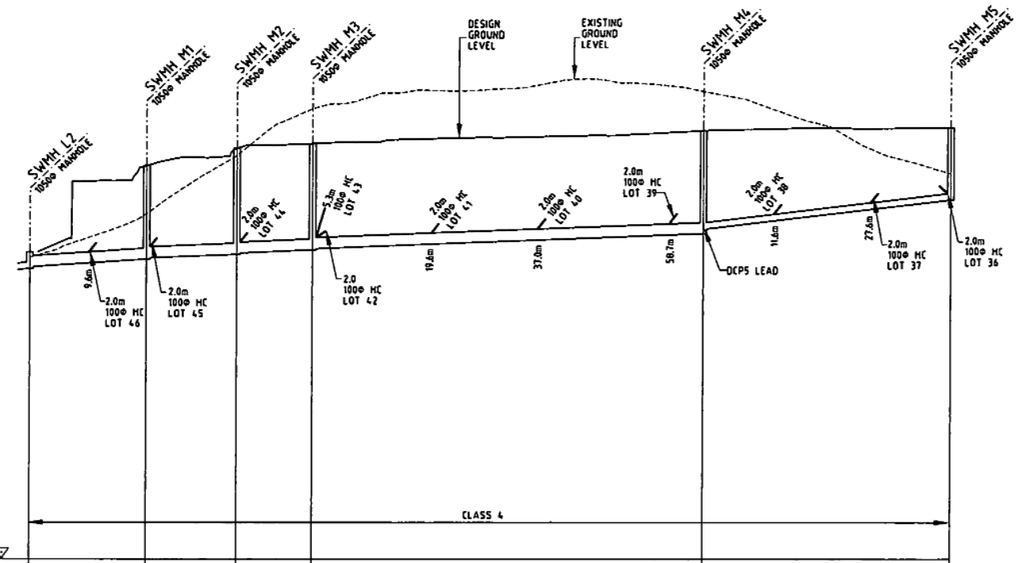
DATUM RL 15.0m ▽		
PIPE	225Φ	
DEPTH TO INVERT		
INVERT LEVEL	18.24	18.39
GROUND LEVEL		
DISTANCE	11.3	
GRADE	1.3%	
DESIGN FLOW l/sec CAPACITY l/sec		

LONGITUDINAL SECTION LINE T (WETLAND TO DETENTION BASIN 1)



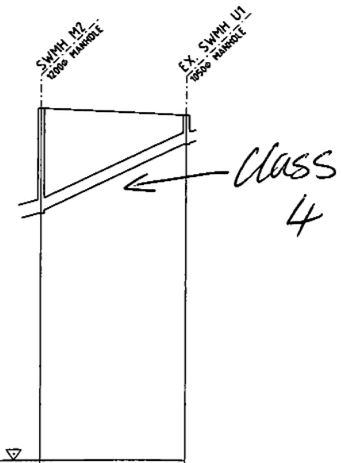
DATUM RL 15.0m ▽			
PIPE	150Φ		
DEPTH TO INVERT	3.41		1.20
INVERT LEVEL	22.59 22.59		22.80
GROUND LEVEL	26.00		24.00
DISTANCE	0.0	24.5	24.5
GRADE	0.9%		
DESIGN FLOW l/sec CAPACITY l/sec	8.1 15		

LONGITUDINAL SECTION LINE Q



DATUM RL 15.0m ▽					
PIPE	450Φ	450Φ	375Φ	375Φ	225Φ
DEPTH TO INVERT	0.57 3.21	3.63	3.61	3.58	2.46
INVERT LEVEL	24.80 24.87 25.10	25.15 25.27	25.34 25.44	25.49 26.00	26.08 27.14
GROUND LEVEL	25.37 28.31	28.90	29.05	29.58	29.60
DISTANCE	19.0	14.6	12.4	64.2	40.7
GRADE	1.2%	0.8%	0.8%	0.8%	2.6%
DESIGN FLOW l/sec CAPACITY l/sec	256.0 314	248.7 256	129.4 158	120.7 158	8.4 73.7

LONGITUDINAL SECTION LINE M



DATUM RL 17.0m ▽		
PIPE	375Φ	
DEPTH TO INVERT	3.56	0.94
INVERT LEVEL	25.27 25.35	27.73
GROUND LEVEL	28.90	28.67
DISTANCE	24.1	
GRADE	9.9%	
DESIGN FLOW l/sec CAPACITY l/sec	558.2	

LONGITUDINAL SECTION LINE U

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DRAWING NOTES

APPROVED
21/2/07

REV	DATE	DESCRIPTION	DRAWN	CHE
F	190207	LINE U AMENDED	FK	
E	050207	VARIOUS AMENDMENTS	FK	
D	310107	PIPE CLASSES AMENDED	FK	
C	250107		FK	
B	230107	LS FOR LINE M ADDED	FK	
A	180107	TEXT AMENDMENTS	MSO	

DRAWING REVISIONS

SURVEYORS · ARCHITECTS · ENGINEERS
Babbage CONSULTANTS
109 FANSHAWE STRE
PO BOX 2
AUCKLAND 1 · NEW ZEALA
PHONE 09 - 379 9680 · FAX 09 - 377 11
admin@babbaga.cc

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN
FOR
NZ HOUSING FOUNDATIO

DRAWING TITLE

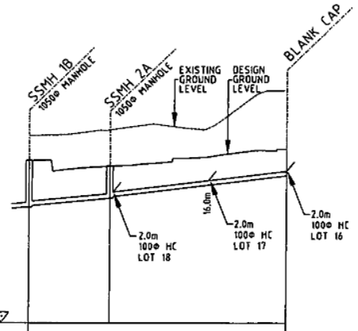
STORMWATER LONGITUDINAL SECTIONS (SHEET 4

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		

SCALE (A1)

1:500(H) 1:100(V)

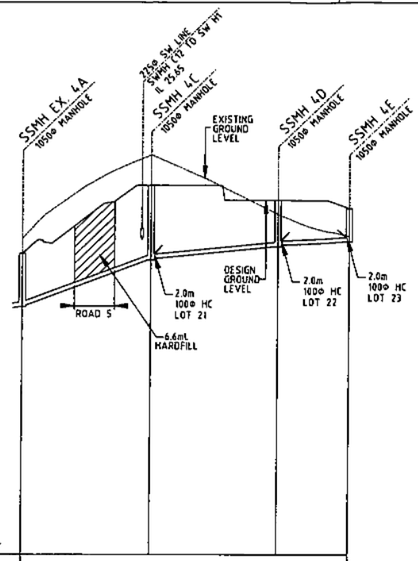
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C40	F



DATUM RL 15.0m

PIPE	150Φ					
DEPTH TO INVERT	1.53	1.09				0.90
INVERT LEVEL	18.93 18.98	19.24	19.29			19.99
GROUND LEVEL	20.51	20.33				20.89
DISTANCE	12.4	29.2				
GRADE	2.1%	2.4%				

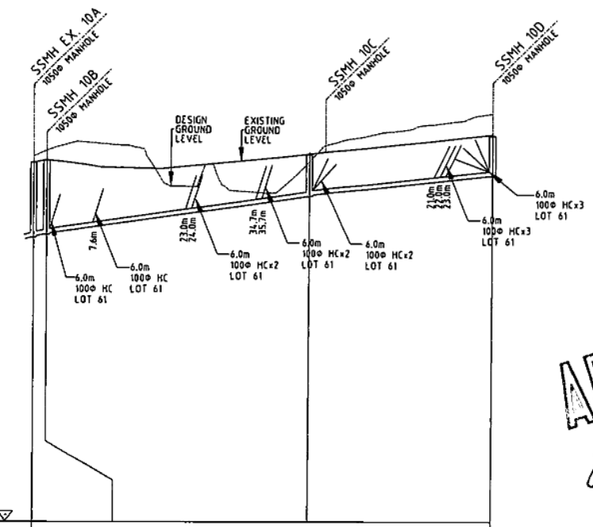
LONGITUDINAL SECTION LINE 2



DATUM RL 15.0m

PIPE	150Φ							
DEPTH TO INVERT	1.75		2.52			1.57		1.13
INVERT LEVEL	23.39 23.44		24.98 25.03			25.43 25.48		25.60
GROUND LEVEL	25.19		27.50			27.00		26.73
DISTANCE	21.0		21.1			11.7		
GRADE	7.3%		2.0%			1.1%		

LONGITUDINAL SECTION LINE 4



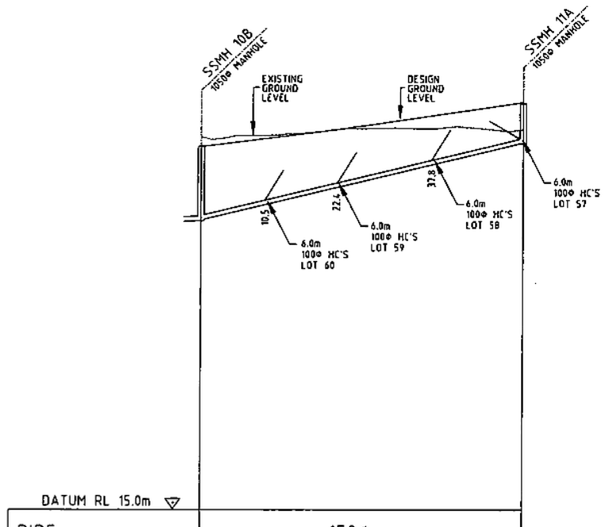
DATUM RL 15.0m

PIPE	150Φ									
DEPTH TO INVERT	2.48		2.51				1.40			1.35
INVERT LEVEL	24.66 24.69		24.74 24.79				26.11 26.16			26.72
GROUND LEVEL	27.17		27.25				27.53			28.07
DISTANCE	2.3		43.7				37.1			
GRADE	2.2%		3.0%				1.5%			

LONGITUDINAL SECTION LINE 10

NOTES

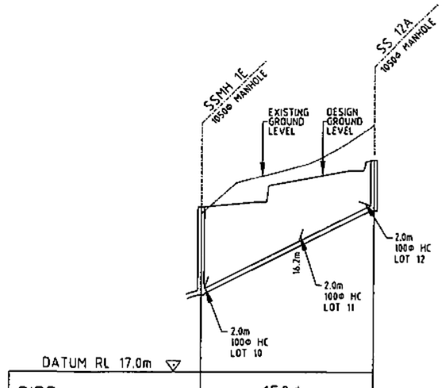
1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC)CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Φ UNLESS NOTED OTHERWISE.
3. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
4. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHEDGROUND LEVELS.
5. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
6. ALL PIPES ARE uPVC SN16 UNLESS OTHERWISE SHOWN.
7. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.
8. ALL WORK ON EXISTING WCC SEWER TO BE UNDERTAKEN BY AN APPROVED CONTRACTOR. THIS INCLUDES LOWERING AND EXTENTION OF EXISTING MANHOLES.



DATUM RL 15.0m

PIPE	150Φ		
DEPTH TO INVERT	2.33		1.38
INVERT LEVEL	24.74 24.79		27.35
GROUND LEVEL	27.25		28.73
DISTANCE	52.9		
GRADE	4.8%		

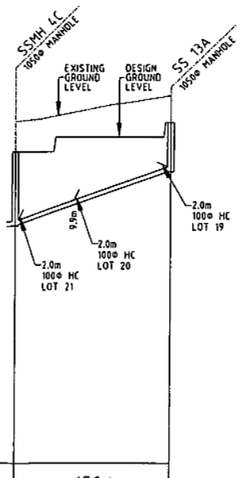
LONGITUDINAL SECTION LINE 11



DATUM RL 17.0m

PIPE	150Φ		
DEPTH TO INVERT	2.96		1.75
INVERT LEVEL	19.58 19.63		22.39
GROUND LEVEL	22.54		24.14
DISTANCE	28.7		
GRADE	9.6%		

LONGITUDINAL SECTION LINE 12



DATUM RL 17.0m

PIPE	150Φ		
DEPTH TO INVERT	2.47		1.70
INVERT LEVEL	24.98 25.03		26.80
GROUND LEVEL	27.50		28.50
DISTANCE	26.2		
GRADE	6.8%		

LONGITUDINAL SECTION LINE 13

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DRAWING NOTES

OK.

APPROVED
21/2/07

REV	DATE	DESCRIPTION	DRAWN	CHE
D	120207	LINE 5 & SSMH 4B DELETED	FK	
C	050207	VARIOUS AMENDMENTS	FK	
B	310107	VARIOUS AMENDMENTS	FK	
A	180107	TEXT AMENDMENTS	MSO	

DRAWING REVISIONS

ENGINEERS · ARCHITECTS · SURVEYORS
Babbage CONSULTANT
109 FANSHAWE STR
PO BOX
AUCKLAND 1 · NEW ZEAL
PHONE 09 - 379 9980 · FAX 09 - 377 1
admin@babbage.c

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN

FOR

NZ HOUSING FOUNDATIO

DRAWING TITLE

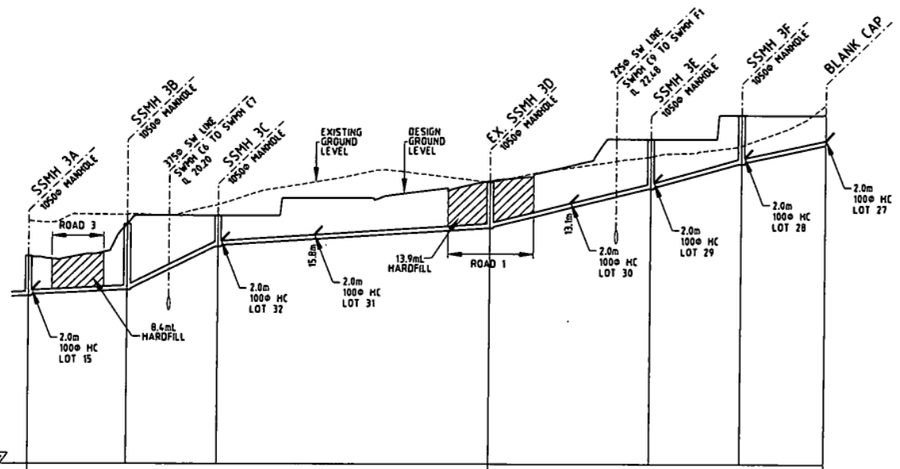
SANITARY SEWER LONGITUDINAL SECTIONS (SHEET 1

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		

SCALE (A1)

1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISIO
42608	C41	D



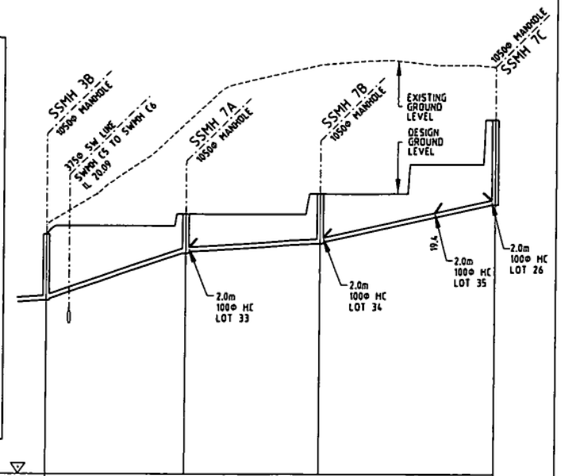
DATUM RL 15.0m

PIPE	300Φ				150Φ			
DEPTH TO INVERT	1.30	2.23	1.05	1.17	1.68	1.64		1.04
INVERT LEVEL	20.68 20.73	20.89	20.94 22.35	22.40 22.99	23.04 24.32	24.37 25.16	25.21	25.80
GROUND LEVEL	22.03	23.12	23.40	24.16	26.00	26.80		26.84
DISTANCE	16.0	14.8	44.5		26.2	15.0	13.8	
GRADE	1.00%	9.53%	1.33%		4.88%	5.27%	4.28%	

LONGITUDINAL SECTION LINE 3

NOTES

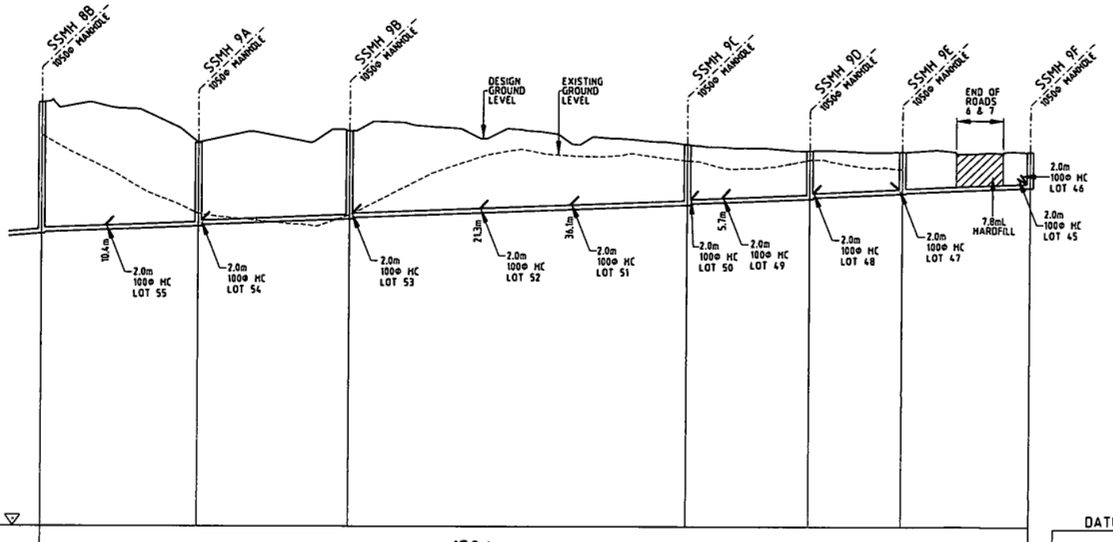
1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCCICODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Φ UNLESS NOTED OTHERWISE.
3. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
4. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHEDGROUND LEVELS.
5. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
6. ALL PIPES ARE uPVC SN16 UNLESS OTHERWISE SHOWN.
7. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.
8. ALL WORK ON EXISTING WCC SEWER TO BE UNDERTAKEN BY AN APPROVED CONTRACTOR. THIS INCLUDES LOWERING AND EXTENTION OF EXISTING MANHOLES.



DATUM RL 15.0m

PIPE	150Φ		
DEPTH TO INVERT	2.18	1.32	1.68	2.87
INVERT LEVEL	20.89 20.94	22.48 22.53	22.82 22.87	24.13
GROUND LEVEL	23.12	23.80	24.50	27.00
DISTANCE	23.3	22.4	29.6	
GRADE	6.61%	1.29%	4.26%	

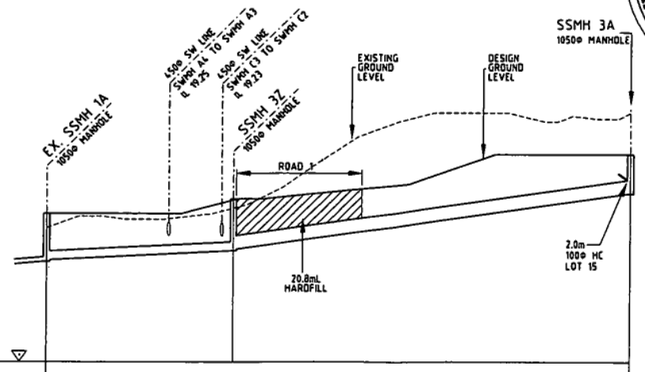
LONGITUDINAL SECTION LINE 7



DATUM RL 15.0m

PIPE	150Φ					
DEPTH TO INVERT	4.46	2.85	2.99	2.06	1.65	1.44	1.35
INVERT LEVEL	24.86 24.91	25.11 25.16	25.36 25.41	25.85 25.90	26.06 26.11	26.23 26.28	26.45
GROUND LEVEL	29.32	27.96	28.35	27.91	27.71	27.67	27.80
DISTANCE	25.6	24.8	55.5	20.1	15.2	21.2	
GRADE	0.80%	0.80%	0.80%	0.80%	0.80%	0.90%	

LONGITUDINAL SECTION LINE 9



DATUM RL 15.0m

PIPE	300Φ		
DEPTH TO INVERT	1.52	1.71	1.32
INVERT LEVEL	18.43 18.48	18.75 18.80	20.68 20.73
GROUND LEVEL	20.00	20.46	22.00
DISTANCE	31.6	66.5	
GRADE	0.85%	2.83%	

LONGITUDINAL SECTION - LINE TO BE RELAID

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DRAWING NOTES

APPROVED
Duncan 21/2/07

REV	DATE	DESCRIPTION	DRAWN	CHE
D	050207	VARIOUS AMENDMENTS	FK	
C	310107	VARIOUS AMENDMENTS	FK	
B	160107	VARIOUS AMENDMENTS	MSO	
A	10/08	PIPE SIZE AMENDED	FK	FK

DRAWING REVISIONS

ENGINEERS • SURVEYORS • ARCHITECTS
Babbage CONSULTANTS
109 FANSHAWE STRE
PO BOX 2
AUCKLAND 1 · NEW ZEALA
PHONE 09 - 379 9980 · FAX 09 - 377 11
admin@babbage.co

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN
FOR
NZ HOUSING FOUNDATIO

DRAWING TITLE

SANITARY SEWER LONGITUDINAL SECTIONS (SHEET 2

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.08	GNB
CHECKED		
APPROVED		

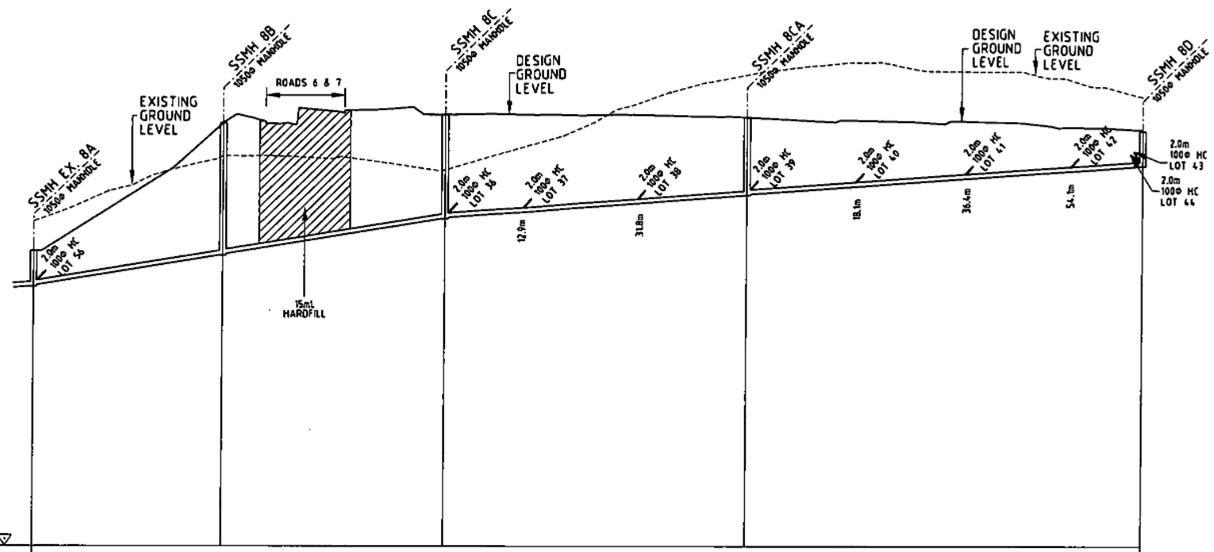
SCALE (A1)

1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C42	D

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC)CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Φ UNLESS NOTED OTHERWISE.
3. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
4. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHEDGROUND LEVELS.
5. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
6. ALL PIPES ARE uPVC SN16 UNLESS OTHERWISE SHOWN.
7. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.
8. ALL WORK ON EXISTING WCC SEWER TO BE UNDERTAKEN BY AN APPROVED CONTRACTOR. THIS INCLUDES LOWERING AND EXTENTION OF EXISTING MANHOLES.



DATUM RL 15.0m

| | | |

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
6 Henderson Valley Road
Henderson 0612

Private Bag 93109
Henderson 0650
Waitakere

Telephone
09 836 8000

24Hr Call Centre
09 839 0400

Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

28 March 2007

NEW ZEALAND HOUSING FOUNDATION
C/- Babbage Consultants
PO Box 2027
Fanshawe Street
Auckland

Attn: Fiona Keir
Your ref: 42608/C

Dear Sir / Madam

Resource Consent Application:	**SUB-2006-1078**
Proposal:	**61 LOT SUB**
	NOTE: COMBO REFER RMA 20061077 FOR LUC
	E15461
Site Address:	**423-429 West Coast Road, GLEN EDEN**

You recently submitted amended plans for engineering approval for the above subdivision.

Your plans have been forwarded to Ecowater, Transport Assets and Parks Planning. Each unit will contact you directly if they require any further information.

Yours faithfully

Kristin Spyve
PLANNING TECHNICAL ASSISTANT

WAITAKERE CITY COUNCIL
21 MAR 2007

DOCUMENT TRANSFER

To:	**Waitakere City Council** Private Bag 93 109 Henderson Waitakere City 1231 New Zealand	***Job No:***	42608/C
Attention:	Maylene Barrett	***File:***	
From:	Fiona Keir	***Date:***	19 Mar 07
Copy to:			

Babbage CONSULTANTS

BABBAGE CONSULTANTS LIMITED
109 FANSHAWE STREET, AUCKLAND
PO BOX 2027, AUCKLAND 1, NEW ZEALAND
PHONE 0-9-379 9980, FAX 0-9-377 1170
EMAIL: admin@babbage.co.nz

Housing Development
West Coast Rd (No. 423-429), Henderson
Engineering Approval - Footbridge/Cycleway

694001

DOCUMENTS: Please find enclosed five A3 copies of:
C60 – Footbridge Details Rev B
C61 – Footbridge Site Plan Rev –
C62 – Cycleway Plan (Sheet 1) Rev –
C63 – Cycleway Plan (Sheet 2) Rev –
C64 – Cycleway Cross Section Details Rev -

ACTION REQUIRED: For engineering approval.

Regards

Fiona Keir
Babbage Consultants Ltd

Chief Executive	
Corporate Services	
City Services Moselle	✓
Consultancy Services	
ECO - WATER	
Strategic Group	
Consent Services	
Field Services	

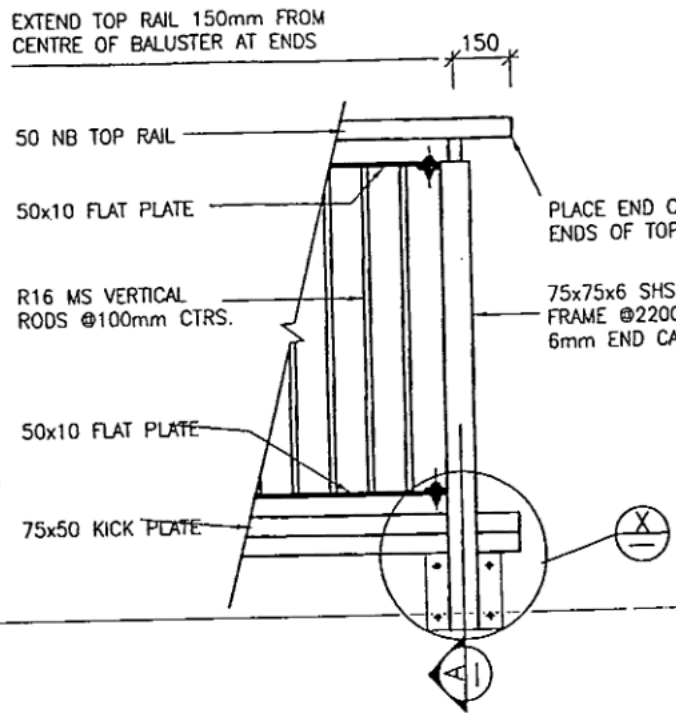
SENT: ✓ SURFACE MAIL FAST POST COURIER OTHER

BDOC03524985

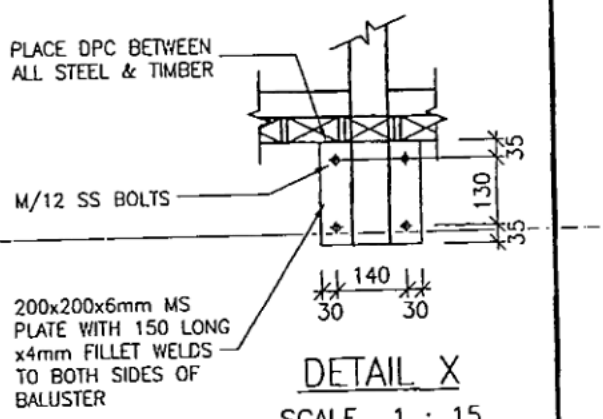
Waitakere *City Council*
Te Taiao o Waitakere

NOTES

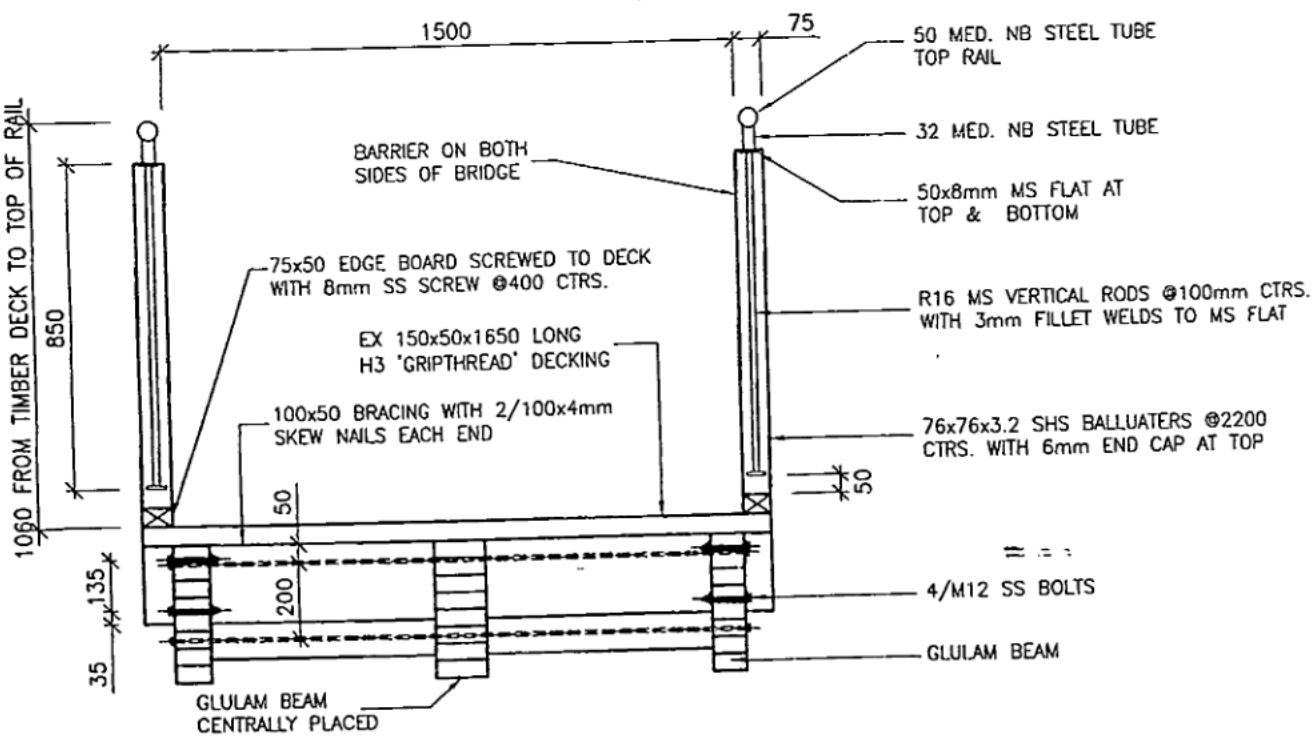
1. All Structural Steelwork to Comply with NZS 3404 Grade 250.
2. All Welds to be General purpose & Comply with NZS 4701 using E41XXn Electrodes.
3. All Bolts to be 4.6/s in accordance with AS 1252.
4. All Steelwork, Bolts, Nuts, Washers etc. to be Hot Dipped in Galvanised after Fabrication to 70 Micron Min. thickness.All Welding to Take Place Prior to Galvanising.



BALLUSTER ELEVATION
SCALE 1 : 20



DETAIL X
SCALE 1 : 15



SECTION A–A
SCALE 1 : 20

DRAFT COPY

ENGINEERING STANDARDS MANUAL	TYPICAL FOOTBRIDGE (GLULAM BEAM)	STANDARD DETAIL
ISSUE		SD7.11B

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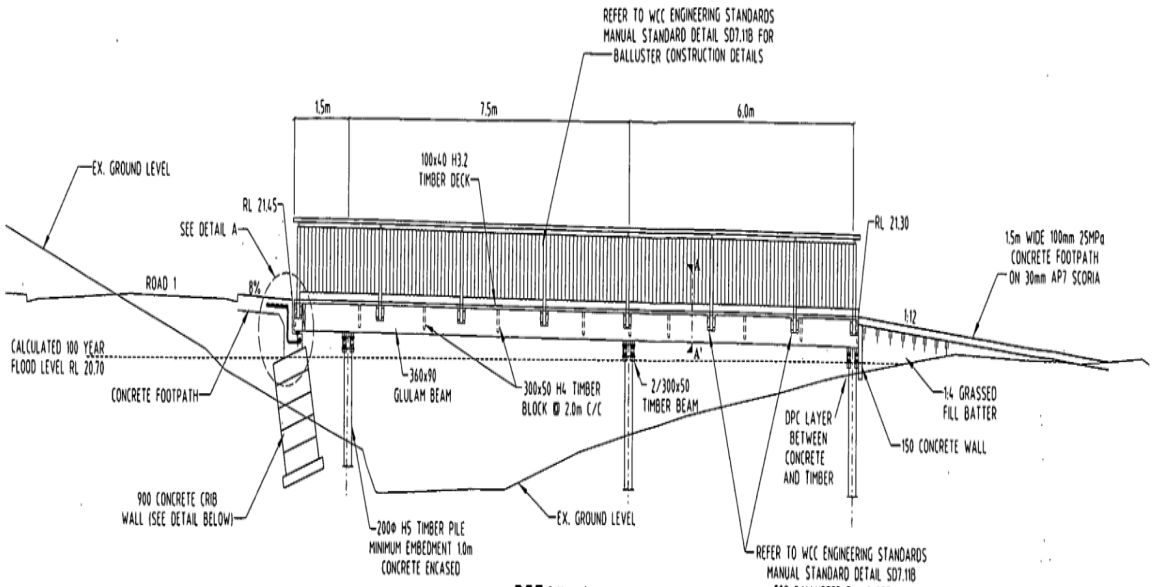
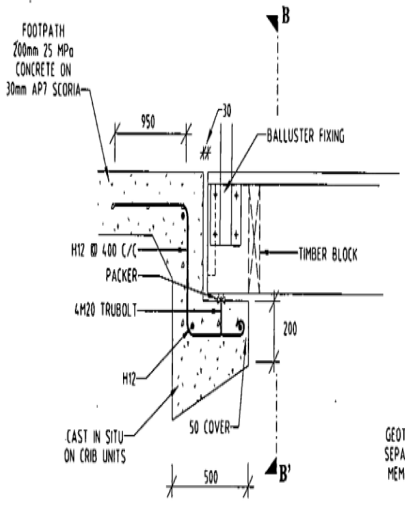
DRAWING NOTES



DETAIL A
SCALE 1:50



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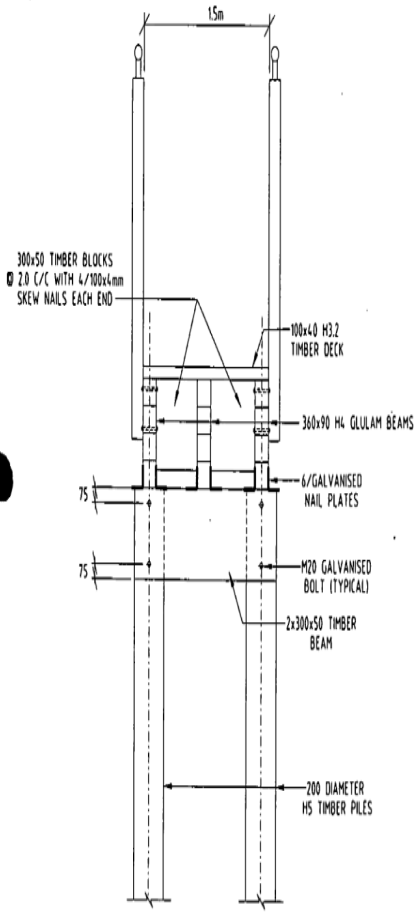
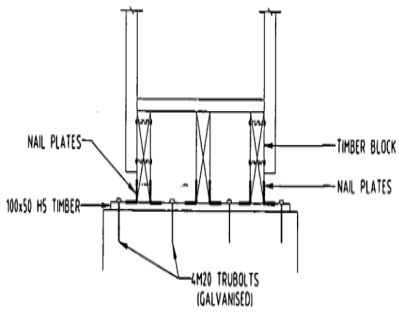
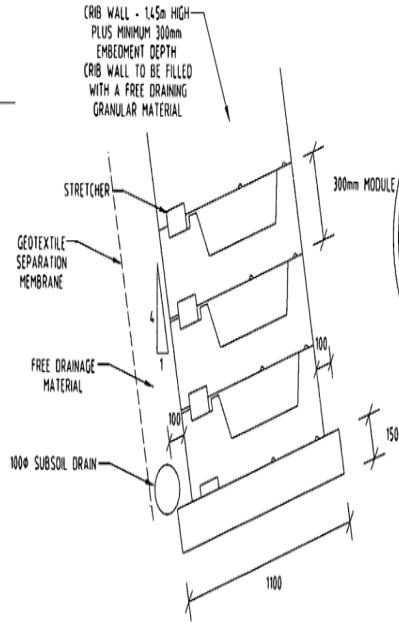
NOT TO SCALE



SECTION A-A'



SECTION B-B'



900 CRIB WALL DETAIL
NOT TO SCALE

TYPICAL CROSS SECTIONS OF FOOTBRIDGE
NOT TO SCALE

REV	DATE	DESCRIPTION	DRAWN	CHECK
B	08.03.07	VARIOUS AMENDMENTS	FK	
A	13.02.07	STREAM BED ADDED	DH	DMR

DRAWING REVISIONS

Babbage CONSULTANTS
109 PANSHAWE STREET
PO BOX 2027
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PHONE 09 - 379 9680 · FAX 09 - 377 1170
admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

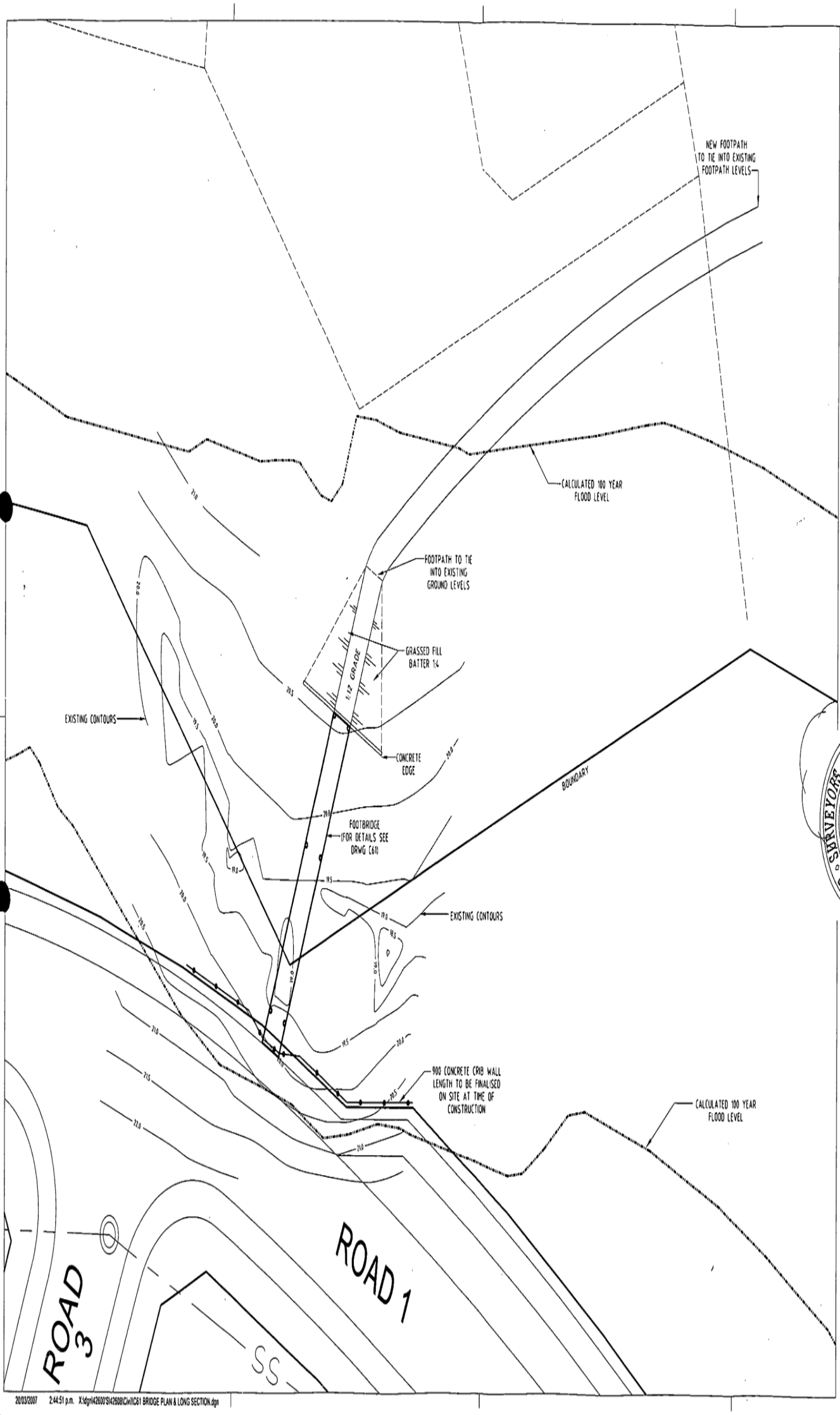
FOOTBRIDGE DETAILS

	DATE	INITIAL
DESIGNED	AUGUST 2006	VL
DRAWN	AUGUST 2006	GNB
CHECKED		
APPROVED		

SCALE (A1)

AS SHOWN

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C60	B



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

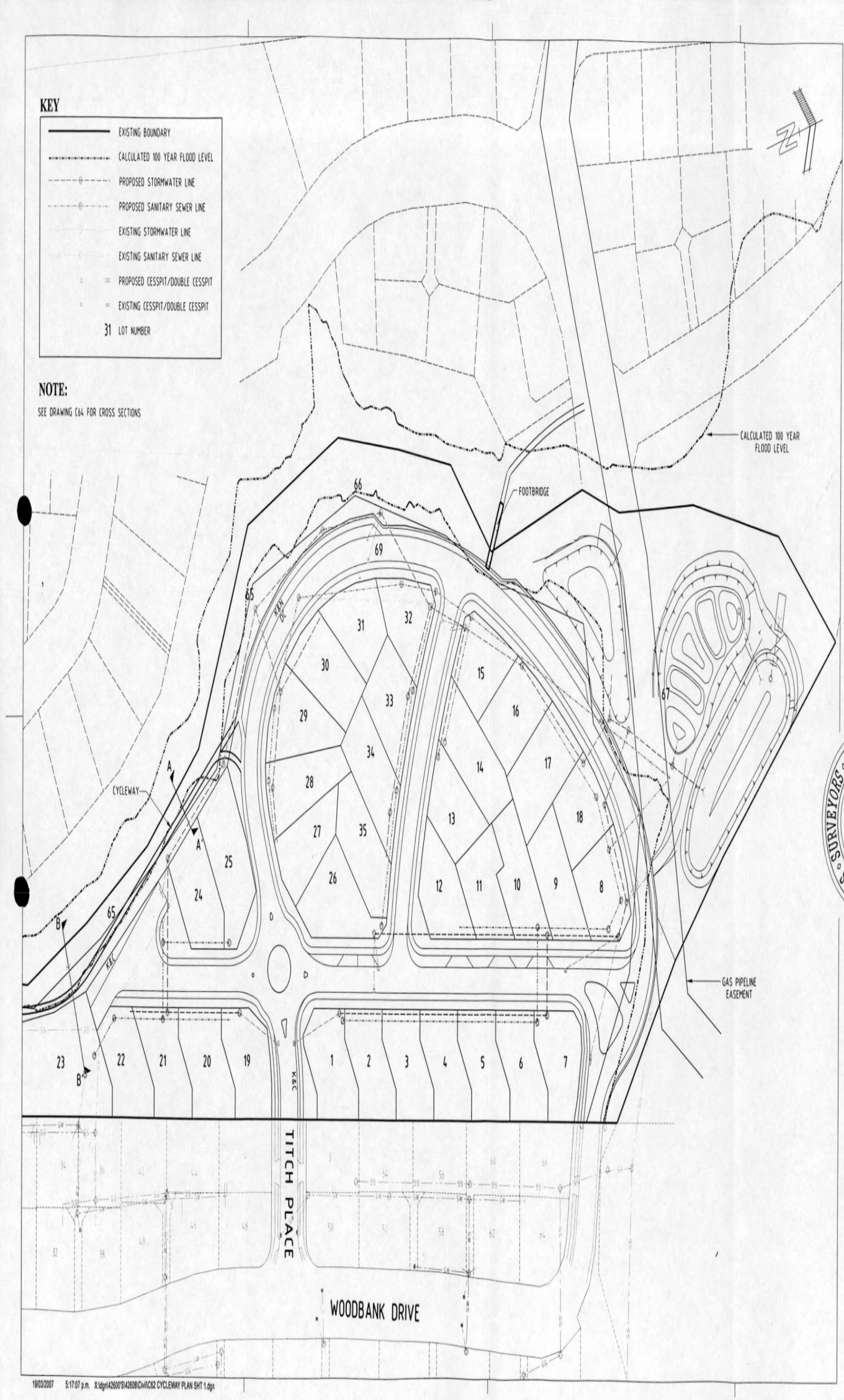
FOOTBRIDGE SITE PLAN

	DATE	INITIAL
DESIGNED	FEB 2007	FK
DRAWN	FEB 2007	FK
CHECKED		
APPROVED		

SCALE (A1)

1:100

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C61	-



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHEC

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

CYCLEWAY PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	FEB 2007	FK
DRAWN	FEB 2007	FK
CHECKED		
APPROVED		

SCALE (A1)

1:500

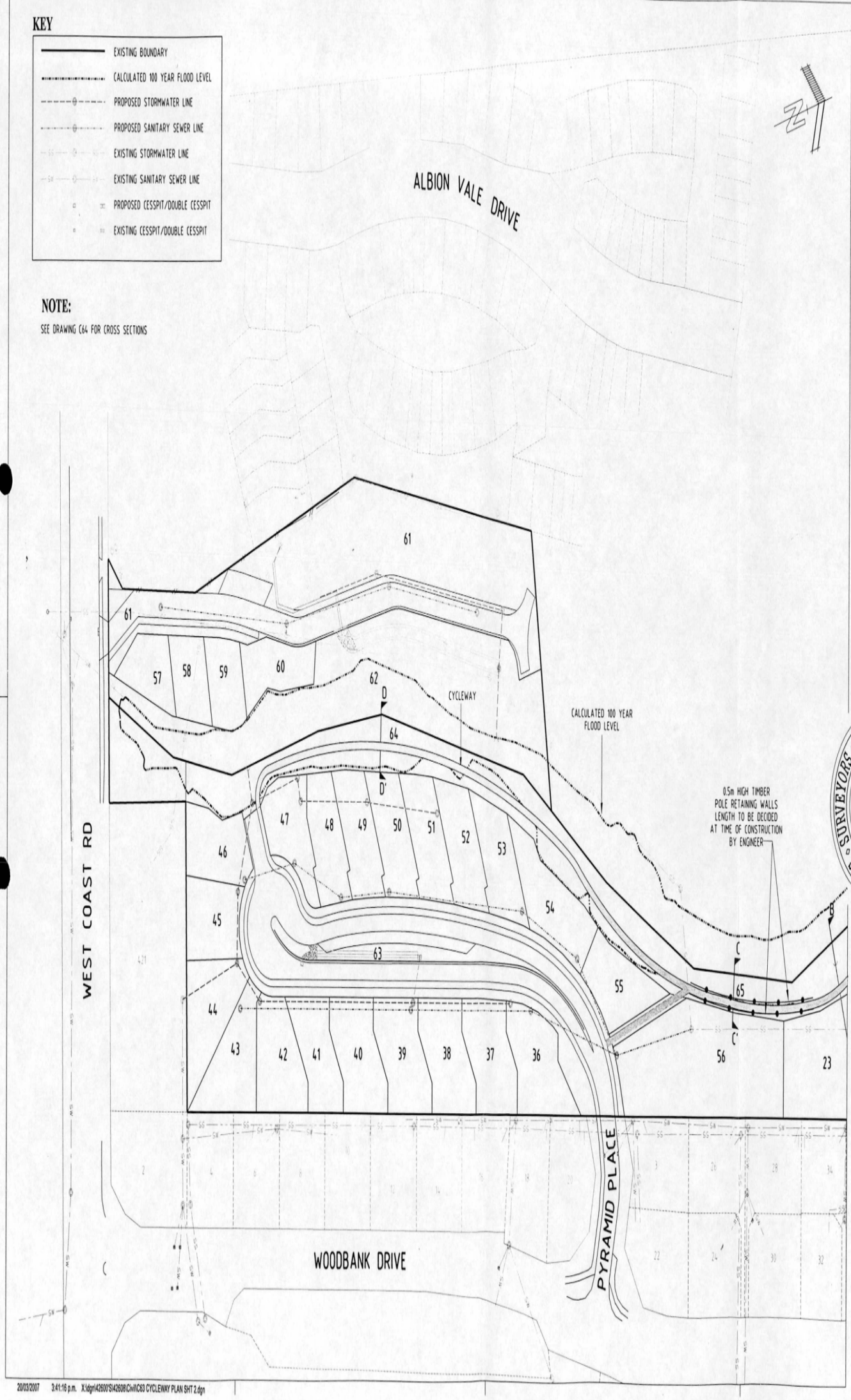
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C62	-

KEY

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- PROPOSED STORMWATER LINE
- PROPOSED SANITARY SEWER LINE
- EXISTING STORMWATER LINE
- EXISTING SANITARY SEWER LINE
- PROPOSED CESSPIT/DOUBLE CESSPIT
- EXISTING CESSPIT/DOUBLE CESSPIT

NOTE:

SEE DRAWING C64 FOR CROSS SECTIONS



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

CYCLEWAY PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C63	-

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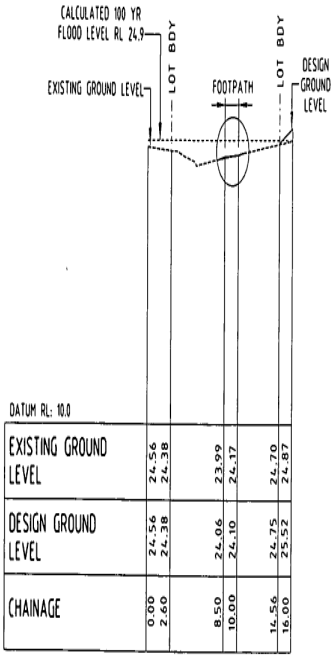
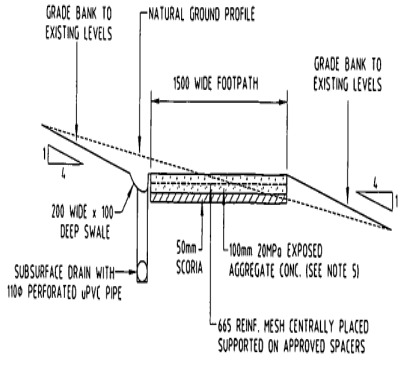


SECTION D-D'

SCALE 1: 200



FOOTPATH - TYPICAL SECTION

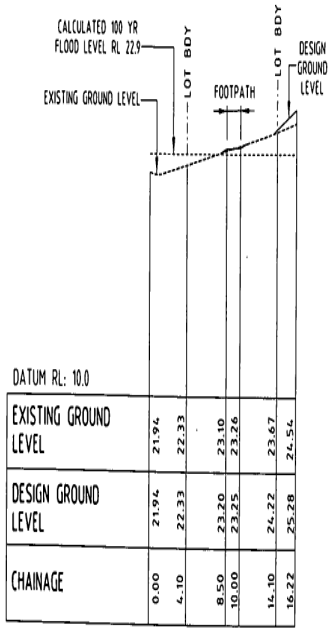
SCALE 1: 20

FOOTPATH CONSTRUCTION NOTES

1. 20MPA CONCRETE - SAWCUT @ 3.0m INTERVALS WITHIN 48 HOURS.
2. SCORIA BEDDING - 50mm THICK.
3. 1.5% CROSSFALL ON FOOTPATH.
4. LONGITUDINAL GRADE OF FOOTPATH NOT TO EXCEED 8%.
5. 10-13mm AGGREGATE EXPOSED USING RUGASOL TO PROVIDE EVEN AGGREGATE FINISH AND WATER BLASTED TO REMOVE SLURRY AND PRODUCE EVEN EXPOSED FINISH.
6. BOXING MUST BE TO THE FULL DEPTH OF CONCRETE TO BE POURED.

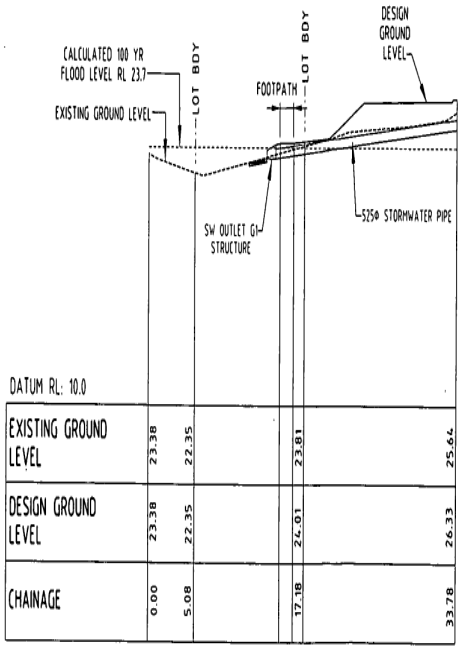
REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS



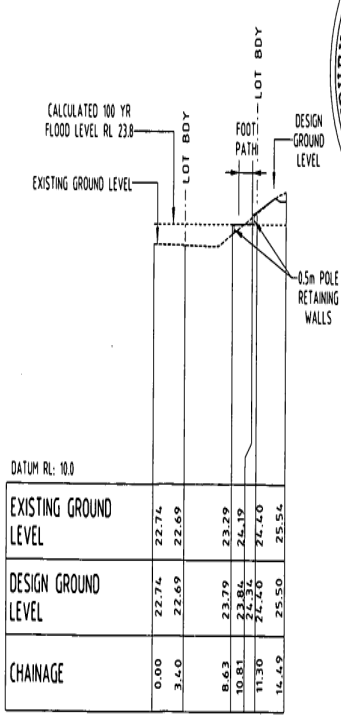
SECTION A-A'

SCALE 1: 200



SECTION B-B'

SCALE 1: 200



SECTION C-C'

SCALE 1: 200

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CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

CYCLEWAY CROSS SECTION DETAILS

	DATE	INITIAL
DESIGNED		
DRAWN	MARCH 2007	MSD
CHECKED	MARCH 2007	FK
APPROVED		

SCALE (A1)

AS SHOWN

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C64	-

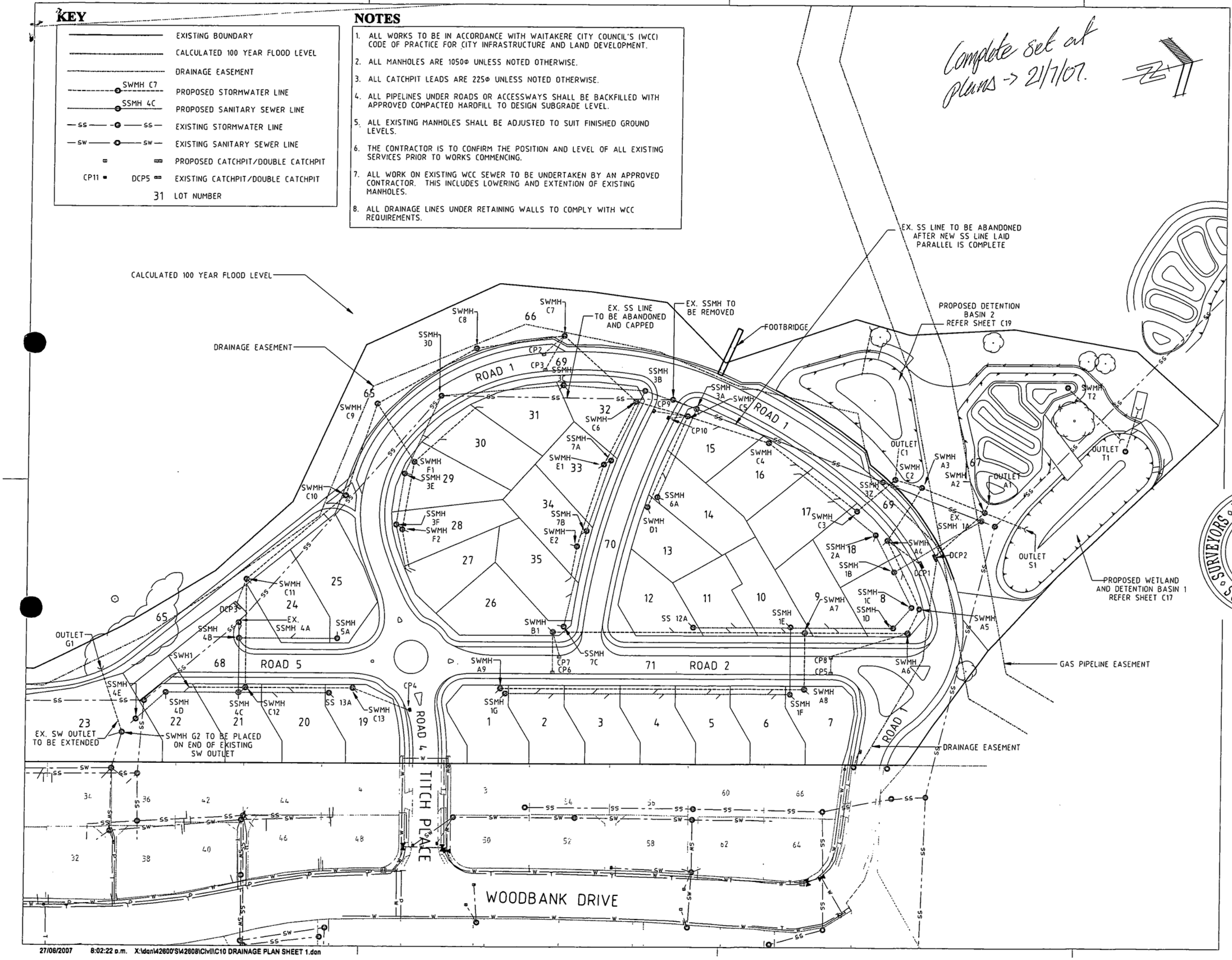
KEY

	EXISTING BOUNDARY
	CALCULATED 100 YEAR FLOOD LEVEL
	DRAINAGE EASEMENT
SWMH C7	PROPOSED STORMWATER LINE
SSMH 4C	PROPOSED SANITARY SEWER LINE
ss ss	EXISTING STORMWATER LINE
sw sw	EXISTING SANITARY SEWER LINE
	PROPOSED CATCHPIT/DOUBLE CATCHPIT
CP11 DCP5	EXISTING CATCHPIT/DOUBLE CATCHPIT
31	LOT NUMBER

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Φ UNLESS NOTED OTHERWISE.
3. ALL CATCHPIT LEADS ARE 225Φ UNLESS NOTED OTHERWISE.
4. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
5. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
6. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
7. ALL WORK ON EXISTING WCC SEWER TO BE UNDERTAKEN BY AN APPROVED CONTRACTOR. THIS INCLUDES LOWERING AND EXTENTION OF EXISTING MANHOLES.
8. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.

Complete Set of plans -> 21/7/07.



REV	DATE	DESCRIPTION	DRAWN	CHEC
O	220807	WETLAND POND AMENDED	FK	
N	300407	CP ADDED TO BEGINNING OF ROAD 1	FK	NSL
M	160407	SWMH C10 MOVED	FK	NSL
L	270307	CP5 MOVED TO RD 2 DCP1 & 2 MOVED	FK	
K	090307	FOOTBRIDGE ALIGNMENT AMENDED	FK	
J	280207	SSMH 3C AND HC'S FOR LOTS 31 AND 32 AMENDED	FK	
I	160207	REV H REVERSED	FK	
H	120207	SS LINE 4B TO 5A DELETED HC TO LOTS 24/25 AMENDED	FK	
G	050207	MH'S ADDED TO LINES SS12 AND SS13	FK	
F	310107	VARIOUS AMENDMENTS	FK	
E	17.01.07	VARIOUS AMENDMENTS	MSO	
D	091008	TEXT AMENDED FOR SS LINE 3A TO 1A	FK	DR
C	210906	SSMH 3Z ADDED	FK	DR
B	150806	POND ADDED	FK	DR
A	150806	VARIOUS AMENDMENTS	FK	DR

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

DRAINAGE PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED		

SCALE (A1)

1:500

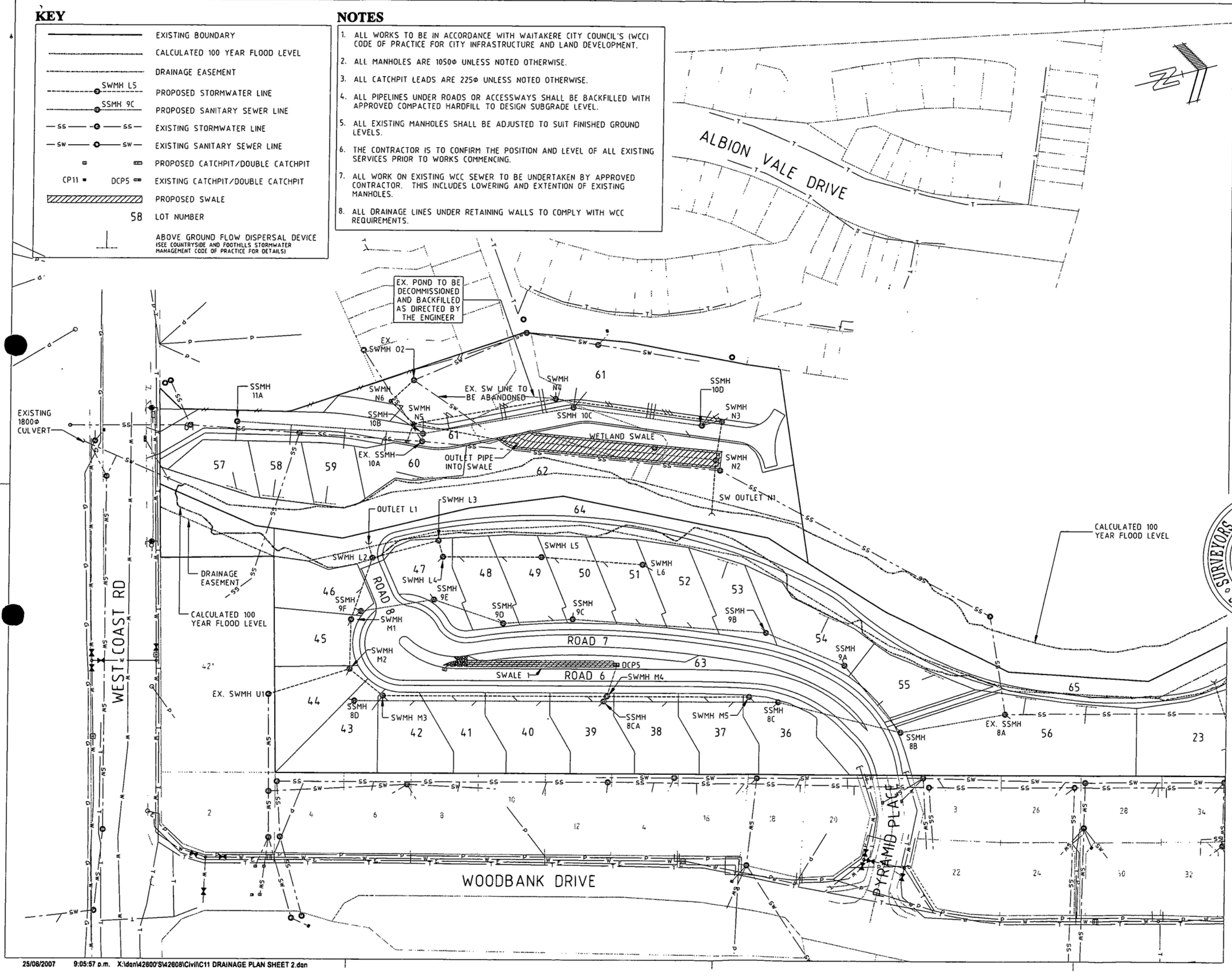
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C10	N

KEY

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- DRAINAGE EASEMENT
- SWMH L5 — PROPOSED STORMWATER LINE
- SSMH 9C — PROPOSED SANITARY SEWER LINE
- ss — ss — EXISTING STORMWATER LINE
- sw — sw — EXISTING SANITARY SEWER LINE
- PROPOSED CATCHPIT/DOUBLE CATCHPIT
- CP11 — DCP5 — EXISTING CATCHPIT/DOUBLE CATCHPIT
- PROPOSED SWALE
- 58 — LOT NUMBER
- ABOVE GROUND FLOW DISPERSAL DEVICE (SEE COUNTRYSIDE AND FOOTHILLS STORMWATER MANAGEMENT CODE OF PRACTICE FOR DETAILS)

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Φ UNLESS NOTED OTHERWISE.
3. ALL CATCHPIT LEADS ARE 225Φ UNLESS NOTED OTHERWISE.
4. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
5. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
6. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
7. ALL WORK ON EXISTING WCC SEWER TO BE UNDERTAKEN BY APPROVED CONTRACTOR. THIS INCLUDES LOWERING AND EXTENTION OF EXISTING MANHOLES.
8. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHEC
G	220607	SWALE 2 AND SW LINE N AMENDED	FK	
F	140607	SWALE 2 AND SW LINE N AMENDED	FK	
E	190207	HC AMENDMENT FOR LOT 45	FK	
D	050207	VARIOUS AMENDMENTS	FK	
C	310107	AMENDMENTS TO SW LINE N	FK	
B	17.01.07	VARIOUS AMENDMENTS	MSO	
A	07.09.06	SWALE ADDED	FK	DR

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATIOI

DRAWING TITLE

DRAINAGE PLAN (SHEET 2)

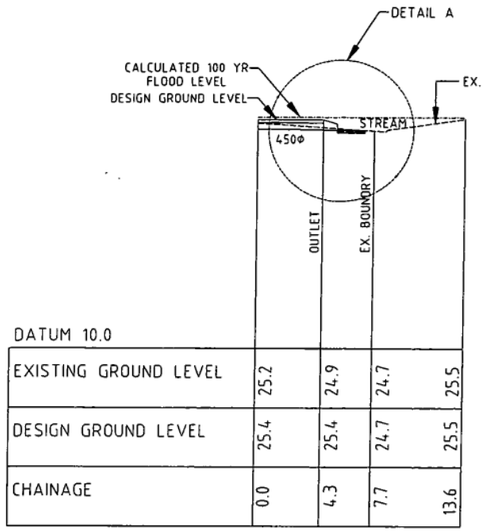
	DATE	INITIAL
DESIGNED	JUNE 2008	FK
DRAWN	JUNE 2008	FK
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C11	G

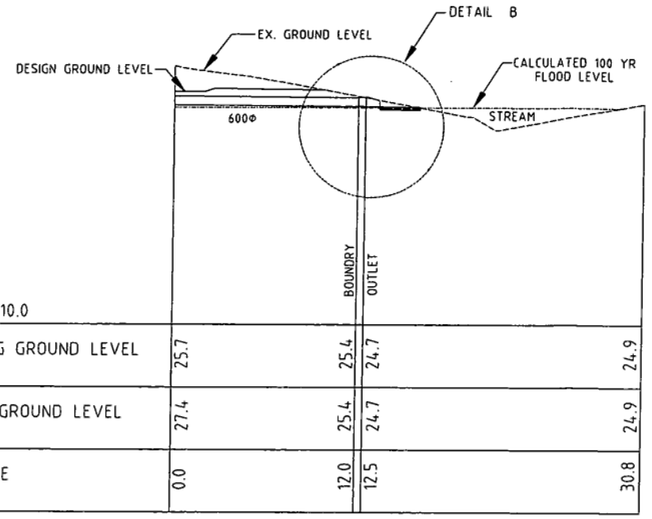
25/06/2007 9:05:57 p.m. X:\dan\42600's\42608\Civil\C11 DRAINAGE PLAN SHEET 2.dan



DATUM 10.0				
EXISTING GROUND LEVEL	25.2	24.9	24.7	25.5
DESIGN GROUND LEVEL	25.4	25.4	24.7	25.5
CHAINAGE	0.0	4.3	7.7	13.6

STORMWATER OUTLET L1 CROSS SECTION

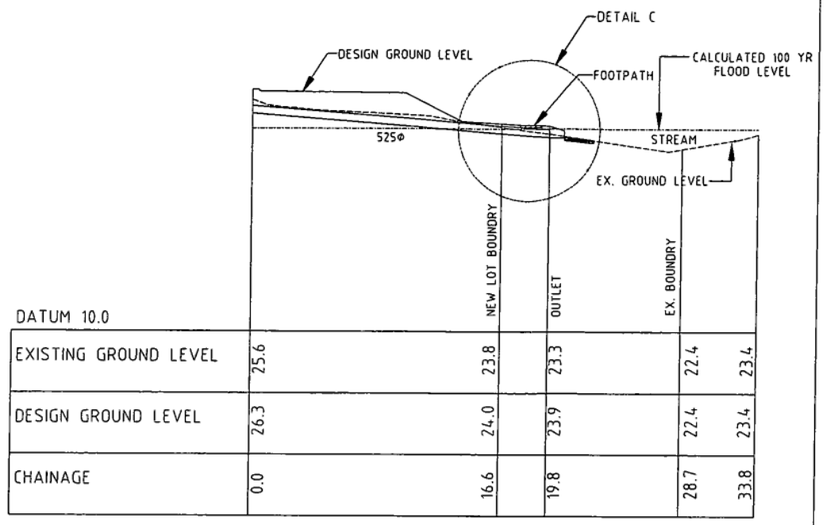
SCALE 1:200 (A1)



DATUM 10.0				
EXISTING GROUND LEVEL	25.7	25.4	24.7	24.9
DESIGN GROUND LEVEL	27.4	25.4	24.7	24.9
CHAINAGE	0.0	12.0	12.5	30.8

STORMWATER OUTLET N1 CROSS SECTION

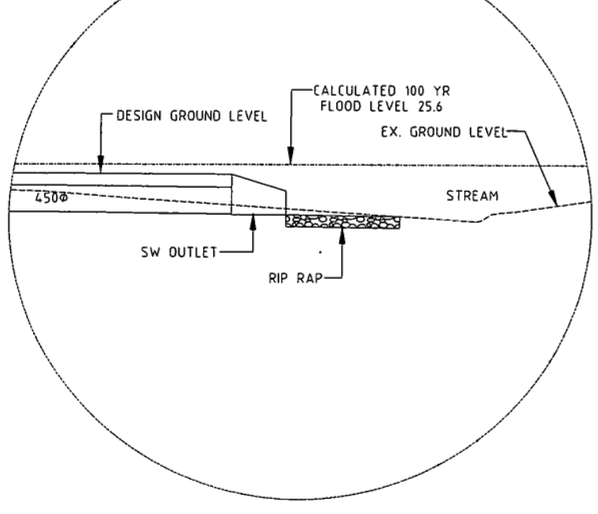
SCALE 1:200 (A1)



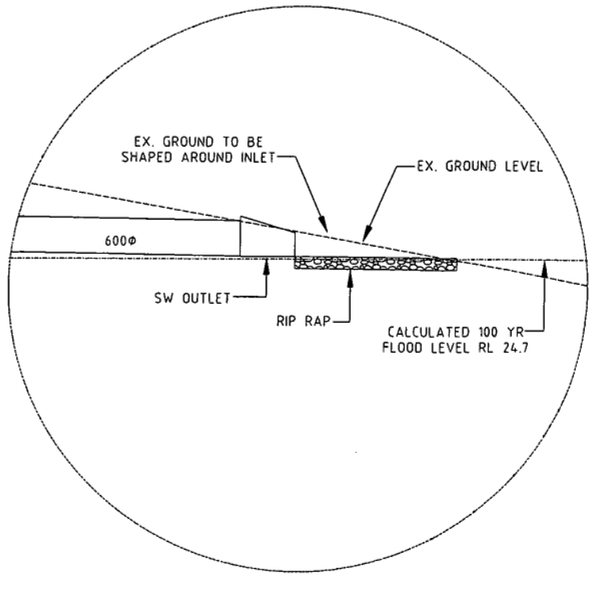
DATUM 10.0					
EXISTING GROUND LEVEL	25.6	23.8	23.3	22.4	23.4
DESIGN GROUND LEVEL	26.3	24.0	23.9	22.4	23.4
CHAINAGE	0.0	16.6	19.8	28.7	33.8

STORMWATER OUTLET G1 CROSS SECTION

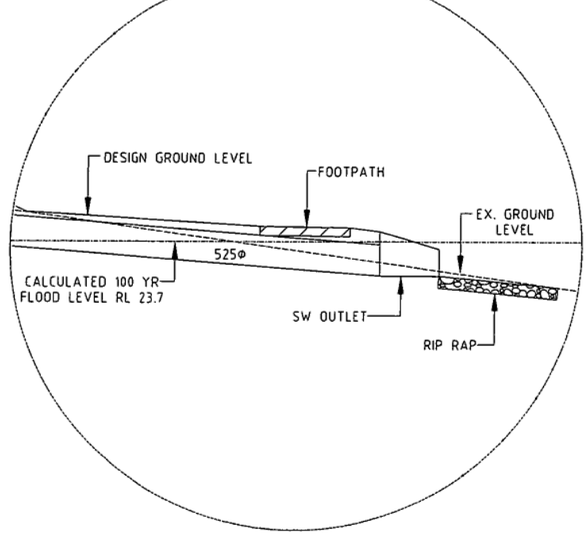
SCALE 1:200 (A1)



DETAIL A



DETAIL B



DETAIL C

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHEC
A	280607	SW OUTLET N1 CS AMENDED	FK	

DRAWING REVISIONS

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admin@babbage.co.

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATIOI

DRAWING TITLE

STORMWATER OUTLET STRUCTURE DETAILS

	DATE	INITIAL
DESIGNED	FEB 2007	FK
DRAWN	FEB 2007	FK
CHECKED	FEB 2007	NSL
APPROVED		

SCALE (A1)

AS SHOWN

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C12	A

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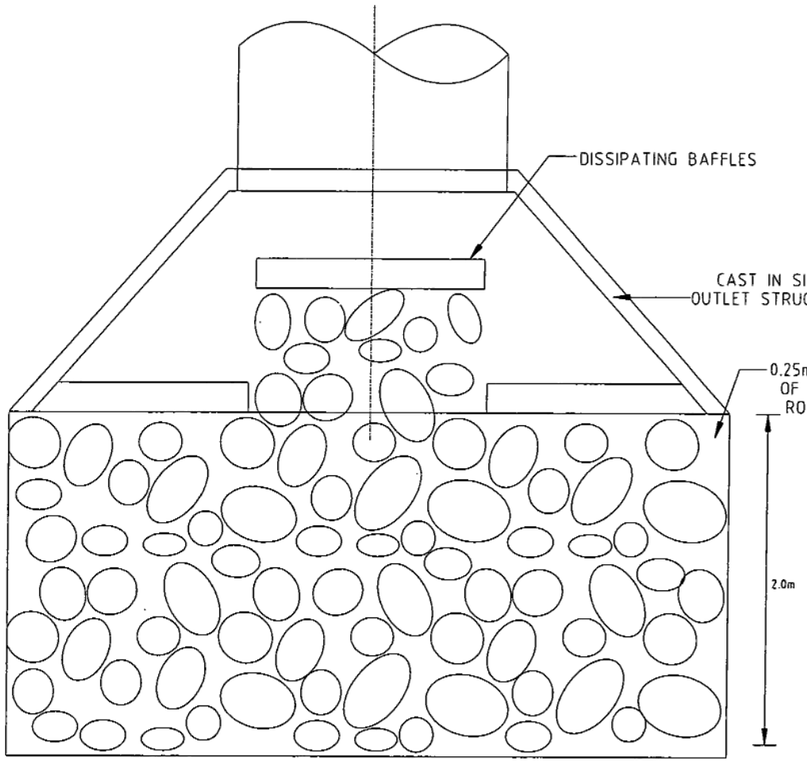
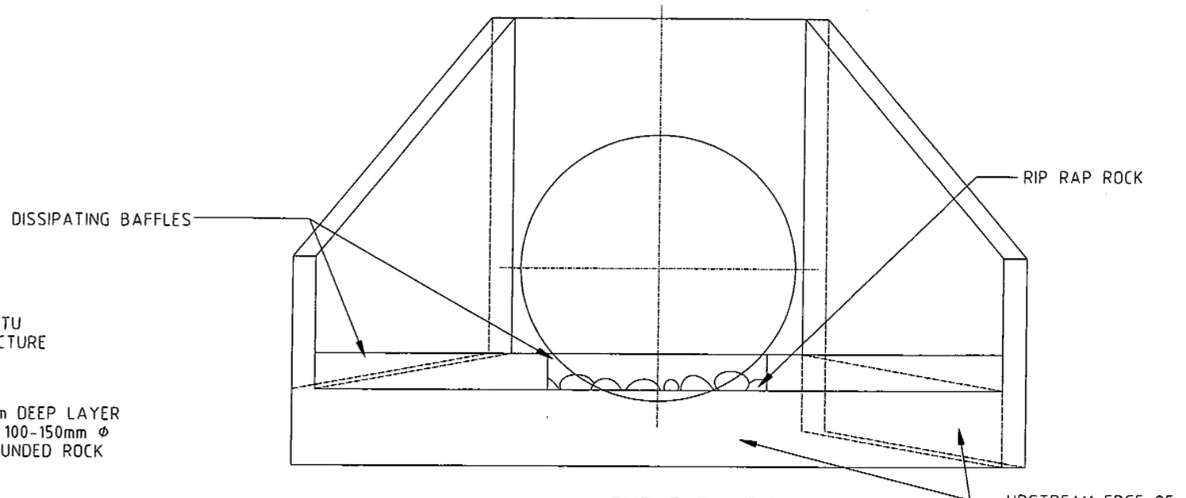
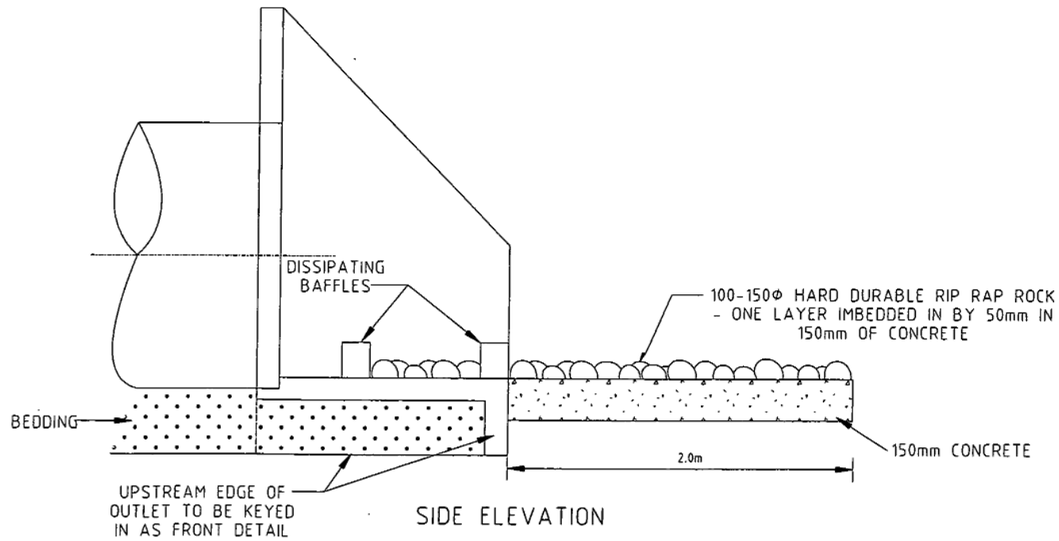


PLAN



END ELEVATION



SIDE ELEVATION

L1, N1 AND G1 STORMWATER OUTLET CONFIGURATION

NOT TO SCALE

NOTES:

1. DIMENSIONS AND REINFORCING ARE TO BE IN ACCORDANCE WITH WCC's CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT. (SEE DWG SD4.05)

REV	DATE	DESCRIPTION	DRAWN	CHE
A	300307	UPSTREAM EDGE OF OUTLET AMENDED TO SHOW KEY	FK	NS

DRAWING REVISIONS

Babbage CONSULTANT
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PHONE 09 - 379 9980 · FAX 09 - 377 1
admin@babbage.c

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN

FOR

NZ HOUSING FOUNDATIO

DRAWING TITLE

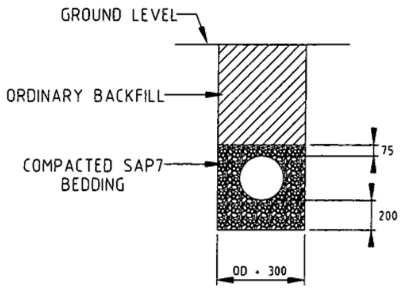
STORMWATER OUTLET DETAIL

	DATE	INITIAL
DESIGNED	FEB 2007	FK
DRAWN	FEB 2007	FK
CHECKED	FEB 2007	NSL
APPROVED		

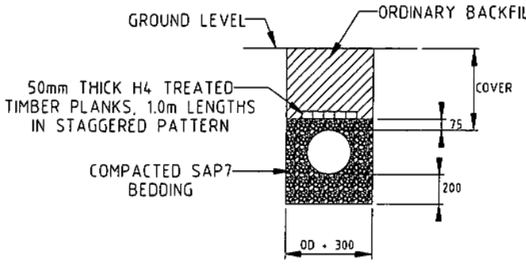
SCALE (A1)

NOT TO SCALE

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C13	A

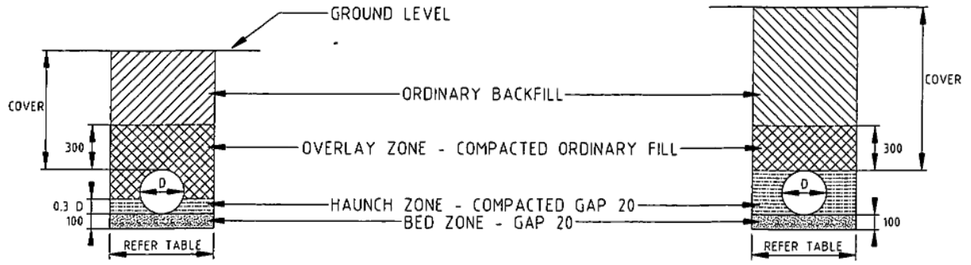


COVER >= 750mm



COVER < 750mm

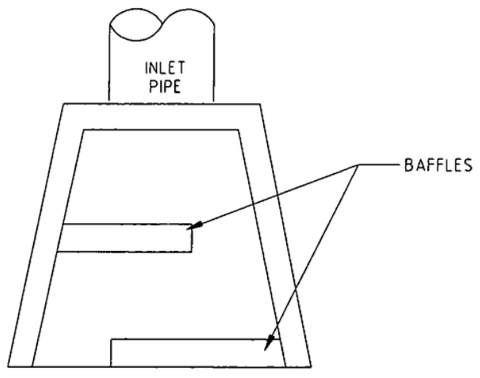
PIPE BEDDING AND PROTECTION FOR uPVC PIPES
(NOT TO SCALE)

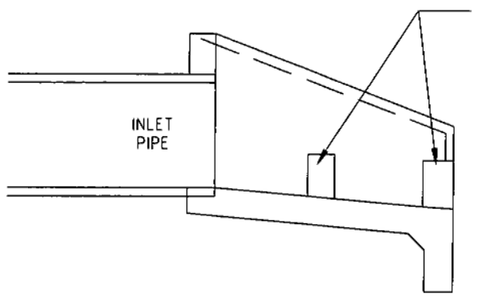


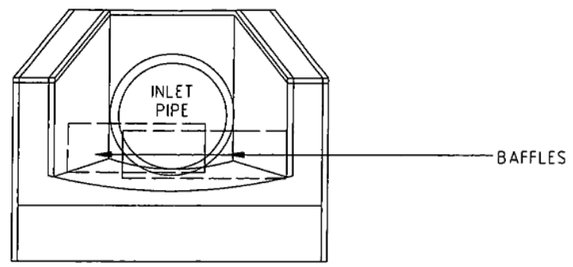
COVER >= 750mm

COVER < 750mm

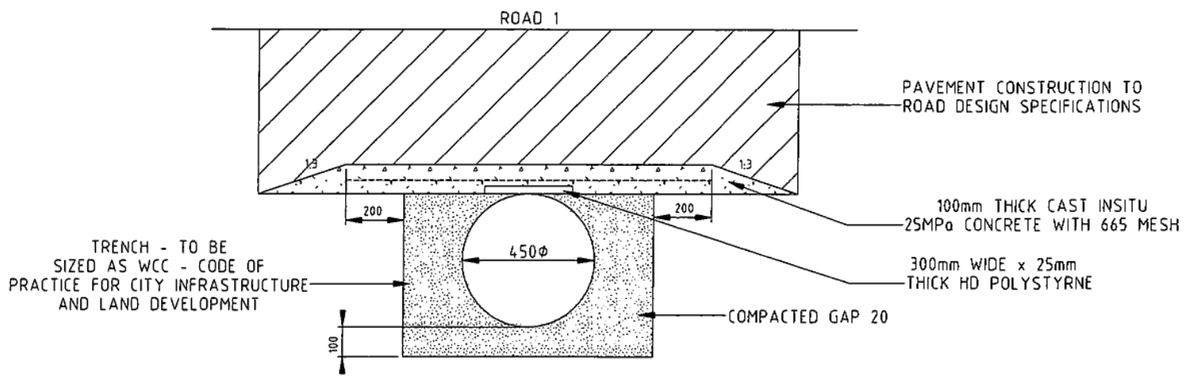
PIPE BEDDING AND PROTECTION FOR CONCRETE PIPES
(NOT TO SCALE)







CAST IN SITU STORMWATER OUTLET
(NOT TO SCALE)



PIPE BEDDING AND PROTECTION FOR STORMWATER LINE A4 TO A3 CONCRETE PIPE UNDER ROAD 1
(NOT TO SCALE)

NOTE:
DIMENSIONS ARE TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S CODE OF PRATICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
A	230107	PIPE PROTECTION DETAIL ADDED	FK	NSL

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE

SANITARY SEWER & STORMWATER DETAILS

	DATE	INITIAL
DESIGNED		
DRAWN	JAN 2007	MSO
CHECKED	JAN 2007	FK
APPROVED		

SCALE (A1)
AS SHOWN

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C14	A

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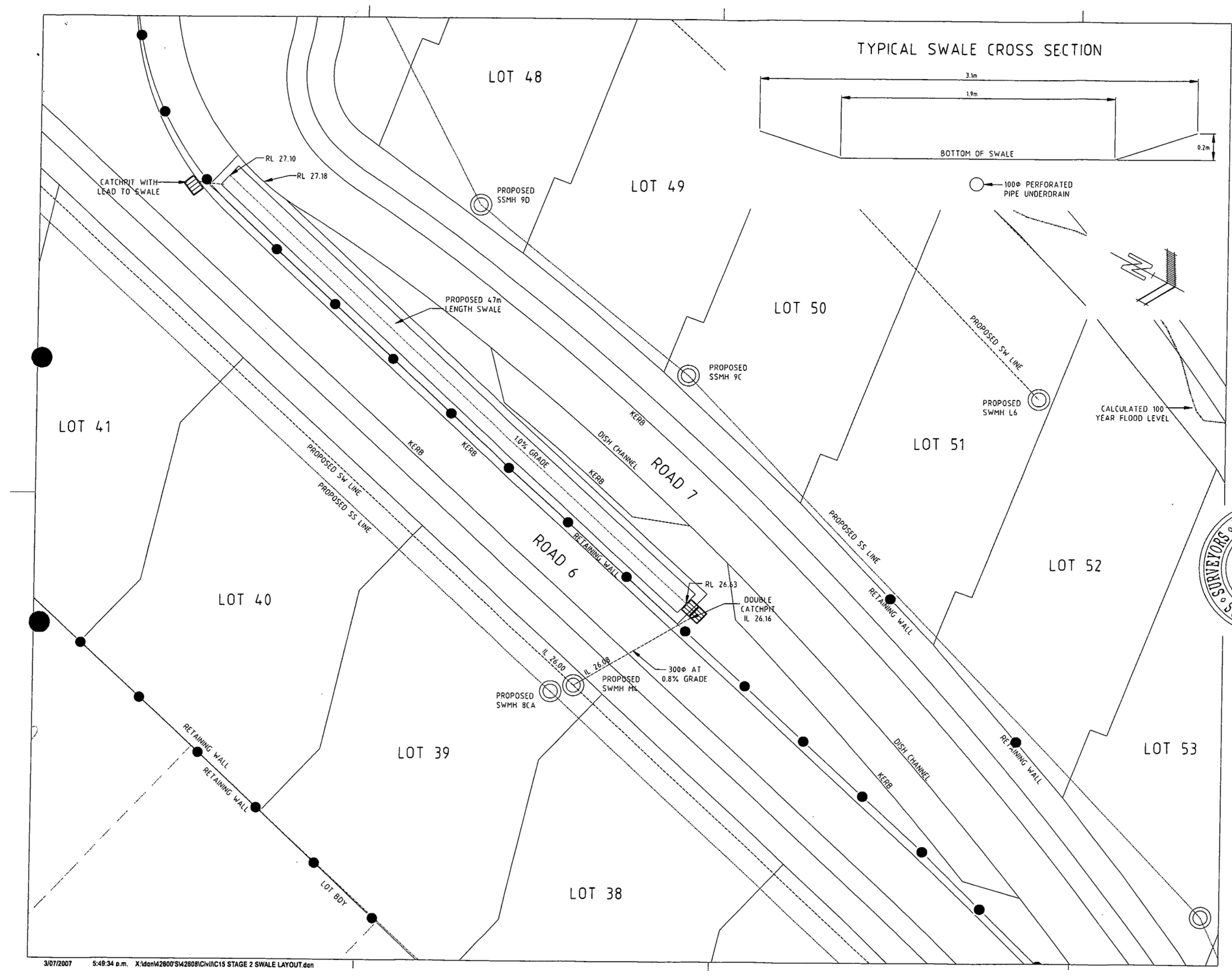
DRAWING NOTES

TYPICAL SWALE CROSS SECTION



REV	DATE	DESCRIPTION	DRAWN	CHEC
C	030707	SWALE AMENDED	FK	
B	300607	DETAILS AMENDED	FK	
A	270607	DETAILS ADDED	FK	

DRAWING REVISIONS

4/7/07.

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN

FOR

NZ HOUSING FOUNDATIOI

DRAWING TITLE

STAGE 2 SWALE LAYOUT

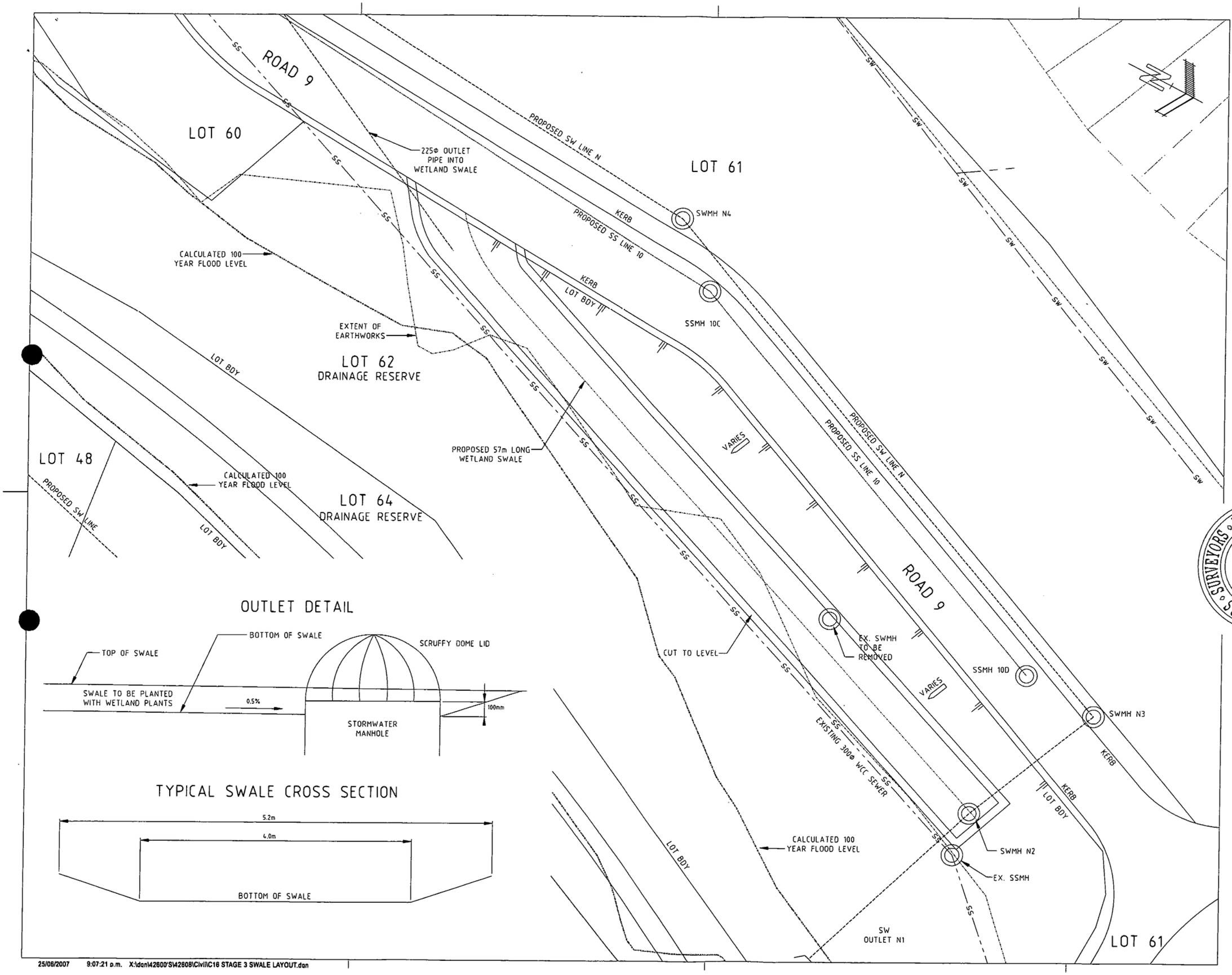
	DATE	INITIAL
DESIGNED	SEPT 2006	FK
DRAWN	SEPT 2006	FK
CHECKED		
APPROVED		

SCALE (A1)

1:125

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C15	C

3/07/2007 5:49:34 p.m. X:\dan\42600'S\42608\Civil\C15 STAGE 2 SWALE LAYOUT.dan



OUTLET DETAIL

TYPICAL SWALE CROSS SECTION

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHEC
E	22.08.07	WETLAND SWALE AMENDED	FK	
D	14.08.07	SWALE AMENDED WITH WETLAND SWALE	FK	NSI
C	01.03.07	REPLACE INFILTRATION TRENCH WITH SWALE WITH CHECK DAMS	FK	NSI
B	26.02.07	INFILTRATION TRENCH REPLACES SWALE	FK	NSI
A	07.07.06	SWALE REPLACES POND	FK	DMF

DRAWING REVISIONS

ARCHITECTS · SURVEYORS · ENGINEERS
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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATIO

DRAWING TITLE

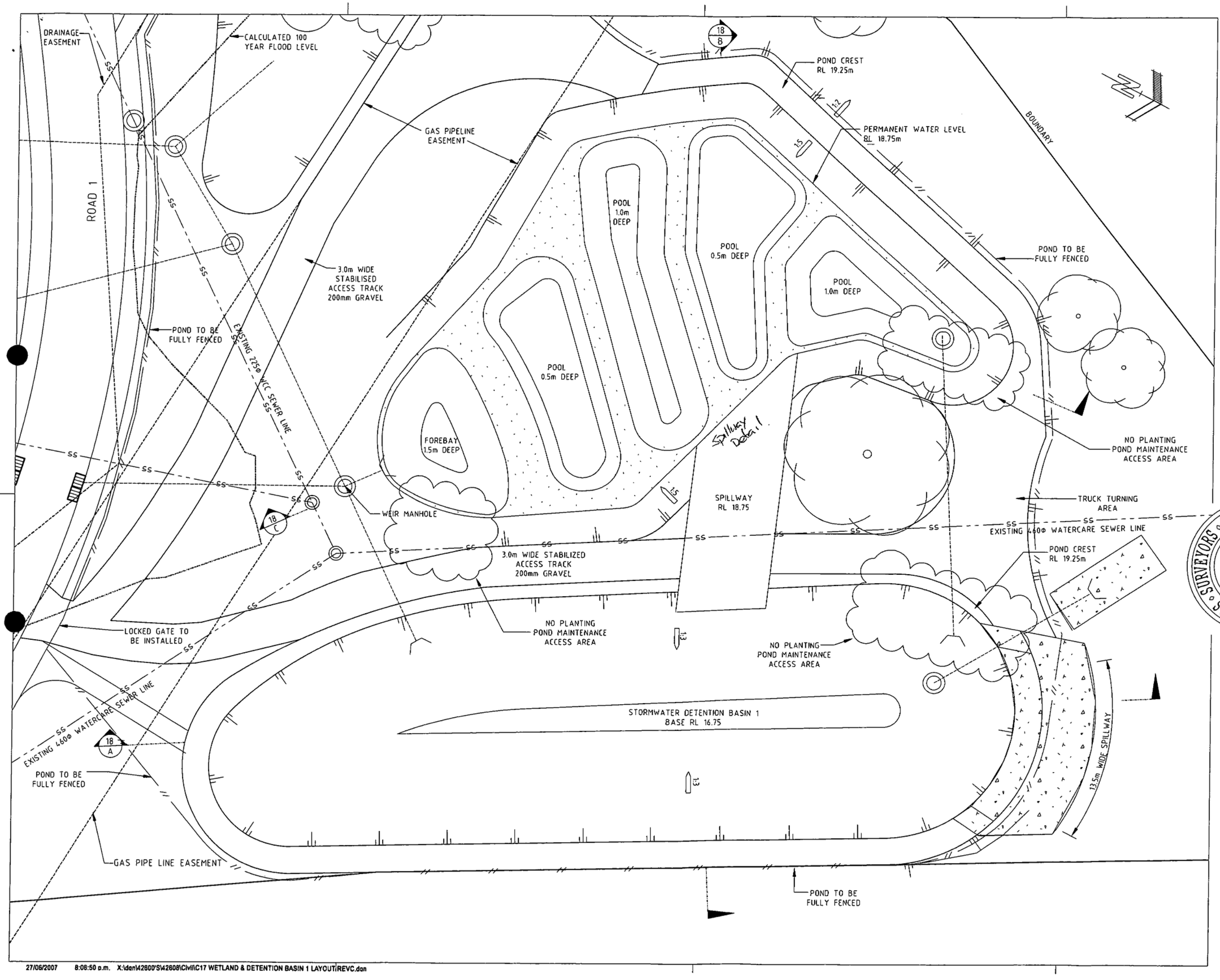
STAGE 3 SWALE LAYOUT

	DATE	INITIAL
DESIGNED	JUNE 2006	DMR
DRAWN	JUNE 2006	MJD
CHECKED		
APPROVED		

SCALE (A1)

1:125

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C16	E



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DRAWING NOTES

1. ALL WORKS TO BE IN ACCORDANCE WIT WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. SAFETY SIGNS TO BE ERECTED AS WCC STANDARD DRAWING SD 4.22.

REV	DATE	DESCRIPTION	DRAWN	CHE
C	220607	WETLAND AMENDED	FK	
B	020407	VARIOUS AMENDMENTS	FK	
A	0808	VARIOUS AMENDMENTS	FK	

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN

FOR

NZ HOUSING FOUNDATIO

DRAWING TITLE

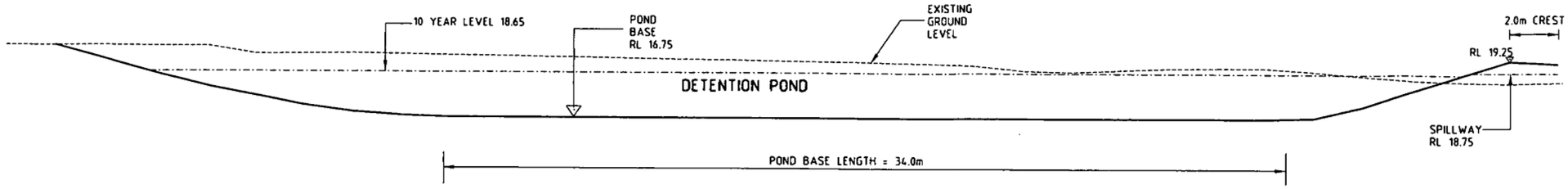
WETLAND & DETENTION BASIN 1 LAYOUT

	DATE	INITIAL
DESIGNED	JUNE 2006	DMR
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

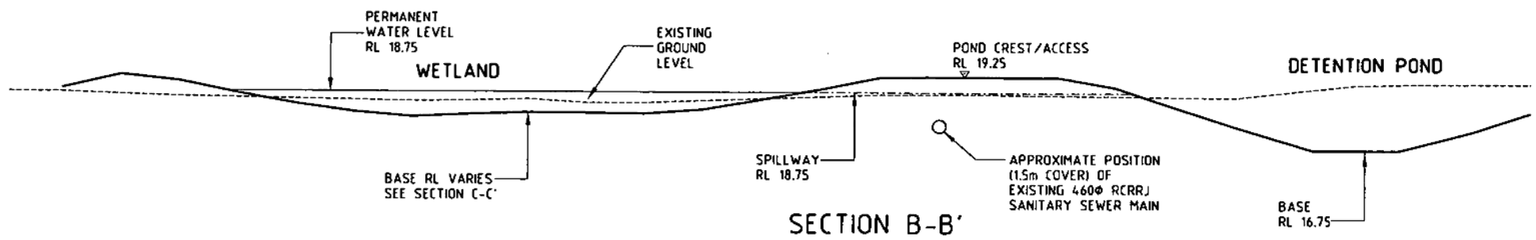
SCALE (A1)

1:125

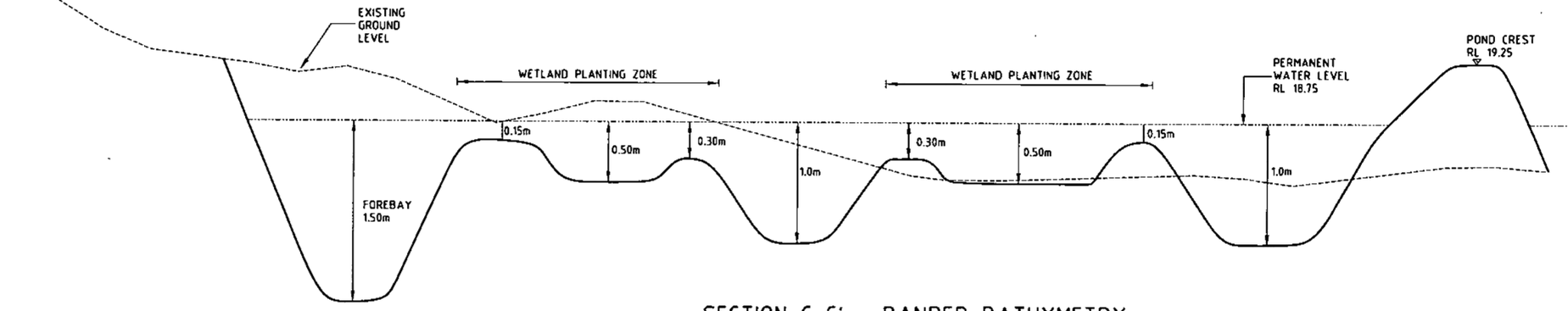
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C17	C



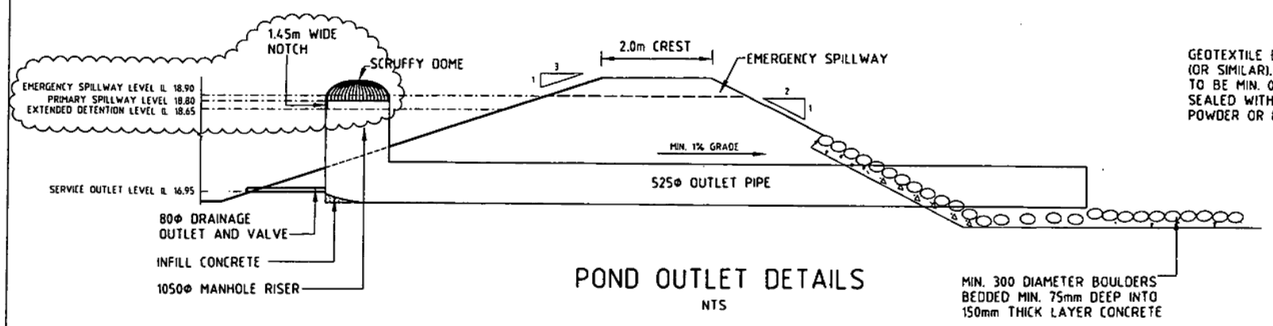
SECTION A-A'
SCALE 1:100



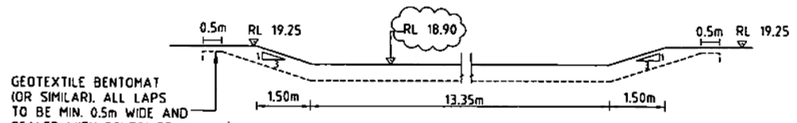
SECTION B-B'
SCALE 1:100



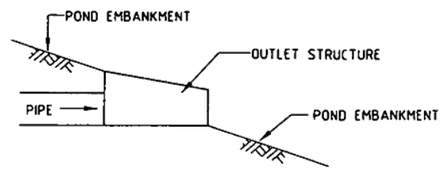
SECTION C-C' - BANDED BATHYMETRY
SCALE HORT 1:100 VERT 1:20



POND OUTLET DETAILS
NTS



EMERGENCY SPILLWAY DETAIL
NTS



TYPICAL OUTLET STRUCTURE SITING ON POND BANK
NTS

22/01/2007 2:21:39 p.m. x:\dgn\42600's\42608\civil\C18 POND DETAILS.dgn

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
B	16.08.06	WORDING AMENDED	FK	
A	29.06.06	WORDING AMENDED	DMR	

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

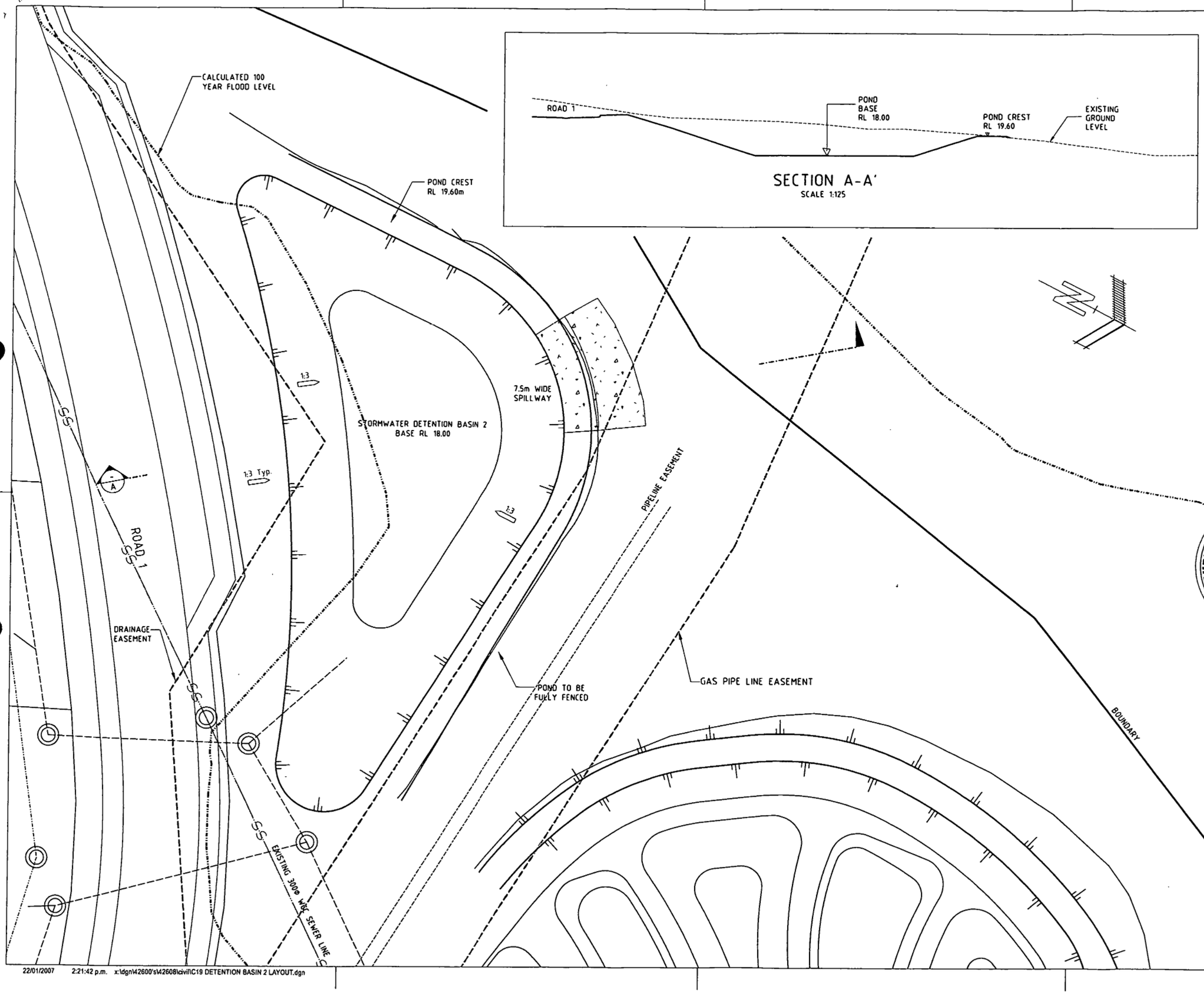
DRAWING TITLE

POND DETAILS PLAN

	DATE	INITIAL
DESIGNED	JUNE 2006	DMR
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

SCALE (A1)
AS SHOWN

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C18	B



SECTION A-A'
SCALE 1:125

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE

DETENTION BASIN 2 LAYOUT

	DATE	INITIAL
DESIGNED	AUG 2006	DMR
DRAWN	AUG 2006	FK
CHECKED		
APPROVED		

SCALE (A1)
1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C19	-

GENERAL NOTES AND KEY:

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL PIPELINES SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL.
3. THE CONTRACTOR IS TO CONFIRM ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.

EXISTING BOUNDARY
CALCULATED 100 YEAR FLOOD LEVEL
DRAINAGE EASEMENT
31 LOT NUMBER

WATERMAIN NOTES AND KEY:

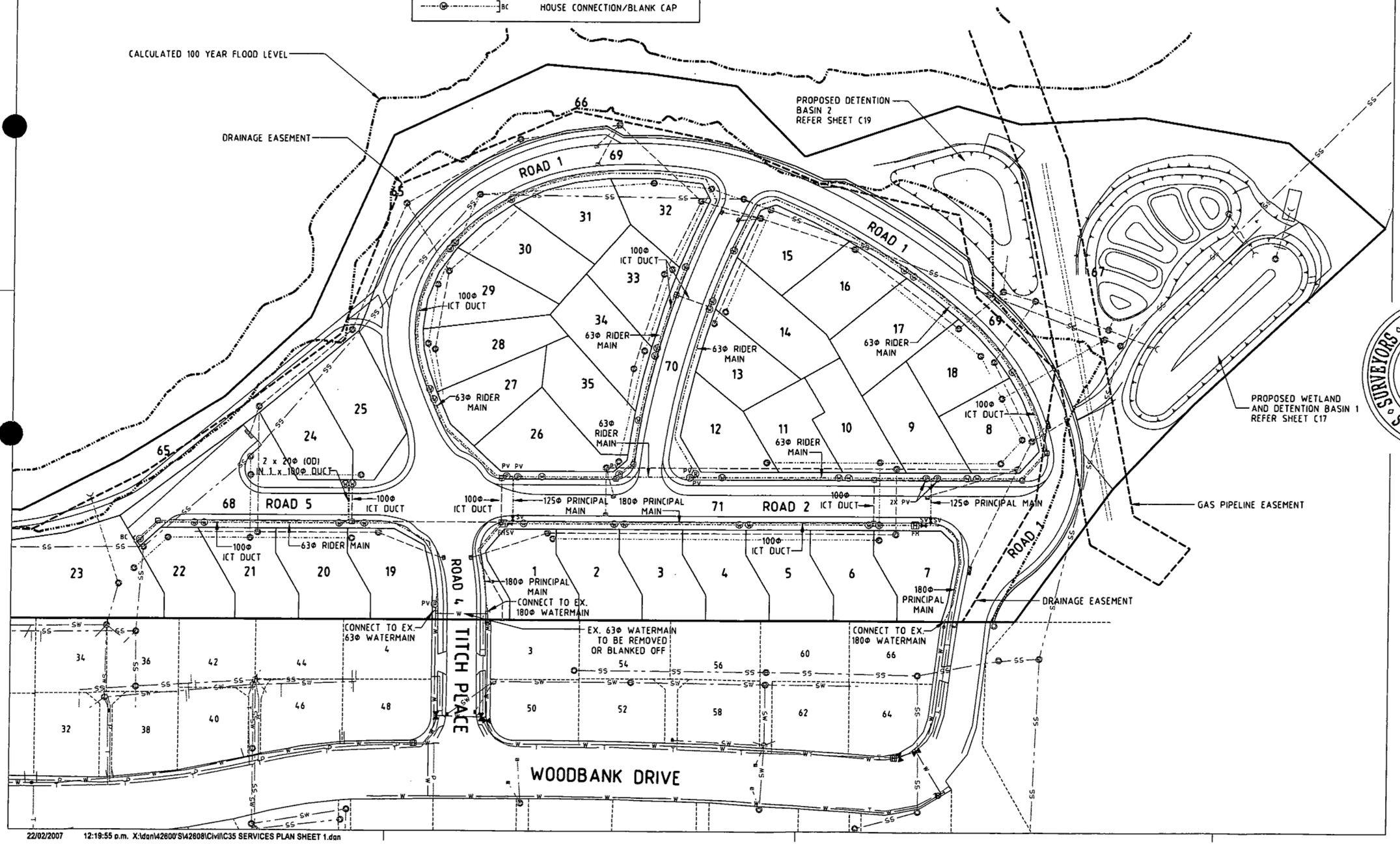
1. APPROVED 'DETECTABLE' WARNING TAPE SHALL BE INSTALLED WITH ALL WATERMAIN PIPES.
2. PRINCIPAL MAINS - 180mmΦ (OD) PE (SDR 11 PE 80) UNLESS OTHERWISE NOTED
   - 125Φ (OD) PE (SDR 11 PE 80) UNLESS OTHERWISE NOTED
   - 600mm COVER IN BERM AND 900 COVER IN CARRIAGEWAY
3. RIDER MAINS - 63mmΦ (OD) PE PRESSURE RATING 12.5 (PE 80) UNLESS OTHERWISE NOTED
   - 450mm COVER IN BERM AND 900 COVER IN CARRIAGEWAY
4. HOUSE CONNECTIONS - 20Φ PE (OD) LEAD LESS THAN 15m
   - 25Φ PE (OD) LEAD LONGER THAN 15m

EXISTING WATERMAIN
PROPOSED WATERMAIN
SV SLUICE VALVE/PEET VALVE
FH FIRE HYDRANT
CC CONNECTION CHAMBER
BC HOUSE CONNECTION/BLANK CAP

ICT DUCT NOTES AND KEY:

1. APPROVED 'DETECTABLE' WARNING TAPE SHALL BE INSTALLED A MINIMUM OF 300mm IMMEDIATELY ABOVE THE DUCT.
2. ALL PIPES SHALL BE uPVC PLAIN WALL WITH A MINIMUM SN14 RATING TO AS/NZS 1260 (1999) WITH RUBBER RING OR SOLVENT WELED JOINTS AND SALMON IN COLOUR.
3. ALL PIPES SHALL BE LAID A MINIMUM OF 600mm BELOW GROUND LEVEL.

ICT DUCT
600 x 600 ICT CHAMBER



22/02/2007 12:19:55 p.m. X:\dgn\42600'S\42608\Civil\C35 SERVICES PLAN SHEET 1.dgn

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHEC
C	22.02.07	WCC AMENDMENTS	FK	
B	19.02.07	WCC AMENDMENTS	FK	
A	07.09.06	ROADING AMENDED	FK	DMF

DRAWING REVISIONS

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admin@babbage.co.

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN
FOR
NZ HOUSING FOUNDATIOI

DRAWING TITLE

SERVICES PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED		

SCALE (A1)
1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C35	C

GENERAL NOTES AND KEY:

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL PIPELINES SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL.
3. THE CONTRACTOR IS TO CONFIRM ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- DRAINAGE EASEMENT
- 31 LOT NUMBER

WATERMAIN NOTES AND KEY:

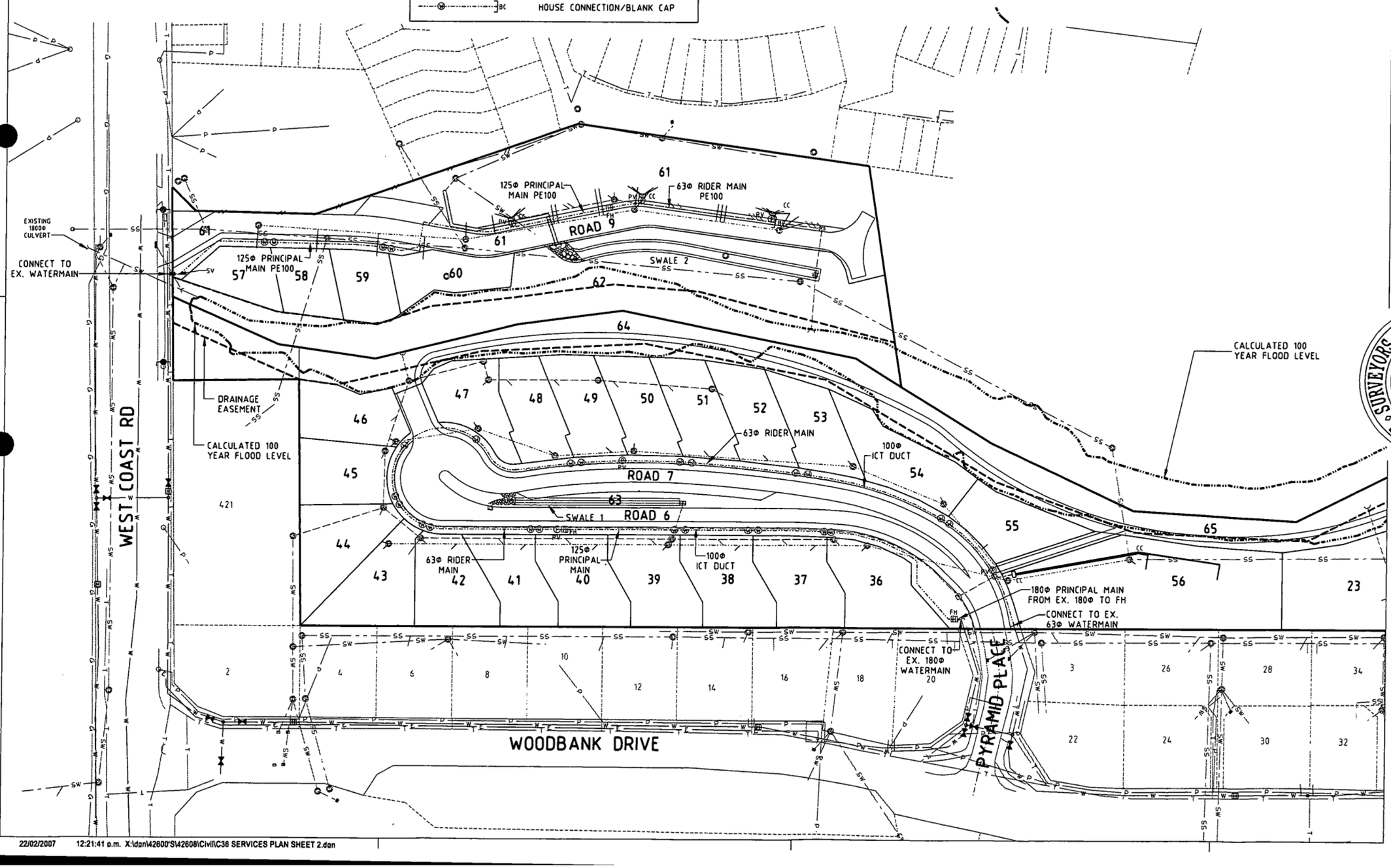
1. APPROVED 'DETECTABLE' WARNING TAPE SHALL BE INSTALLED WITH ALL WATERMAIN PIPES.
2. PRINCIPAL MAINS - 180mmΦ (OD) PE (SDR 11 PE 80) UNLESS OTHERWISE NOTED
   - 125Φ (OD) PE (SDR 11 PE 80) UNLESS OTHERWISE NOTED
   - 600mm COVER IN BERM AND 900 COVER IN CARRIAGEWAY
3. RIDER MAINS - 63mmΦ (OD) PE PRESSURE RATING 12.5 (PE 80) UNLESS OTHERWISE NOTED
   - 450mm COVER IN BERM AND 900 COVER IN CARRIAGEWAY
4. HOUSE CONNECTIONS - 20Φ PE (OD) LEAD LESS THAN 15m
   - 25Φ PE (OD) LEAD LONGER THAN 15m

- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- SLUICE VALVE/PEET VALVE
- FIRE HYDRANT
- CONNECTION CHAMBER
- HOUSE CONNECTION/BLANK CAP

ICT DUCT NOTES AND KEY:

1. APPROVED 'DETECTABLE' WARNING TAPE SHALL BE INSTALLED A MINIMUM OF 300mm IMMEDIATELY ABOVE THE DUCT.
2. ALL PIPES SHALL BE uPVC PLAIN WALL WITH A MINIMUM SN14 RATING TO AS/NZS 1260 (1999) WITH RUBBER RING OR SOLVENT WELED JOINTS AND SALMON IN COLOUR.
3. ALL PIPES SHALL BE LAID A MINIMUM OF 600mm BELOW GROUND LEVEL.

- ICT DUCT
- 600 x 600 ICT CHAMBER



22/02/2007 12:21:41 p.m. X:\dan\42600's\42608\Civil\C36 SERVICES PLAN SHEET 2.dgn

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHE
C	22.09.06	WCC AMENDMENTS	FK	
B	19.09.06	WCC AMENDMENTS	FK	
A	07.09.06	ROADING AMENDED	FK	DM

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN
FOR
NZ HOUSING FOUNDATIO

DRAWING TITLE

SEVICES PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED		

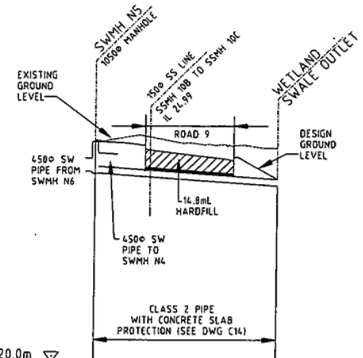
SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C36	C

NOTES

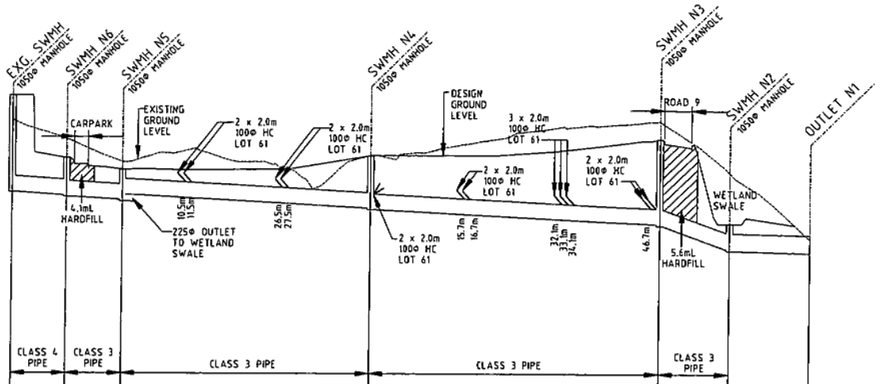
1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Φ UNLESS NOTED OTHERWISE.
3. MANHOLE LIGHT DUTY FRAMES AND LIDS SHALL BE USED EXCEPT WHERE SUBJECT TO TRAFFIC LOADING. HEAVY DUTY FRAMES AND LIDS SHALL BE USED WHEN SUBJECT TO TRAFFIC LOADING.
4. ALL CATCHPIT LEADS ARE 225Φ UNLESS NOTED OTHERWISE.
5. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
6. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
7. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
8. ALL PIPES ARE CONCRETE RUBBER RING JOINTED AND CLASS 2 UNLESS OTHERWISE SHOWN
9. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.
10. ALL OUTLETS DISCHARGING INTO THE STREAM SHALL BE PLACED SO AS TO NOT IMPED FLOW DIRECTION.
11. PIPE SEPERATION FOR RELAID SANITARY SEWER AND STORMWATER PIPE BETWEEN A4 AND A3 TO BE CONFIRMED ON SITE.
12. ALL LOT CONNECTIONS TO BE LONDON JUNCTIONS UNLESS OTHERWISE NOTED.



DATUM RL 20.0m

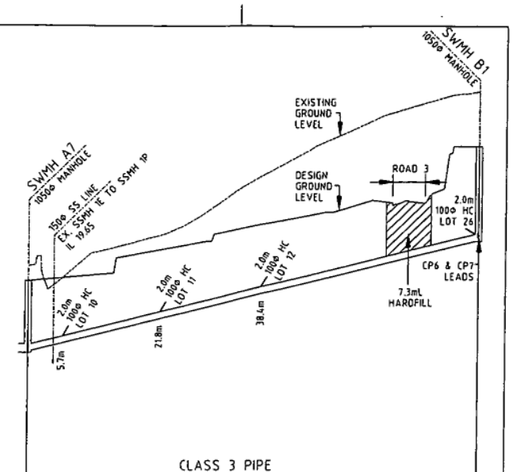
PIPE		225Φ	
DEPTH TO INVERT	1.02		
INVERT LEVEL	26.48 / 26.43		26.00
GROUND LEVEL	27.50		
DISTANCE		30.5	
GRADE		1.4%	
DESIGN FLOW l/sec CAPACITY l/sec		54 54	

LONGITUDINAL SECTION
WETLAND SWALE OUTLET



CLASS 4 PIPE	CLASS 3 PIPE	CLASS 3 PIPE	CLASS 3 PIPE	CLASS 3 PIPE		
525Φ	525Φ	525Φ	525Φ	525Φ		600Φ
3.26	1.27	1.02	1.69	2.73	0.87	
26.74	26.63	26.58	26.48	26.66	26.21	26.16	25.82	25.77	24.85	24.80	24.70
30.00	27.90	27.50	27.90	28.55	25.72	24.70
9.1	9.4	41.2	48.1	11.5	12.5
1.2%	1.1%	1.1%	0.7%	8.0%	0.8%
344 472	344 452	302 452	322 361	322 1222	403 548

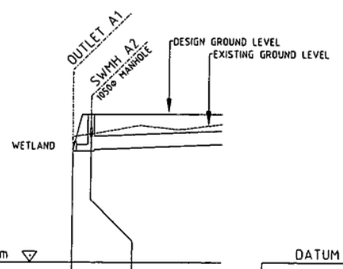
LONGITUDINAL SECTION LINE N



DATUM RL 15.0m

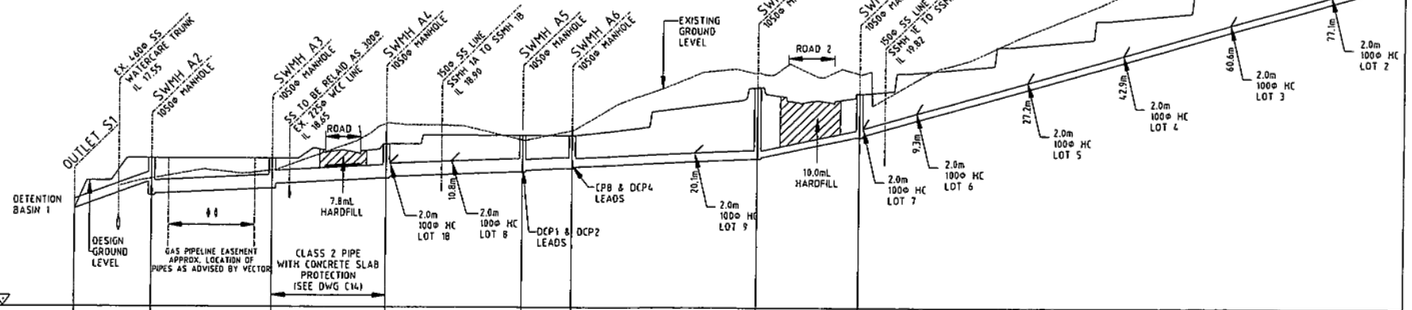
PIPE		225Φ	
DEPTH TO INVERT	2.43		3.18
INVERT LEVEL	20.02 / 20.10		23.82
GROUND LEVEL	22.45		27.0
DISTANCE		73.8	
GRADE		5.0%	
DESIGN FLOW l/sec CAPACITY l/sec		32.1 102	

LONGITUDINAL SECTION LINE B



DATUM RL 15.0m

PIPE	225Φ		450Φ
DEPTH TO INVERT		1.25	
INVERT LEVEL	18.75	18.75	18.80
GROUND LEVEL		20.00	
DISTANCE	3.1		20.0
GRADE	0.0%		1.0%
DESIGN FLOW l/sec CAPACITY l/sec	50.0 50		186.5 287



DATUM RL 15.0m

PIPE	300Φ	450Φ	450Φ	450Φ	375Φ	300Φ	225Φ	225Φ
DEPTH TO INVERT	0.80	1.01	1.17	1.25	1.12	2.42	1.48	1.50
INVERT LEVEL	18.65 / 19.20	18.80 / 18.99	19.14 / 19.33	19.38 / 19.55	19.62 / 19.68	19.73 / 20.02	20.10 / 20.76	20.81 / 26.00
GROUND LEVEL	20.00	20.00	20.50	20.80	20.80	22.44	22.24	27.50
DISTANCE	12.8	20.0	19.0	22.8	8.1	30.4	17.0	88.8
GRADE	4.3%	1.0%	1.0%	0.7%	0.7%	1.0%	3.9%	5.8%
DESIGN FLOW l/sec CAPACITY l/sec	156.5 204	206.5 287	186.5 287	182.7 240	128.8 148	87.2 98	51.0 90	51.0 110

LONGITUDINAL SECTION LINE A

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHE
F	290807	SW LINE N AMENDED	MSO	FK
E	220807	SW LINE N AMENDED	FK	
D	140807	SW LINE N AMENDED	FK	
C	310107	AMENDMENTS TO LS N AND B	FK	
B	230107	SW LINE BETWEEN A4-A3 AND NOTES AMENDED	FK	
A	160107	VARIOUS AMENDMENTS	MSO	

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN
FOR
NZ HOUSING FOUNDATIOI

DRAWING TITLE

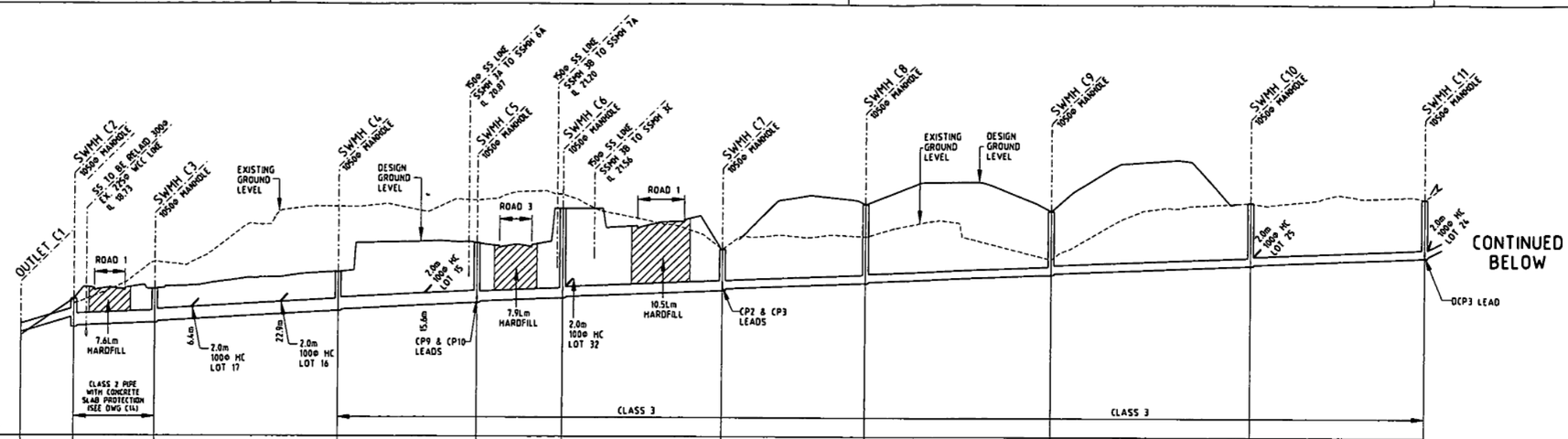
STORMWATER LONGITUDINAL SECTIONS (SHEET 1)

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.08	GNB
CHECKED		
APPROVED		

SCALE (A1)

1:500(H) 1:100(V)

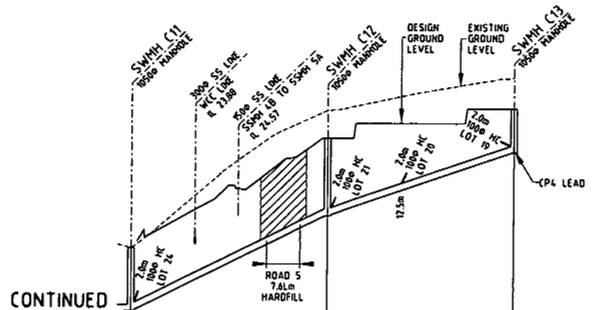
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C37	F



DATUM RL 15.0m

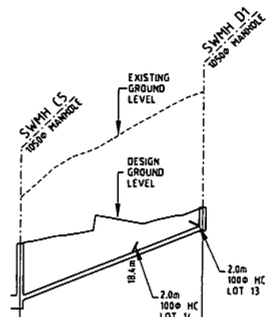
PIPE	300Ø	450Ø	450Ø	450Ø	375Ø	375Ø	300Ø	300Ø	300Ø	300Ø
DEPTH TO INVERT		1.06	1.39	2.21	3.30	1.53	2.91	2.34	2.33	2.15
INVERT LEVEL	18.80 19.36	19.20 19.37	19.40 19.67	19.71 19.91	19.98 20.10	20.15 20.38	20.46 20.67	20.72 20.99	21.04 21.33	21.38 21.63
GROUND LEVEL	18.50 20.04	20.43	21.06	22.12	23.4	21.91	23.58	23.33	23.66	23.78 21.71
DISTANCE	9.6	14.7	33.4	25.3	15.8	28.9	25.6	33.4	35.8	31.0
GRADE	5.8%	1.2%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
DESIGN FLOW l/sec	171.9	191.9	191.9	183.1	140.4	124.9	82.6	82.6	62.3	62.3
CAPACITY l/sec	269.0	314.0	256.0	256.0	158.0	158.0	87.6	87.6	87.6	87.6

LONGITUDINAL SECTION LINE C



PIPE		225Ø	225Ø
DEPTH TO INVERT	2.15	2.64	1.50
INVERT LEVEL	21.63 21.71	24.86 24.91	27.00
GROUND LEVEL	23.78	27.5	28.5
DISTANCE		32.6	31.1
GRADE		9.7%	6.7%
DESIGN FLOW l/sec		22.2	14.2
CAPACITY l/sec		143	118

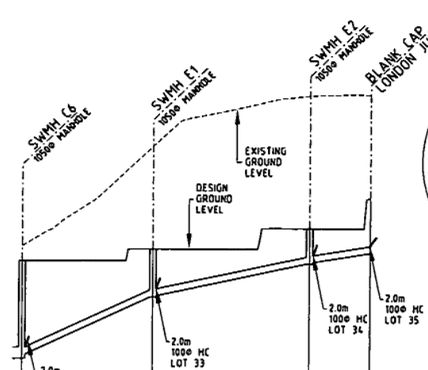
LINE C CONTINUED



DATUM RL 15.0m

PIPE		150Ø
DEPTH TO INVERT	2.21	0.90
INVERT LEVEL	19.91 20.21	22.48
GROUND LEVEL	22.12	23.38
DISTANCE		29.9
GRADE		7.6%
DESIGN FLOW l/sec		8.0
CAPACITY l/sec		43

LONGITUDINAL SECTION LINE D



DATUM RL 15.0m

PIPE		225Ø	225Ø	150Ø
DEPTH TO INVERT	3.30	1.63	1.20	1.83
INVERT LEVEL	20.10 20.25	22.17 22.22	23.30 23.38	23.67
GROUND LEVEL	23.4	23.8	24.5	25.5
DISTANCE		21.2	25.9	9.7
GRADE		9.1%	4.2%	3.0%
DESIGN FLOW l/sec		11.7	7.9	3.9
CAPACITY l/sec		138	94	27

LONGITUDINAL SECTION LINE E

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Ø UNLESS NOTED OTHERWISE.
3. MANHOLE LIGHT DUTY FRAMES AND LIDS SHALL BE USED EXCEPT WHERE SUBJECT TO TRAFFIC LOADING. HEAVY DUTY FRAMES AND LIDS SHALL BE USED WHEN SUBJECT TO TRAFFIC LOADING.
4. ALL CATCHPIT LEADS ARE 225Ø UNLESS NOTED OTHERWISE.
5. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
6. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
7. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
8. ALL PIPES ARE CONCRETE RUBBER RING JOINTED AND CLASS 2 UNLESS OTHERWISE SHOWN
9. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.
10. ALL OUTLETS DISCHARGING INTO THE STREAM SHALL BE PLACED SO AS TO NOT IMPED FLOW DIRECTION.

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHEC
F	190207	VARIOUS AMENDMENTS	FK	
E	050207	VARIOUS AMENDMENTS	FK	
D	310107	VARIOUS AMENDMENTS	FK	
C	180107	VARIOUS AMENDMENTS	MSO	
B	NOV06	C2-C1 DATA AMENDED	FK	DRN
A	210906	VARIOUS AMENDMENTS	FK	DRN

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admin@babbage.co.

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATIOI

DRAWING TITLE

STORMWATER LONGITUDINAL SECTIONS (SHEET 2)

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		

SCALE (A1)

1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C38	F

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
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3. MANHOLE LIGHT DUTY FRAMES AND LIDS SHALL BE USED EXCEPT WHERE SUBJECT TO TRAFFIC LOADING. HEAVY DUTY FRAMES AND LIDS SHALL BE USED WHEN SUBJECT TO TRAFFIC LOADING.
4. ALL CATCHPIT LEADS ARE 225Φ UNLESS NOTED OTHERWISE.
5. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
6. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
7. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
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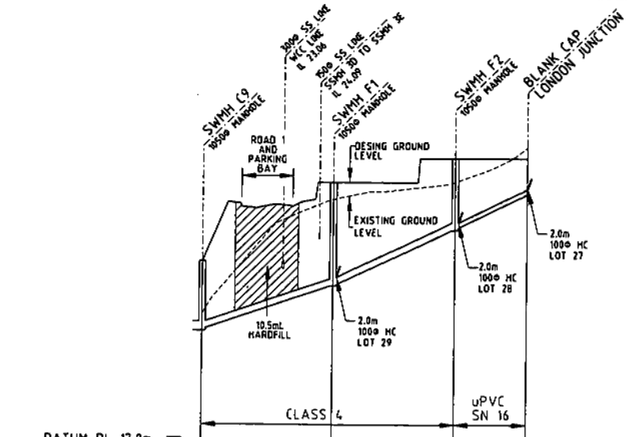
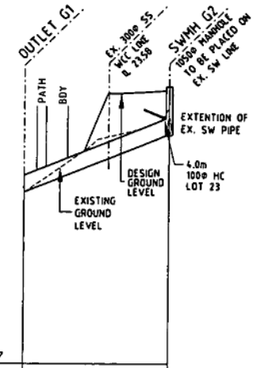
9. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.
10. ALL OUTLETS DISCHARGING INTO THE STREAM SHALL BE PLACED SO AS TO NOT IMPED FLOW DIRECTION.



DATUM RL 17.0m

PIPE 150Φ	225Φ			225Φ			150Φ		
DEPTH TO INVERT	2.34		3.49			2.38			1.20
INVERT LEVEL	20.99	21.07		22.51	22.56		24.42	24.50	25.60
GROUND LEVEL	23.33		26.0			26.8			26.8
DISTANCE	20.7			20.7			11.9		
GRADE	7.0%			9.0%			9.2%		
DESIGN FLOW l/sec	20.3			8.1			3.8		
CAPACITY l/sec	121			137			47		

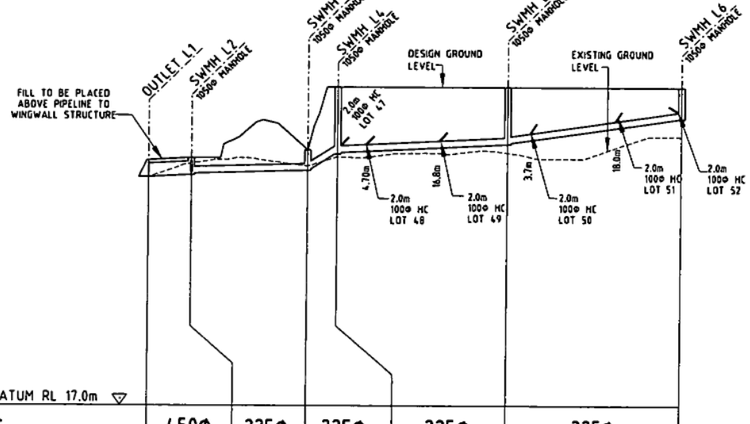
LONGITUDINAL SECTION LINE F



DATUM RL 17.0m

PIPE	525Φ		
DEPTH TO INVERT			1.63
INVERT LEVEL	22.80		24.70
GROUND LEVEL	00.0		26.33
DISTANCE	23.8		
GRADE	8.0%		
DESIGN FLOW l/sec			
CAPACITY l/sec	1222		

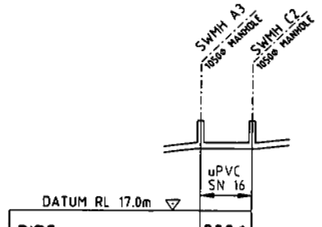
LONGITUDINAL SECTION LINE G



DATUM RL 17.0m

PIPE	450Φ		225Φ		225Φ		225Φ		225Φ		
DEPTH TO INVERT		0.60		0.69		2.28		1.95			1.08
INVERT LEVEL	24.73	24.80	24.87	25.06	25.11	25.50	25.55	25.83	25.88		26.70
GROUND LEVEL	25.29		25.40	25.63		27.78		27.78			27.78
DISTANCE	7.1		19.6		5.0		28.10		29.20		
GRADE	1.1%		1.0%		7.8%		1.0%		2.8%		
DESIGN FLOW l/sec	276.2		20.2		20.2		16.6		9.8		
CAPACITY l/sec	301.0		45.6		127.8		45.6		76.5		

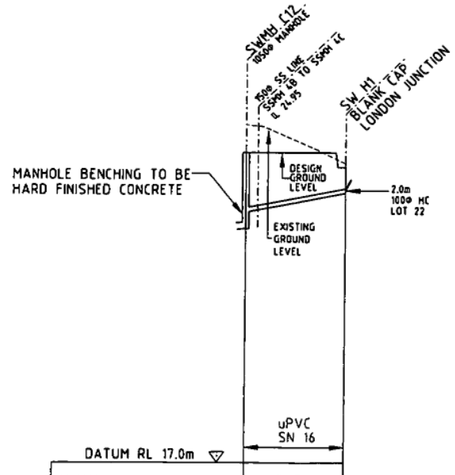
LONGITUDINAL SECTION LINE L



DATUM RL 17.0m

PIPE	200Φ		
DEPTH TO INVERT	0.94		0.94
INVERT LEVEL	19.10		19.10
GROUND LEVEL	20.00		20.04
DISTANCE	8.4		
GRADE	0.0%		
DESIGN FLOW l/sec	20.0		
CAPACITY l/sec	20.0		

LONGITUDINAL SECTION LINE C2-A3



DATUM RL 17.0m

PIPE	150Φ		
DEPTH TO INVERT	2.00		1.00
INVERT LEVEL	24.86	25.50	26.00
GROUND LEVEL	27.50		27.00
DISTANCE	16.3		
GRADE	3.1%		
DESIGN FLOW l/sec	4.1		
CAPACITY l/sec	27.3		

LONGITUDINAL SECTION LINE H

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHEC
F	190207	VARIOUS AMENDMENTS	FK	
E	050207	VARIOUS AMENDMENTS	FK	
D	310107	LINE F AND LINE L AMENDED	FK	
C	JAN07	VARIOUS AMENDMENTS	FK	
B	NOV06	VARIOUS AMENDMENTS	MSO	
A	NOV06	VARIOUS AMENDMENTS	FK	DMF

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admin@babbage.co.

CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATIOI

DRAWING TITLE

STORMWATER LONGITUDINAL SECTIONS (SHEET 3)

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		

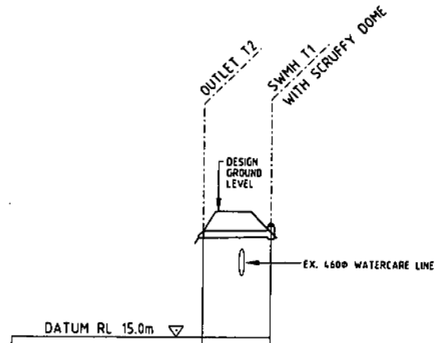
SCALE (A1)

1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C39	F

NOTES

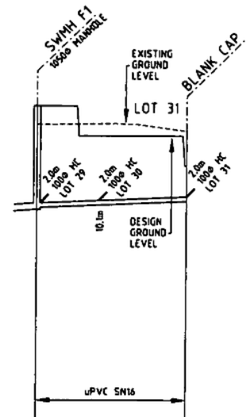
1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1050Φ UNLESS NOTED OTHERWISE.
3. MANHOLE LIGHT DUTY FRAMES AND LIDS SHALL BE USED EXCEPT WHERE SUBJECT TO TRAFFIC LOADING. HEAVY DUTY FRAMES AND LIDS SHALL BE USED WHEN SUBJECT TO TRAFFIC LOADING.
4. ALL CATCHPIT LEADS ARE 225Φ UNLESS NOTED OTHERWISE.
5. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
6. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
7. THE CONTRACTOR IS TO CONFIRM THE POSITION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.
8. ALL PIPES ARE CONCRETE RUBBER RING JOINTED AND CLASS 2 UNLESS OTHERWISE SHOWN
9. ALL DRAINAGE LINES UNDER RETAINING WALLS TO COMPLY WITH WCC REQUIREMENTS.
10. ALL OUTLETS DISCHARGING INTO THE STREAM SHALL BE PLACED SO AS TO NOT IMPED FLOW DIRECTION.
11. ALL LOT CONNECTIONS TO BE LONDON JUNCTIONS UNLESS OTHERWISE NOTED.



DATUM RL 15.0m

PIPE	225Φ	
DEPTH TO INVERT		
INVERT LEVEL	18.24	18.39
GROUND LEVEL		
DISTANCE	11.3	
GRADE	1.3%	
DESIGN FLOW l/sec CAPACITY l/sec		

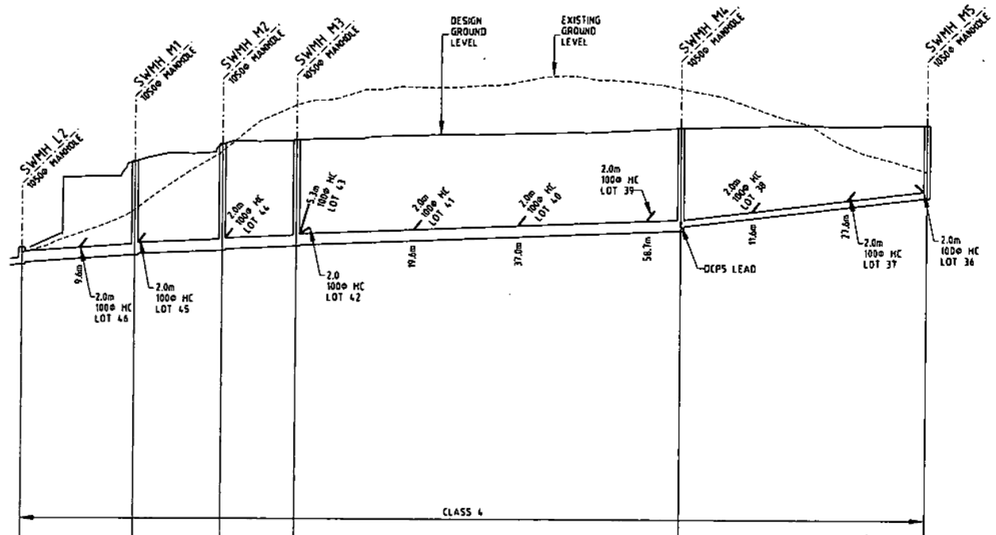
LONGITUDINAL SECTION LINE T (WETLAND TO DETENTION BASIN 1)



DATUM RL 15.0m

PIPE	150Φ		
DEPTH TO INVERT	3.41		1.20
INVERT LEVEL	22.59 / 22.59		22.80 / 24.00
GROUND LEVEL	26.00		24.00
DISTANCE	0.0	24.5	24.5
GRADE	0.9%		
DESIGN FLOW l/sec CAPACITY l/sec	8.1 15		

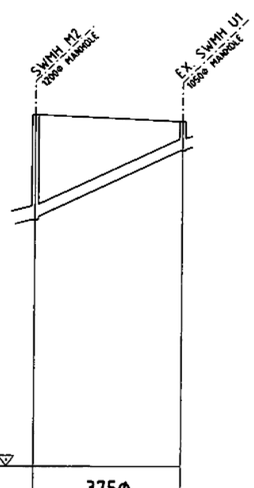
LONGITUDINAL SECTION LINE Q



DATUM RL 15.0m

PIPE	450Φ	450Φ	375Φ	375Φ	225Φ
DEPTH TO INVERT	0.57 / 3.21	3.63	3.61	3.58	2.46
INVERT LEVEL	24.80 / 24.87	25.10 / 25.15	25.27 / 25.34	25.44 / 25.49	26.00 / 26.08 / 27.14
GROUND LEVEL	25.37 / 28.31	28.90	29.05	29.58	29.60
DISTANCE	19.0	14.6	12.4	64.2	40.7
GRADE	1.2%	0.8%	0.8%	0.8%	2.6%
DESIGN FLOW l/sec CAPACITY l/sec	256.0 314	248.7 256	129.4 158	120.7 158	8.4 73.7

LONGITUDINAL SECTION LINE M



DATUM RL 17.0m

PIPE	375Φ	
DEPTH TO INVERT	3.56	0.94
INVERT LEVEL	25.27 / 25.35	27.73
GROUND LEVEL	28.90	28.67
DISTANCE	24.1	
GRADE	9.9%	
DESIGN FLOW l/sec CAPACITY l/sec	558.2	

LONGITUDINAL SECTION LINE U

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHEC
F	190207	LINE U AMENDED	FK	
E	050207	VARIOUS AMENDMENTS	FK	
D	310107	PIPE CLASSES AMENDED	FK	
C	250107		FK	
B	230107	LS FOR LINE M ADDED	FK	
A	160107	TEXT AMENDMENTS	MSO	

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admin@babbage.co.

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

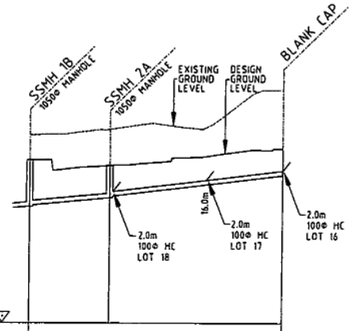
STORMWATER LONGITUDINAL SECTIONS (SHEET 4)

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		

SCALE (A1)

1:500(H) 1:100(V)

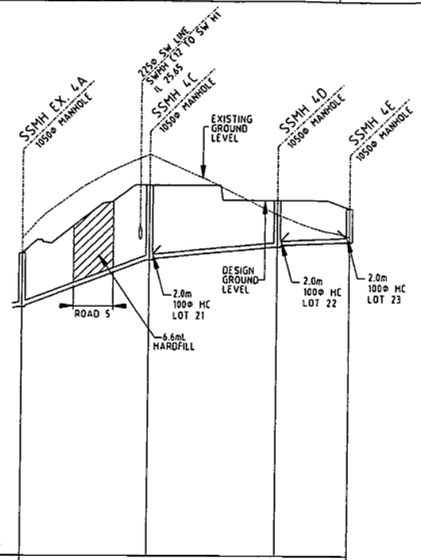
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C40	F



DATUM RL 15.0m

PIPE	150Φ				
DEPTH TO INVERT	1.53	1.09			0.90
INVERT LEVEL	18.93 18.98	19.24	19.29		19.99
GROUND LEVEL	20.51	20.33			20.89
DISTANCE	12.4	29.2			
GRADE	2.1%	2.4%			

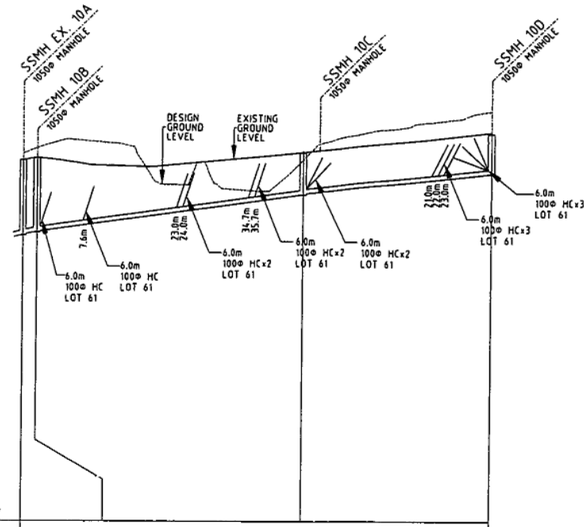
LONGITUDINAL SECTION LINE 2



DATUM RL 15.0m

PIPE	150Φ					
DEPTH TO INVERT	1.75		2.52		1.57	1.13
INVERT LEVEL	23.39 23.44		24.98 25.03		25.43 25.48	25.60
GROUND LEVEL	25.19		27.50		27.00	26.73
DISTANCE	21.0		21.1		11.7	
GRADE	7.3%		2.0%		1.1%	

LONGITUDINAL SECTION LINE 4



DATUM RL 15.0m

PIPE	150Φ				
DEPTH TO INVERT	2.48	2.51		1.40	1.35
INVERT LEVEL	24.64 24.69	24.74 24.79		26.11 26.16	26.72
GROUND LEVEL	27.17	27.25		27.53	28.07
DISTANCE	2.3	43.7		37.1	
GRADE	2.2%	3.0%		1.5%	

LONGITUDINAL SECTION LINE 10

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC)CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
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6. ALL PIPES ARE uPVC SN16 UNLESS OTHERWISE SHOWN.
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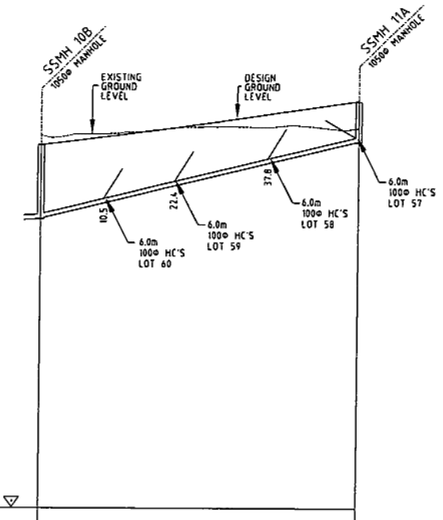
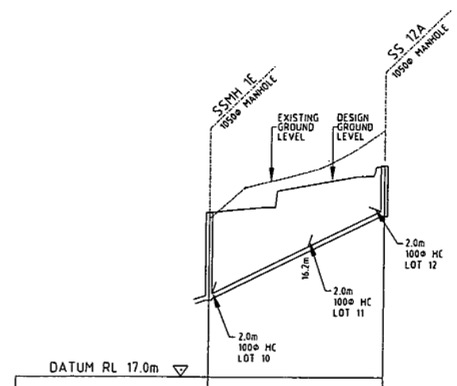
8. ALL WORK ON EXISTING WCC SEWER TO BE UNDERTAKEN BY AN APPROVED CONTRACTOR. THIS INCLUDES LOWERING AND EXTENTION OF EXISTING MANHOLES.



DATUM RL 15.0m

PIPE	150Φ		
DEPTH TO INVERT	2.33		1.38
INVERT LEVEL	24.74 24.79		27.35
GROUND LEVEL	27.25		28.73
DISTANCE	52.9		
GRADE	4.8%		

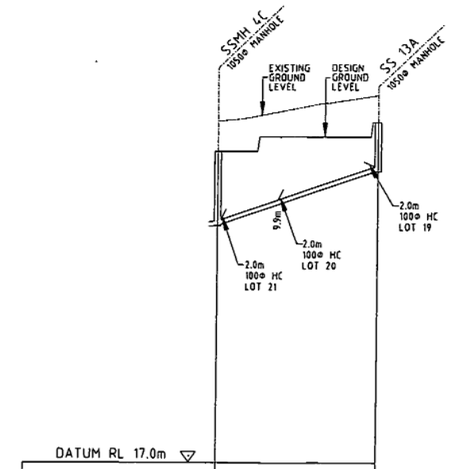
LONGITUDINAL SECTION LINE 11



DATUM RL 17.0m

PIPE	150Φ		
DEPTH TO INVERT	2.96		1.75
INVERT LEVEL	19.58 19.63		22.39
GROUND LEVEL	22.54		24.14
DISTANCE	28.7		
GRADE	9.6%		

LONGITUDINAL SECTION LINE 12



DATUM RL 17.0m

PIPE	150Φ		
DEPTH TO INVERT	2.47		1.70
INVERT LEVEL	24.98 25.03		26.80
GROUND LEVEL	27.50		28.50
DISTANCE	26.2		
GRADE	6.8%		

LONGITUDINAL SECTION LINE 13

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DRAWING NOTES

OK

REV	DATE	DESCRIPTION	DRAWN	CHEC
D	120207	LINE 5 & SSMH 4B DELETED	FK	
C	050207	VARIOUS AMENDMENTS	FK	
B	310107	VARIOUS AMENDMENTS	FK	
A	180107	TEXT AMENDMENTS	MSO	

DRAWING REVISIONS

ENGINEERS • ARCHITECTS • SURVEYORS
Babbage CONSULTANTS
109 FANSHAWE STREE
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AUCKLAND 1 NEW ZEALA
PHONE 09 - 379 9980 FAX 09 - 377 11
admin@babbage.co.

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATIOI

DRAWING TITLE

SANITARY SEWER LONGITUDINAL SECTIONS (SHEET 1)

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		

SCALE (A1)

1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C41	D

NOTES

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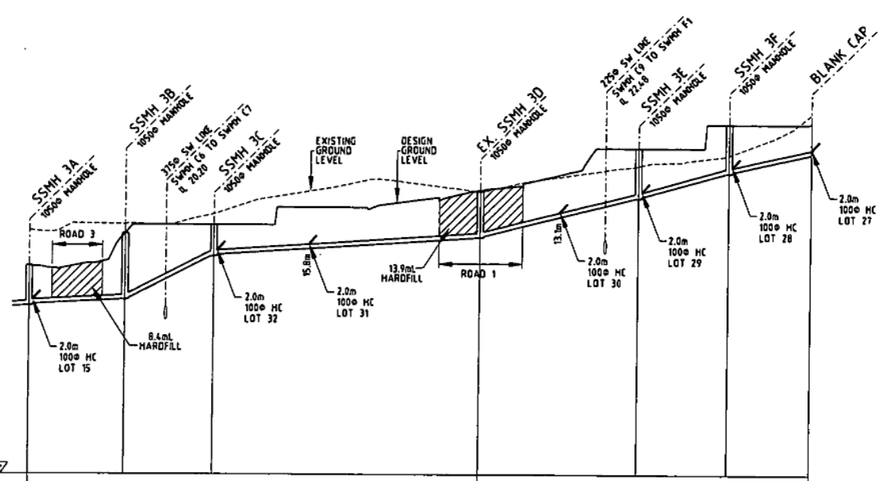
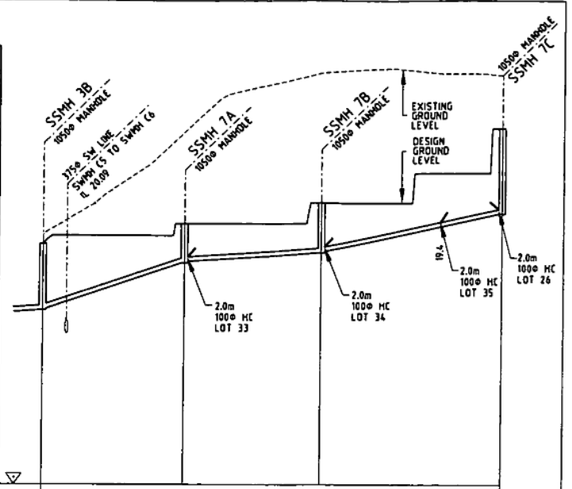
8. ALL WORK ON EXISTING WCC SEWER TO BE UNDERTAKEN BY AN APPROVED CONTRACTOR. THIS INCLUDES LOWERING AND EXTENTION OF EXISTING MANHOLES.



DATUM RL 15.0m

PIPE	300Φ				150Φ			
DEPTH TO INVERT	1.30	2.23	1.05	1.17	1.68	1.64	1.04	
INVERT LEVEL	20.68 20.73	20.89 20.94	22.35 22.40	22.99 23.04	24.32 24.37	25.16 25.21	25.80	
GROUND LEVEL	22.03	23.12	23.40	24.16	26.00	26.80	26.84	
DISTANCE	16.0	14.8	44.5		26.2	15.0	13.8	
GRADE	1.00%	9.53%	1.33%		4.88%	5.27%	4.28%	

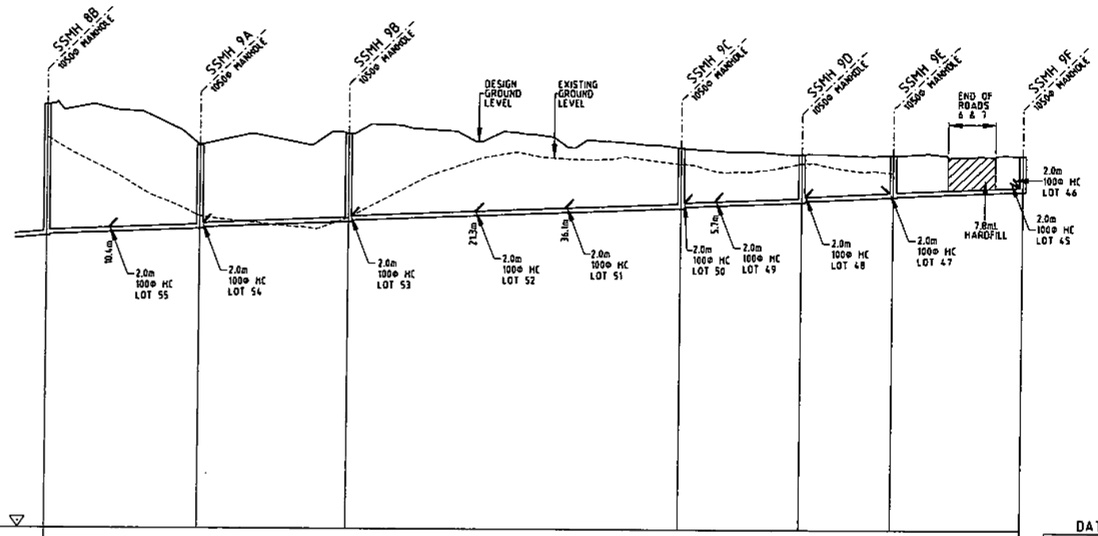
LONGITUDINAL SECTION LINE 3



DATUM RL 15.0m

PIPE	150Φ			
DEPTH TO INVERT	2.18	1.32	1.68	2.87
INVERT LEVEL	20.89 20.94	22.48 22.53	22.82 22.87	24.13
GROUND LEVEL	23.12	23.80	24.50	27.00
DISTANCE	23.3	22.4	29.6	
GRADE	6.61%	1.29%	4.26%	

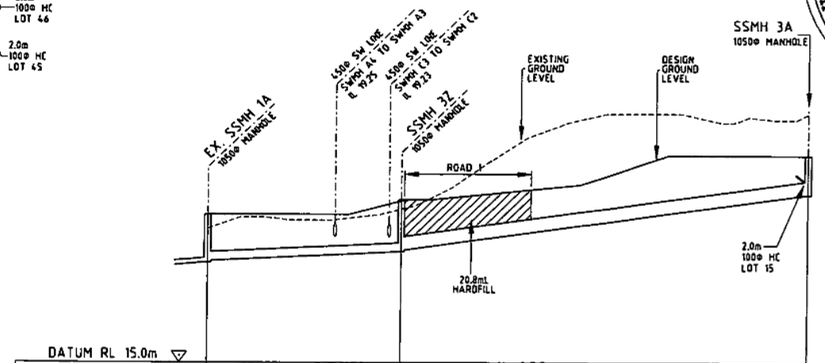
LONGITUDINAL SECTION LINE 7



DATUM RL 15.0m

PIPE	150Φ					
DEPTH TO INVERT	4.46	2.85	2.99	2.06	1.65	1.44	1.35
INVERT LEVEL	24.86 24.91	25.11 25.16	25.36 25.41	25.85 25.90	26.06 26.11	26.23 26.28	26.45
GROUND LEVEL	29.32	27.96	28.35	27.91	27.71	27.67	27.80
DISTANCE	25.6	24.8	55.5	20.1	15.2	21.2	
GRADE	0.80%	0.80%	0.80%	0.80%	0.80%	0.90%	

LONGITUDINAL SECTION LINE 9



DATUM RL 15.0m

PIPE	300Φ		
DEPTH TO INVERT	1.52	1.71	1.32
INVERT LEVEL	18.43 18.48	18.75 18.80	20.68 20.73
GROUND LEVEL	20.00	20.46	22.00
DISTANCE	31.6	66.5	
GRADE	0.85%	2.83%	

LONGITUDINAL SECTION - LINE TO BE RELAID

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHEC
D	050207	VARIOUS AMENDMENTS	FK	
C	310107	VARIOUS AMENDMENTS	FK	
B	160107	VARIOUS AMENDMENTS	MSO	
A	10/08	PIPE SIZE AMENDED	FK	FK

DRAWING REVISIONS

SURVEYORS · ENGINEERS · ARCHITECTS
Babbage CONSULTANTS
109 FANSHAWE STREE
PO BOX 20
AUCKLAND 1 · NEW ZEALA
PHONE 09 - 379 9980 · FAX 09 - 377 11
admin@babbage.co.

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATIOI

DRAWING TITLE

SANITARY SEWER LONGITUDINAL SECTIONS (SHEET 2)

	DATE	INITIAL
DESIGNED		
DRAWN	27.07.06	GNB
CHECKED		
APPROVED		

SCALE (A1)

1:500(H) 1:100(V)

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C42	D

NOTES

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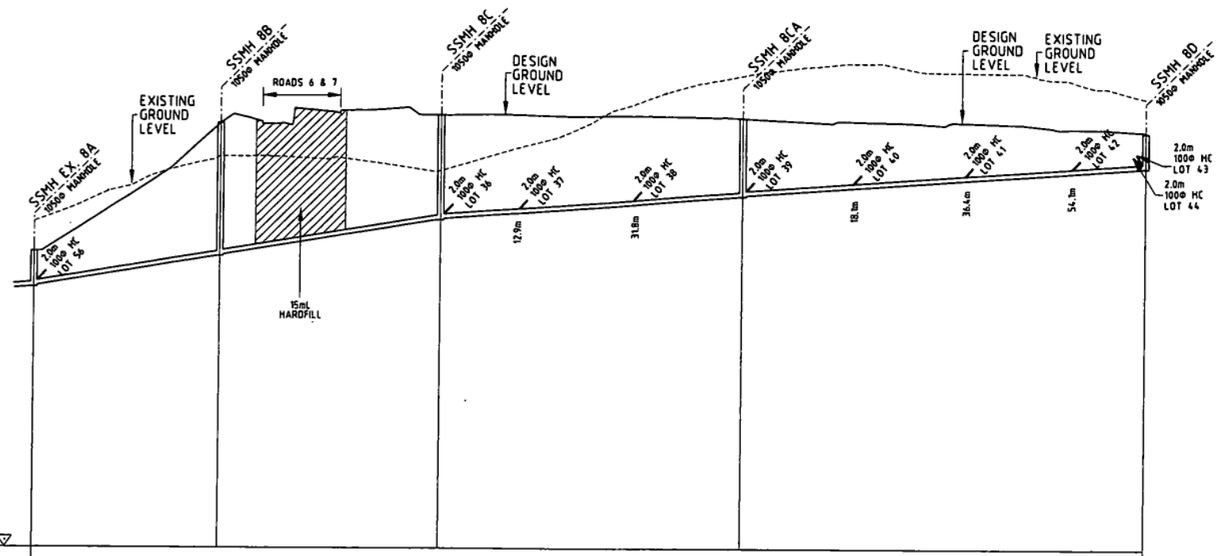


DATUM RL 15.0m

| | | |

Planting Schedules for Stormwater Pond No.1

423-429 West Coast Road, Henderson - Housing Development

Margin Zone

135.3 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Bau art	*Baumea articulata*	PB3	30-40	20%	10-20	2/m²	<1m	54	
Bau ter	*Baumea teretifolia*	PB3	30-40	20%	10-20	2/m²	<100	54	
Car vir	*Carex virgata*	PB3	20-40	20%	10-20	2/m²	<100	54	
Car les	*Carex lessoniana*	PB3	20-40	20%	10-20	2/m²	<100	54	
Apo sim	*Apodasmia similis*	PB3	20-40	20%	10-20	2/m²	<150	54	
TOTAL				100%				270	

Lower Bank

160.4 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Ble nov	*Blechnum novae-zelandiae*	PB3	20-30	20%	15-20	0.5		128	Good coloniser
Cyp ust	*Cyperus ustulatus*	PB3	20-40	15%	10+	1.0	<100	24	
Pho ono	*Phormium tenax*	PB3	30-40	20%	5+	1.5	<100	14	
Cor ful	*Cortaderia fulvida*	PB3	20-40	20%	3+	2.0		8	Periodic Imersion
Cop pro	*Coprosma propinqua*	PB3	20	15%	7+	1.0		24	Periodic Imersion
Lep sco	*Leptospermum scoparium*	PB3	20+	10%	5-15	1.0		16	
TOTAL				100%				204	

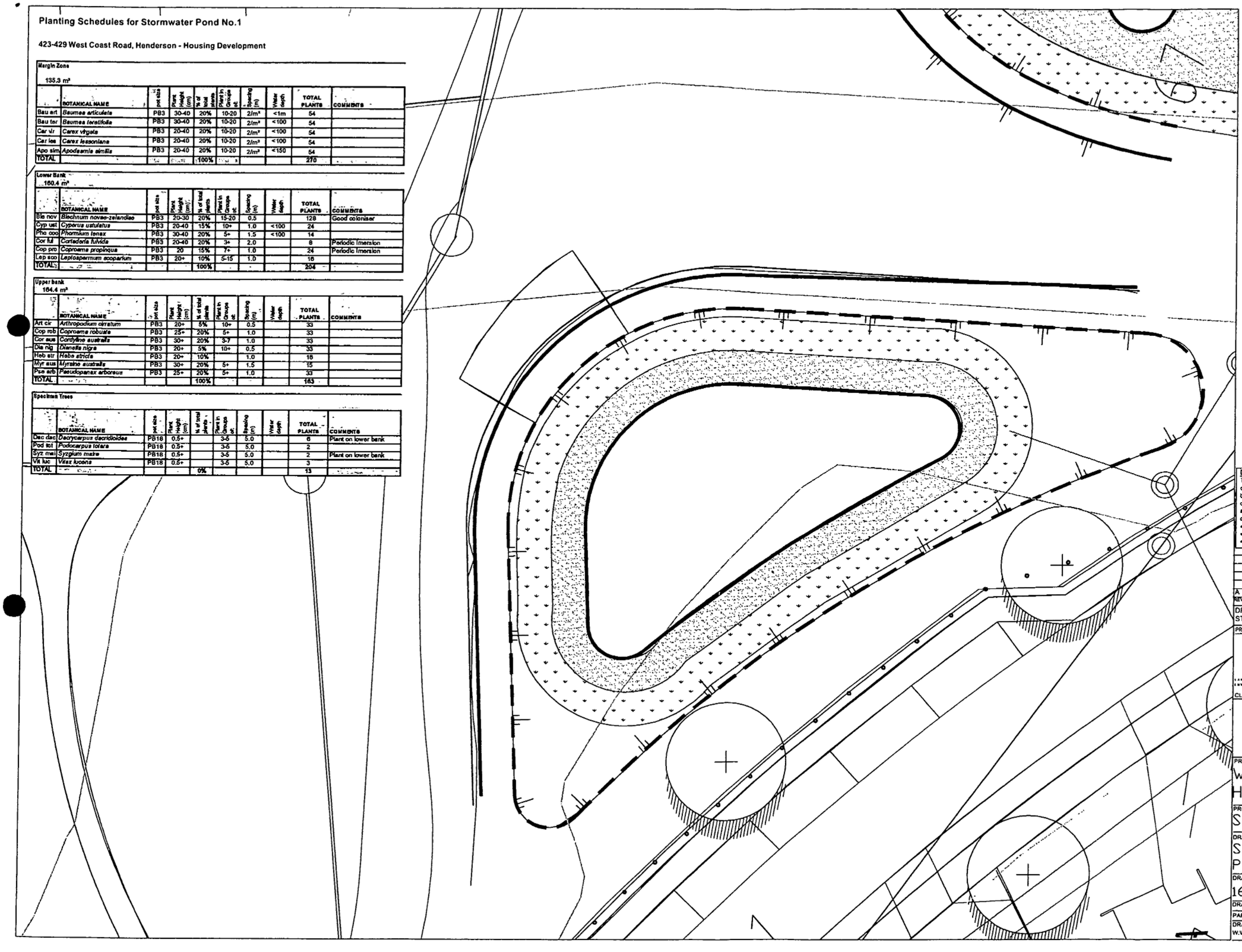
Upper bank

164.4 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Art cir	*Arthropodium cirratum*	PB3	20+	5%	10+	0.5		33	
Cop rob	*Coprosma robusta*	PB3	25+	20%	5+	1.0		33	
Cor aus	*Cordyline australis*	PB3	30+	20%	3-7	1.0		33	
Dia nig	*Dianella nigra*	PB3	20+	5%	10+	0.5		33	
Heb str	*Hebe stricta*	PB3	20+	10%		1.0		16	
Myr aus	*Myrsine australis*	PB3	30+	20%	5+	1.5		15	
Pse arb	*Pseudopanax arboreus*	PB3	25+	20%	5+	1.0		33	
TOTAL				100%				163	

Specimen Trees

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Dac dac	*Dacrycarpus dacrioides*	PB18	0.5+		3-5	5.0		6	Plant on lower bank
Pod tot	*Podocarpus totara*	PB18	0.5+		3-5	5.0		2	
Syz mai	*Syzgium maire*	PB18	0.5+		3-5	5.0		2	Plant on lower bank
Vit luc	*Vitex lucens*	PB18	0.5+		3-5	5.0		3	
TOTAL				0%				13	



LEGEND:

- Margin Zone
- Lower Bank
- Upper Bank

NORTH

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- All given dimensions in mm.

REVISION	DATE:	DESCRIPTION:	DRAWN	CHECKED
A	31.5.07	planting	AH	

DRAWING STATUS: DRAFT

PRODUCED BY:

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URBAN DESIGN LANDSCAPE ARCHITECTURE ENVIRONMENTAL PLANNING

CLIENT:

PROJECT TITLE:
West Coast Road Housing Development

PROJECT NUMBER: SOUL-161

PLOT DATE: 31.05.07

DRAWING TITLE:
Storm Water Pond No.1
PLANTING PLAN

DRAWING NUMBER: 161-PP01

SHEET NO.: 1/5

REVISION: A

DRAWING SCALE: 1:100

APPROVED BY: CH

PAPER SIZE: A1

DRAWN BY: AH

DRAWING FILE LOCATION:
W:\Babbage - West Coast Road\CAD

Planting Schedules for Stormwater Pond No.2

423-429 West Coast Road, Henderson - Housing Development

Margin Zone

546.8 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Bau art	*Baumea articulata*	PB3	30-40	20%	10-20	0.7	<1m	223	
Bau ter	*Baumea teretifolia*	PB3	30-40	20%	10-20	0.7	<100	223	
Car vir	*Carex virgata*	PB3	20-40	20%	10-20	0.7	<100	223	
Car les	*Carex lessoniana*	PB3	20-40	20%	10-20	0.7	<100	223	
Typ ori	*Typha orientalis*	PB3	20-40	20%	10-20	0.7	<150	223	
TOTAL				100%				1116	

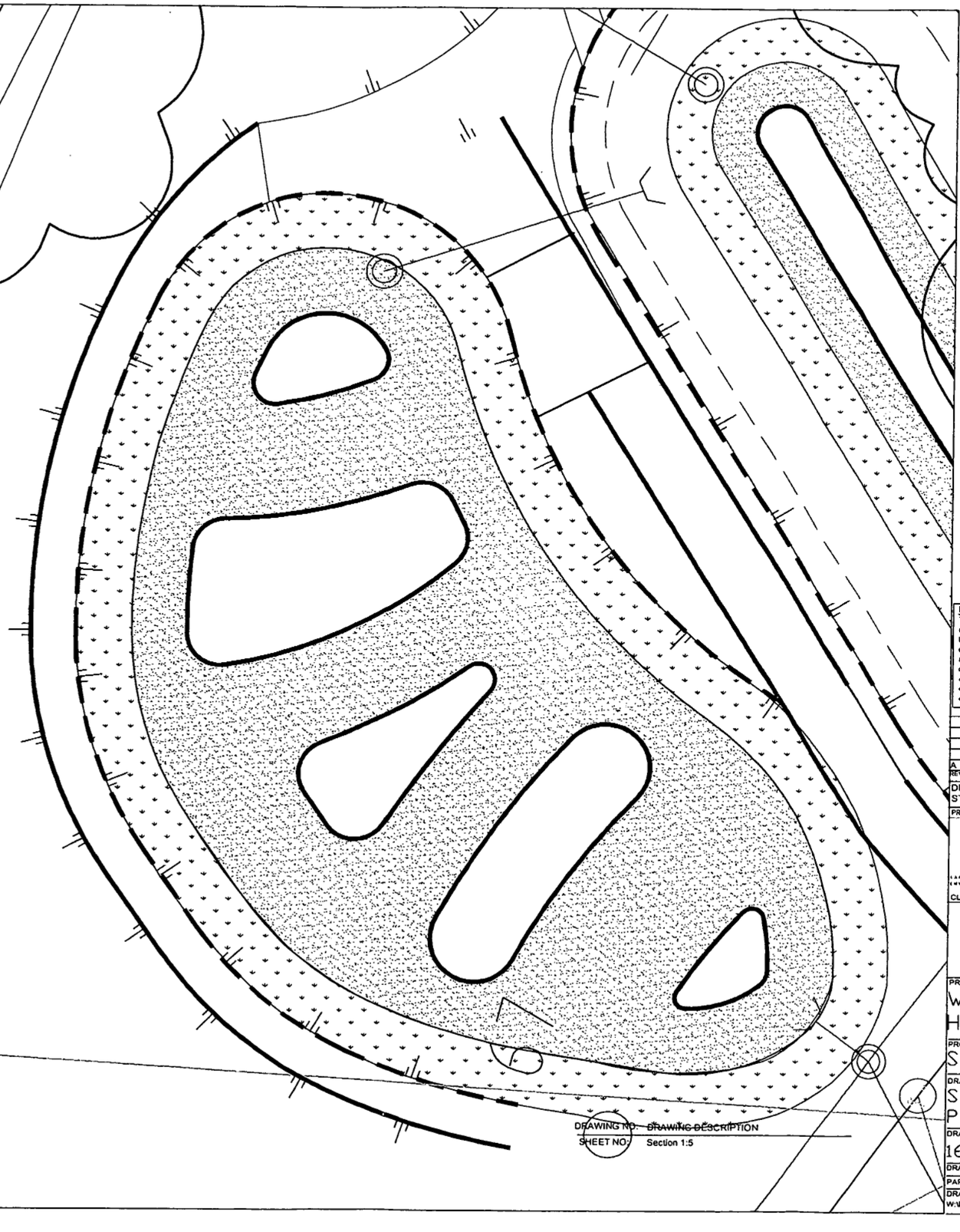
Lower Bank

291 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Ble nov	*Blechnum novae-zelandiae*	PB3	20-30	13%	15-20	0.5		151	Good coloniser
Cyp ust	*Cyperus ustuletus*	PB3	20-40	15%	10+	1.0	<100	44	
Pho coo	*Phormium tenax*	PB3	30-40	20%	5+	1.5	<100	26	
Cor ful	*Cortaderia fulvida*	PB3	20-40	20%	3+	2.0		15	Periodic Imersion
Cop pro	*Coprosma propinqua*	PB3	20	15%	7+	1.0		44	Periodic Imersion
Dac dac	*Dacrycarpus dacridioides*	PB3	35-45	10%	n/a	5.0		5	Periodic Imersion
Dic squ	*Dicksonia squarrosa*	PB3	25+	7%	3-7	1.0		20	
TOTAL				100%				284	

Specimen Trees

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Dac dac	*Dacrycarpus dacridioides*	PB18	0.5+		3-5	5.0		3	Plant on lower bank
Syz mai	*Syzgium maire*	PB18	0.5+		3-5	5.0		3	Plant on lower bank
Pod tot	*Podocarpus totara*	PB18	0.5+		3-5	5.0		2	
Vit luc	*Vitex lucens*	PB18	0.5+		3-5	5.0		3	
TOTAL				0%				6	



LEGEND:

- Margin Zone
- Lower Bank
- Upper Bank

NORTH

DRAWING NO: DRAWING DESCRIPTION
SHEET NO: Section 1:5

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REVISION	DATE:	DESCRIPTION:	DRAWN:	CHECKED
A	31.5.07	planting	AH	

DRAWING STATUS: DRAFT

PRODUCED BY:

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BIBEN SUBRITES
URBAN DESIGN
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL PLANNING
SOUL

CLIENT:

PROJECT TITLE:
West Coast Road Housing Development

PROJECT NUMBER: SOUL-161
PLOT DATE: 31.05.07

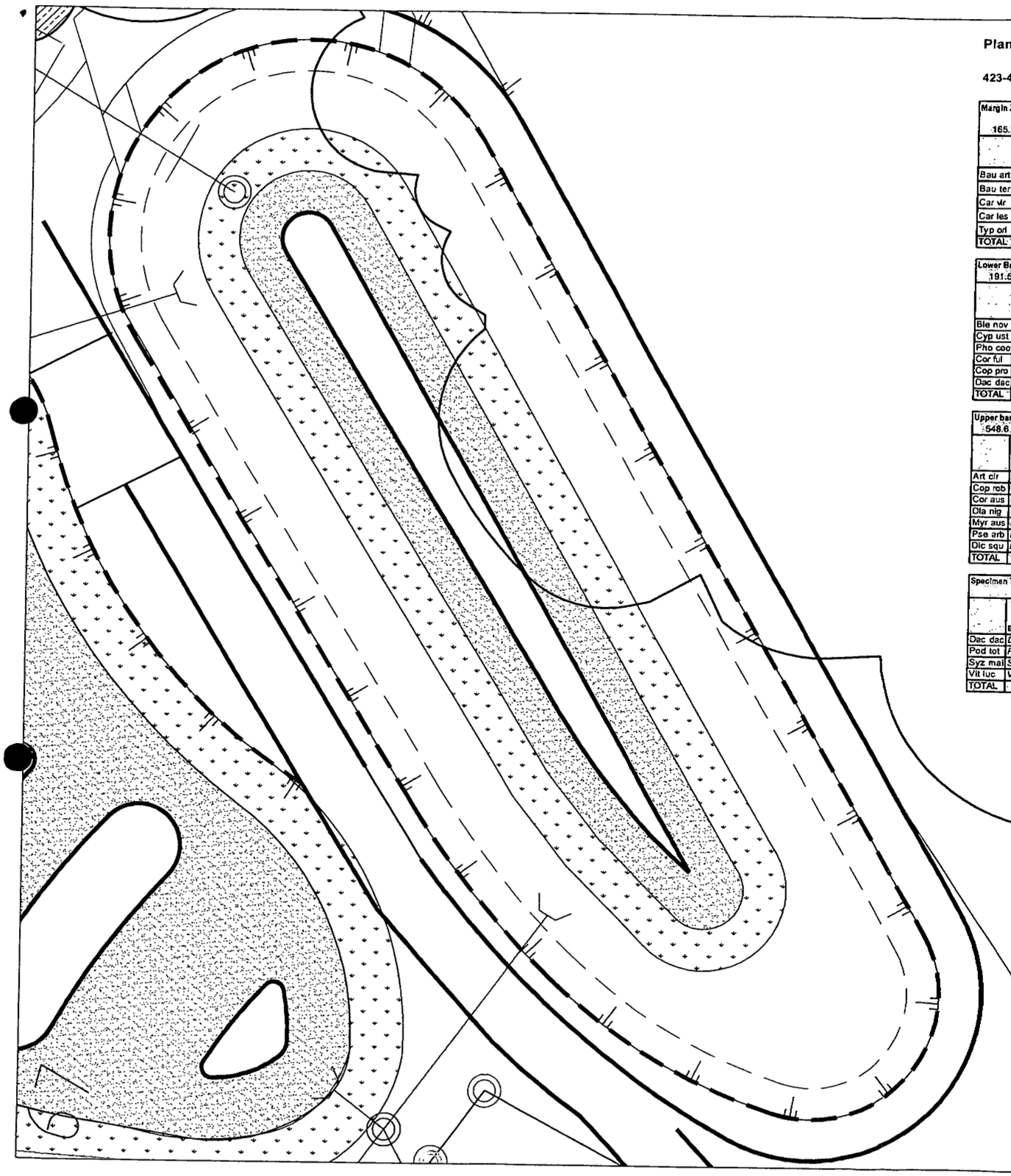
DRAWING TITLE:
Storm Water Pond No.2 PLANTING PLAN

DRAWING NUMBER: 161-PP02
SHEET NO: 2/5
REVISION: A

DRAWING SCALE: 1:100
APPROVED BY: CH

PAPER SIZE: A1
DRAWN BY: AH

DRAWING FILE LOCATION:
W:\Babbage - West Coast Road\CAD



Planting Schedules for Stormwater Pond No.3

423-429 West Coast Road, Henderson - Housing Development

Margin Zone

165.3 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Bau art	*Baumea articulata*	PB3	30-40	20%	10-20	0.7	<1m	67	
Bau ter	*Baumea terettifolia*	PB3	30-40	20%	10-20	0.7	<100	67	
Car vir	*Carex virgata*	PB3	20-40	20%	10-20	0.7	<100	67	
Car les	*Carex lessoniana*	PB3	20-40	20%	10-20	0.7	<100	67	
Typ ori	*Typha orientalis*	PB3	20-40	20%	10-20	0.7	<150	67	
TOTAL				100%				337	

Lower Bank

191.5 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Ble nov	*Blechnum novae-zelandiae*	PB3	20-30	20%	15-20	0.5		153	Good coloniser
Cyp ust	*Cyperus ustulatus*	PB3	20-40	15%	10+	1.0	<100	29	
Pho coo	*Phormium tenax*	PB3	30-40	20%	5+	1.5	<100	17	
Cor ful	*Cortaderia fulvida*	PB3	20-40	20%	3+	2.0		10	Periodic Imersion
Cop pro	*Coprosma propinqua*	PB3	20	15%	7+	1.0		29	Periodic Imersion
Dac dac	*Dacrycarpus dacridioides*	PB3	35-45	10%	n/a	5.0		5	Periodic Imersion
TOTAL				100%				242	

Upper bank

548.6 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Art cir	*Arthropodium cirratum*	PB3	20+	5%	10+	0.5		110	
Cop rob	*Coprosma robusta*	PB3	25+	20%	5+	1.0		110	
Cor aus	*Cordyline australis*	PB3	30+	20%	3-7	1.0		110	
Dia nig	*Dianella nigra*	PB3	20+	8%	10+	0.5		176	
Myr aus	*Myrsine eustrelis*	PB3	30+	20%	5+	1.5		49	
Pse arb	*Pseudopanax arboreus*	PB3	25+	20%	5+	1.0		110	
Dic squ	*Dicksonia squarrosa*	PB3	25+	7%	3-7	1.0		38	
TOTAL				100%				592	

Specimen Trees

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Dac dac	*Dacrycarpus dacridioides*	PB18	0.5+		3-5	5.0		2	Plant on lower bank
Pod tot	*Podocarpus totara*	PB18	0.5+		3-5	5.0		5	Plant to north end of pond
Syz mal	*Syzglum maire*	PB18	0.5+		3-5	5.0		1	Plant on lower bank
Vit luc	*Vitex lucens*	PB18	0.5+		3-5	5.0		3	
TOTAL				0%				11	

LEGEND:

- Margin Zone
- Lower Bank
- Upper Bank

NORTH

DISCLAIMER:

This drawing is to be read in conjunction with all relevant drawings and specifications for the project, with any conflicting information to be brought to the attention of the CA before work commences on site. All dimensions and levels are to be checked and verified on drawings and site by contractor before comencement of any work on site.

- Do not scale from this drawing.
- Always work to noted dimensions.
- All given dimensions in mm.

REVISION	DATE:	DESCRIPTION:	DRAWN:	CHECKED
A	31.5.07	planting	AH	

DRAWING STATUS: DRAFT

PRODUCED BY:

Copy Right SOUL Environments 2006

SOUL

URBAN DESIGN
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL PLANNING

CLIENT:

PROJECT TITLE:
West Coast Road
Housing Development

PROJECT NUMBER: SOUL-161

PLOT DATE: 31.05.07

DRAWING TITLE
Storm Water Pond No.3
PLANTING PLAN

DRAWING NUMBER: 161-PP03

SHEET NO: 3/5

REVISION: A

DRAWING SCALE: 1:100

APPROVED BY: CH

PAPER SIZE: A1

DRAWN BY: AH

DRAWING FILE LOCATION:
W:\Babbage - West Coast Road\CAD

Planting Schedules for Wetland Swale

423-429 West Coast Road, Henderson - Housing Development

Mix 1

98 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Bau art	*Baumea articulata*	PB3	30-40	50%	10-20	0.7	<1m	100	Plant on base of swale
Sch val	*Schoenoplectus validus*	PB3	30-40	50%	10-20	0.7	<0.6m	100	Plant on base of swale
TOTAL				100%				200	

Mix 2

150 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Apo sim	*Apodasmia similis*	PB3	20-40	25%	10-20	0.7	<150	77	Plant on base of swale and upper pa
Car les	*Carex lessoniana*	PB3	20-40	20%	10-20	1.0	<100	30	Plant on base of swale in wetter zon
Car sec	*Carex secta*	PB3	30-40	25%	10-20	1.0	<100	38	Plant in base of swale and on sides
Car vir	*Carex virgata*	PB3	20-40	15%	10-20	1.0	<100	23	Plant on base of swale
Cyp ust	*Cyperus ustulatus*	PB3	20-40	15%	10+	1.0	<100	23	Plant on sides of swale
TOTAL				100%				144	

Mix 3

365 m²

	BOTANICAL NAME	pot size	Plant Height (cm)	% of total plants	Plant in Groups of:	Spacing (m)	Water depth	TOTAL PLANTS	COMMENTS
Ble nov	*Blechnum novae-zelandiae*	PB3	20-30	20%	15-20	0.5		292	Plant on sides of swale and out of s
Car sec	*Carex secta*	PB3	30-40	25%	10-20	1.0	<100	91	Plant in base of swale and on sides
Cor aus	*Cordyline australis*	PB3	30+	20%	3-7	1.0		73	Plant out of swale
Cop pro	*Coprosma propinqua*	PB3	20	15%	7+	1.0		55	Plant on sides of swale and out of s
Heb str	*Hebe stricta*	PB3	20+	20%		1.0		73	Plant out of swale
TOTAL				100%				292	

LEGEND

MIX 1

MIX 2

MIX 3

REVISION	DATE	DRAWN	CODE	CHECKED BY

DRAWING STATUS: **FOR CONSENT**

environments SOUL
URBAN DESIGN LANDSCAPE ARCHITECTURE ENVIRONMENTAL PLANNING
Level 2, Old Sofrana House
14 – 18 Customs St East, Auckland City
PO Box 106747, Auckland City, New Zealand
phone 64 9 3776822 fax 64 9 3776821

PROJECT TITLE:
WEST COAST RD
HOUSING DEVELOPMENT

PROJECT NUMBER: **SOUL_06/07-161**
PLOT DATE: **17/07/2007**

DRAWING SCALE: **1:300**
APPROVED: **CH**

PAPER SIZE: **A3**
DRAWN: **AD**

DRAWING TITLE:
WETLAND SWALE

DRAWING NUMBER: **161-05**
REVISION

DRAWING FILE LOCATOR: W:\Babbage - West Coast Road\Graphic Design\CAD\Archicad\westcoastrd.lbk

DO NOT SCALE FROM THIS DRAWING

Waitakere City Council
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Website: www.waitakere.govt.nz

16 October 2007

NEW ZEALAND HOUSING FOUNDATION
C/- Babbage Consultants Limited
PO Box 2027
Shortland Street
AUCKLAND 1020

Attention: Kevin Meikle
Your ref: 42608/SV

Dear Sir / Madam

Survey Plan Application Number:	**SUB-2006-1078**
Proposal:	**61 LOT SUBDIVISION**
Site Address:	**423-429 West Coast Road, GLEN EDEN**

Please find enclosed a copy you're Survey Plans for Stage 1, 2 & 3, which has been approved by Council and signed within Land Online.

Yours faithfully

James Lathan
Process Support - Subdivisions

Waitakere City Council
Te Taiao o Waitakere

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DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

15 September 2007

Ted Barwell
Consent Services

Application Number: SUB-2006-1078
Applicant Name: NEW ZEALAND HOUSING FOUNDATION
Application Address: 423-429 West Coast Road, GLEN EDEN

SECTION 223 – SURVEY PLAN ECOWATER APPROVAL

EcoWater's Section 223 conditions applying to the above subdivision application have been met and are now approved for the purposes of signing the survey plan. The assessment notes are shown below each condition in BOLD. For enquiries or clarification regarding the items noted below please contact Shelley Renkema.

PUBLIC DRAINAGE INFRASTRUCTURE – ECOWATER SECTION 223 CONDITIONS

(a) Define the 1 in 100 year floodplain of the Parrs Stream, and the areas required for the stormwater quality treatment ponds and provide separate Lot(s) to vest in Council as drainage reserve. Specific requirements:
   (i) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage reserve boundaries.
   (ii) The existing drainage easement(s) on Lot 2 DP 339810 can be surrendered once the drainage reserve(s) vest in Council under each Stage as required above.
   (iii) The existing drainage easement(s) on Lot 3 DP 339810 can be surrendered once the existing pond has been replaced with an alternative treatment device and the drainage reserve vests in Council under Stage 3 as required above.

   Flood levels provided by Babbage Consultants, August 2007, showing 1%AEP floodplain contained within drainage reserve boundaries. Completed.

(b) Define the 1 in 100 year overland flowpath and provide a drainage easement(s) in gross in favour of Council in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon." Specific requirements:
   (i) The easement document will be prepared by Council's Solicitor at the applicant's cost.
   (ii) The easement document shall advise the owner of their responsibility to maintain the overland flowpath in it's approved state, and to keep it unobstructed by buildings, earthworks, solid walls or fences, or any other impediments to the free flow of water through the easement area.
   (iii) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage easement.

   Overland flowpath easements, approx 2m wide, provided over Lots 44-46. No calculations provided at this stage. As-builts will be required at 224c stage to confirm construction of overland flowpath is contained within easement boundaries.

(c) Provide for water supply easement(s) in gross in favour of Council over the ROW serving Lots 57-62 under Stage 3 in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out

in the Memorandum hereon." Specific requirements:

(i) The easement document will be prepared by Council's Solicitor at the applicant's cost.

(ii) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage easement.

Provided over access Lot 61.

Shelley Renkema
Principal Subdivision & Consents Engineer

Babbage
CONSULTANTS

BABBAGE CONSULTANTS LIMITED
109 FANSHAWE STREET, AUCKLAND 1010
PO BOX 2027, AUCKLAND 1140, NEW ZEALAND
PHONE: 0-9-379 9980, FAX: 0-9-377 1170
EMAIL: admin@babbage.co.nz

Waitakere City Council
Civic Admin Building
6 Waipareira Avenue
Henderson
Waitakere City, New Zealand

Job Number: 42608/SV
KM
26 July 2007

Attention: Ted Barwell

Dear Ted

423-429 West Coast Rd, Henderson
New Zealand Housing Foundation
RMA 2006-1078 (SPW22816)

Attached herewith: — Plan uplifted by Babbage 21 Aug 2007

- Stage 1 Replacement Transparency for 223 Certification
- A2 copies of sheets 1 – 5 inclusive.

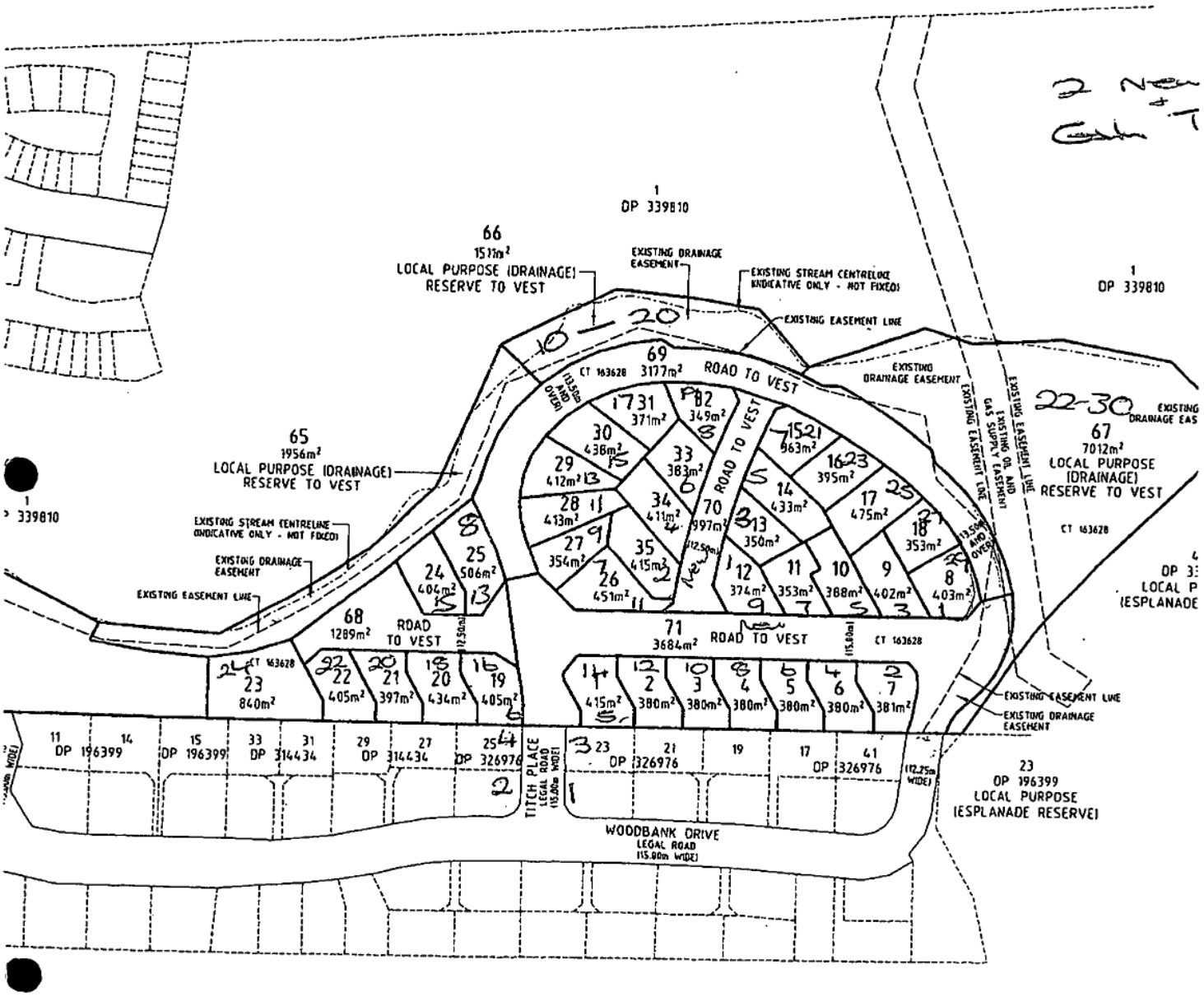
We have amended the plan to reflect the preliminary street numbering/naming layout suggested by Council, per your e-mail to Fiona Keir of our office.

Please destroy the previously submitted Stage 1 plans.

Yours faithfully

Kevin M

Kevin Meikle
Babbage Consultants Limited



EASEMENTS IN GROSS

IENT MENT	CREATED BY	GRANTEE
339810	B344219.1	NATURAL GAS CORPORATION OF NEW ZEALAND LTD.
ND 3	6135712.4	WAITAKERE CITY COUNCIL
339810	6070221.2	
339810	6070221.1	

KEY

EXISTING EASEMENT BOUNDARY

CENTRELINE OF EXISTING STREAM (INDICATIVE ONLY - NOT FIXED)

NOTES:

1. LOCAL AUTHORITY: WAITAKERE CITY COUNCIL.
2. MEASUREMENTS AND AREAS ARE SUBJECT TO SURVEY.
3. EASEMENTS TO BE CREATED FOR SERVICES AND PARTY WALL RIGHT OF SUPPORT WHERE APPROPRIATE.

APPROVED
subject to conditions endor
on : RMA 2006/1078
signed: _____ date:
authorised officer

DULE - STAGE ONE

DENTIAL	1.4373ha
AL PURPOSE (DRAINAGE) ERVE TO VEST	1.0479ha
D TO VEST	0.9147ha
TOTAL	= 3.3999ha

Waitakere City Council
Te Taiao o Waitakere

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09 839 0400

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DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

4 July 2007

BABBAGE CONSULTANTS LTD
C/O Kevin Meikle
PO Box 2027
Shortland Street
AUCKLAND 1140

Dear Sir

Application Number: SUB-2006-1078
Applicant Name: NEW ZEALAND HOUSING FOUNDATION
Application Address: 423-429 West Coast Road, GLEN EDEN

SECTION 223 – SURVEY PLAN AMENDMENT REQUEST

EcoWater's Section 223 conditions applying to the above subdivision application are shown below with notes following in **BOLD** explaining the items required to be addressed or amended prior to signing of the survey plan. For enquiries or clarification of any items noted below please contact Steven Rankin.

PUBLIC DRAINAGE INFRASTRUCTURE – ECOWATER SECTION 223 CONDITIONS

(a) Define the 1 in 100 year floodplain of the Parrs Stream, and the areas required for the stormwater quality treatment ponds and provide separate Lot(s) to vest in Council as drainage reserve. Specific requirements:
   (i) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage reserve boundaries.
   (ii) The existing drainage easement(s) on Lot 2 DP 339810 can be surrendered once the drainage reserve(s) vest in Council under each Stage as required above.
   (iii) The existing drainage easement(s) on Lot 3 DP 339810 can be surrendered once the existing pond has been replaced with an alternative treatment device and the drainage reserve vests in Council under Stage 3 as required above.

   Through an onsite meeting with Babbage engineers it has been brought to WCC's attention that the survey information used to determine the extend of the floodplain is not correct due to an area of material located within the floodplain. Please either resurvey and provide an amended flood report with the correct levels or remove the fill material providing the required resource consent are granted and complied with from WCC and ARC

(b) Define the 1 in 100 year overland flowpath and provide a drainage easement(s) in gross in favour of Council in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon." Specific requirements:
   (i) The easement document will be prepared by Council's Solicitor at the applicant's cost.
   (ii) The easement document shall advise the owner of their responsibility to maintain the overland flowpath in it's approved state, and to keep it

Waitakere City Council
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unobstructed by buildings, earthworks, solid walls or fences, or any other impediments to the free flow of water through the easement area.

(iii) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage easement.

Please supply the supporting calculations and design for the formed overland flow path located at the rear of lots 44, 45, and 46

(c) Provide for water supply easement(s) in gross in favour of Council over the ROW serving Lots 57-62 under Stage 3 in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon." Specific requirements:

(i) The easement document will be prepared by Council's Solicitor at the applicant's cost.

(ii) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage easement.

Ted Barwell

From: Ted Barwell
Sent: Tuesday, 3 July 2007 9:49 a.m.
To: 'admin@babbage.co.nz'
Subject: For Kevin Meikle

Hello

Your ref 42608/SV

423 -429 West Coast Road
NZ Housing Foundation
Subdivision Consent SUB2006-1078 (SPW22816)

I have received the survey plans for this project and there a couple of preliminary matters that I want to clarify while the plans are being processed through the various Council asset teams.

I note that there are three separate survey plans - one for each stage - all submitted together. Does this indicate that the subdivision is not being staged at all and it is in fact proceeding as a single stage? Or, is it intended that staging will come into play later and the s224(c) certificate for each plan will be applied for at staggered intervals.
Each plan will be charged the base fees. So for the s223 certificates it will be 3 x the base fee (currently $455) and for the s224(c) it will be 3 x the base fee (currently $1043).

Although consent was granted for staging there is no compulsion to submit a separate survey plan for each stage where all stages are running parallel. The complete subdivision can be shown on the one plan.

The other matter is street names. Have these been approved by NZPost central addresses? Who in Council approved them?

Thanks
Ted

Ted Barwell Dip TP Reg.Surv MNZIS MNZPI
Resource Planner - Subdivisions
Waitakere City Council
Phone 836 8000 extn 8970
Fax 836 8052
e-mail: ted.barwell@waitakere.govt.nz

Waitakere City Council
Te Taiao o Waitakere

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Website: www.waitakere.govt.nz

02/07/2007

Babbage Consultants Ltd
PO Box 2027
AUCKLAND
1140

Attn: Kevin Meikle

Dear Sir,

RE: SUBDIVISION - SUB 20061078
ADDRESS: 423-429 WEST COAST ROAD;HENDERSON

Thank you for your application for the signing of your survey plan under Section 223 of the Resource Management Act 1991. The current fee for the section 223 process is $450.00, which will be needed for the plan to be released, once signed.

Please find enclosed an invoice for $450.00 which is now payable.

Yours faithfully

James Lathan
PROCESS SUPPORT - Subdivisions

Babbage
CONSULTANTS

BABBAGE CONSULTANTS LIMITED
109 FANSHAWE STREET, AUCKLAND 1010
PO BOX 2027, AUCKLAND 1140, NEW ZEALAND
PHONE: 0-9-379 9980, FAX: 0-9-377 1170
EMAIL: admin@babbage.co.nz

Waitakere City Council
Private Bag 93 109
Henderson
Waitakere City 1231, New Zealand

Job Number: 42608/SV
KM
28 June 2007

Attention: Jeannette Ibrahim

Dear Jeannette

423-429 West Coast Road, Henderson
RMA20061078 – SPW 22816

223 CERTIFICATE

We refer to the Subdivision Consent granted on the 28th January 2007.

The following documents are lodged for your 223 Certification:
Stage 1 – 3 Inclusive
Title plan transparencies plus 1 x A2 and 1 x A4 copies

All Section 223 requirements have been satisfied as described hereunder:-

(a) The survey plans are generally in accordance with the approved scheme plans.
(b) All drainage lines within the Lots are to be public lines and as such no easements are required.
(c) Shown in the Easement Schedule on the Stage 3 plan
(d) Shown in the Easement Schedule on the Stage 3 plan.
(e) Reserve boundaries established by calculation in conjunction with EcoWater and Engineering drawings approved accordingly.
(f) The only flowpath affecting the lots is shown on the Stage 2 Title plan. The 1% AEP storm flows are contained within the 2m wide easement along the rear of Lots 44-46. This flowpath serves a very small catchment and has more than adequate capacity and complies with EcoWater requirements. Easement in gross in favour of Council is shown in the easement schedule on the Stage 2 plan.
(g) Water supply Easement in gross in favour of Council included in the easement schedule on the Stage 3 plan

Your early processing of these Section 223 applications would be appreciated.
Yours faithfully

Kevin Meikle
Babbage Consultants Limited

D O C U M E N T T R A N S F E R

To:	**Waitakere City Council** Private Bag 93 109 Henderson Waitakere City 1231, New Zealand	***Job No:***	42608/SV
Attention:	Jeannette Ibrahim	***File:***	
From:	Kevin Meikle	***Date:***	28 Jun 07
Copy to:			

BABBAGE CONSULTANTS LIMITED
109 FANSHAWE STREET, AUCKLAND
PO BOX 2027, AUCKLAND 1, NEW ZEALAND
PHONE 0-9-379 9980, FAX 0-9-377 1170
EMAIL: admin@babbage.co.nz

423 -429 West Coast Road, Henderson
RMA20061078 - SPW 22816

DOCUMENTS:

Stage 1 DP 389289 – 1 x A2 Transparency Sheet 1
1 x A2 and 1 x A4 copies Sheets 1 to 5 Inclusive
Stage 2 DP 390735 – 1 x A2 Transparency Sheet 1
1 x A2 and 1 x A4 copies Sheets 1 to 3 Inclusive
Stage 3 DP 390736 – 1 x A2 transparency
1 x A2 and 1 x A4 copy

ACTION REQUIRED: Section 223 Certification

Regards

Kevin M

Kevin Meikle
Babbage Consultants Ltd

SENT: ✓ SURFACE MAIL FAST POST COURIER OTHER

Waitakere City Council
Te Taiao o Waitakere

City of Waitakere District Plan

REPORT FOR DISCRETIONARY ACTIVITY APPLICATION SECTION 94 AND 104 ASSESSMENT AND DETERMINATION IN ACCORDANCE WITH THE RESOURCE MANAGEMENT ACT 1991

1.0 SUMMARY OF PROPOSAL

To subdivide a 5.7284 hectare site into 61 residential lots with net site areas ranging from 263m² to 840m², with reserves and roads to vest.

2.0 APPLICATION DETAILS

Resource Planner:		Felicitas Dhliwayo
Site Address:		423-429 West Coast Road & 4 Pyramid Place, Glen Eden
Applicant:		New Zealand Housing Foundation
Date Received:		26 June 2006
Resource Consent No:		RMA20061078
Scheme Plan No:		SPW 22816
Ward:		Waitakere
Legal Description:		Lot 2 DP 339810 (CT 163628) & Lot 3 DP339810 (CT 163629).
Address for Service:		Matthew Paetz Babbage Consultants P O Box 2027 Auckland.
Total Area:		Lot 2- 4.9336 hectares Lot 3- 7948m²
Lot Areas (Net Areas):		Net unit areas vary from 263m² to 840m² (see table One below)
Operative Plan:	Human Environment:	Living
	Natural Area:	General / Riparian/ Restoration
	Landscape Elements:	Riparian Margin - 7metres
	Hazards:	**Lot 3 DP 339810** Special Feature Nos: 7762 (Flooding); 11689 (drainage easement); 11690 (ROW easement); 12074 (natural flowpath); 12077(overland flowpath) **Lot 2 DP 339810** High Pressure Natural Gas Pipeline Special Feature Nos: 12071 (replanting of reserve); 12073 (natural flowpath); 12076 (overland flowpath); 12087 (flooding)
	Roading Hierarchy:	District
Further Information Required:		Tree Planting Plan, Ecowater requirements, Revised Landscaping Plan.
Date Requested:		24/07/06, 03/08/06, 25/08/06

Date Received: 17/08/06, 29/09/06, 16/10/06

Any Affected Persons: No

Approval Given: NA

TABLE ONE- LOT SIZES

Lot No	Area m²	Lot No	Area m²	Lot No	Area m²	Lot No	Area m²
1	415*	16	395*	31	371*	46	377*
2	380*	17	475**	32	349	47	372*
3	380*	18	353*	33	383*	48	361*
4	380*	19	405*	34	411*	49	369*
5	380*	20	434*	35	415*	50	363*
6	380*	21	397*	36	446*	51	366*
7	381*	22	405*	37	426*	52	364*
8	403*	23	840**	38	439*	53	354*
9	402*	24	404*	39	439*	54	469**
10	388*	25	506**	40	439*	55	370*
11	353*	26	451**	41	370*	56	1416*
12	374*	27	354*	42	431*	57	268
13	350*	28	413*	43	444*	58	263
14	433*	29	412*	44	459**	59	273
15	363*	30	438*	45	370*	60	318
						61	3743
62 (Drainage Reserve to vest)	3005	66	1511 (Drainage reserve to vest)				
63 (Road to vest)	3302	67	7012 (Drainage reserve to vest)			70 (road to vest)	997
64 (Drainage Reserve to vest)	2556	68	1289 (Road to vest)			71 (Road to vest)	3684
65 (Drainage reserve to vest)	1956	69	3177 (Road to vest)				

** Site areas > permitted activity density of 450m²

* Site areas > limited discretionary activity density of 350m²

Locality Diagrams

Figure 1- View of the subject site(s) as shown on Colour Orthography Map (March 2000)

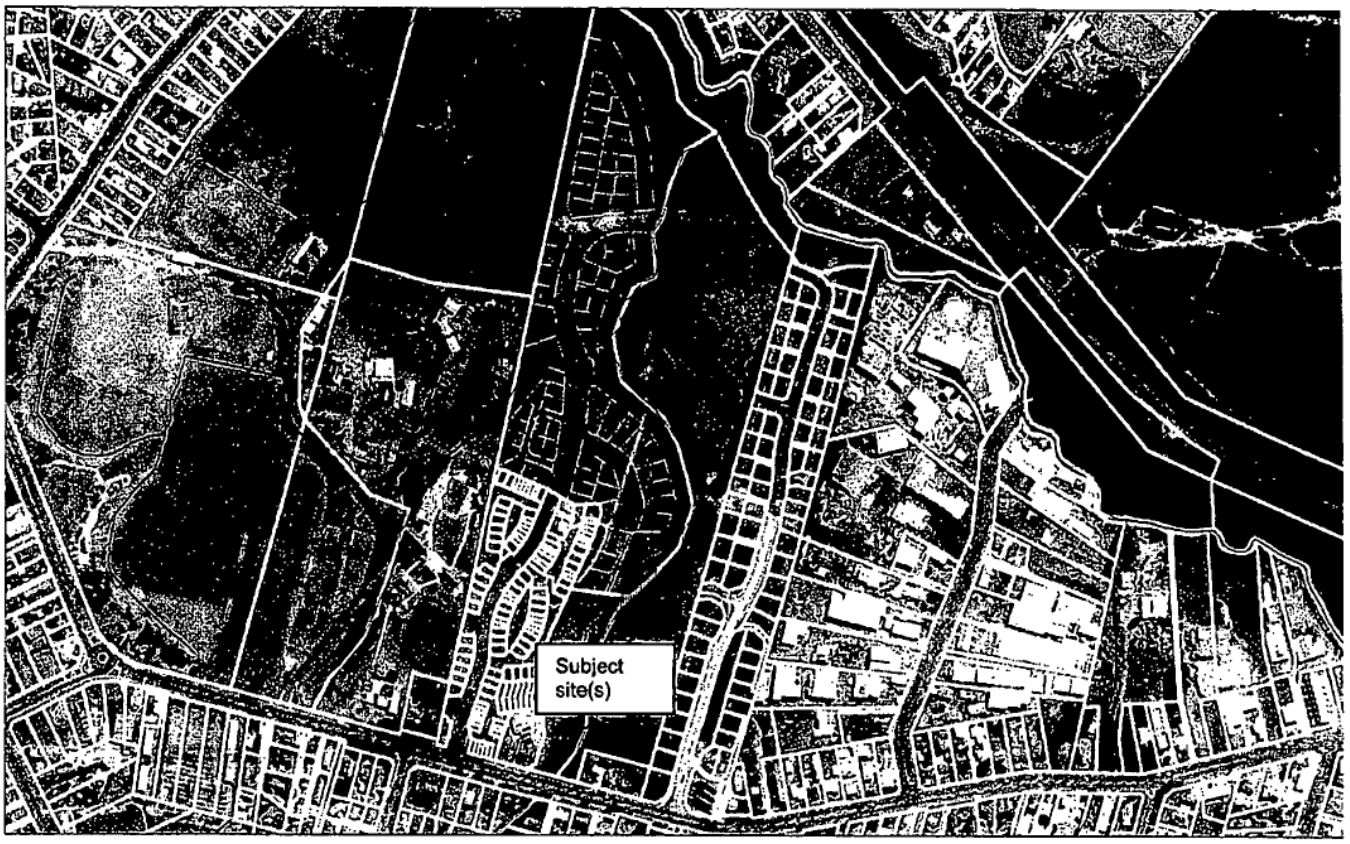


Figure 2- Location of subject site(s) as shown on Natural Environment Map.

2.1 Documents considered for this report include the application documentation and the site visit checklist completed on 10/07/2006. Specialists reports provided included;

- Landscape/Visual Assessment/ Arborist Report prepared by SOUL Environments.
- Traffic Assessment Report prepared by Traffic Design Group.
- Geotechnical Assessment Report prepared by Babbage Consultants.

2.2 BACKGROUND

The landuse part of this application, being RMA20061077 was granted by Council on 30 October 2006. RMA20061077 covered a comprehensive development of the site into 77 unit medium density development and consent was granted for medium density housing, shared driveway, earthworks, vegetation alteration, impermeable surfaces & building within the Riparian Margin, height, height in relation to boundary, and development on a flood sensitive site. Please refer to RMA20061077 for details.

3.0 REASON FOR APPLICATION- RELEVANT DISTRICT PLAN RULES
Extent Of Infringement And Type Of Activity Proposed

3.1 Subdivision - Operative Plan - March 2003

SUBDIVISION- GREENFIELDS

Rule 4.2- Greenfields Subdivision

Discretionary Activity consent is required for subdivision of an existing site 3 hectares or more in net site area, comprising the net unit area specified in a resource consent and meeting the specified performance standards for driveways and provision of infrastructure (drainage, telecommunications, gas electricity).

Overall the application is considered to be a **Discretionary Activity**. The proposal complies with all other development control rules under the District Plan.

4.0 SITE AND PROPOSAL

4.1 Site Description

The subject site comprises two properties (being 423-429 West Coast Road and 4 Pyramid Place), each on separate certificates of title, with a combined site area of 5.7284 hectares. The site is described in the application as follows; "The development site is located on West Coast Road, Glen Eden, in close proximity to the intersection of that road with Woodbank Drive. The site has legal frontage to four roads – West Coast Road, Pyramid Place, Titch Place and Woodbank Drive."

The site is of an irregular shape, which is largely a result of the topographical characteristics of the locality, in particular the location and route of the watercourse (Parrs Stream) running through the site roughly in a meandering north-south direction. To the south of Pyramid Place there is a row of mature pine trees running from east to west.

In the southern portions of the site the land is gently sloping downwards from east to west, towards the stream channel and associated riparian margins, before sloping upwards from the stream channel to the western site boundary. The land to the north of Pyramid Place on the site becomes steeper as part of the site drops quite steeply into a gully towards the stream. The west side of the site is moderately steep.

The larger area at the north end of the site is relatively flat with a gentle slope down to the stream. The site is presently covered in overgrown grass, weeds, gorse and trees. There is a mixture of native and exotic trees, predominantly located around the edge of the stream and at the northern boundary.

The area has a new subdivision on its western boundary which has the roading network laid and the construction of some houses has commenced. A more mature subdivision borders the site on the eastern side. There are no structures currently on the site.

The neighbourhood character is varied containing a mix of land use activities within 400 metres of the site, including developed and undeveloped residential land, open space developed for active and passive recreation, undeveloped open space, Marae, school, dairy and fruit and vegetable shops.

The surrounding neighbourhood contains a mix of housing styles, including medium density terraced housing, free-standing town houses on sites generally ranging between 350m² and 450m² (i.e. Woodbank Drive development), and conventional house and garden development where the site areas are in excess of 600m² (i.e. West Coast Road)".

Figure 3- View of subject site looking North from West Coast Road.

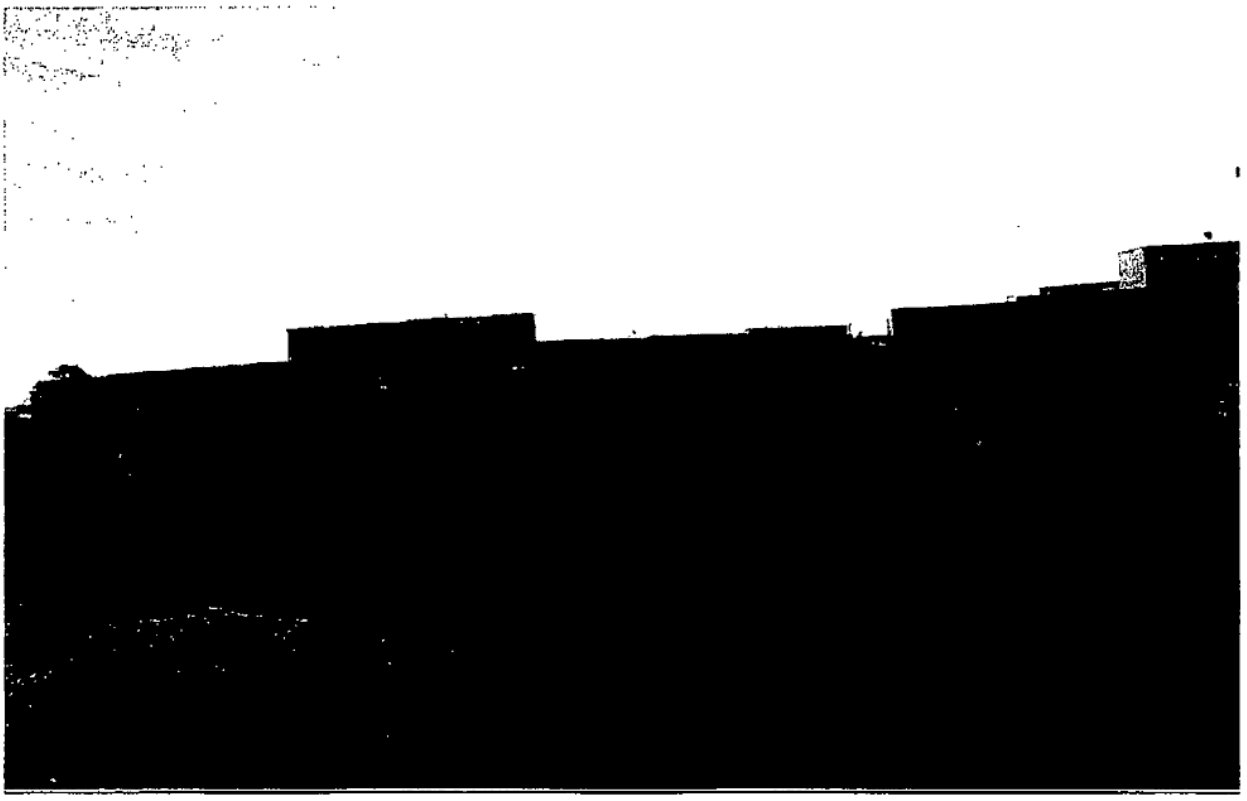


Figure 4- Looking west from Pyramid Place- Note the existing neighbouring Albicnvale development.

4.2 Proposal

The proposal is for a 3-stage 61 lot subdivision around 77 units as outlined in detailed under RMA20061077. Roads and drainage reserves are proposed and these will be vested in Waitakere City Council.

The 3-staged development will be carried out as follows;

Stage 1 (Subdivision of Lot 2 DP339810)

Lots 1-35, Drainage reserves to vest (Lots 65-67) and Roads to vest (Lots 68-71) and a balance lot from Lot 2 DP339810.

Stage 2 (Subdivision of balance of Lot 2 DP 339810)

Lots 36-56, Road to vest (Lot 63), Drainage reserve to vest (Lot 64).

Stage 3 (Subdivision of Lot 3 DP 339810)

Lots 57-61, Drainage reserve to vest (Lot 62).

5.0 SECTION 94 ASSESSMENT

5.1 Statutory Context

As a Discretionary Activity, the application for resource consent should be publicly notified in accordance with section 93 of the Resource Management Act, unless it can be demonstrated that the requirements of sections 93 and 94 of the Act can be satisfied. Applications must be notified (either publicly or in a limited manner) if the adverse effects of the activity on the environment are more than minor or all affected persons have not given their written approval.

Section 93 provides that applications for resource consent need not be notified where:

"(a) The application is for a controlled activity ;or
(b) *The consent authority is satisfied that the adverse effects of the activity on the environment will be minor.*

Section 94 provides for limited notification if not all adversely affected persons have given their written approval, whereby all affected persons will be notified (but not the public at large) and have the opportunity to make a submission and be heard. Section 94(2) also provides for an application to proceed on a non-notified basis without notice being served, *"if all persons who in the opinion of the consent authority, may be adversely affected by the activity have given their written approval to the activity."*

Recent case law has indicated that consent authorities should give careful consideration to the question of notification, and should publicly notify applications for resource consent unless it can be clearly demonstrated that the criteria of sections 93 and 94(2) are met. A comprehensive assessment of any potential adverse effects is required. This conservative approach is underscored by the relatively wide definitions of "environment" and "effects" that are set out respectively in sections 2 and 3 of the Act. In determining whether or not an adverse effect on the environment of any activity will be minor, Council may take no account of the adverse effect of an activity on the environment or any person if the Plan permits an activity with that effect (sections 94A and 94B).

In relation to adversely affected persons, case law has established that the Council is only able to disregard adverse effects that would be 'de minimis' (Bayley CA 115/98). This concept can be taken to describe effects that are negligible or whose occurrence would be remote. In the case of the current application, this threshold has been adopted as the correct basis for assessing whether any person may be adversely affected by the activity.

In terms of determining adverse effects on the environment and whether a person would be adversely affected by the proposed activity, Section 94A and 94B gives Council the discretion to make permitted baseline comparisons i.e. a comparison between the environment (which includes both the subject site and the neighbouring environment) as it exists at the time the application is considered and (the effects) of activities that are permitted by the Plan even if hypothetical, as compared with the effects of the proposed activity. Case law has established that any such hypothetical developments must be not be "fanciful" in terms of what could reasonably be expected to establish there.

When considering effects under Section 94A and 94B, regard may be had to any condition which, if imposed under any decision to grant consent would eliminate or reduce the adverse effect to one which would be minor for the purposes of section 94A or to a point where it would be de minimis or only a remote possibility for the purposes of section 94B.

5.2 ADVERSE EFFECTS ASSESSMENT

The adverse effects of the proposal on water quality and quantity, vegetation, land, soil and amenity of the area was addressed under the landuse consent that will be comprehensively developed under RMA20061077 granted on 30 October 2006.

The proposed subdivision would result in 61 lots with net areas ranging from 263m² to 840m². It is considered that the proposed development would be in keeping with the character of the existing residential environment, and is a development that could reasonably be expected in the area. All the lots will allow for adequate open space for the future residents and the proposed reserves will also be used as passive recreation.

The proposal has been assessed by Council's Subdivision Engineer, Lucy Lunevich with regard to infrastructural issues, such as stormwater, water supply and wastewater (refer to memorandum dated 6 October 2006). Ms Lunevich has made a number of recommendations with respect to the proposed subdivision. It is concluded that subject to the implementation of her recommendations any adverse effect of the development on the existing sanitary sewer system would be no more than de minimis.

The proposal has also been reviewed by council's Transport Assets Engineer, Mr John Carroll who supports the proposal and has recommended the inclusion of conditions of consent (in the event that consent is granted) to ensure that the proposal complies with Council's Code of Practice, payment of bonds, road signs and the vesting of the roads in Council.

5.3 Conclusion in relation to Sections 93(1)(b) and 94 A:

Overall the adverse effect on the environment of the activity for which consent is sought would be no more than minor for the reasons stated above.

5.4 Sections 94 and 94B - Adversely Affected Persons

There are no persons considered to be adversely affected by the proposed activity because:

As stated before a landuse consent has already been granted for this application. The proposed subdivision will be in keeping with the existing character as the area is characterised by a variety of lot sizes similar to the ones being proposed. The proposed roading network will fit in well with the existing neighbourhood amenity and will be designed to provide safe and efficient movement of people, vehicles and goods. The proposal will be provided with adequate infrastructure and any adverse effects on existing infrastructure will be adequately mitigated through conditions of consent.

5.5 Special Circumstances

In accordance with section 94C(2) of the RMA it is considered that there are no special circumstances that warrant notification of the proposal.

6.0 SECTIONS 93 AND 94 RECOMMENDATION

Pursuant to Sections 93 and 94 of the Resource Management Act 1991, it is recommended that this application be processed without being publicly notified for the following reasons:

- The adverse effect on the environment of the activity for which consent is sought will be no more than minor because the proposal is in keeping with existing neighbourhood character and amenity and is one which could reasonably be expected on such a site close to a town centre and which has been anticipated by the provisions of the District Plan.
- There are no persons considered to be adversely affected by the activity.
- There are no special circumstances to warrant notification of this application.

Reporting Planner:..... **Date:** 27/01/2007
Felicitas Dhliwayo

7.0 SECTION 94 DETERMINATION

Acting under delegated authority and for the reasons set out in the above assessment this application for resource consent shall be non-notified as recommended.

..... **Date:**.....
Jeannette Ibrahim/ Sonya McCall
Team Leader Consents

8.0 STATUTORY ASSESSMENT

9.0 ENVIRONMENTAL ASSESSMENT

In order to make a decision in terms of Section 104B of the Act it is necessary to undertake an analysis and assessment to determine whether the purpose and principles of the Act are being met (Part II) having regard to the matters set out in Section 104, the Fourth Schedule and any other statutory considerations.

Section 104(1) of the Act requires that Council have regard to any actual or potential effects on the environment, any relevant objectives, policies, rules or other provisions of a plan or proposed plan and any relevant regional policy statement and regional plan or proposed plan, and any other matters the consent authority considers relevant and reasonably necessary to determine the application.

When considering an application Council must not have regard to any effect on a person who has given their written approval to the application (section 104 (3)(a)).

9.1 SECTION 104 ASSESSMENT

9.2 Actual and Potential Effects on the Environment

As a Discretionary Activity a variety of issues are relevant when determining the nature and scale of adverse effects on the environment including effects on visual amenity, privacy, aural amenity, traffic generation, infrastructural capacity and construction effects. These aspects have been discussed previously in Section 5.2 of the accompanying Sections 93 and 94 Assessment and Determination Report. The assessment of effects concluded that there would be adverse effects from bulk earthworks and vegetation alteration but these would be short term, largely confined to the subject site and managed through proposed conditions of consent and that medium to long term effects would be mitigated or remedied through the sealing or re-grassing of exposed surfaces and through landscaping and restoration planting. The proposed medium density housing development is of a scale, intensity and design that has been anticipated by the District Plan and is a development that could reasonably be expected to occur on this site given its Living Environment zoning.

In addition the Plan has been prepared with a clear "effects-based" emphasis. Consideration of the proposed development in relation to each of the Plan's assessment criteria would ensure that all the relevant matters contained in Section 104 of the Act have been addressed. The relevant assessment criteria from the Operative District Plan, together with comments as to whether each criterion can be satisfied are as follows:

9.3 SUBDIVISION – GREENFIELDS

a) The extent to which the subdivision design and likely future development made possible by the subdivision will adversely affect the overall resilience, biodiversity and integrity of the Green Network.
(b) The extent to which the subdivision design recognises the natural qualities of the land and encourages strong and positive amenity values and neighbourhood character through: • responding to landmarks and views • providing continuity, coherence and focal points through the use of road and open space networks.
(e) The extent to which proposed sites enable efficient provision of infrastructure.
(f) The extent to which site orientation and site dimension facilitates the siting and design of 'dwellings' which can maximise use of passive solar energy.
(g) The extent to which the subdivision design minimises necessity for earthworks, avoids development on flood plains and encourages on-site water retention.
(h)The extent to which the design and location of roads and driveways minimises alteration to landform, avoids visible scars on the landscape and takes advantage of natural drainage systems
(i) The extent to which the subdivision design takes account of personal safety concerns.
(j) The extent to which open space is provided in convenient locations, having considered: • the accessibility and adequacy of the scale and linkages between open space for intended users • having sites and roads facing toward open space rather than backing on to open space • the quality of the

open space in terms of protecting or linking natural features • the quality of the open space for passive or active recreational use • the relationship of the open space to the road, such that personal safety, amenity and ease of use is encouraged • the ease of maintenance of open space • the presence of other open space in the vicinity (ie if there is sufficient open space already a cash contribution rather than land may be preferred) • any Parks Strategy adopted by the Council.
(t) The extent to which sufficient lighting is provided to provide light for safety purposes on public pedestrian accessways, open space entrances and pathways, road intersections and road junctions and all roads.
(u) The extent to which provision is made for vehicle turning, particularly on no-through roads.
(v) The extent to which provision is made for retaining existing trees, and incorporation of prominent trees as features within the subdivision.
(ad) The extent to which the design of stormwater systems incorporates measures to reduce runoff rates where there may be damage caused to natural waterway systems.
(ae) The extent to which, where a connection is proposed or required to a public stormwater system, there is sufficient capacity within that system to accommodate the proposed and future planned development.
(af) The extent to which sufficient secondary flow paths are provided to avoid adverse effects from damage in flood conditions, and, if over private land, are protected by appropriate easements and consent notices.
(ag) The extent to which the design and capacity of the wastewater treatment and disposal system give regard to the upstream catchment and effect on the downstream catchment, including likely future development.
(ai) The extent to which gravity systems are utilised to dispose of wastewater.
(al)The extent to which more than minor adverse effects can be adequately avoided, remedied, mitigated or offset through provision works and services on or off the site and/ through payment or provision of a financial contribution on-site or, if this is not possible, can be adequately remedied, mitigated offset by a financial contribution off-site.

As discussed previously, the higher density development is concentrated towards the western end of the subject site where it adjoins a similar medium density housing development. It is acknowledged that Medium Density style living can offer only limited on-site amenity by its very nature and is therefore reliant on proximity to community facilities to provide a range of amenities normally experienced within suburban residential development. Public open space is provided by the esplanade reserve and drainage reserves within the proposed development. In addition, Parrs Park located further to the west of the subject site can also be used by residents as a public open space.
Communal facilities available within reasonable walking distance include the Glen Eden shops, Library and Playhouse theatre. The Glen Eden and Sunnyvale railway stations would also be reasonably accessible from the development though access to them would most likely be by car. A range of parks, playing fields and nature walks are also available slightly further afield.

As discussed in previous sections of this report, the proposed development will adjoin a recently established medium density development to the west, also accessed from West coast Road, and hence will be easily identified. A recently completed single level housing development is also located to the east, along Woodbank Road. The proposed roading network will connect into the existing developments to the east and west and hence the proposed development will fit in well with existing neighbourhood character and amenity. The proposed roading network has been designed to provide safe and efficient movement of people, vehicles and goods and will complement the existing roading network. Adequate visitor car parks and pedestrian footpaths will also be provided on site. Therefore it is considered that there would be no conflict between pedestrians and vehicles and the safety of both within and beyond the site will be ensured.

Infrastructure requirements have been assessed by Council's EcoWater Subdivision Engineer (Ms Lucy Lunevich) and would be required to meet Council's Code of Practice requirements for infrastructure – see Ms Lunevich's Memorandum of 6 October 2006. Conditions have been recommended to ensure all units can be properly serviced and the impact of existing and future infrastructure is minimised. Financial contributions would also be required to offset the cost of upgrading and/or installing new services and this would become a condition of consent.

The proposal would therefore meet the relevant assessment criteria by providing appropriate amenities, safe exit and entry for pedestrians and vehicles, infrastructure that meets the necessary standards and financial contributions that would offset the cost of providing upgrade or renewal of services.

9.4 Other Matters (Section 104(1(c)))

(a) The proposal also requires the following resource consent from the Auckland Regional Council:
- Land Use Consent: Sediment Control for land disturbing activities over more than 1.0 hectare of land;
- Land Use Consent : Section 13 (RMA) for works within a watercourse for the construction of a road crossing and culvert.

The above consents have been granted.

(b) A high pressure gas pipeline cuts across the proposed drainage reserve to the northern end of the subject site. The Scheme Plan shows an existing easement through the site to accommodate this. The proposed residential lots will be outside of this easement. A portion of the proposed road will be within the easement. The applicants have confirmed that prior to the works being carried out an inspection will be carried out and a permit issued by Vector Gas Limited.

(c) Potential contamination: The site is large and has had a pastoral use in the past. It has **not** been identified on the Auckland Regional Council contamination maps and there is no indication of any contamination sources. Soil testing has therefore not been required.

9.5 Long Term Council Community Plan

It is noted that the creation of a 59 new additional Lots and 77 new residential units including medium density development attracts a development contribution in accordance with the Waitakere City Council LTCCP.

A Development Contribution of $613, 657.09 (incl. GST) was estimated at lodgement for this application. This development contribution has already been paid.

There are no other matters relevant to this application.

9.6 POLICIES AND OBJECTIVES

It is considered that the proposed development would be consistent with the objectives and policies of the District Plan. The District Plan is "effects-based" in its approach to natural and physical resources and it has been demonstrated in the previous environmental assessment of effects that subject to conditions any adverse effects arising from the proposal would be no more than minor.

The District Plan Assessment Criteria, developed to address the issues covered in the objectives and policies, have already been discussed in section 9.3.

The proposed development is considered to be consistent with these assessment criteria. For this reason the proposed development is also considered to be consistent with the relevant Objectives and Policies. The relevant objectives and policies have been discussed in detail under the landuse consent (RMA20061077).

10.0 PART II OF THE ACT- PURPOSE AND PRINCIPLES

Section 5 in Part II of the Act identifies the purpose of the Act as being the sustainable management of natural and physical resources. This means managing the use of natural and physical resources in a way that enables people and communities to provide for their social, cultural and economic well-being while sustaining those resources for future generations, protecting the life supporting capacity of ecosystems, and avoiding, remedying or mitigating adverse effects on the environment.

It is considered that the proposal is consistent with sustainable resource management. In particular this proposal is concerned with the sustainable management of the Living Environment, General Natural area and Riparian Margins in such a way that the communities' social and cultural well being are enhanced through maintaining the existing neighbourhood character and amenity. The proposal would allow for the establishment of Medium Density Housing with unit areas ranging from 263m² - 840m² that would be appropriate within the environment and would be able to establish and operate in such a way that the amenities of the neighbourhood would not be adversely affected.

The proposal is not considered to adversely affect any matters of national importance nor affect Council's obligations under the Treaty of Waitangi. It is considered that the adverse effects arising from the proposal and the proposed mitigation are limited in significance to the surrounding urban neighbourhood.

Council's iwi partners, Ngati Whatua and Te Kawerau a Maki have been given the opportunity to discuss this proposal and no issues have arisen in regard to the Treaty of Waitangi.

Section 7 identifies a number of "other matters" to be given particular regard by Council in the consideration of any assessment for resource consent, and includes the efficient use of natural and physical resources, and the maintenance and enhancement of amenity values.

The potential effects of the proposal on the amenity and character of the area have been discussed in detail in the effects assessment contained in Section 8 of this report. Subject to conditions such as compliance with Council's Code of Practice for infrastructure (drainage and roading), it is concluded that the proposed development would be compatible with the surrounding built and natural environment and the existing amenity of the area would not be reduced.

11.0 TIME PERIOD IN WHICH TO IMPLEMENT THE CONSENT

Under section 125 of the Resource Management Act 1991, a consent lapses either on the date that is specified in the consent or if no date is specified, 5 years after the date of commencement of the consent. A 5 year lapse period has been granted for this consent.

12.0 MONITORING

The proposal will need to be monitored in accordance with the conditions specified in this report, and the requirements contained in the District Plan.

13.0 RESERVE CONTRIBUTION

The reserve contribution has been considered in accordance with the Resource Management Act 1991. The sum to be paid in lieu of reserves will be computed from the gross realisation value of Lots 3 – 61 based on the average site value for the new lots created (supplied by QV Valuations), as shown on the plans submitted with the application at the time of survey plan approval. A condition requiring payment of this contribution is recommended.

14.0 RECOMMENDED DECISION

That Subdivision Consent Application **RMA20061078** (SPW 22816) being a Discretionary Activity and being a 61 Lot subdivision for Lot 2 DP 339810 (CT 163628) and Lot 3 DP 339810 (CT 163628) situated at 4 Pyramid Place and 423-429 West Coast Road, Glen Eden, by New Zealand Housing Foundation be granted subdivision consent pursuant to Sections 104, 104B, 108 and 220 of the Resource Management Act 1991.

Pursuant to Section 113 of the Resource Management Act, the reasons for granting consent are as follows;

1) No persons may be adversely affected by the proposal.
2) The proposal has been considered in terms of the relevant assessment criteria, meets the relevant policies and objectives of the District Plan, and would create no more than minor adverse effects on the environment.

Conditions imposed on the consent are as follows:

1: STAGING REQUIREMENTS

(a) Consent is hereby given to carry out the subdivision of this property in stages as follows:-

Stage 1: Comprising Lots 1-35, Roads to Vest (Lots 68, 69, 70 & 71), Drainage reserves to vest (Lots 65, 66 & 67) and balance lot.

Stage 2: Comprising Lots 36-56, Road to vest (Lot 63), Drainage reserve to vest (Lot 64).

Stage 3: Comprising Lots 57-61, Drainage reserve to vest (Lot 62).

(b) The conditions listed in the Section 223 and 224 requirements below shall be applied as appropriate to each stage.

(c) Separate 223C and 224C certificates will be issued at each stage.

2: SECTION 223 REQUIREMENTS

(a) A survey plan of the subdivision shall be in accordance with the Subdivision Scheme Plans titled, Proposed Subdivision of Lots 2 and 3 DP 339810 Stage 1 (Sheet ST01), Stage 2 (Sheet ST02) & Stage 3 (Sheet ST03), Job No. 42608, dated October 2006 and Roading Plan for NZ Housing Foundation Sheet 1 (C20- Rev A), dated June 2006 all drawn by Babbage Consultants and will be approved pursuant to Section 223 of the Act provided that the survey plan signing fee has been paid and that the following conditions have been complied with to the satisfaction of Council.

(b) Provide drainage and services easements (for the services through Lots to Lots to protect the existing or proposed connections) in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon."

(c) Provide for the right of way easement lettered A over Lot 61 in favour of Lots 57, 58, 59 and 60.

(d) Provide for right of way easements A & B in gross in favour of Council over proposed Lot 61 in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon." Notes:

(i) The easement document will be prepared by Council's Solicitor at the applicant's cost.

(e) Define the 1 in 100 year flood plain of the Parrs Stream, and the areas required for the stormwater quality treatment ponds and provide separate Lot(s) to vest in Council as drainage reserve. Specific requirements:

(i) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage reserve boundaries.

(ii) The existing drainage easement(s) on Lot 2 DP 339810 can be surrendered once the drainage reserve(s) vests in Council under each Stage as required above.

(iii) The existing drainage easement(s) on Lot 3 DP 339810 can be surrendered once the existing pond has been replaced with an alternative treatment device and the drainage reserve vests in Council under stage 3 as required above.

(f) Define the 1 in 100 year overland flowpath and provide a drainage easement(s) in gross in favour of Council in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon." Specific requirements:

(i) The easement document will be prepared by Council's Solicitor at the applicant's cost.

(ii) The easement document shall advise the owner of their responsibility to maintain the overland flowpath in its approved state, and to keep it unobstructed by buildings, earthworks, solid walls or fences, or any other impediments to the free flow of water through the easement area.

(iii) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage easement.

(g) Provide for water supply easement(s) in gross in favour of Council over the ROW serving Lots 57-62 under Stage 3 in a Memorandaum of Easements endorsed on the survey Plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon." Specific requirements:
(i) The easement document will be prepared by Council's Solicitor at the applicant's cost.
(ii) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage easement.

Take note that street numbers for the lots on the survey plan will be allocated by Council subsequent to Section 223 approval, and these numbers must be used for future applications for building consent. A copy of the survey plan with the Council allocated numbers will be provided.

3. SECTION 224C REQUIREMENTS

Prior to the release by the Council of the Section 224(c) compliance certificate for this subdivision the applicant shall comply with the following conditions to the satisfaction of Council:-

Note: The application requesting the 224 release shall be in writing, shall include the advertised processing fee, shall address how each of the following conditions have been satisfied, and shall be accompanied with Compliance Certificates from each of Council section(s) named below.

ECOWATER CONDITIONS (PUBLIC DRAINAGE)

(EW 1) Provide a catchment analysis detailing any 1 in 100 year overland flowpaths that will exist through the proposed residential lots upon completion of earthworks, including a possible overland flowpath occurring over proposed Lots 44-46. Wherever possible, keep all overland flowpaths contained within the legal road reserve and discharge to the drainage reserve with a minimum of nuisance. Provide an As-Built plan, long section and cross sections, prepared by a Licenced Cadastral Surveyor to demonstrate that completed overland flowpath(s) meets the design requirements. Provide a drainage easement in favour of Council over all areas required to maintain unobstructed overland flow. All buildings are required to be located entirely outside the 1 in 100 year overland flowpath area, and with a finished floor level not less than 500mm above the 1 in 100 year overland flowpath level for catchments over 2 hectares (200mm for catchments less than 2 hectares). This information will be recorded on Council's Hazards and Special Features register.

(EW 2) Design, provide and install a complete public wastewater reticulation system to serve all Lots in compliance with Councils Code of Practice for City Infrastructure and Land Development (Refer Section 5.0). Provide engineering plans and calculations to council for approval prior to commencing works. Specific requirements:
(i) Provide each Lot with a separate public connection at the lowest point within the boundary.
(ii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.
(iii) Locate all drainage lines in the front Lots where possible to provide ease of access for future maintenance requirements.
(iv) Re-route the existing public drainage lines passing through Lot(s) 31-32 to provide more adequate building sites for those Lots. At the stage of engineering approval a quote will be obtained from Councils contractor for the new manholes required on the existing wastewater network.

(EW 3) Design, provide and install a complete public storm water drainage system to serve all Lots in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Provide engineering plans and calculations to council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.
(ii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(iii) Collect all existing stormwater discharges onto the land and provide for these catchments in the capacity of the new systems. This includes the existing public stormwater drains discharging at proposed Lots 44 and 23, and any others encountered during construction.

(iv) Clearance between the proposed stormwater pipes and the existing Watercare Services Ltd trunk wastewater drain is required to be a minimum of 0.5 m, and no pipe points area permitted above the trunk wastewater drain, in accordance with the conditions of Watercare Services Ltd consent number D1415/06.

(v) Abandoned public drainage is required to be either removed and backfilled with certified engineered fill, or grout filled. If grout filled, then foundations of future buildings will need to bridge over the trench and abandoned pipes.

(vi) New stormwater outlets to the stream are required to discharge in the direction of flow to minimise erosion on the opposite bank.

(EW 4) Design, provide and install a complete storm water quality treatment system for the site in accordance with the Auckland Regional Council's TP10 "*Stormwater Management Devices Design Guideline Manual*", and WCC Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Provide a copy of the engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All stormwater treatment and detention devices are required to be located clear of existing or proposed public drainage lines.

(ii) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain. This includes provision of a 0.5m thick impermeable compacted clay liner under the pond base, embankment and spillway to avoid seepage of pond water into the trenching material surround the drain. Provide evidence that this has been completed in the geotechnical completion report. Heavy machinery is required to be kept 2m clear of the watercare Services Ltd trunk wastewater drain at all times during construction.

(iii) Provide in the design of the device for treatment of a fully developed upstream catchment. Detain the 2 year storm event and discharge at pre-development levels as required by the Parrs Stream Catchment Management Plan.

(iv) The existing pond on Lot 3 DP 339810 can be replaced by a quality treatment device that provides the equivalent level of treatment. Provide engineering plans and calculations to demonstrate that the proposed swale can achieve this, or alternatively provide written confirmation from ARC that the proposed swale is an acceptable form of treatment in this situation.

(v) Provide a planting plan, including species list, quantities, and methodology to Ecowater and Parks for approval prior to commencing planting.

(vi) Provide a surveyed as-built plan of the device showing all lid and invert levels, permanent water level, and contours at 200mm intervals below water level.

(vii) Provide a geotechnical completion report certifying construction of the pond.

(viii) Provide a maintenance manual for the treatment device.

(vii) Provide a drainage reserve over the entire area occupied by the treatment device, associated maximum flood water levels, and all areas necessary to access and maintain the treatment device.

(EW 5) Design, provide and install a complete public water supply reticulation system and fire fighting services to serve all Lots/Units in compliance with Council's Code of Practice for City Infrastructure and Land Development (refer section 6). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All Lots/Units are to be individually metered at the road reserve boundary. Ducting of private lines is recommended where they cross driveways.

(ii) Locate all water connections at the same position as the power and telephone connection to each Lot/ Unit.

(iii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(iv) Pay to the Council the cost of supervising the shut down of Council's water supply mains. This service includes Council providing written advice to all affected property owners and tenants.

(v) Provide fire hydrants within 135m of the furthest point on any property, and within 65m of the end of a cul-de-sac.

(vi) Where the required public system is on private property, easements over the course of such a system in favour of council will be necessary.

(EW 6) Design, provide and install a complete ICT Network along all new public roads for the future provision of ICT services within the development in compliance with council's Code of Practice for City Infrastructure and Land Development (Refer section 8). Provide engineering plans to Council for approval prior to commencing works.

GEOTECHNICAL CONDITIONS

Arising from the geotechnical conditions (GT 1- GT 10) listed below, further foundation design conditions may be applicable on receipt of the earthworks completion report. A **consent notice** pursuant to Section 221 of the Act may be required to be issued and registered on the new titles to be issued for any affected lots.

(GT 1) A geotechnical investigation shall be completed by an experienced geotechnical engineer for the detailed design of earthworks at the site. This shall include recommendations for the batter slopes and an assessment of overall stability off site slopes (supported by limit equilibrium analysis), consolidation characteristics of the soils, fill quality and compaction requirements. All the requirements for constructing and controlling engineered fill shall be detailed. The report on this work shall accompany the earthworks construction management report.

(GT 2) Groundwater drainage measures for the development shall be designed by an experienced geotechnical engineer, taking into account existing information on shallow groundwater levels, anticipated maximum winter high and summer low groundwater levels, and potential effects on adjacent developed properties or roadways.

(GT 3) Building consents shall be required for the retaining walls which shall be no higher that 2.0 metres on all boundaries.

(GT 4) Pavement designs shall be confirmed by an experienced geotechnical engineer following the completion of earthworks.

(GT 5) A producer statement must be provided on completion of earthworks together with an earthworks completion report stating what requirements if any are necessary for the individual lots.

(GT 6) Unless there is clear evidence in the earthworks completion report to be provided by an engineer that NZS 3604 requirements have been fully met, all foundations shall require specific design.

(GT 7) Foundations of all lots shall be verified by an experienced geotechnical engineer familiar with the geotechnical report and shall take into account the potential for shrink/swell behaviour.

(GT 8) Stormwater pond construction shall be supervised by an experienced engineer familiar with the geotechnical report.

(GT 9) The proposed stormwater management systems to be used during construction shall be reviewed by an experienced engineer familiar with the geotechnical report.

(GT 10) The proposed stormwater management systems to be used during construction shall be reviewed by an experienced engineer familiar with the geotechnical report.

TRANSPORT ASSETS CONDITIONS

Please contact the Transportation Engineer on 836-8000 (extension 8793) to book an inspection.

(TA 1) Before commencement of work, obtain the approval of Council to engineering plans and specifications prepared in accordance with Council's "Code of Practice for City Infrastructure and Land Development" detailing the nature and extent of any proposed work; and pay the Engineering Approval Fee.

(TA 2) The roads (Lots 63 & 68 to 71) vested to Council shall be designated as a Local road.

ROADING CONDITIONS

(RD 1) Take note that the street intersection geometry, street furniture and safety features will be finalised through the engineering plan approval process, and this may result in minor amendments to lot boundaries at these locations to accommodate necessary design details. Lot areas shall not be altered.

(RD 2) Design, form and completely construct the proposed roads (Lots 63 & 68 to 71) in accordance to Council's Code of Practice for City Infrastructure and Land Development to the satisfaction of the Council.
Notes:

(1) Street tree planting shall be carried out (subject to prior approval of a plan showing the location and the species to be used) to the satisfaction of the Service Manager: Parks Green Assets (refer to PK 16 below).
(2) The intersection geometry, street furniture and safety features will be finalised through the engineering plan approval process.
(3) Footpaths shall be provided full length on both sides of the road.
(4) Provide indented on-street parking (normally at a ratio of one parking space per three dwellings).
(5) Access to properties that have indented parking bays on the frontage will not be permitted to locate a driveway that intersects or interferes with the operation of the parking bay. A consent notice pursuant to section 221 of the Act is required to be issued and registered on the new title for the lots affected, restricting access to the lots to the locations clear of the parking bay.

(RD 3) Ensure, where practicable, that not less than a 150mm deep layer of topsoil free of deleterious material is replaced on all allotments to the satisfaction of the Council.

SHARED DRIVEWAYS & VEHICLE CROSSINGS

(SD 1) Form the shared driveway (ROW) Lot 61, lettered A & B and construct thereon a carriageway and storm water controls in accordance with Council's Code of Practice for City Infrastructure and Land Development, and to the satisfaction of Council.
Notes:

1. The construction shall include the vehicle crossing with storm water control, using standard detail SD 3.11 Heavy Commercial Vehicle Crossing and refer to SD 3.14 High Volume / Speed Vehicle Crossing for the left turn-in flare details; and for which a vehicle crossing forms shall be completed and returned to Council.
2. The construction shall include the vehicle crossing with storm water control, using standard detail SD 3.11 Heavy Commercial Vehicle Crossing at distance 70 on Road 1 for service access to the storm water ponds; and for which a vehicle crossing forms shall be completed and returned to Council.
3. Inspection of the shared driveway and vehicle crossing subgrade prior to pavement construction (or boxing prior to pouring) is required. Contact phone 836 8000 Ext. 8725 at least 48-hours prior to inspection being required.
4. Ensure that the longitudinal section of the driveway and the vehicle crossing comply with standard detail SD 3.15 Maximum Vehicle Crossing Profile.
5. All bends shall have a minimum inside radius of not less than 6.5m.
6. The minimum width carriageway on shared driveways is specified in council's District Plan and the construction details are given in the Code of Practice. Provide a carriageway width for 6-10 lots/dwellings, 3.5m wide with passing bay and 1.5m services strip. All to the satisfaction of Council.

(SD 2) Ensure a hard stand area for solid waste bins complies with standard detail SD 3.07 Urban Private Way Details.

ROAD TO VEST

(RV 1) Take note that Lots 63 & 68 to 71 shall vest in the Waitakere City Council as road pursuant to Section 238 of the Act.

(RV 2) Provide to Council prior to the release of the 224 Certificate, all RAMM as built data and as built plans of the new roads formed (electronic and compatible with WCC GIS system). This will be inclusive of kerb lines, cesspits, street lighting, footpaths, parking bays, intersection control devices, pavement markings and signs, street furniture, landscaping, vehicle crossings, and property boundaries.

PARKS CONDITIONS

Please contact the Parks Assets Planning Co-ordinator on 836-8000 (extension 8768) to book an inspection.

(PK 1) Carry out the removal of environmentally damaging plants from all lots including the proposed reserves, as listed in the Waitakere City Council Proposed District Plan. Submit a Weed Control Programme to the satisfaction of the Manager, Resource Consents within 2 months of the issue of this consent. This Weed Control Programme shall be implemented on the site within 6 months of the date of issue of this resource consent to the satisfaction of the Manager, Resource Consents. The programme needs to include:

a) an inventory of the weed species to be removed;
b) removal techniques to be utilised; weed disposal methods;
c) time frames for work and whether the weed removal needs to be staged (particularly relevant for sensitive areas such as coastal edges or riparian margins);
d) any re-vegetation programme required to prevent re infestation of weeds;
e) an assessment of any ecological issues around the removal of vegetation;
f) methods for addressing stability and erosion and sediment control methods.

(PK 2) Enter into a registerable fencing agreement with Council in regards to Lots 23, 24, 25, and 46 – 60 to the effect that the Council will not be liable to contribute towards the cost of creating or maintaining any dividing fence between any reserve or other land vested in or administered by the Council. Also, that any fences facing the reserve shall be of visually permeable construction such as swimming pool fencing and 1.2metres maximum height in order to ensure good surveillance of the reserve, and to reduce the likelihood of graffiti.

(PK 3) Prior to work commencing on the site, protective fencing shall be placed around the dripline of the Totara (#4), Kahikatea (#7), Cabbage (#13), Pear (#10) and groups of native revegetation (references #4 and #6) as shown on the plan titled "Housing Foundation HZ, West Coast Road Development (Part of 423-429 West Coast Road) vegetation and major features, Sheets 1 & 2", dated 12 June 2006 prepared by Willy Coenradi. The fencing shall remain in place throughout the vegetation alteration, earthworks and construction stages.

(PK 4) Monitoring of the health of the vegetation referenced in (PK3) above shall be undertaken prior to the commencement of, and during the vegetation alteration, earthworks and construction stages. This monitoring shall be undertaken by an appropriately qualified arborist engaged by the applicant in conjunction with a WCC arborist to provide progressive on-site assessment of the effects of the work on the health of the Riparian vegetation.

(PK 5) That a silt fence and dirty water diversion run-off bund as depicted on the Erosion and Sediment Control Plan prepared by Babbage Consultants dated 23/06/06 contained in Appendix 10 of the application shall be implemented along the full length of the western side of the stream to the satisfaction of prior to Parks Consent Planner prior to earthworks or vegetation alteration commencing on the site.

(PK 6) Landscaping and street tree planting is to be established within the development to the satisfaction of the Parks Consent Planner. The landscaping and street tree plans prepared by SOUL Environments specifically:

- Landscape Master Plan dated 16/06/06 Revision C Reference LSP-01
- Street Tree Planting Plan, Plan 1 of 2 and 2 of 2, dated 15/08/06 Revision B
- Accompanying information titled "NZ Housing Foundation Babbage Consultants 423 -429 West Coast Road, Henderson. Additional information on proposed planting 13-October-06, Revision C".

are to be implemented in accordance with WCC parks guidelines and subject to the following:

(ii) That the bollards along the road frontage of the drainage reserve at the northern end shall be implemented in accordance with the WCC Code of Practice Standard Detail

7.17 and 7.71. That a 3 metre chain entry for maintenance access to the stormwater pond and wetland area shall be located in an appropriate location to the satisfaction of the Parks Consents Planner.

(iii) Street Lighting shall be implemented in accordance with the WCC Code of Practice Section 3.3.14 and Standard Detail 7.91 attached and located so as to not conflict with street tree planting.

(iv) In accordance with Section 7.3.7.3 of the WCC Code of Practice all footpath concrete paving in the reserve shall be 1.5 metres wide and exposed aggregate.

(v) That the plants along the footpath adjacent to the Stream shall be low level and set back a suitable distance so as to not restrict access or visibility along the pathway.

(vi) That the parking areas provided on the streets adjacent to footpaths shall be curbed or wheel stops implemented to the satisfaction of the Parks Consent Planner.

(vii) All plants shall be best nursery stock, healthy vigorous and eco-sourced.

(PK 7) The street tree planting shall be implemented to the satisfaction of the Parks Consent Planner. All plantings are to be in accordance with the WCC parks guidelines, Code of Practice and the landscape specification submitted with the Landscape Plan. An option exists for the applicant to pay Council the cost of supplying, planting and staking of street trees per plan, to carry out the planting of street trees following the completion of the building works. The cost for this would be $153 plus GST per tree (the current contract price for supply, planting, and staking of a PB95 tree as at April 2003).

(PK 8) The consent holder is to be responsible for the maintenance of all street trees and reserve landscaping for a period of two years (from the date of its certified establishment from Council) including the replacement of any dead or dying vegetation, to the satisfaction of the Parks Consent Planner. A bond, based on $7 per sq metre per annum for gardens/shrubbery, and $75 per tree per annum, will be required to ensure the satisfaction of this condition. The consent applicant is to advise the Parks Consent Planner of a maintenance schedule and the name of the qualified person/company responsible for the planting maintenance. Alternatively, a maintenance cash contribution may be paid, and the maintenance will be undertaken by Council. The contribution will be calculated at a rate of $75 per tree per annum and $7 per square metre of garden per annum.

(PK 9) The details of the pedestrian footpath, footbridge and boardwalk shall be finalised at the Engineering Plan stage to the satisfaction of the Parks Consent Planner. Engineering plans for the footpath, footbridge and boardwalk shall be submitted within 3 months of the issue of this consent. All works shall comply with the Waitakere City Council Code of Practice for City Infrastructure and Land Development. The developer must advise the Parks Consent Planner of when work will commence and prior to any works being carried out. Engineering plan details shall be provided at Engineering Plan stages for the following:

a. The exposed aggregate footpath alignment details shall be to a width of 1.5m and constructed in accordance with the Waitakere City Council Code of Practice for City Infrastructure and Land Development Standard Detail 7.102 for Parks Walkway Types attached.

b. That the footbridge shall be constructed in accordance with the Waitakere City Council Code of Practice City Infrastructure and Land Development Standard Detail 7.106 for Typical Foot Bridge attached.

c. The boardwalk along the stream shall be constructed in accordance with the WCC Code of Practice Standard detail 7.105 for Typical Boardwalk attached.

(PK 10) Ensure that the reserves are left in a condition suitable for maintenance and mowing in accordance with section 7.3 of the WCC Code of Practice and to the satisfaction of the Parks Asset Planner.

LEGAL DOCUMENTATION

These conditions will be signed off by Consent Services.

(LD 1) Take note that:
(a) The consent notices required by Condition (GT 1) above; and
(b) The drainage easement in gross required by Condition 2 (f) above;

(c) The right of way easement in gross required by Condition 2 (d) above;
(d) The water supply easement in gross; and
(c) The fencing agreement required by condition (PK 2) above.

will be prepared by the City Solicitor at the applicants cost when the following information has been received:

(i) All necessary technical information.

(ii) A copy of the Land Transfer plan showing the Deposited Plan and Certificate(s) of Title numbers allocated by Land Information New Zealand, and

(iii) The name and address of the solicitor acting for the owner.

(LD 2) Where any condition imposed upon this consent to subdivision is to be complied with on an ongoing basis by the subdividing owner and subsequent owners after the deposit of a survey plan (not being a condition in respect of which a Bond is required to be entered into by the subdividing owner of a completion certificate is capable of being or has been issued) the subdividing owner shall pay the Council's Solicitors legal costs and disbursements relating to the preparation and registration of a Consent Notice pursuant to Section 221 of the Resource Management Act 1991, and shall do all acts and things necessary to enable registration of such Notice to be completed.

(LD 3) Council will agree to a partial cancellation pursuant to section 243(e) & (f) of the Resource Management Act in respect of Right of way easement 607022.1 in so far as it relates to all Lots except Lot 61.

(LD 4) Council will agree to a cancellation pursuant to section 243(e) & (f) of the Resource Management Act in respect of Stormwater Detention and Drainage easements 6070221.2 and 6135712.4 in so far as it relates to all Lots.

FEES, BONDS & CONTRIBUTIONS

Invoices will be prepared by Consent Services. If paying by personal/company cheque the standard 5 days clearance will apply. If you require the 224C certificate immediately, you must provide a bank cheque.

(FC 1) Pay to Council any engineering, works supervision, monitoring, 224(c) processing and administrative fees as incurred which will be charged at Councils advertised schedule of fees.

(FC 2) Pay to Council a street damage bond of $5000 prior to the commencement of work. This bond shall be refunded in full after inspection by Council's Construction Supervisor confirms no damage to Council's roading assets has occurred. The inspection is to take place once all work is completed.

(FC 3) Pursuant to Sections 407 of the Resource Management Act, the following financial contributions have been assessed for the proposed development, and are required to be paid in full prior to the issue to the 224c:

(i) Twin Streams Contribution (Oratia catchment) totalling $207,492.01 inclusive of GST- calculated based on 59 residential Lots @ $3,007.13 (incl. GST) per additional Lot.

(FC 4) Pursuant to Section 108(2)(b) and 108A and in accordance with Council's Code of Practice for City Infrastructure and Land Development, the applicant is required to provide a maintenance bond to Council, equivalent to 2½% (minimum $500.00) of the value of works being taken over by Council. This maintenance bond will be held for six months from the date of 224c issue, or until 31 October, whichever is longer. Maintenance of these assets are the responsibility of the developer during the maintenance period. At the end of the maintenance period the QA Supervisor will undertake a maintenance inspection to ascertain whether the assets are still in satisfactory condition and if so, will instruct the bond to be released, and Council will take over maintenance responsibilities from that time forward. Where defects occur during the developer's maintenance liability period, the costs of repairing such defects are the full responsibility of the developer. Where the developer does not repair the defects, Council will retain the bond monies for use in repairing the defects, and refund any residual monies held to the developer. The developer's liability is not limited to the amount of the maintenance bond, and any additional costs will be invoiced to the developer and will become a debt due to the Council.

(FC 6) Pay to the Council a financial contribution equal to 6% (plus GST at 12.5%) of Quotable New Zealand's market values, to be obtained for Lots 1 – 55, and 57-60 as of the date of issue of this subdivision

consent (or as at the date of any subsequent re-approval of subdivision consent or at intervals of not greater than three years) for reserve purposes.

On stage 1 payment will be required for Lots 1-35 inclusive;
On stage 2 payment will be required for Lots 36-55 inclusive; and
On stage 3 payment will be required for Lots 57-60 inclusive.

GENERAL

These conditions are to be signed off by Consent Services, fees will be charged on an hourly basis.

(GL 1) Advise Council of the Land Transfer plan number allocated by Land Information New Zealand.

(GL 2) Satisfy all requirements of the Inland Revenue Department in respect of Goods and Services Tax including any requirements that may be made in respect of proposed public services and land to vest in and be transferred to the Council.

(GL 3) Advise Council the name of the Consultant and/or person/s who will be the developers representative fulfilling engineering responsibilities as detailed in section 1.4.1 of Councils Code of Practice for City Infrastructure and Land Development.
A résumé stating the qualifications and experience of the nominated representative may be required at the Council's discretion.
Note: WCC COP requires the developer to appoint a suitably qualified and experienced person for any projects that involve development works for which standards are specified in the COP. On larger projects (those with public roading) a Registered Engineer or Registered Surveyor will be deemed to meet these criteria. The developer's representative shall have insurance liability and indemnity cover as appropriate, and be responsible for the following:

(i) Investigating, designing and obtaining approvals for the works.

(ii) Providing contract administration and engineering supervision of the works.

(iii) Co-ordination of specialist responses e.g. geotechnical, hydrology, structural reporting.

(iv) Certification of the works upon completion.

(GL 4) Obtain the reticulation of electric power to all Lots by underground methods and provide to the Council satisfactory confirmation that the completed installation has been installed in compliance with the requirements of the Electrical Network Operator (including the requirements of the Operator of the network to which the subdivision network is to be connected).

(GL 5) Obtain the reticulation of telephone services to all Lots by underground methods and provide to the Council satisfactory confirmation that the completed installation has been installed in compliance with the requirements of the Network Operator.

(GL 6) Provide confirmation that the relevant network utility operators are satisfied with the electric power and telephone connections to each allotment; or, if necessary, carry out any remedial work required.

(GL 7) Before commencement of any works, adequate sediment and erosion measures shall be constructed and maintained in accordance with Erosion and Sediment Control Measures Appendix to the Natural Area Rules of the Waitakere City Council District Plan.

(GL 8) Pursuant to Section 125 of the Resource Management Act 1991, if not given effect to earlier, this consent shall lapse five (5) years after the grant date of the consent.

ADVICE NOTES

1. A Development Contribution of $613, 657.09 (incl. GST) was estimated at lodgement for this subdivision. This development contribution has been paid.

2. Upon the applicant's request, Council will agree to a partial cancellation according to Section 243(e) & (f) of the Resource Management Act in respect of the Oil and Gas easement B344219.1 in so far as it relates to all lots except Lot 67(drainage reserve).

3. Waitakere City Council holds a Comprehensive discharge Consent from the ARC for the Parrs Stream catchment, and this proposal meets the recommendations of the Parrs Stream Catchment

Management Plan subject to these conditions being met. It is the applicant's responsibility to obtain all other necessary consents, or evidence of dispensation, from the Auckland Regional Council, pay all associated costs and comply with any conditions imposed by the regional Council.

4. **Engineering Approval and Quality Assurance Process:** Public infrastructure works, as conditioned above, require Council's approval of engineering plans and specifications prepared by the applicant's engineer in accordance with Council's Code of Practice for City Infrastructure and Land Development.
   (i) Submit full engineering plans, long sections and calculations, prepared in accordance with Council's Code of Practice, to Council for approval.
   (ii) Comply with all conditions of the approval from Watercare Service Ltd for working close to their trunk wastewater drain.
   (iii) Advise the name of the appointed developer's representative fulfilling engineering responsibilities as detailed in section 1.4.1 of the Code of Practice.
   (iv) After engineering approval has been given and prior to commencing construction, contact Council's Call Centre on 839 0400 to arrange a QA Pre-Start Meeting. Allow 3 working days for the QA Pre-Start Meeting to be booked.
   (v) The applicant is required to ensure that the contracted drainlayer and developer's representative attend the QA Pre-Start Meeting, and that construction materials are on-site for inspection.
   (vi) EcoWater's QA Supervisor will then undertake random site inspections throughout the construction process.
   (vii) Upon completion of construction the applicant's surveyor is required to prepare As-Built plans in accordance with the Code of Practice, and CCTV inspection of the drains are to be carried out.
   (viii) The developer's representative is required to fully inspect the drainage including overseeing the drainage tests, view the cctv's and check against the as-builts, and ensure that any remedial works are completed.
   (ix) When the developer's representative is satisfied that all works meet Council standards, they are required to complete the 'QA Final Inspection Request Form' and lodge this at Council together with As-Builts, CCTV (all footage on one DVD), log sheets, chlorination certificate for watermains, and inspection reports.
   (x) EcoWater's QA Supervisor will check all information against the approved design and Code of Practice, then undertake a field check and testing of the new drainage systems in conjunction with Council's approved maintenance contractor.
   (xi) When all public works and documentation are completed to Council's satisfaction the QA Completion Certificate will be issued to the applicant.
   (xii) Submit a copy of the QA Completion Certificate with the application for s224c Certificate as evidence of compliance with the conditions of consent requiring construction of infrastructure to public standards.
   (xiii) Pay all of Council's engineering fees and costs associated with engineering approvals, quality assurance site inspections, as-built & cctv approvals, final inspections, testing and bond management.

5. Regarding the proposed road being within the existing gas and oil easement, the applicants have provided evidence of confirmation from Vector that an inspection and issuing of a permit will be required prior to works commencing. It was further confirmed that Vector is aware that once the road is constructed, the easement will be cancelled where it falls under the road.

Reporting Planner: ..... **Date:** 25/01/2007
Felicitas Dhliwayo

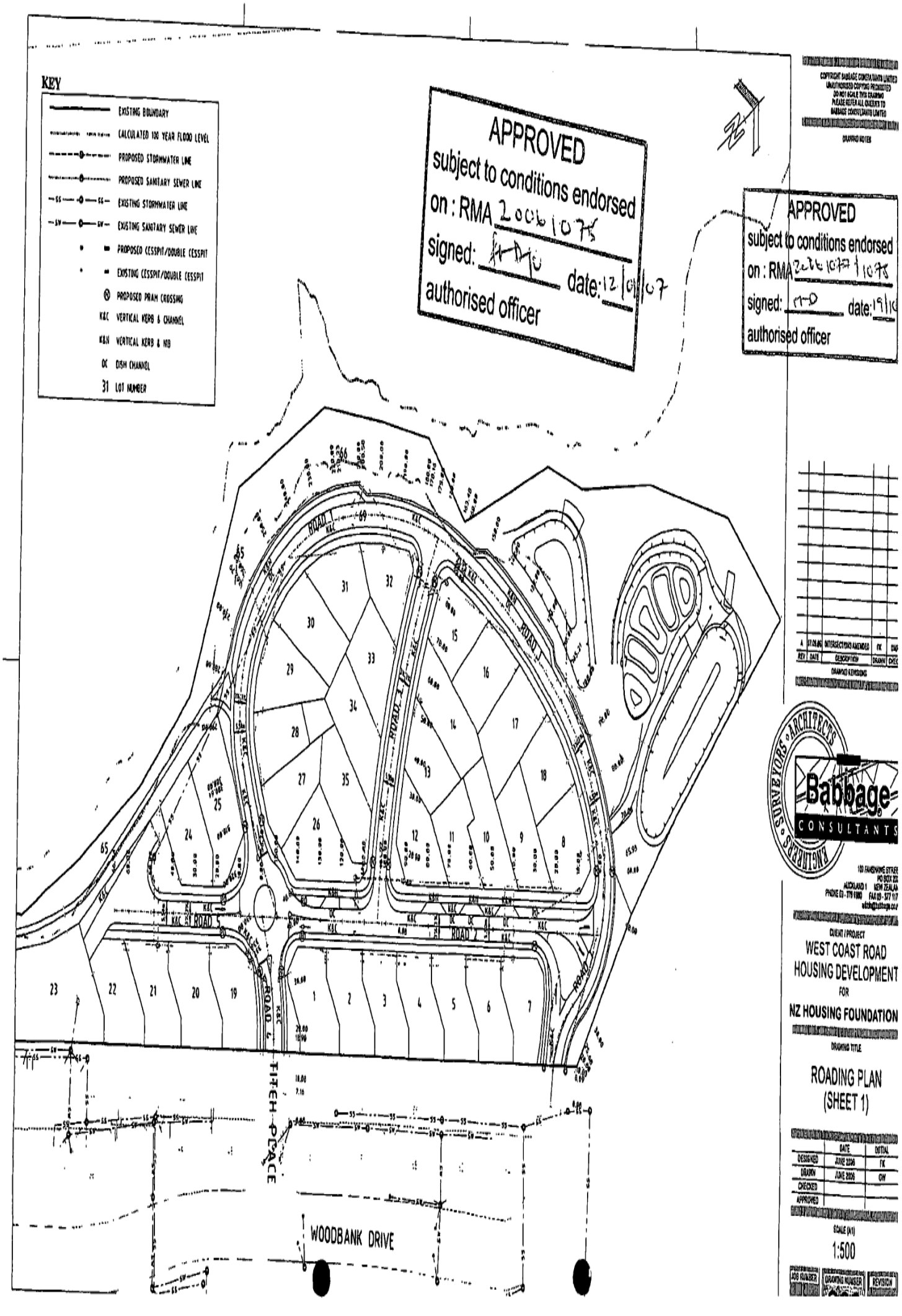
..... **Date:** 25 January 2007
Ted Barwell
Resource Planner (Subdivisions)

14.0 CONSENT GRANTED AS RECOMMENDED

..... **Date:** 25/01/07
Jeannette Ibrahim/ Sonya McCall
Team Leader Consents

Manager, Resource Consents

Please contact Council (Ph 839 0400) if you have any queries about this resource consent and associated report.


KEY
EXISTING BOUNDARY
CALCULATED 100 YEAR FLOOD LEVEL
PROPOSED STORMWATER LINE
PROPOSED SANITARY SEWER LINE
EXISTING STORMWATER LINE
EXISTING SANITARY SEWER LINE
PROPOSED CESSPIT/DOUBLE CESSPIT
EXISTING CESSPIT/DOUBLE CESSPIT
PROPOSED PRAM CROSSING
VERTICAL KERB & CHANNEL
VERTICAL KERB & NIB
DISH CHANNEL
LOT NUMBER
APPROVED
subject to conditions endorsed
on : RMA 2006 1075
signed:
date: 12/01/07
authorised officer
APPROVED
subject to conditions endorsed
on : RMA 2006 1077 & 1075
signed:
date: 19/1
authorised officer
ROAD 1
ROAD 2
ROAD 3
ROAD 4
ROAD 5
ROAD 6
FIFTEEN PLACE
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101 FANSHAWE STREET
PO BOX 226
AUCKLAND 1
NEW ZEALAND
PHONE 03 - 379 1980
FAX 03 - 377 117
CLIENT / PROJECT
WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION
DRAWING TITLE
ROADING PLAN
(SHEET 1)
DESIGNED
DRAWN
CHECKED
APPROVED
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JUNE 2006
JUNE 2006
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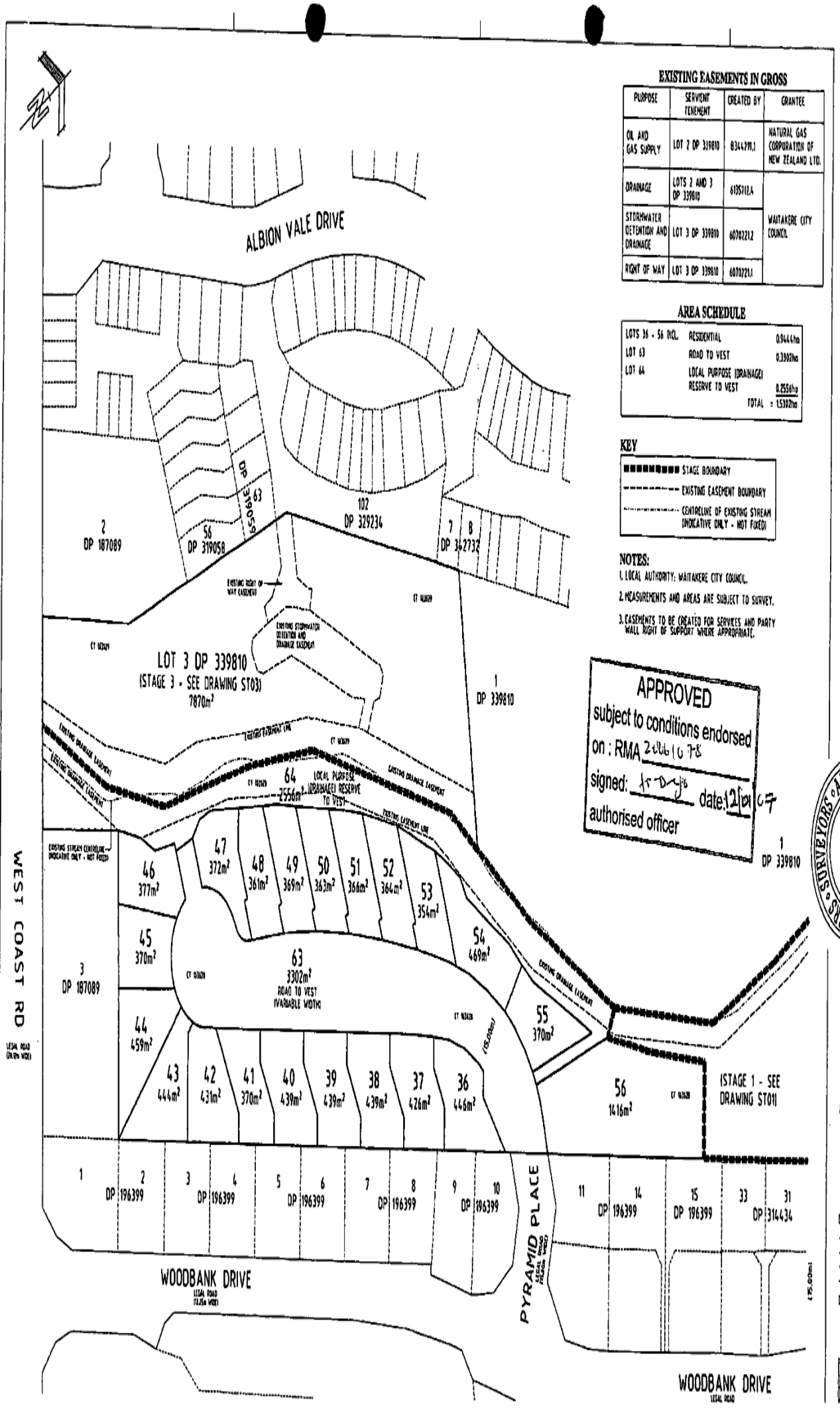
REVISION



EXISTING EASEMENTS IN GROSS

PURPOSE	SERVIENT TENEMENT	CREATED BY	GRANTEE
OIL AND GAS SUPPLY	LOT 2 DP 339810	8344299.1	NATURAL GAS CORPORATION OF NEW ZEALAND LTD.
DRAINAGE	LOTS 2 AND 3 DP 339810	6135712.4	WAITAKERE CITY COUNCIL
STORMWATER DETENTION AND DRAINAGE	LOT 3 DP 339810	6070212	
RIGHT OF WAY	LOT 3 DP 339810	6070221.1	

AREA SCHEDULE

LOTS 36 - 56 INCL.	RESIDENTIAL	0.9444ha
LOT 63	ROAD TO VEST	0.3302ha
LOT 64	LOCAL PURPOSE (DRAINAGE) RESERVE TO VEST	0.2556ha
	TOTAL =	1.5302ha

KEY

- STAGE BOUNDARY
- EXISTING EASEMENT BOUNDARY
- CENTRELINE OF EXISTING STREAM (INDICATIVE ONLY - NOT FIXED)

NOTES:

1. LOCAL AUTHORITY: WAITAKERE CITY COUNCIL.
2. MEASUREMENTS AND AREAS ARE SUBJECT TO SURVEY.
3. EASEMENTS TO BE CREATED FOR SERVICES AND PARTY WALL RIGHT OF SUPPORT WHERE APPROPRIATE.

APPROVED
subject to conditions endorsed
on : RMA 20061078
signed: _____ date: 12/01/07
authorised officer

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN

DRAWING REVISIONS

SURVEYORS • ARCHITECTS • ENGINEERS
Babbage CONSULTANT
105 FAMISHAM
PO B
AUCKLAND 1 · NEW Z
PHONE 09 - 379 0500 · FAX 09 - 3

CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPME
FOR
NZ HOUSING FOUNDATI

DRAWING TITLE

PROPOSED SUBDIVISION
OF LOTS 2 AND 3 DP 3398
STAGE 2
(LOTS 36 - 56 INCL., 63 AND

	DATE	INITIA
DESIGNED		
DRAWN	OCT, 2006	MJD
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVIS
2006	ST06	

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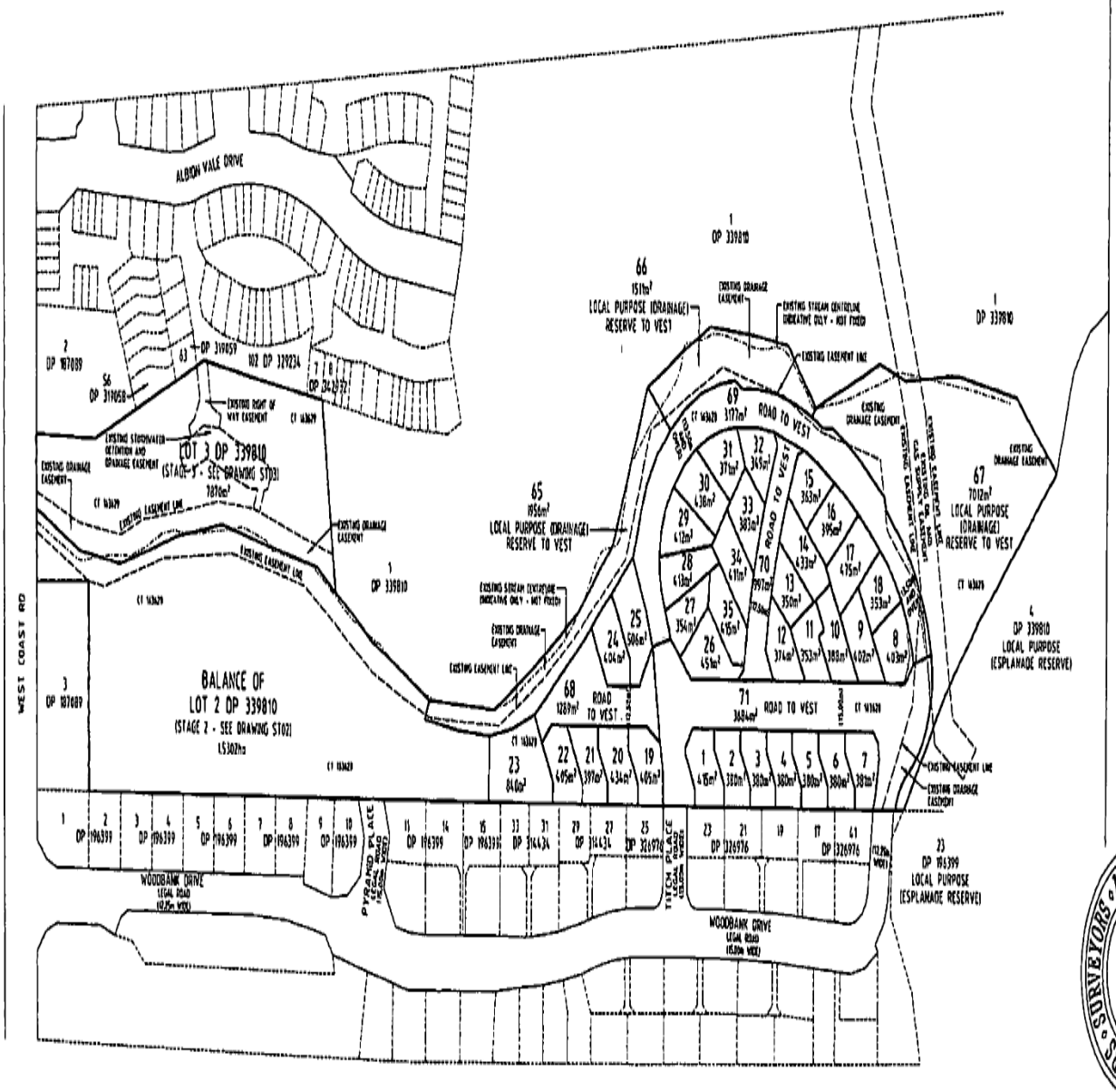
DRAWING NOTES



EXISTING EASEMENTS IN GROSS

PURPOSE	SERVIENT TENEMENT	CREATED BY	GRANTEE
OIL AND GAS SUPPLY	LOT 2 DP 339810	6344219.1	NATURAL GAS CORPORATION OF NEW ZEALAND LTD.
DRAINAGE	LOTS 2 AND 3 DP 339810	6435712.4	WAITAKERE CITY COUNCIL
STORMWATER DETENTION AND DRAINAGE	LOT 3 DP 339810	6070221.2	
RIGHT OF WAY	LOT 3 DP 339810	6070221.3	

KEY

EXISTING EASEMENT BOUNDARY

CENTRELINE OF EXISTING STREAM INDICATIVE ONLY - NOT FIXED)

NOTES:

1. LOCAL AUTHORITY: WAITAKERE CITY COUNCIL.
2. MEASUREMENTS AND AREAS ARE SUBJECT TO SURVEY.
3. EASEMENTS TO BE CREATED FOR SERVICES AND PARTY WALL RIGHT OF SUPPORT WHERE APPROPRIATE.

APPROVED
subject to conditions endorsed
on : RMA 20061078
signed: _____ date: 12/04/07
authorised officer

AREA SCHEDULE - STAGE ONE

LOTS 1 - 35 INCL.	RESIDENTIAL	1.4373ha
LOTS 65 - 67 INCL.	LOCAL PURPOSE (DRAINAGE) RESERVE TO VEST	1.0439ha
LOTS 68 - 71 INCL.	ROAD TO VEST	0.9147ha
	TOTAL :	3.3959ha

REV	DATE	DESCRIPTION	DRAWN

DRAWING REVISIONS

SURVEYORS • ARCHITECTS • ENGINEERS
Babbage CONSULTANTS
109 FANSHAWE
PO
AUCKLAND 1
PHONE 09 - 379 9530 · FAX 09 -
admin@babb

CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMI
FOR
NZ HOUSING FOUNDAT

DRAWING TITLE

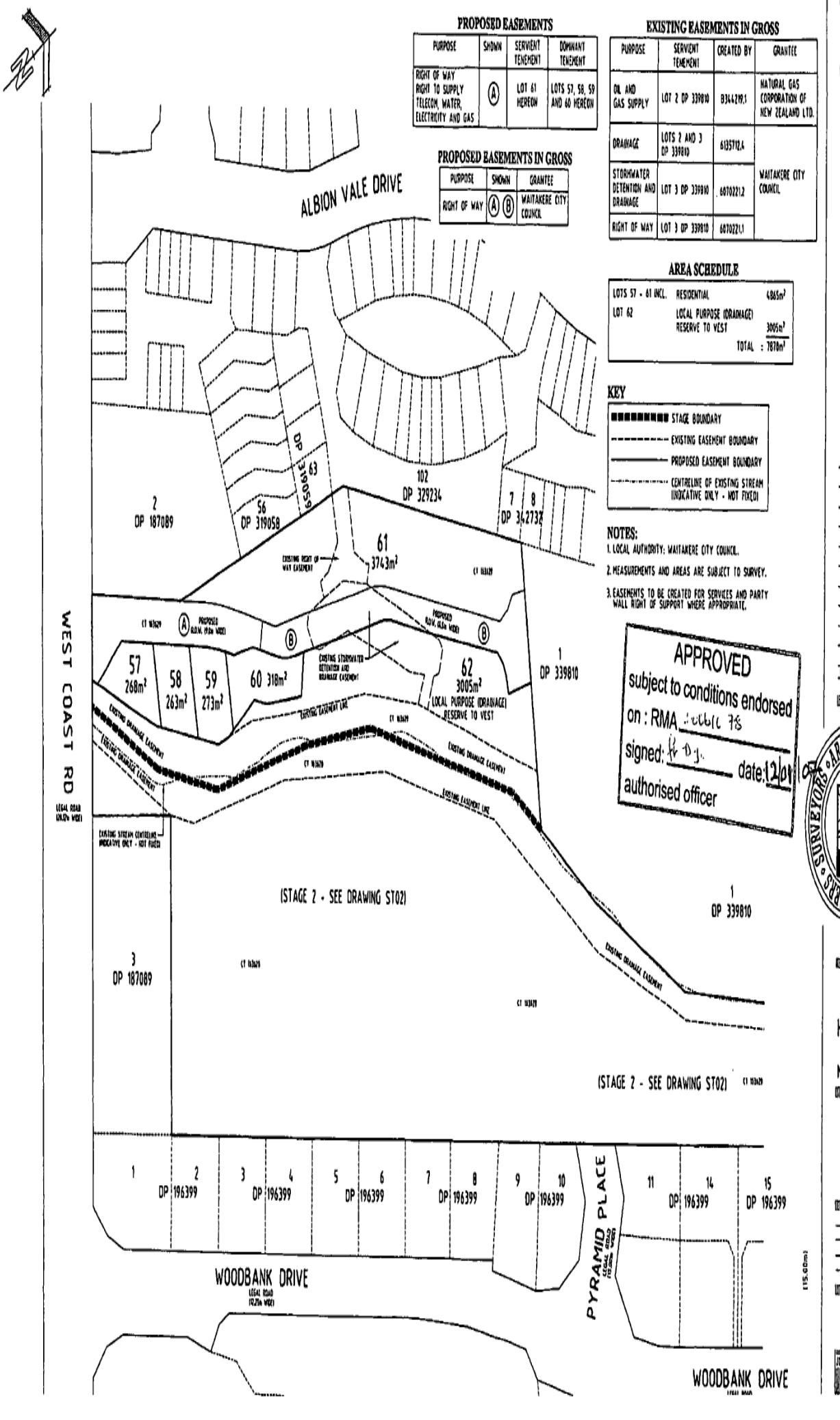
PROPOSED SUBDIVISION
OF LOTS 2 AND 3 DP 33981
STAGE 1
(LOTS 1 - 35 INCL.,
65 - 67 INCL. AND 68 - 71 INC

	DATE	INIT
DESIGNED		
DRAWN	OCT. 2006	M
CHECKED		
APPROVED		

SCALE (A1)

1:1000

JOB NUMBER	DRAWING NUMBER	REVISION
5138	ST01	



PROPOSED EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY RIGHT TO SUPPLY TELECOM, WATER, ELECTRICITY AND GAS	(A)	LOT 61 HEREON	LOTS 57, 58, 59 AND 60 HEREON

PROPOSED EASEMENTS IN GROSS

PURPOSE	SHOWN	GRANTEE
RIGHT OF WAY	(A) (B)	WAITAKERE CITY COUNCIL

EXISTING EASEMENTS IN GROSS

PURPOSE	SERVIENT TENEMENT	CREATED BY	GRANTEE
OIL AND GAS SUPPLY	LOT 2 DP 339810	B344219.1	NATURAL GAS CORPORATION OF NEW ZEALAND LTD.
DRAINAGE	LOTS 2 AND 3 DP 339810	6135712.4	WAITAKERE CITY COUNCIL
STORMWATER DETENTION AND DRAINAGE	LOT 3 DP 339810	6070221.2	
RIGHT OF WAY	LOT 3 DP 339810	6070221.1	

AREA SCHEDULE

LOTS 57 - 61 INCL.	RESIDENTIAL	4865m²
LOT 62	LOCAL PURPOSE (DRAINAGE) RESERVE TO VEST	3005m²
	TOTAL :	7870m²

KEY

- STAGE BOUNDARY
- EXISTING EASEMENT BOUNDARY
- PROPOSED EASEMENT BOUNDARY
- CENTRELINE OF EXISTING STREAM INDICATIVE ONLY - NOT FIXED

NOTES:

1. LOCAL AUTHORITY: WAITAKERE CITY COUNCIL.
2. MEASUREMENTS AND AREAS ARE SUBJECT TO SURVEY.
3. EASEMENTS TO BE CREATED FOR SERVICES AND Pparty WALL RIGHT OF SUPPORT WHERE APPROPRIATE.

APPROVED
subject to conditions endorsed
on : RMA 20061075
signed: [signature] date: 12/01/07
authorised officer

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DRAWING NOTES

REV	DATE	DESCRIPTION	BY

DRAWING REVISIONS

SURVEYORS • ENGINEERS • ARCHITECTS
Babbage CONSULTANTS
109 FANSHAWE
PO
AUCKLAND 1 - NEW
PHONE 09-379 9920 - FAX 09-
admin@babb

CLIENT / PROJECT

WEST COAST ROAI
HOUSING DEVELOPMI
FOR
NZ HOUSING FOUNDAT

DRAWING TITLE

PROPOSED SUBDIVISIO
OF LOTS 2 AND 3 DP 339
STAGE 3
(LOTS 57 - 62 INCL.)

	DATE	INIT
DESIGNED		
DRAWN	OCT. 2006	M
CHECKED		
APPROVED		

SCALE (A1)
1:500

JOB NUMBER	DRAWING NUMBER	REV
2006	ST05	

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DRAWING NOTES

KEY

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- PROPOSED STORMWATER LINE
- PROPOSED SANITARY SEWER LINE
- EXISTING STORMWATER LINE
- EXISTING SANITARY SEWER LINE
- PROPOSED CESSPIT/DOUBLE CESSPIT
- EXISTING CESSPIT/DOUBLE CESSPIT
- PROPOSED PRAM CROSSING
- KAC VERTICAL KERB & CHANNEL
- KBN VERTICAL KERB & NIB
- DC DISH CHANNEL
- 31 LOT NUMBER

APPROVED
subject to conditions endorsed
on : RMA 2006 1078
signed: _____ date: 12/01/07
authorised officer

APPROVED
subject to conditions endorsed
on : RMA 2006 1077 & 1078
signed: _____ date: 19/10
authorised officer

A	31.09.06	DIFFERENTIATION AMENDED	FK	DMH
ALTY	DATE	DESCRIPTION	DRAWN	CHKD

DRAWING REVISIONS

ROAD 1 ROAD 2 ROAD 3 ROAD 4 ROAD 5 ROAD 6 ROAD 7

TITCH PEACE

WOODBANK DRIVE

SURVEYORS • ARCHITECTS • ENGINEERS

Babbage CONSULTANTS

103 FANSHAWE STREET
PO BOX 7107
AUCKLAND 1 NEW ZEALAND
PHONE 09 - 370 0880 FAX 09 - 377 1170
admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE

ROADING PLAN
(SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

SCALE (A1)
1:500

JOB NUMBER | DRAWING NUMBER | REVISION

TA Approvals

Territorial Authority	Waitakere City Council TA Certification Division	**TA Reference**	SUB2006-1078 (W22816)
Survey Number	LT 389289	**Survey Purpose**	LT Subdivision
Surveyor Reference	42608	**Land District**	North Auckland
Surveyor	Kevin Raymond Meikle		
Surveyor Firm	Babbage Consultants Ltd		
Dataset Description	Lots 1 - 35 and 65 - 72 being a Subdivision of Lot 2 DP 339810		

TA Certificates

I hereby certify that plan 389289 was approved by the Waitakere City Council pursuant to section 223 of the Resource Management Act 1991 on the 24th day of September 2007. ☑

The approval of the Council under Section 223 of the Resource Management Act 1991 is subject to the granting or reserving of the easements set out in the Memorandum of Easements attached as a supporting document to plan 389289. ☑

Signature

Signed by Edward John Barwell, Authorised Officer, on 24/09/2007 03:07 PM

Receipt Information

Transaction Receipt Number	2926267
Signing Certificate (Distinguished Name)	Barwell, Edward John
Signing Certificate (Serial Number)	1019542736
Signature Date	24/09/2007

***** End of Report *****

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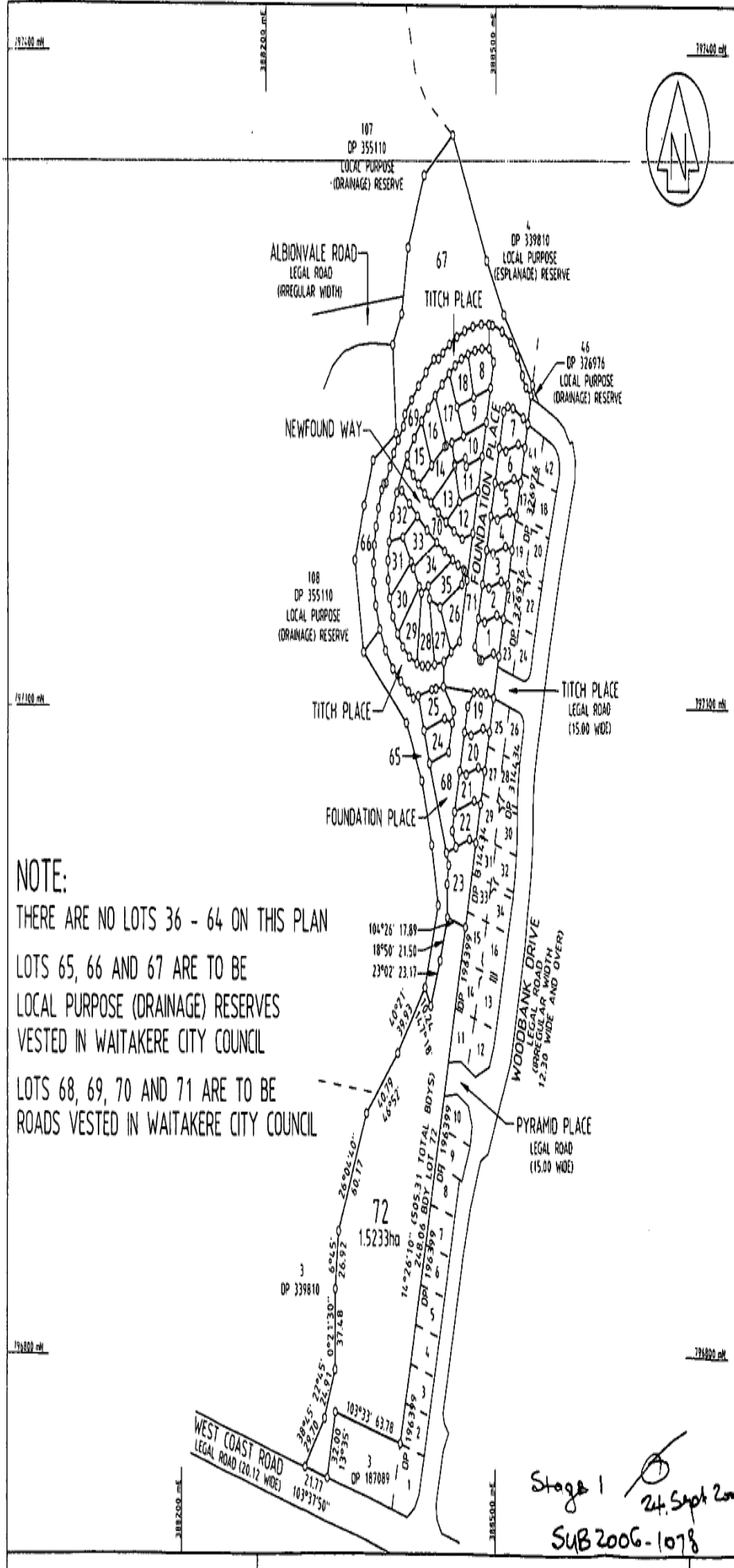


Stage 1
24 Sept 2007
SUB2006-1078

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF SUPPORT	(A)	LOT 1	LOT 2
	(B)	LOT 2	LOT 3
	(C)	LOT 3	LOT 4
	(D)	LOT 4	LOT 5
	(E)	LOT 5	LOT 6
	(F)	LOT 6	LOT 7
	(G)	LOT 8	LOT 18
	(H)	LOT 9	LOT 8
	(J)	LOT 10	LOT 9
	(J)	LOT 11	LOT 10
	(K)	LOT 12	LOT 11
	(L)	LOT 12	LOT 13
	(M)	LOT 13	LOT 14
	(N)	LOT 14	LOT 15
RIGHT OF SUPPORT	(O)	LOT 17	LOT 16
	(P)	LOT 18	LOT 17
	(Q)	LOT 9	LOT 17
	(R)	LOT 27	LOT 28
	(S)	LOT 28	LOT 27
	(T)	LOT 28	LOT 29
	(U)	LOT 29	LOT 30
	(V)	LOT 30	LOT 31
	(W)	LOT 33	LOT 32
	(X)	LOT 33	LOT 34
	(Y)	LOT 34	LOT 33
	(Z)	LOT 35	LOT 34
	(AA)	LOT 20	LOT 19
	(AB)	LOT 21	LOT 20
RIGHT OF SUPPORT	(AC)	LOT 22	LOT 21
	(AD)	LOT 23	LOT 22
	(AE)	LOT 24	LOT 25

EXISTING EASEMENTS IN GROSS

PURPOSE	SHOWN	CREATED BY
OIL AND GAS SUPPLY	(AF) (AG) (AH)	B344219.1

I HEREBY CERTIFY THAT THIS PLAN WAS APPROVED BY THE WAITAKERE CITY COUNCIL PURSUANT TO SECTION 223 OF THE RESOURCE MANAGEMENT ACT 1991

ON THE ____ DAY OF _____ 2007
SUBJECT TO THE GRANTING OR RESERVING OF THE EASEMENTS SET OUT IN THE MEMORANDUM HEREON

_____
AUTHORISED OFFICER

NEW CT ALLOCATED

LOT 1 - 357044	LOT 19 - 357062
LOT 2 - 357045	LOT 20 - 357063
LOT 3 - 357046	LOT 21 - 357064
LOT 4 - 357047	LOT 22 - 357065
LOT 5 - 357048	LOT 23 - 357066
LOT 6 - 357049	LOT 24 - 357067
LOT 7 - 357050	LOT 25 - 357068
LOT 8 - 357051	LOT 26 - 357069
LOT 9 - 357052	LOT 27 - 357070
LOT 10 - 357053	LOT 28 - 357071
LOT 11 - 357054	LOT 29 - 357072
LOT 12 - 357055	LOT 30 - 357073
LOT 13 - 357056	LOT 31 - 357074
LOT 14 - 357057	LOT 32 - 357075
LOT 15 - 357058	LOT 33 - 357076
LOT 16 - 357059	LOT 34 - 357077
LOT 17 - 357060	LOT 35 - 357078
LOT 18 - 357061	LOT 72 - 357079

NOTES

1. FOR LOT AREAS AND BOUNDARY DIMENSIONS SEE SHEETS 2, 3 AND 4
2. FOR EASEMENT BOUNDARY DIMENSIONS SEE DIAGRAMS A AND B ON SHEET 2 AND DIAGRAMS C, D AND E ON SHEET 5.

SHEET 1 OF 5

CLASS OF SURVEY: 1

Total Area 4.9334ha

Comprised in CT 163628

I KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2;
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed _____ Date _____

Field Book p. Traverse Book p.
Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

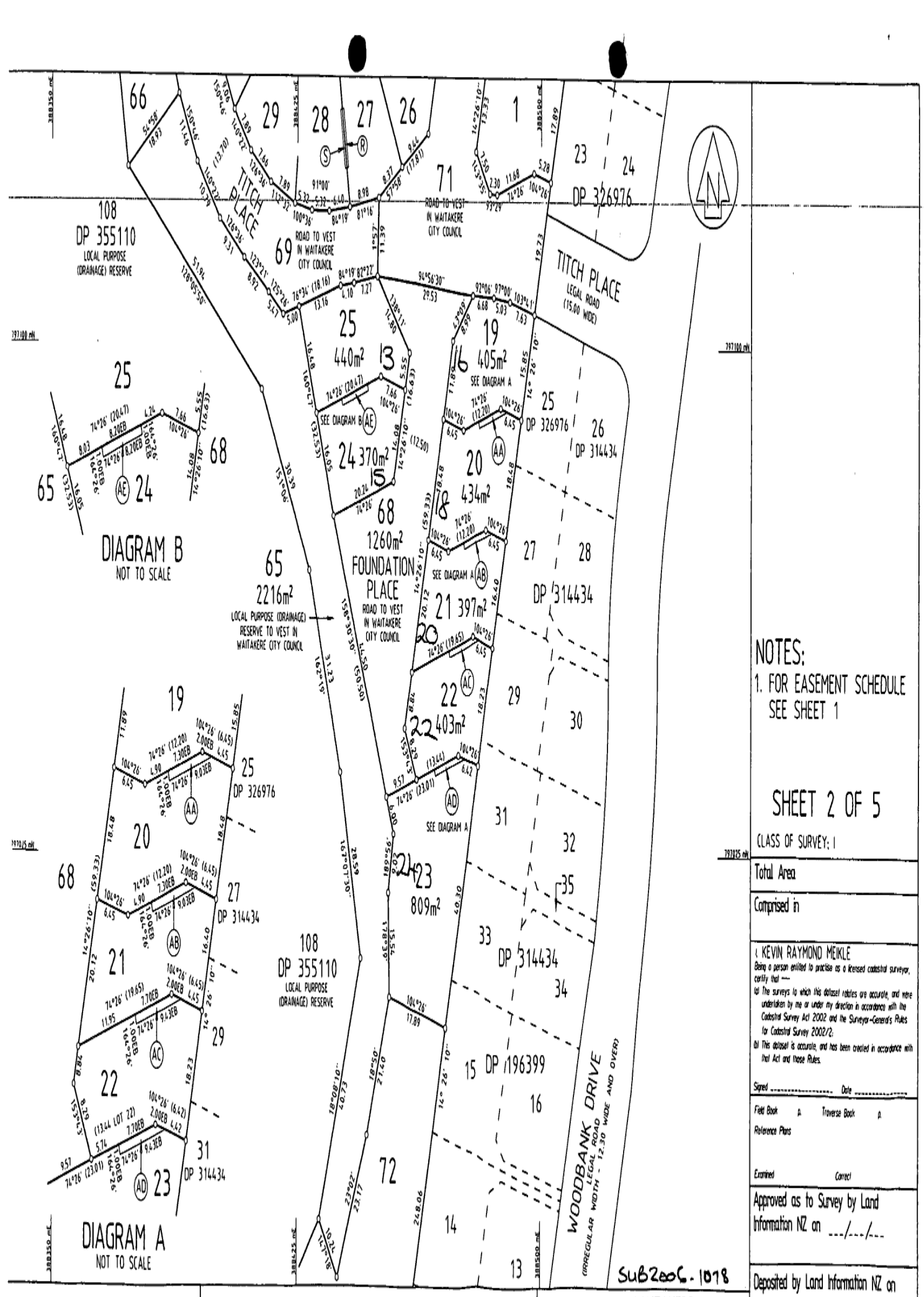
File Received

DP389289

LAND DISTRICT NORTH AUCKLAND

LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY
Surveyed by BABBAGE CONSULTANTS LTD. 42608
Scale 1 : 2000 Date MAY 2007



NOTES:

1. FOR EASEMENT SCHEDULE SEE SHEET 1

SHEET 2 OF 5

CLASS OF SURVEY: 1

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —

(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2;

(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed ..... Date .....

Field Book p. Traverse Book p.

Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ---/---/---

Deposited by Land Information NZ on ---/---/---

File Received

LAND DISTRICT NORTH AUCKLAND

LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

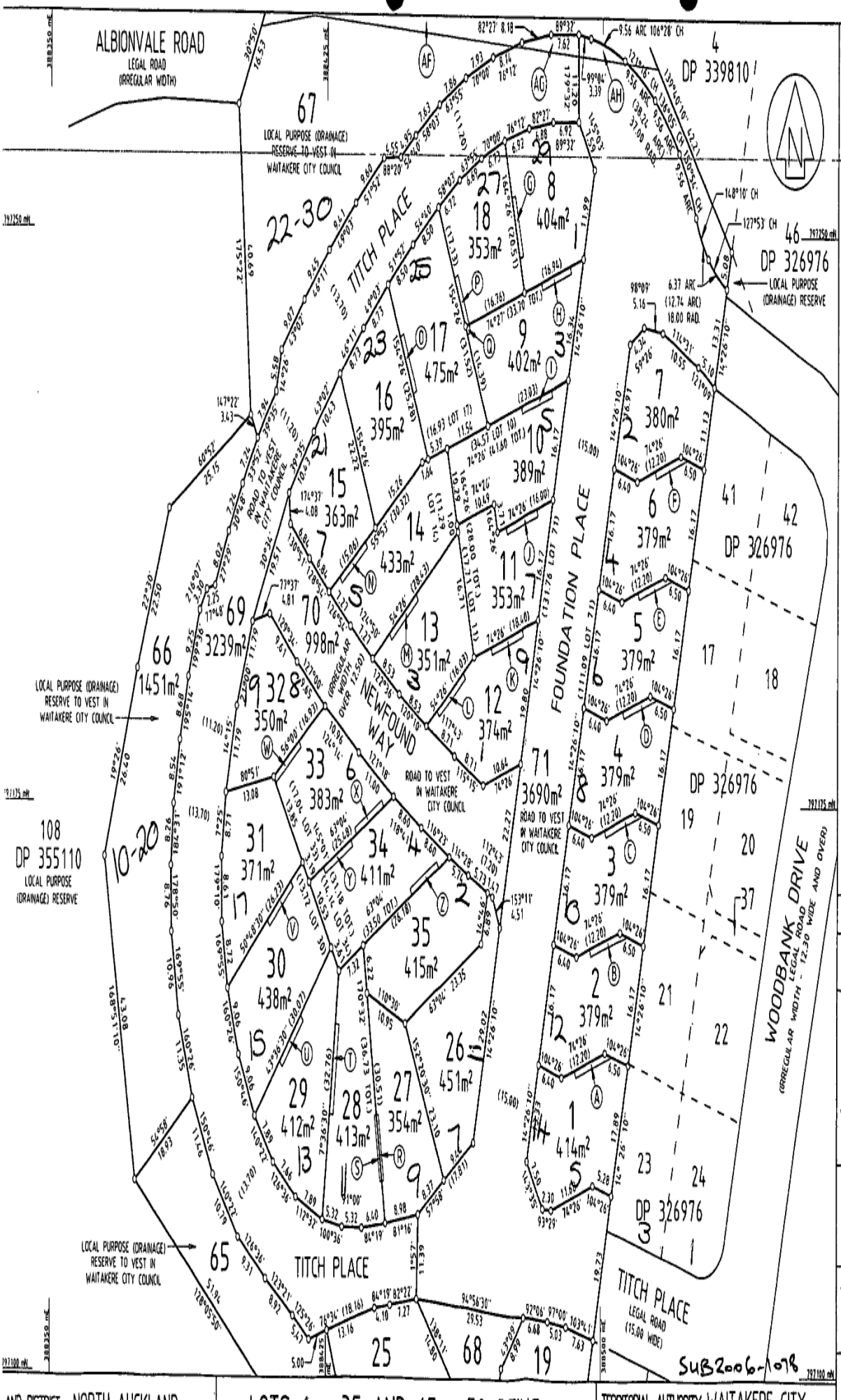
TERRITORIAL AUTHORITY WAITAKERE CITY

Surveyed by BABBAGE CONSULTANTS LTD. 42608

Scale 1 : 500 Date MAY 2007

SUB2006-1078

DP389289



NOTES:

1. FOR EASEMENT SCHEDULE SEE SHEET 1
2. FOR EASEMENT DIAGRAMS SEE SHEET 5

SHEET 3 OF 5

CLASS OF SURVEY: 1

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE

Being a person entitled to practise as a licensed cadastral surveyor, certify that —

(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2;

(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed ..... Date .....

Field Book p. Traverse Book p.

Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ---/---/---

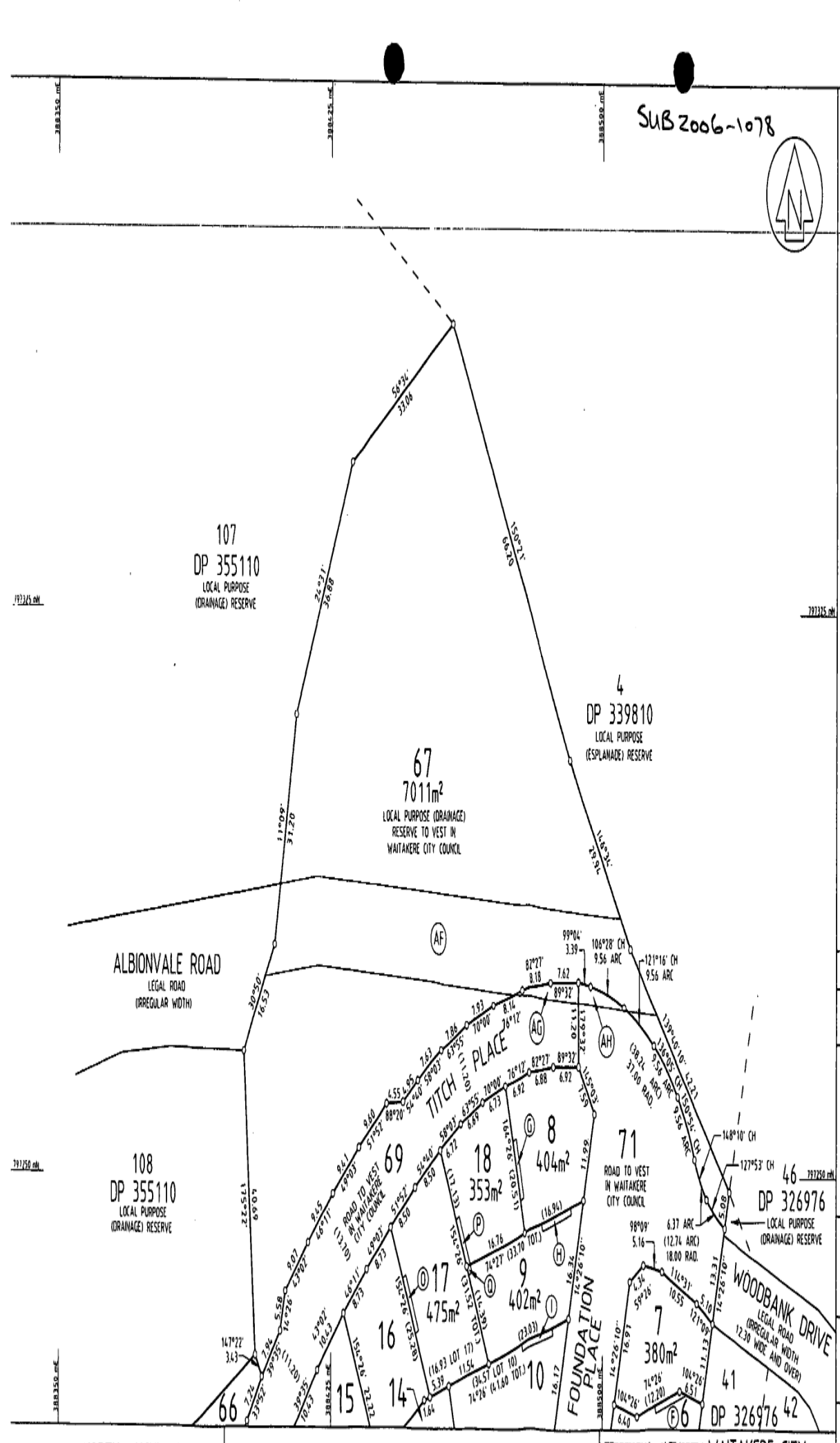
Deposited by Land Information NZ on ---/---/---

File

Received

DP389789

SUB 2006-1078



NOTES:

1. FOR EASEMENT SCHEDULE SEE SHEET 1
2. FOR EASEMENT DIAGRAMS SEE SHEET 5

SHEET 4 OF 5

CLASS OF SURVEY: 1

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2.
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed _____ Date _____

Field Book p. Traverse Book p.

Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File Received Instrument

DP389289

LAND DISTRICT NORTH AUCKLAND

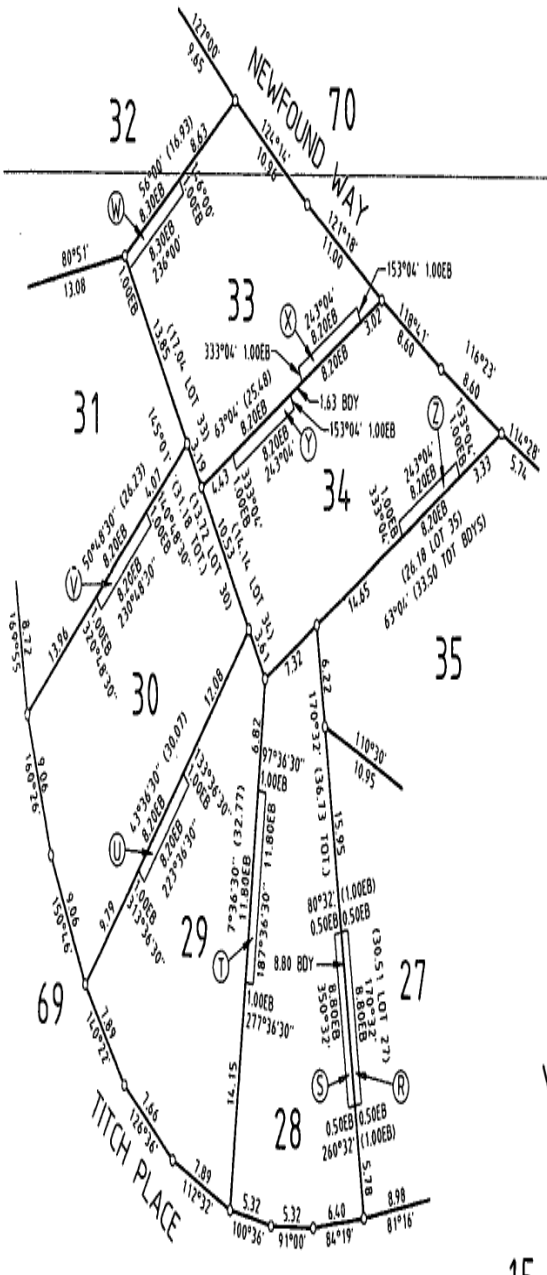
LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

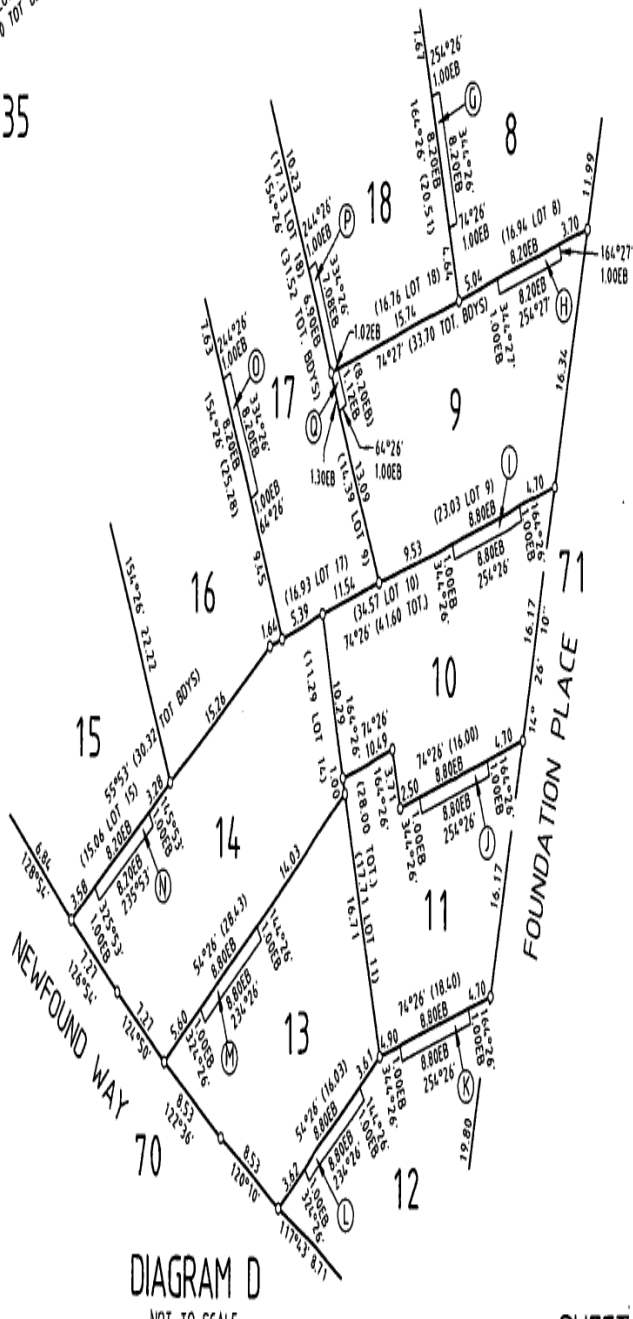
TERRITORIAL AUTHORITY WAITAKERE CITY

42608

Surveyed by BABBAGE CONSULTANTS LTD.

Scale 1 : 500 Date MAY 2007




NEWFOUND WAY
FOUNDATION PLACE
70
71
15
16
17
18
14
13
12
11
10
9
8
254°26' 1.00EB
164°26' 8.20EB
74°26' 1.00EB
(16.94 LOT 8)
3.70
164°27' 1.00EB
(16.76 LOT 18) 15.74
74°27' (33.70 TOT. BDY(S))
1.02EB
(8.20EB)
1.30EB
64°26' 1.00EB
(14.39 LOT 9)
(23.03 LOT 9) 8.80EB
4.70
164°26' 8.80EB
(16.93 LOT 17) 11.54
(34.57 LOT 10) 74°26' (41.60 TOT.)
9.53
8.80EB 254°26'
(11.29 LOT 17)
(28.00 TOT) (12.71 LOT 11)
74°26' (16.00) 8.80EB
74°26' (18.40) 8.80EB
74°26' (16.03) 8.80EB
254°26' (28.43) 8.80EB
55°53' (30.32) (15.06 LOT 15) 8.20EB
235°53'
(15.26 TOT BDYS)
15.28
22.22
154°26'
(25.28)
8.20EB
164°26' 8.20EB
(10.22 LOT 18) 15.74
74°26' 1.00EB
74°26' 8.20EB
254°26' 1.00EB
164°26' (20.51)
8.20EB
74°26' 1.00EB
74°26' 8.20EB
254°26' 1.00EB
164°26'

TA Approvals

Territorial Authority	Waitakere City Council TA Certification Division	**TA Reference**	SUB2006-1078 (W22816)
Survey Number	LT 390735	**Survey Purpose**	LT Subdivision
Surveyor Reference	42608	**Land District**	North Auckland
Surveyor	Kevin Raymond Meikle		
Surveyor Firm	Babbage Consultants Ltd		
Dataset Description	Lots 36 - 56, 63 and 64 being a Subdivision of Lot 72 DP 389289		

TA Certificates

I hereby certify that plan 390735 was approved by the Waitakere City Council pursuant to section 223 of the Resource Management Act 1991 on the 24th day of September 2007. ☑

The approval of the Council under Section 223 of the Resource Management Act 1991 is subject to the granting or reserving of the easements set out in the Memorandum of Easements attached as a supporting document to plan 390735. ☑

Signature

Signed by Edward John Barwell, Authorised Officer, on 24/09/2007 03:43 PM

Receipt Information

Transaction Receipt Number	2926435
Signing Certificate (Distinguished Name)	Barwell, Edward John
Signing Certificate (Serial Number)	1019542736
Signature Date	24/09/2007

***** End of Report *****

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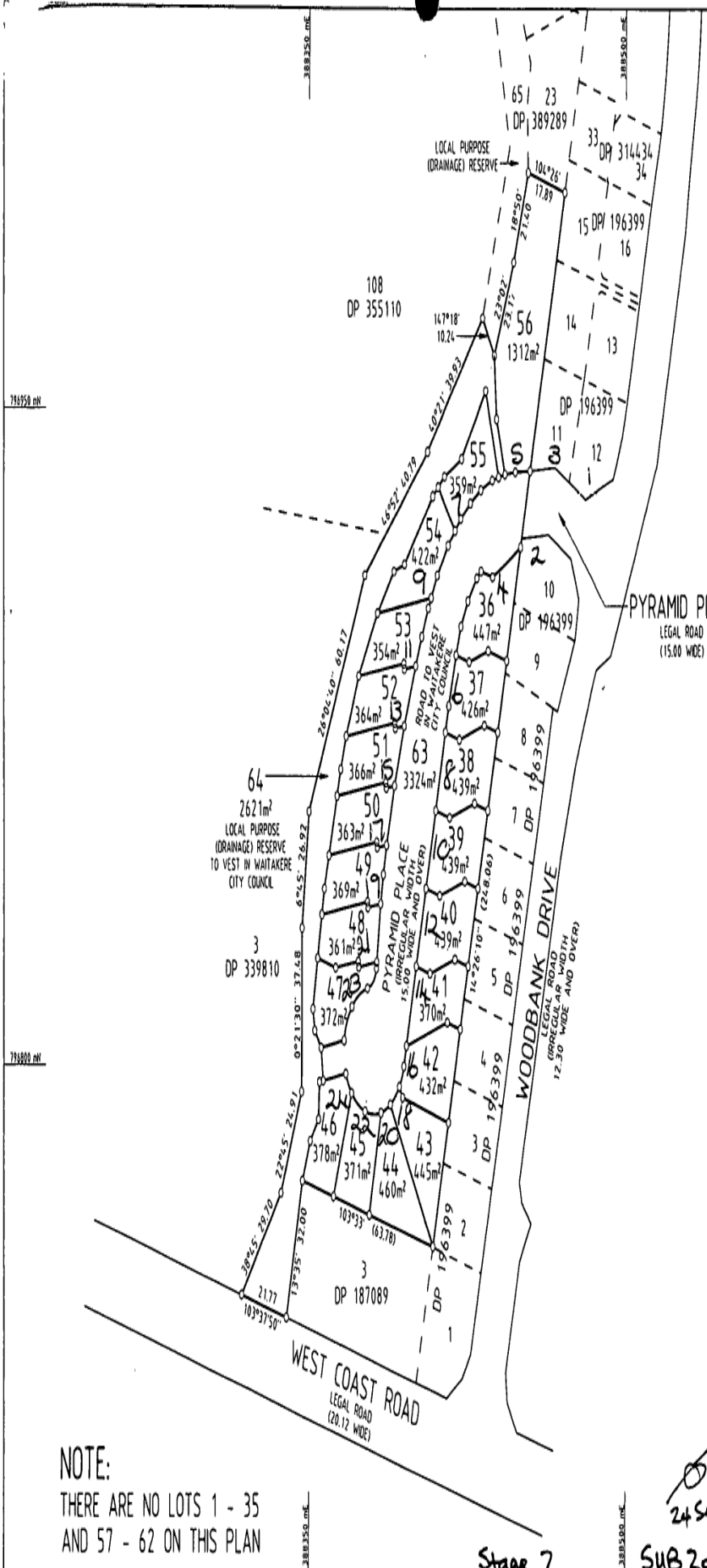


NOTE:
THERE ARE NO LOTS 1 - 35 AND 57 - 62 ON THIS PLAN

I HEREBY CERTIFY THAT THIS PLAN WAS APPROVED BY THE WAITAKERE CITY COUNCIL PURSUANT TO SECTION 223 OF THE RESOURCE MANAGEMENT ACT 1991

ON THE ____ DAY OF _____ 2007
SUBJECT TO THE GRANTING OR RESERVING OF THE EASEMENTS SET OUT IN THE MEMORANDUM HEREON

_____
AUTHORISED OFFICER

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF SUPPORT	Ⓐ	LOT 38	LOT 37
	Ⓑ	LOT 39	LOT 38
	Ⓒ	LOT 40	LOT 39
	Ⓓ	LOT 41	LOT 40
	Ⓔ	LOT 42	LOT 41
	Ⓕ	LOT 43	LOT 42
	Ⓖ	LOT 43	LOT 44
	Ⓗ	LOT 44	LOT 43
	Ⓘ	LOT 44	LOT 45
	Ⓙ	LOT 45	LOT 46
	Ⓚ	LOT 47	LOT 48
	Ⓛ	LOT 48	LOT 49
	Ⓜ	LOT 49	LOT 48
	Ⓝ	LOT 49	LOT 50
	Ⓞ	LOT 50	LOT 49
	Ⓟ	LOT 50	LOT 51
	Ⓠ	LOT 51	LOT 50
	Ⓡ	LOT 51	LOT 52
	Ⓢ	LOT 52	LOT 51
	Ⓣ	LOT 52	LOT 53
	Ⓤ	LOT 53	LOT 52
	Ⓥ	LOT 53	LOT 54
	Ⓦ	LOT 54	LOT 53

MEMORANDUM OF EASEMENTS IN GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	GRANTEE
OVERLAND FLOWPATH	Ⓧ	LOT 44	WAITAKERE CITY COUNCIL
	Ⓨ	LOT 45	
	Ⓩ	LOT 46	

NEW CT ALLOCATED

LOT 36 - 364340	LOT 47 - 364351
LOT 37 - 364341	LOT 48 - 364352
LOT 38 - 364342	LOT 49 - 364353
LOT 39 - 364343	LOT 50 - 364354
LOT 40 - 364344	LOT 51 - 364355
LOT 41 - 364345	LOT 52 - 364356
LOT 42 - 364346	LOT 53 - 364357
LOT 43 - 364347	LOT 54 - 364358
LOT 44 - 364348	LOT 55 - 364359
LOT 45 - 364349	LOT 56 - 364360
LOT 46 - 364350	

NOTES
1. FOR LOT AND EASEMENT BOUNDARY DIMENSIONS SEE SHEETS 2 AND 3.

SHEET 1 OF 3

CLASS OF SURVEY: I

Total Area 1.5233ha

Comprised in CT 357078
PETER BRIAN REED

I KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2.
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed _____ Date 25 June '07

Field Book p. Traverse Book p.
Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ---/---/---

Deposited by Land Information NZ on ---/---/---

24 Sept 07

Stage 2 SUB 2006-1078

LAND DISTRICT NORTH AUCKLAND	LOTS 36 - 56, 63 AND 64 BEING A SUBDIVISION OF LOT 72 DP 389289	TERRITORIAL AUTHORITY WAITAKERE CITY Surveyed by BABBAGE CONSULTANTS LTD. 42608 Scale 1 : 1000 Date MAY 2007	File Received Instructions DP390735

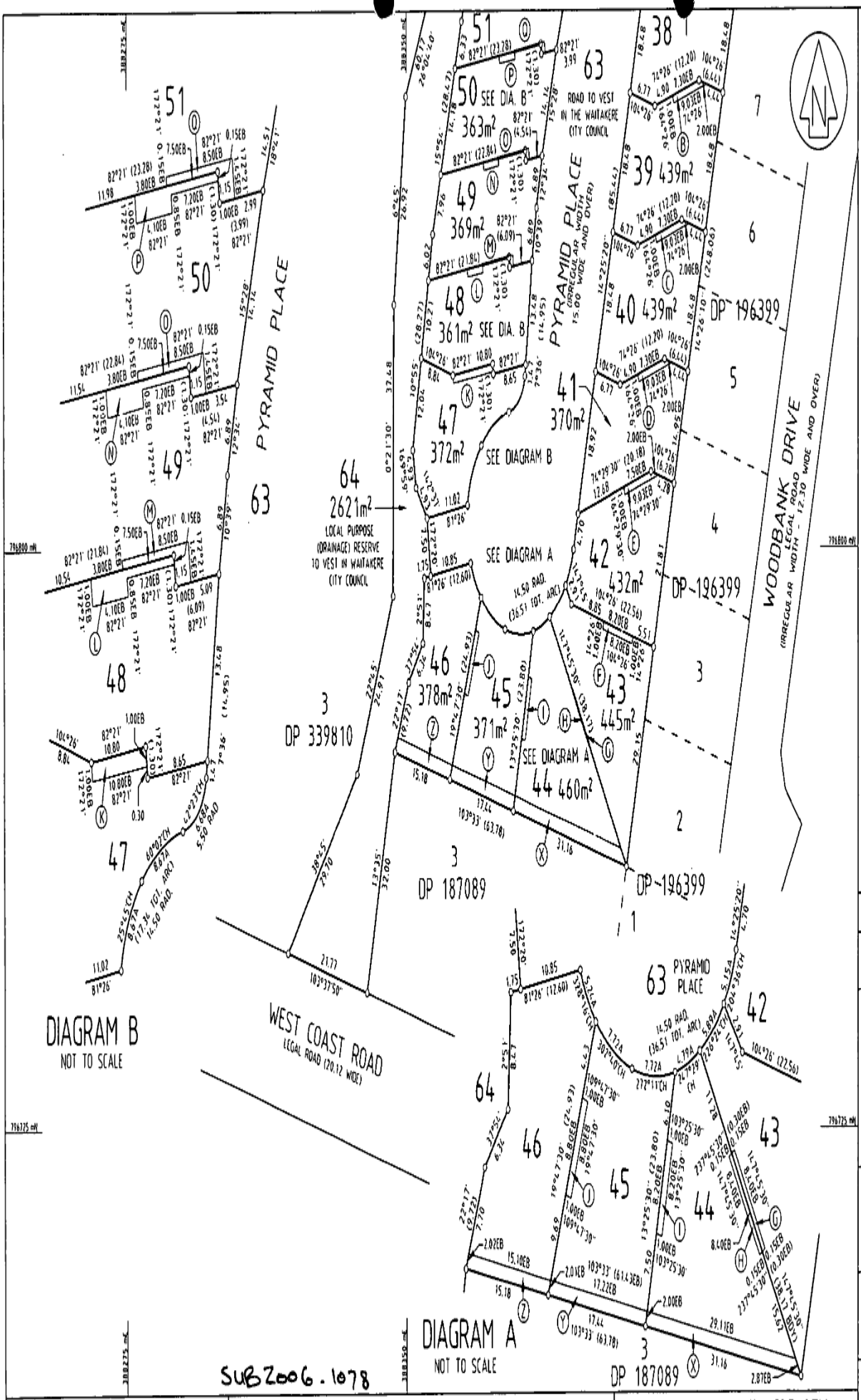


DIAGRAM B
NOT TO SCALE

DIAGRAM A
NOT TO SCALE

SUB2006.1078

NOTE:
FOR EASEMENT SCHEDULE
SEE SHEET 1

SHEET 2 OF 3

CLASS OF SURVEY: 1

Total Area

Comprised in

I, KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2;
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed ..... Date .....

Field Book p. Traverse Book p.

Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on .../.../...

Deposited by Land Information NZ on .../.../...

File Received Instructions

DP390735

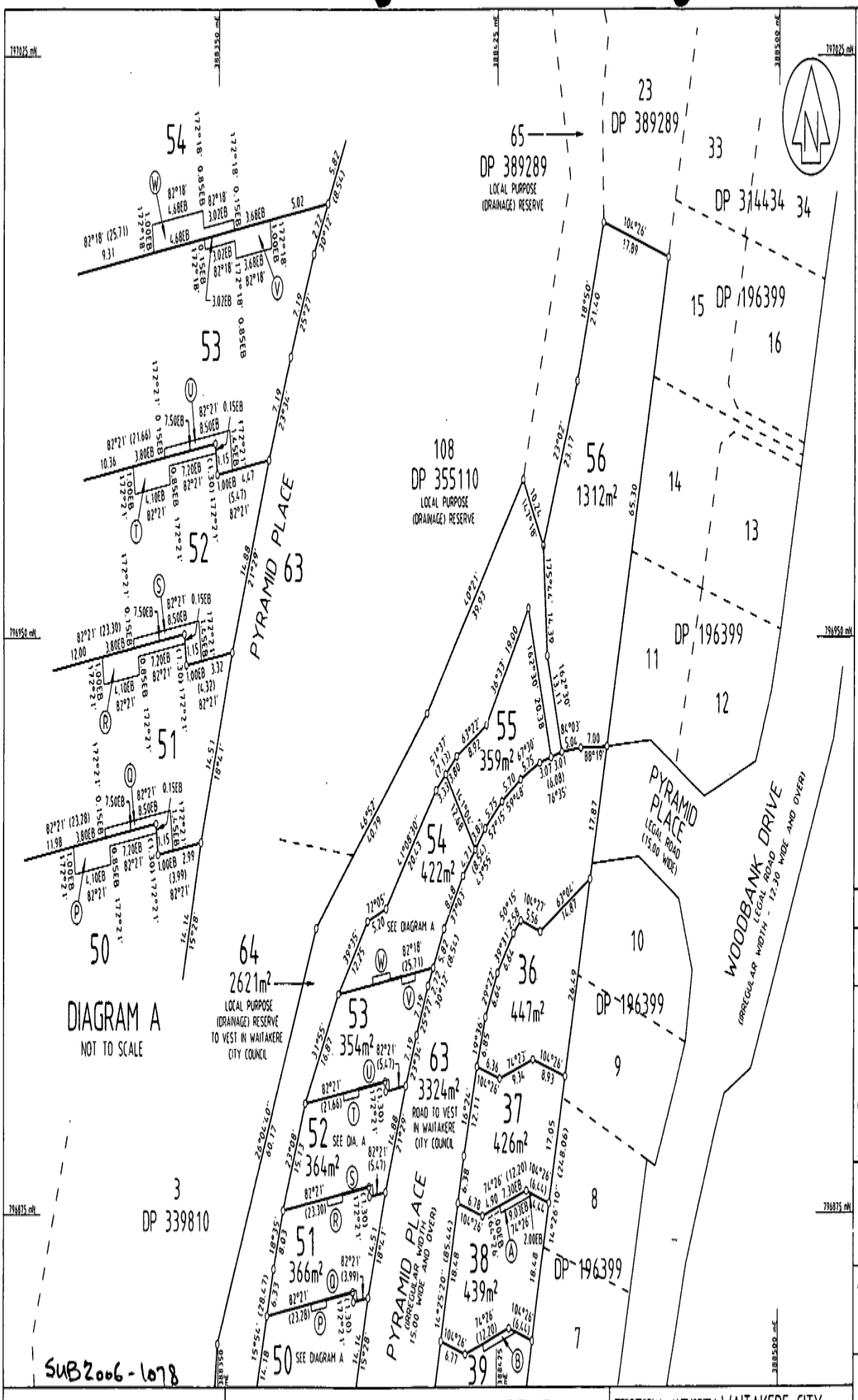
LAND DISTRICT NORTH AUCKLAND

LOTS 36 - 56, 63 AND 64 BEING A SUBDIVISION OF LOT 72 DP 389289

TERRITORIAL AUTHORITY WAITAKERE CITY

Surveyed by BABBAGE CONSULTANTS LTD. 42608

Scale 1 : 500 Date MAY 2007



NOTE:
FOR EASEMENT SCHEDULE
SEE SHEET 1

SHEET 3 OF 3

CLASS OF SURVEY: 1

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —

(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2;

(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed _____ Date _____

Field Book p. Traverse Book p.

Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ---/---/---

Deposited by Land Information NZ on ---/---/---

File
Received
Instructions

DP390735

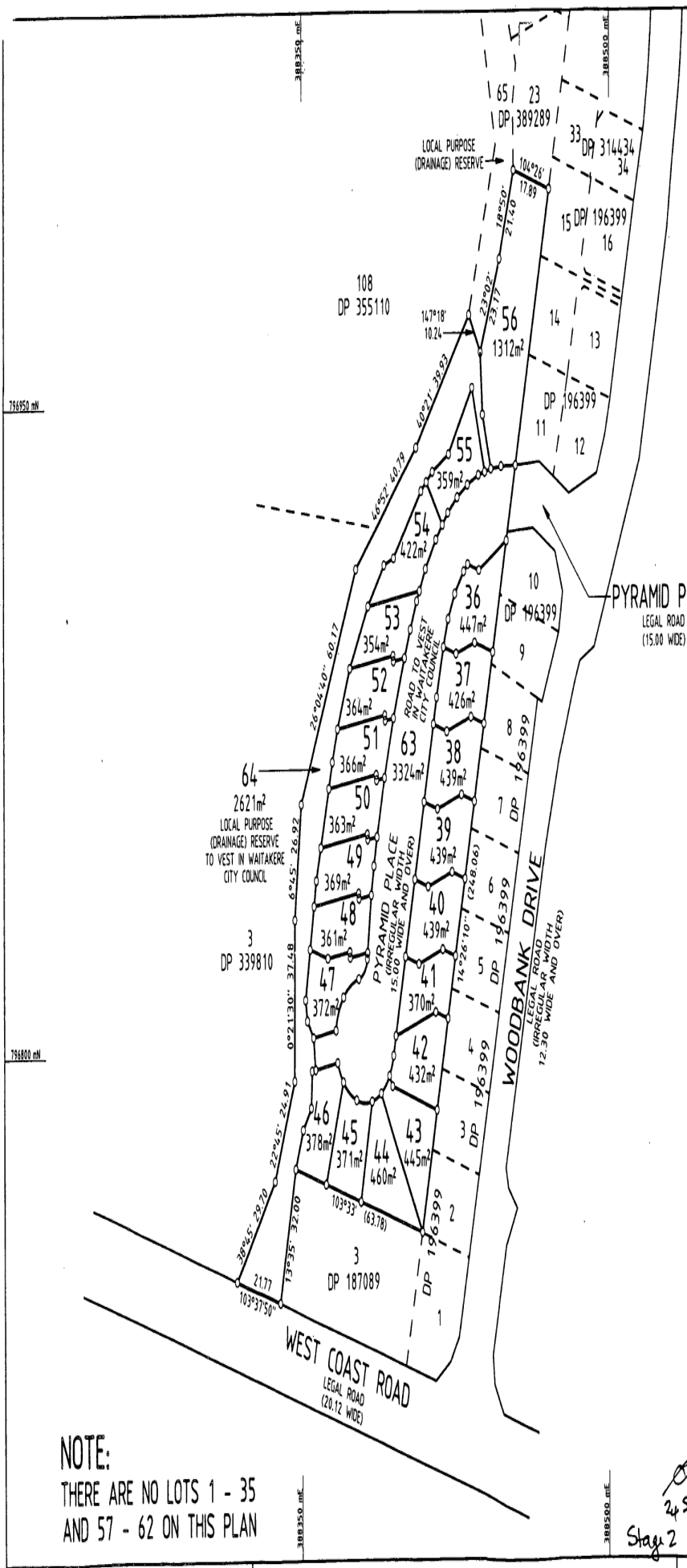
LAND DISTRICT NORTH AUCKLAND

LOTS 36 - 55, 63 AND 64 BEING A SUBDIVISION OF LOT 72 DP 389289

TERRITORIAL AUTHORITY WAITAKERE CITY

Surveyed by BABBAGE CONSULTANTS LTD. 42608

Scale 1 : 500 Date MAY 2007



NOTE:
THERE ARE NO LOTS 1 - 35 AND 57 - 62 ON THIS PLAN

I HEREBY CERTIFY THAT THIS PLAN WAS APPROVED BY THE WAITAKERE CITY COUNCIL PURSUANT TO SECTION 223 OF THE RESOURCE MANAGEMENT ACT 1991

ON THE ____ DAY OF _____ 2007
SUBJECT TO THE GRANTING OR RESERVING OF THE EASEMENTS SET OUT IN THE MEMORANDUM HEREON

AUTHORISED OFFICER

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF SUPPORT	Ⓐ	LOT 38	LOT 37
	Ⓑ	LOT 39	LOT 38
	Ⓒ	LOT 40	LOT 39
	Ⓓ	LOT 41	LOT 40
	Ⓔ	LOT 42	LOT 41
	Ⓕ	LOT 43	LOT 42
	Ⓖ	LOT 43	LOT 44
	Ⓗ	LOT 44	LOT 43
	Ⓘ	LOT 44	LOT 45
	Ⓙ	LOT 45	LOT 46
	Ⓚ	LOT 47	LOT 48
	Ⓛ	LOT 48	LOT 49
	Ⓜ	LOT 49	LOT 48
	Ⓝ	LOT 49	LOT 50
	Ⓞ	LOT 50	LOT 49
	Ⓟ	LOT 50	LOT 51
	Ⓠ	LOT 51	LOT 50
	Ⓡ	LOT 51	LOT 52
	Ⓢ	LOT 52	LOT 51
	Ⓣ	LOT 52	LOT 53
	Ⓤ	LOT 53	LOT 52
	Ⓥ	LOT 53	LOT 54
	Ⓦ	LOT 54	LOT 53

MEMORANDUM OF EASEMENTS IN GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	GRANTEE
OVERLAND FLOWPATH	Ⓧ	LOT 44	WAITAKERE CITY COUNCIL
	Ⓨ	LOT 45	
	Ⓩ	LOT 46	

24 Sept 2007
Stage 2 SUB 2006-1078

NEW CT ALLOCATED

LOT 36 - 364340	LOT 47 - 364351
LOT 37 - 364341	LOT 48 - 364352
LOT 38 - 364342	LOT 49 - 364353
LOT 39 - 364343	LOT 50 - 364354
LOT 40 - 364344	LOT 51 - 364355
LOT 41 - 364345	LOT 52 - 364356
LOT 42 - 364346	LOT 53 - 364357
LOT 43 - 364347	LOT 54 - 364358
LOT 44 - 364348	LOT 55 - 364359
LOT 45 - 364349	LOT 56 - 364360
LOT 46 - 364350	

NOTES

1. FOR LOT AND EASEMENT BOUNDARY DIMENSIONS SEE SHEETS 2 AND 3.

SHEET 1 OF 3

CLASS OF SURVEY: I

Total Area 1.5233ha

Comprised in CT 357078
PETER BRIAN REED

I KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —

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(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed _____ Date 25 June '07

Field Book p. Traverse Book p.
Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ---/---/---

Deposited by Land Information NZ on ---/---/---

File
Received
Instructions

DP390735

LAND DISTRICT NORTH AUCKLAND

LOTS 36 - 56, 63 AND 64 BEING A SUBDIVISION OF LOT 72 DP 389289

TERRITORIAL AUTHORITY WAITAKERE CITY
42608
Surveyed by BABBAGE CONSULTANTS LTD.
Scale 1 : 1000 Date MAY 2007

J:\CCADS\DATA\42608\DWGS2TP1 FROM JOB LTBDYST2

APPROVED LM 99/11

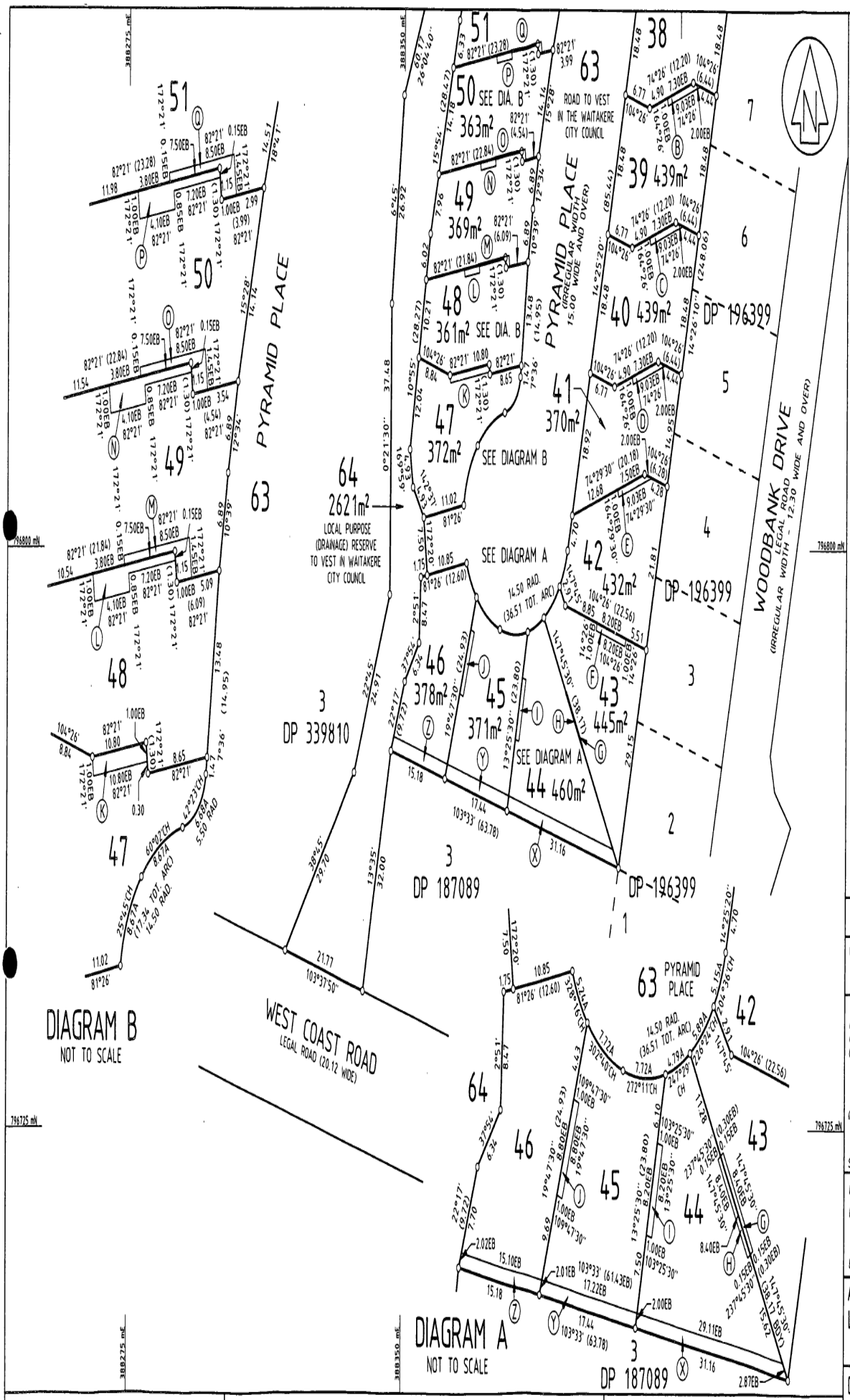

DIAGRAM B
NOT TO SCALE

DIAGRAM A
NOT TO SCALE

NOTE:
FOR EASEMENT SCHEDULE
SEE SHEET 1

SHEET 2 OF 3

CLASS OF SURVEY: I

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE
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(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed _____ Date _____

Field Book p. Traverse Book p.
Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ---/---/---

Deposited by Land Information NZ on ---/---/---

File
Received
Instructions

DP390735

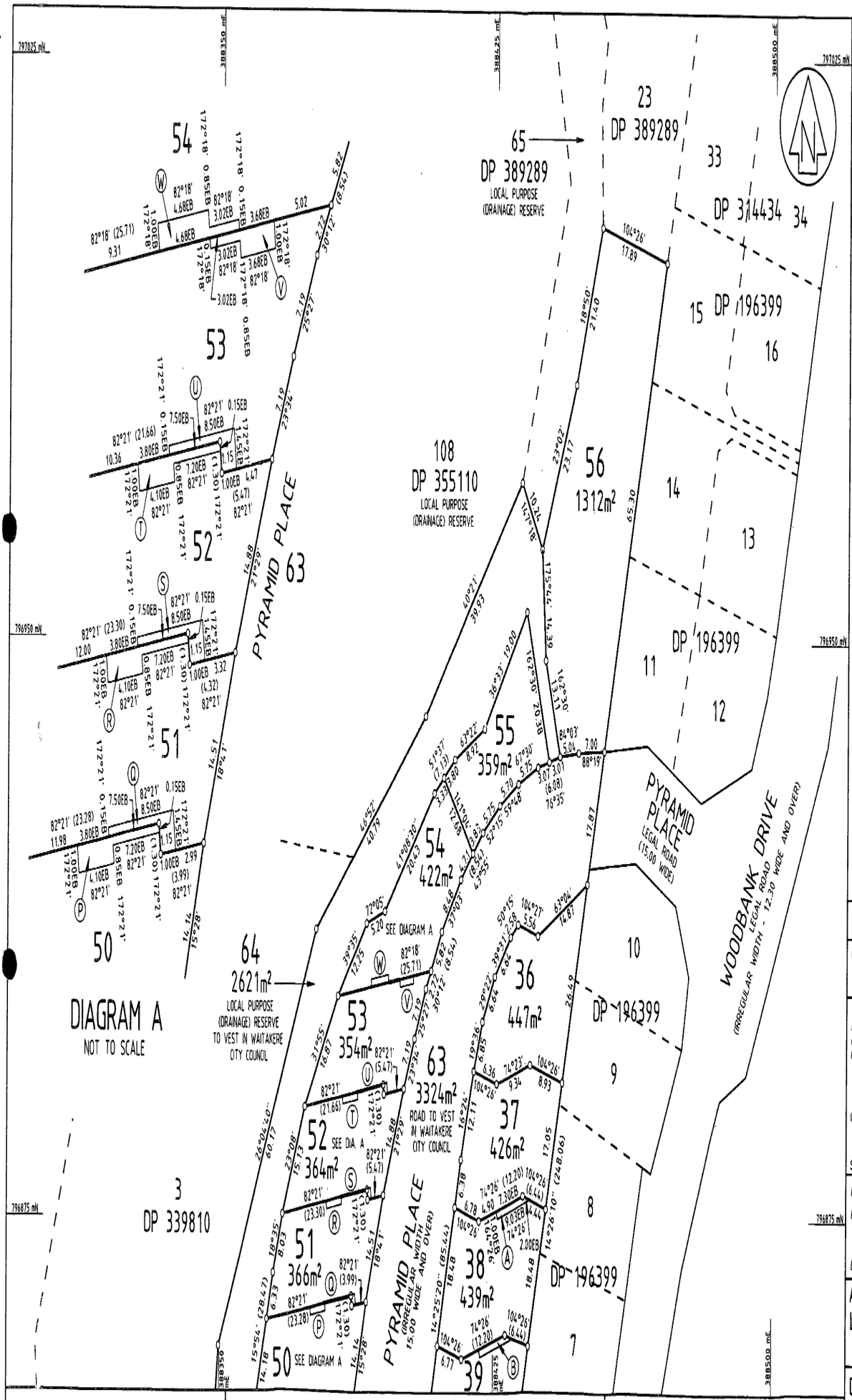
LAND DISTRICT NORTH AUCKLAND

LOTS 36 - 56, 63 AND 64 BEING A SUBDIVISION OF LOT 72 DP 389289

TERRITORIAL AUTHORITY WAITAKERE CITY
42608
Surveyed by BABBAGE CONSULTANTS LTD.
Scale 1 : 500 Date MAY 2007

A:\CCADS\DATA\42608\DWGS2TP2 FROM JOB LTBDYST2

APPROVED LM 99/11



NOTE:

FOR EASEMENT SCHEDULE SEE SHEET 1

SHEET 3 OF 3

CLASS OF SURVEY: 1

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE

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Signed _____ Date _____

Field Book p. Traverse Book p.

Reference Plans

Examined Correct

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File

Received

Instructions

DP390735

LAND DISTRICT NORTH AUCKLAND

LOTS 36 - 55, 63 AND 64 BEING A SUBDIVISION OF LOT 72 DP 389289

TERRITORIAL AUTHORITY WAITAKERE CITY

42608

Surveyed by BABBAGE CONSULTANTS LTD.

Scale 1 : 500 Date MAY 2007

J:\CADS\DATA\42608\DWGS2TP3 FROM JOB LTBDYST2

APPROVED LM 99/11

TA Approvals

Territorial Authority	Waitakere City Council TA Certification Division	**TA Reference**	SUB2006-1078 (W22816)
Survey Number	LT 390736	**Survey Purpose**	LT Subdivision
Surveyor Reference	42608	**Land District**	North Auckland
Surveyor	Kevin Raymond Meikle		
Surveyor Firm	Babbage Consultants Ltd		
Dataset Description	Lots 57 - 62 being a Subdivision of Lot 3 DP 339810		

TA Certificates

I hereby certify that plan 390736 was approved by the Waitakere City Council pursuant to section 223 of the Resource Management Act 1991 on the 24th day of September 2007. ☑

The approval of the Council under Section 223 of the Resource Management Act 1991 is subject to the granting or reserving of the easements set out in the Memorandum of Easements attached as a supporting document to plan 390736. ☑

Signature

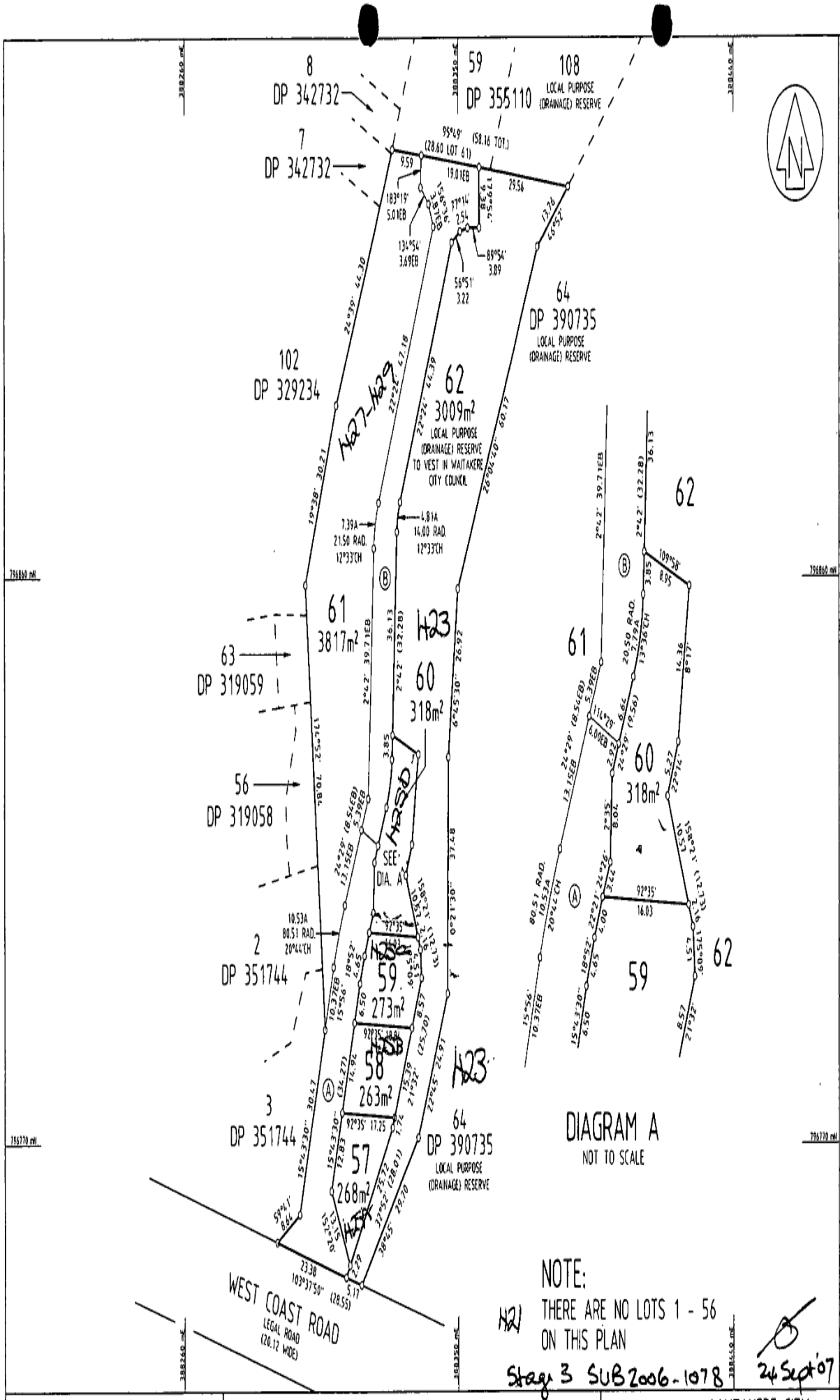
Signed by Edward John Barwell, Authorised Officer, on 24/09/2007 04:24 PM

Receipt Information

Transaction Receipt Number	2926579
Signing Certificate (Distinguished Name)	Barwell, Edward John
Signing Certificate (Serial Number)	1019542736
Signature Date	24/09/2007

***** End of Report *****

© Copyright: Land Information New Zealand



I HEREBY CERTIFY THAT THIS PLAN WAS APPROVED BY THE WAITAKERE CITY COUNCIL PURSUANT TO SECTION 223 OF THE RESOURCE MANAGEMENT ACT 1991

ON THE ___ DAY OF _____ 2007

SUBJECT TO THE GRANTING OR RESERVING OF THE EASEMENTS SET OUT IN THE MEMORANDUM HEREON

_____
AUTHORISED OFFICER

MEMORANDUM OF EASEMENTS IN GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	GRANTEE
RIGHT OF WAY WATER SUPPLY	(A) (B)	LOT 61 HEREON	WAITAKERE CITY COUNCIL

PROPOSED EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY GAS, TELECOM, WATER AND ELECTRICITY SUPPLY	(A)	LOT 61 HEREON	LOTS 57, 58, 59 AND 60 HEREON

NEW CT ALLOCATED

LOT 57 - 364361
LOT 58 - 364362
LOT 59 - 364363
LOT 60 - 364364
LOT 61 - 364365

CLASS OF SURVEY: 1

Total Area 7948m²

Comprised in CT 163629

I KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —

(a) *The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2;*

(b) *This dataset is accurate, and has been created in accordance with that Act and those Rules.*

Signed _____ Date 25 June '07

Field Book p. Traverse Book p.

Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File Received Instructions DP390736

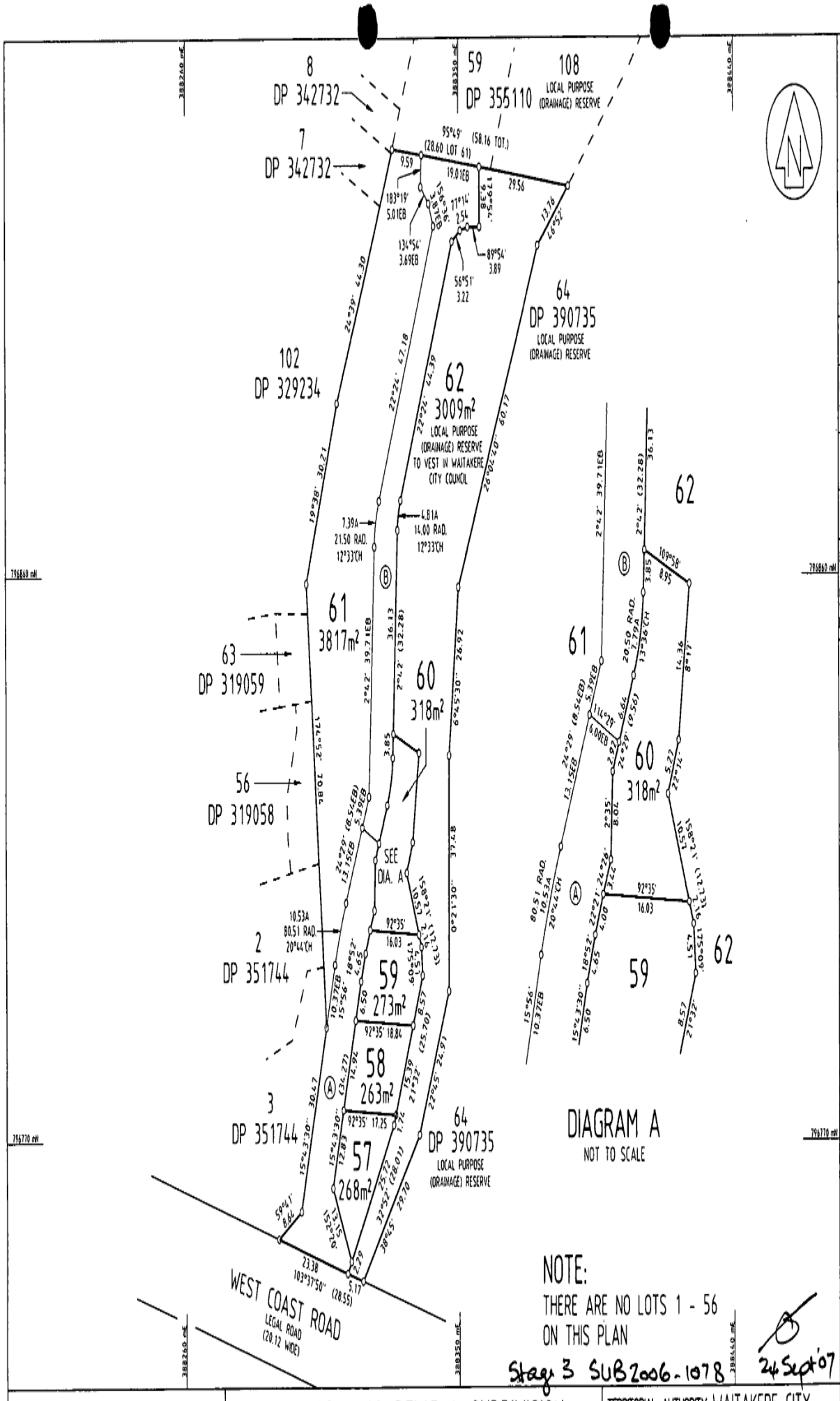
LAND DISTRICT NORTH AUCKLAND

LOTS 57 - 62 BEING A SUBDIVISION OF LOT 3 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY

Surveyed by BABBAGE CONSULTANTS LTD. 42608

Scale 1 : 600 Date MAY 2007



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ON THE ___ DAY OF _____ 2007

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_____
AUTHORISED OFFICER

MEMORANDUM OF EASEMENTS IN GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	GRANTEE
RIGHT OF WAY WATER SUPPLY	Ⓐ Ⓑ	LOT 61 HEREON	WAITAKERE CITY COUNCIL

PROPOSED EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY GAS, TELECOM, WATER AND ELECTRICITY SUPPLY	Ⓐ	LOT 61 HEREON	LOTS 57, 58, 59 AND 60 HEREON

NEW CT ALLOCATED

LOT 57 - 364361
LOT 58 - 364362
LOT 59 - 364363
LOT 60 - 364364
LOT 61 - 364365

CLASS OF SURVEY: I

Total Area 7948m²

Comprised in CT 163629

I KEVIN RAYMOND MEIKLE
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Field Book p. Traverse Book p.

Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File
Received
Instructions

DP390736

LAND DISTRICT NORTH AUCKLAND

LOTS 57 - 62 BEING A SUBDIVISION OF LOT 3 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY

Surveyed by BABBAGE CONSULTANTS LTD. 42608

Scale 1 : 600 Date MAY 2007

APPROVED IN 08/11

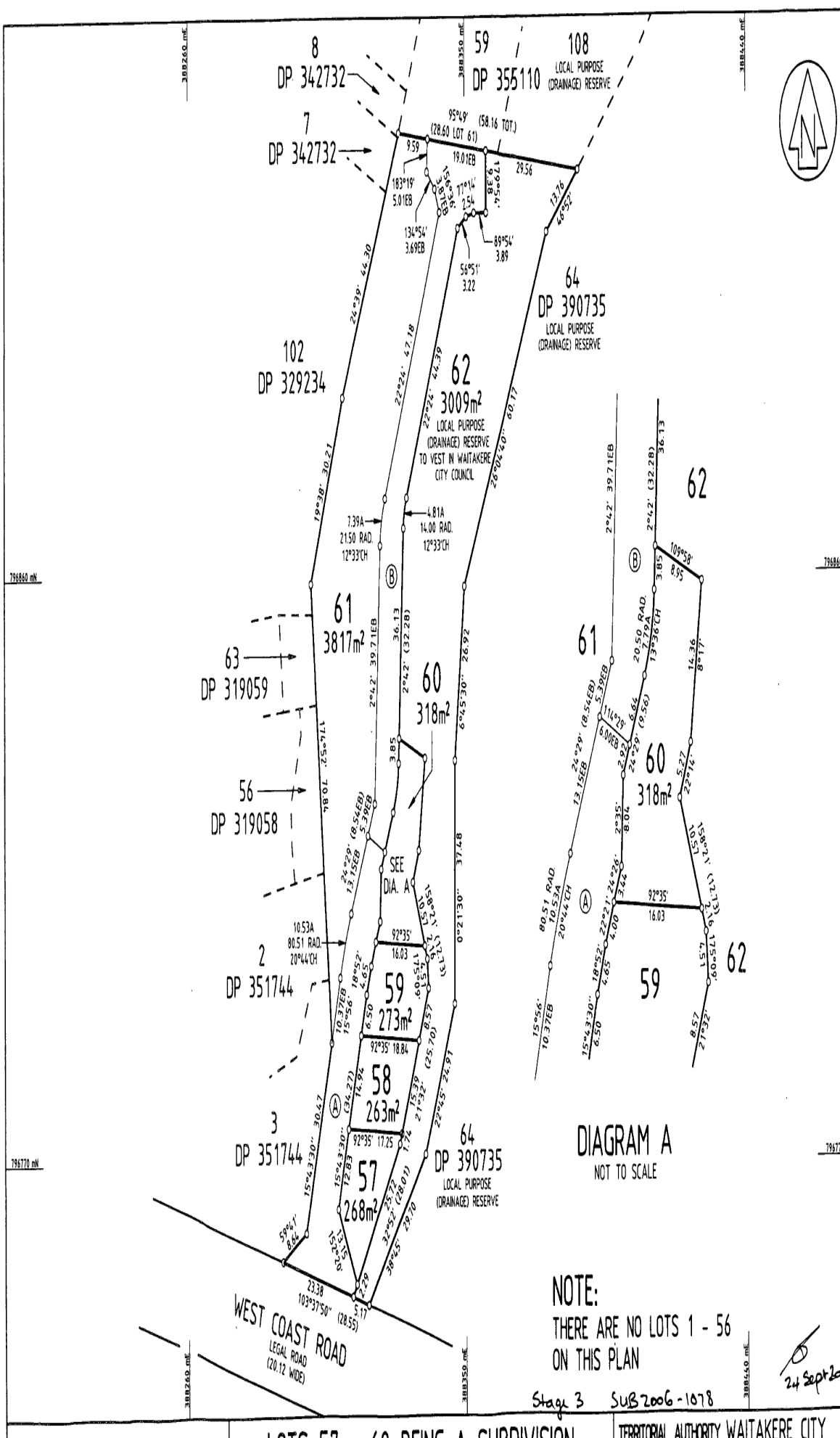

DIAGRAM A
NOT TO SCALE

NOTE:
THERE ARE NO LOTS 1 - 56 ON THIS PLAN

24 Sept 2007

I HEREBY CERTIFY THAT THIS PLAN WAS APPROVED BY THE WAITAKERE CITY COUNCIL PURSUANT TO SECTION 223 OF THE RESOURCE MANAGEMENT ACT 1991

ON THE ___ DAY OF _____ 2007

SUBJECT TO THE GRANTING OR RESERVING OF THE EASEMENTS SET OUT IN THE MEMORANDUM HEREON

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RIGHT OF WAY WATER SUPPLY	Ⓐ Ⓑ	LOT 61 HEREON	WAITAKERE CITY COUNCIL

PROPOSED EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
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NEW CT ALLOCATED

LOT 57 - 364361
LOT 58 - 364362
LOT 59 - 364363
LOT 60 - 364364
LOT 61 - 364365

CLASS OF SURVEY: I

Total Area 7948m²

Comprised in CT 163629

I KEVIN RAYMOND MEIKLE
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Signed _____ Date 25 June '07

Field Book p. Traverse Book p.
Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File
Received
Instructions

DP390736

Stage 3 SUB2006-1078

LAND DISTRICT NORTH AUCKLAND

LOTS 57 - 62 BEING A SUBDIVISION OF LOT 3 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY

Surveyed by BABBAGE CONSULTANTS LTD. 42608

Scale 1 : 600 Date MAY 2007

J:\CCADS\DATA\42608\DWGS3TP1 FROM JOB LTBDMST3

APPROVED LM 99/11

WAITAKERE CITY COUNCIL
21 NOV 2007

Babbage
CONSULTANTS

BABBAGE CONSULTANTS LIMITED
109 FANSHAWE STREET, AUCKLAND 1010
PO BOX 2027, AUCKLAND 1140, NEW ZEALAND
PHONE: 0-9-379 9980, FAX: 0-9-377 1170
EMAIL: admin@babbage.co.nz

02166

Waitakere City Council
Private Bag 93 109
Henderson
Waitakere City 1231
New Zealand

Attention: Rhonda Hobson

Job Number: 42608/C
fk
20 October 2007

RECEIVED IN
22 NOV 2007
SUBDIVISIONS

Dear Rhonda

West Coast Rd (No. 423-429), Henderson
224c Application For Stage 1 (Lots 1-35 Inclusive) W 22816
Resource Consent No. RMA20061078

Please find our application for release by Waitakere City Council (WCC) of the Section 224(c) compliance certificate for Stage 1 of this subdivision.

The following shows how each of the conditions of consent have been satisfied.

Ecowater Conditions (Public Drainage)

(EW1) There are no overland flow paths through the proposed residential lots within Stage 1. All overland flow paths are contained within the legal road reserve and discharge to the drainage reserve.

(EW2) A complete public wastewater reticulation system to serve all Lots has been designed, provided, installed, inspected and tested by WCC to be in accordance with the approved Engineering Approval drawings. WCC are processing QA Completion Certificate.

(i) Each lot has been provided with a separate public connection.
(ii) Not applicable.
(iii) All drainage lines have been located in the front of the Lots where possible.
(iv) The existing public drainage lines passing through Lots 31-32 have been re-routed to provide more adequate building sites for those Lots.

(EW3) A complete public storm water drainage system to serve all Lots has been designed, provided, installed, inspected and tested by WCC to be in accordance with the approved Engineering Approval drawings. WCC are processing QA Completion Certificate

(i) Each lot has been provided with a separate public connection.
(ii) Not applicable.

(iii) All existing stormwater discharges onto the land have been collected and the capacity of the new systems have provided for them.
(iv) A minimum of 0.5m clearance between the proposed stormwater pipes and the existing Watercare Services Ltd trunk wastewater drain has been adhered to.
(v) Not applicable.
(vi) All new stormwater outlets to the stream have been laid in the direction of the flow of the stream.

(EW4) A complete storm water quality treatment system for the site in accordance with the Auckland Regional Council's TP10 "Stormwater Management Devices Design Guideline Manual", and WCC Code of Practice for City Infrastructure and Land Development, has been designed, provided and installed in accordance with the approved Engineering Approval drawings. WCC are processing QA Completion Certificate.

(i) All the stormwater treatment and detention devices have been located clear of existing and proposed public drainage lines.
(ii) All conditions of the approval from Watercare Services Ltd have been adhered to except for the provision of a 0.5m thick impermeable compacted clay liner under the pond base, embankment and spill way. Due to further site investigation upon pond excavation this was found not to be required, see attached letter from Watercare Services Ltd.
(iii) Detention of the 2 year storm event from the entire Stage 1, 2 and 3 phases of the development and discharge at pre-development levels as required by the Parrs Stream Catchment Management Plan has been provided for in the design of the ponds. All design calculations were included with the ponds engineering approval applications.
(iv) Not applicable to this stage.
(v) A planting plan has been submitted and approved as part of the Engineering Approval for the ponds.
(vi) An as-built plan of the ponds has been provided to WCC for approval.
(vii) See attached geotechnical completion report certifying construction of the ponds.
(viii) The maintenance manual for the wetland pond (treatment device) has been submitted and approved as part of the Engineering Approval process.
(ix) A drainage reserve covering these areas is shown on the Title Plans which has been signed off by WCC for the 223 Certificate.

(EW5) A complete public water supply reticulation system and fire fighting services to serve all Lots has been designed, provided, installed, inspected and tested by WCC to be in accordance with the approved Engineering Approval drawings. WCC processing QA Completion Certificate.

(i) All Lots have been individually metered at the road reserve boundary.
(ii) All water connections have been located at the same position as the power and telephone connection to each Lot.
(iii) Not applicable.
(iv) All WCC costs have been paid.
(v) Fire hydrants have been provided for within 135m of the furthest point on any property and within 65m of the end of a cul-de-sac.
(vi) Not applicable.

(EW6) A complete ICT Network along all new public roads for the future provision of ICT services within the development in compliance with Council's Code of Practice for City Infrastructure and Land Development has been designed, provided, installed and inspected by WCC to be in accordance with the approved Engineering Approval drawings. WCC processing QA Completion Certificate.

Geotechnical Conditions

All geotechnical conditions have been covered in the Earthworks Completion Report which is attached.

Transport Assets Conditions

(TA1) A complete transport system has been designed, provided and installed in accordance with the approved Engineering Approval drawings. WCC are processing QA Completion Certificate.

(TA2) The roads (Lots 63 and 68 to 71) shall be vested to Council and designated as a Local road upon deposit of the survey plans.

Roading Conditions

(RD1) The engineering plan approval process has been carried out by WCC.

(RD2) (1) Street planting plan has been approved by WCC but has yet to be implemented. The Developer is intending to bond for this part of the works that effect Stage 1.

(2) Intersection geometry, street furniture and safety features finalised through the engineering approval process and implemented.

(3) Footpaths had been provided for the full length on both sides of the road. A section of approximately 70.0m on the right hand side of the road connecting to the end of existing Woodbank Drive was removed after discussions with Ecowater and Waitakere City Council's roading department. The footpath was removed to accommodate a design change which included a flat kerb and swale.

(4) 25 indented on-street parking spaces have been provided for 35 lots (ratio of 1 parking space per 1.4 dwellings).

(5) No indented on-street parking bays have been located to interfere with the operation of a dwelling driveway.

(RD3) Where practicable a layer not less than 150mm deep of topsoil free of deleterious material has been replaced on all allotments to the satisfaction of the Council.

Shared Driveways and Vehicle Crossings

The shared driveway part of this section refers to Stage 3. This letter only covers the 224(c) application for Stage 1.

(SD1)
1. Not applicable to Stage 1.
2. Not applicable to Stage 1.
3. All vehicle crossing boxing prior to pouring have been inspected by WCC.
4. All vehicle crossings comply with standard detail SD 3.15 Maximum Vehicle Crossing Profile and have been inspected and approved by WCC Roading Inspector.
5. Not applicable to Stage 1.
6. Not applicable to Stage 1.

(SD2) Not applicable to Stage 1.

Road To Vest

(RV1) Survey plans have been lodged with LINZ for approval and 223 submitted directly by WCC to LINZ. The roads, Lots 68, 69, 70 and 71 (Stage 1), will vest on deposit of the survey plan.

(RV2) All as-built data and drawings have been completed and lodged with Waitakere City Council's roading department.

Parks Conditions

(PK1) A Weed Control Programme has been submitted and approved through WCC environmental department.

(PK2) The Developer's solicitors will liaise with WCC for preparation of the fencing agreement which will be lodged to LINZ together with application for new titles.

(PK3) Protective fencing has been placed around the dripline of the protected trees listed in the Consent Conditions and remains in place until the vegetation alteration, earthworks and construction stages are finished.

(PK4) A report is being prepared by the Developer's arborist and will be sent directly to WCC Parks Asset Planning.

(PK5) A silt fence and dirty water diversion run-off bund have been implemented and maintained during the earthworks construction period.

(PK6)
(i) Refer to (PK7).
(ii) The bollards and 3.0m chain entry were replaced by a pool fence and a lockable gate on the instruction of WCC's Assets Department.
(iii) Street lighting has been implemented and approved under the Engineering Approval process.
(iv) Refer to (PK9).
(v) Refer to (PK9).

(vi) All parking areas provided on the streets adjacent to footpaths have been kerbed and approved under the Engineering Approval process.
(vii) All plants shall be best nursery stock, healthy vigorous and eco-sourced when planting is implemented.

(PK7) The street tree planting plan has been approved by WCC's Parks and Reserves but has not been implemented at this stage. The Developer will be providing a bond for the works that affect Stage 1.

(PK8) The landscaping specification which has been approved by WCC has stipulated a two year maintenance period. The planting contract has not yet been allocated but upon allocation the Parks Consent Planner will be advised.

(PK9) Finalisation of alignments and location of paths, boardwalks and footbridges have been finalised with WCC's Parks, Twin Streams and Assets departments at a meeting with these departments and approval is pending. All of the boardwalk, footpath and footbridge in Stage 1 will be constructed when the approved amended drawings have been completed. These works are to be undertaken to the account of WCC.

(PK10) All reserves will be left in a condition suitable for maintenance and mowing in accordance with WCC's Code of Practice and the Parks Asset Planner. This part of the works will be included in the bonded works that affect Stage 1.

Legal Documentation

(LD1) The Developer's Solicitor is Gregory Simon of Gregory Simon Barrister & Solicitor who will be handling the lodgement of all requisite documentation. A copy of the land transfer plan with the DP number and Certificate of Title allocations is attached herewith.

(LD2) – (LD3) Not applicable to this stage of the development.

(LD4) Cancellation of the drainage easement per 6135712.4 will be effected upon vesting of the new drainage reserves.

Fees, Bonds & Contributions

(FC1) Any additional charges will be paid prior to collection of 224(c) certificate.

(FC2) The street damage bond is in place.

(FC3) All outstanding financial contributions will be paid prior to collection of 224(c) certificate.

(FC4) A maintenance bond will be provided prior to collection of 224(c) certificate.

(FC6) All outstanding financial contributions will be paid prior to collection of 224(c) certificate.

General

(GL1) WCC have already been advised and WCC has signed off in respect to 223 certificate. See copy attached.

(GL2) Barter Tax Invoice attached herewith.

(GL3) WCC has been advised of the consultants working on this project.

(GL4) – (GL6) See attached electric power (United Networks) Take-Over & Completion Certificate and telephone services (Telecom) Subdivision Sign Off Certificate.

(GL7) Adequate sediment and erosion control measures have been constructed prior to commencement of the construction works and maintained during construction.

(GL8) Noted.

Advice Notes

All advice notes have been noted and acted on.

Yours faithfully

Fiona Keir
Babbage Consultants Limited

cc Brian Donnelley – New Zealand Housing Foundation
Frank Rientjes – Rientjes Consultants

Encs

Chief Executive	
Corporate Services	
City Services Moselle	
Consultancy Services	
ECO WATER	
Strategic Group	
Consent Services	✓
Field Services	
C	

FORM 5.4

SUBDIVIDER'S/DEVELOPER'S TAX INVOICE

(Company Name) NEW ZEALAND HOUSING FOUNDATION

(Address) PO BOX 36 027

NORTHCOTE, AUCKLAND 1310

GST Number: 79 808 962

Date: 20/11/07

Issued to: **WAITAKERE CITY COUNCIL**

Dr to: NEW ZEALAND HOUSING FOUNDATION (Subdivider/Developer)

For barter with WAITAKERE CITY COUNCIL of roading, reserve, drainage and watermains included in SP W 22816 being a subdivision/ development located at

423-429 WEST COAST ROAD, GLEN EDEN - STAGE ONE ONLY

L.T. Number: LT 389289

Land to vest 19,628 m^2 at $ ..... m^2 ..... As per WCC valuation assessment

Construction Cost 1,511,000.00

TOTAL .....

GST @ 0% .....

INVOICE TOTAL .....

WEST COAST ROAD

STAGE 1 - ROAD BREAKDOWN COSTS

Concrete	
Footpath	$ 61,200.00
Vehicle Crossings	$ 27,690.00
Kerbs	
Kerb	$ 38,588.00
Ped. Crossing	$ 1,350.00
Dish Channel	$ 2,534.00
Ground Sterilising Agent	$ 424.00
Catchpits	
Single	$ 12,520.00
Double	$ 7,530.00
Subsoil Drainge	$ 24,200.00
Road Formation	
Subgrade Trimming	$ 5,594.00
Lime Stabilisation	$ 33,562.00
Metal	$ 121,746.00
AC	$ 79,848.00
Concrete Parking Bays	$ 32,160.00
Streelights	$ 41,550.00
Roading Markings/Signs	$ 15,000.00
TOTAL	**$ 505,496.00**

UnitedNetworks
A division of Vector Limited

Take-Over & Completion Certificate

(On Behalf of UnitedNetworks a division of Vector Limited)

Client:	**Babbage Consultants** **PO Box 2027** **Auckland** Attention: Fiona Keir

UnitedNetworks
101 Carlton Gore Road
Newmarket
PO Box 99882
Newmarket
Auckland
New Zealand
Tel 64 9 **978 7788**
Fax 64 9 **978 7799**
www.unitednetworks.co.nz

Contractor:	Siemens Energy Services Limited.
Contractors Address:	PO Box 101 694 North Shore Mail Centre
Contact:	Midhat Husaric

Description of the Works

Installation of 400V reticulation to supply 35 new dwellings (Stage 1) contained within the development at 423-429 West Coast Road, Glen Eden - UnitedNetworks Project No. EC-N1-07-CIP4-016

1.0 **Electrical Reticulation**
Extension of the 11kV, 400V, pilot cables and associated equipment including the instalation of a 100kVA transformer to supply 35 new dwellings with a single phase 60 Amp supply.

It is hereby certified that the part works as detailed and amended on construction plans EC-N1-07-CIP4-016 have been practically completed in accordance with the Contract Documents and UnitedNetworks Design and Construction Manual criteria.

1.1 Specifically these works encompass the installing 100kVA0kVA Transformer. The design capacity is for single-phase 60-amp supply per dwelling and one dwelling per allotment.

2.0 The works, following tests where required, have been commissioned and taken over by UnitedNetworks/Vector as Network Operator.

3.0 UnitedNetworks a division of Vector Limited is the Electrical Operator of the distribution system which will provide Line Function Services at the Point of Supply to the subdivision.

4.0 Street lighting installation is not included in this certificate

Engineer to Contract: Damon Newton _____ Date 01 October 2007.

(Name) (Signature)

UnitedNetworks
A division of Vector Limited

Take-Over & Completion Certificate

(On Behalf of UnitedNetworks a division of Vector Limited)

Client:	**Babbage Consultants** **PO Box 2027** **Auckland** Attention: Fiona Keir

UnitedNetworks
101 Carlton Gore Road
Newmarket
PO Box 99882
Newmarket
Auckland
New Zealand
Tel 64 9 **978 7788**
Fax 64 9 **978 7799**
www.unitednetworks.co.nz

Contractor:	Siemens Energy Services Limited.
Contractors Address:	PO Box 101 694 North Shore Mail Centre
Contact:	Midhat Husaric

Description of the Works

Installation of 400V reticulation to supply 21 new dwellings (Stage 2) contained within the development at 423-429 West Coast Road, Glen Eden - UnitedNetworks Project No. EC-N1-07-CIP4-016

1.0 **Electrical Reticulation**
400V, pilot cables and associated equipment including the upgrading of a 100kVA to 200kVA transformer to supply 21 new dwellings with a single phase 60 Amp supply.

It is hereby certified that the part works as detailed and amended on construction plans EC-N1-07-CIP4-016 have been practically completed in accordance with the Contract Documents and UnitedNetworks Design and Construction Manual criteria.

1.1 Specifically these works encompass the upgrading 100kVA to 200kVA Transformer. The design capacity is for single-phase 60-amp supply per dwelling and one dwelling per allotment.

2.0 The works, following tests where required, have been commissioned and taken over by UnitedNetworks/Vector as Network Operator.

3.0 UnitedNetworks a division of Vector Limited is the Electrical Operator of the distribution system which will provide Line Function Services at the Point of Supply to the subdivision.

4.0 Street lighting installation is not included in this certificate

Engineer to Contract: Damon Newton _____ Date 05 of March 2008

(Name) (Signature)

Telecom New Zealand Limited
Network Delivery
Level 1
Zespri House
Private Bag 92028
Auckland

Telecom Ref: T 48755
Your Ref:

Telephone: 09 357 7036
Facsimile: 09 358 1273

NZ Housing Foundation
C/- Babbage Consultants Ltd
PO Box 2027
Auckland

Attention: Fiona Keir

Date: 3.9.07

RE: **Proposed Subdivision** West Coast Rd Housing Development Stage 1a
Location Auckland

TELEPHONE NETWORK PROVISIONING
SUBDIVISION SIGN OFF CERTIFICATE

The above subdivision has been reticulated to the standards of Telecom New Zealand Ltd.

It should be noted that this certificate does not cover service lead-ins to individual lots.

Yours faithfully

Mike Kirke
Network Deployment Specialist

Telecom New Zealand Limited
Network Delivery
Level 1
Zespri House
Private Bag 92028
Auckland

Telecom Ref: T 48761
Your Ref:

Telephone: 09 357 7036
Facsimile: 09 358 1273

NZ Housing Foundation
C/- Babbage Consultants Ltd
PO Box 2027
Auckland

Attention: Fiona Keir

Date: 31 8 07.

RE: **Proposed Subdivision** West Coast Rd Housing Development Stage 1b
Location Auckland

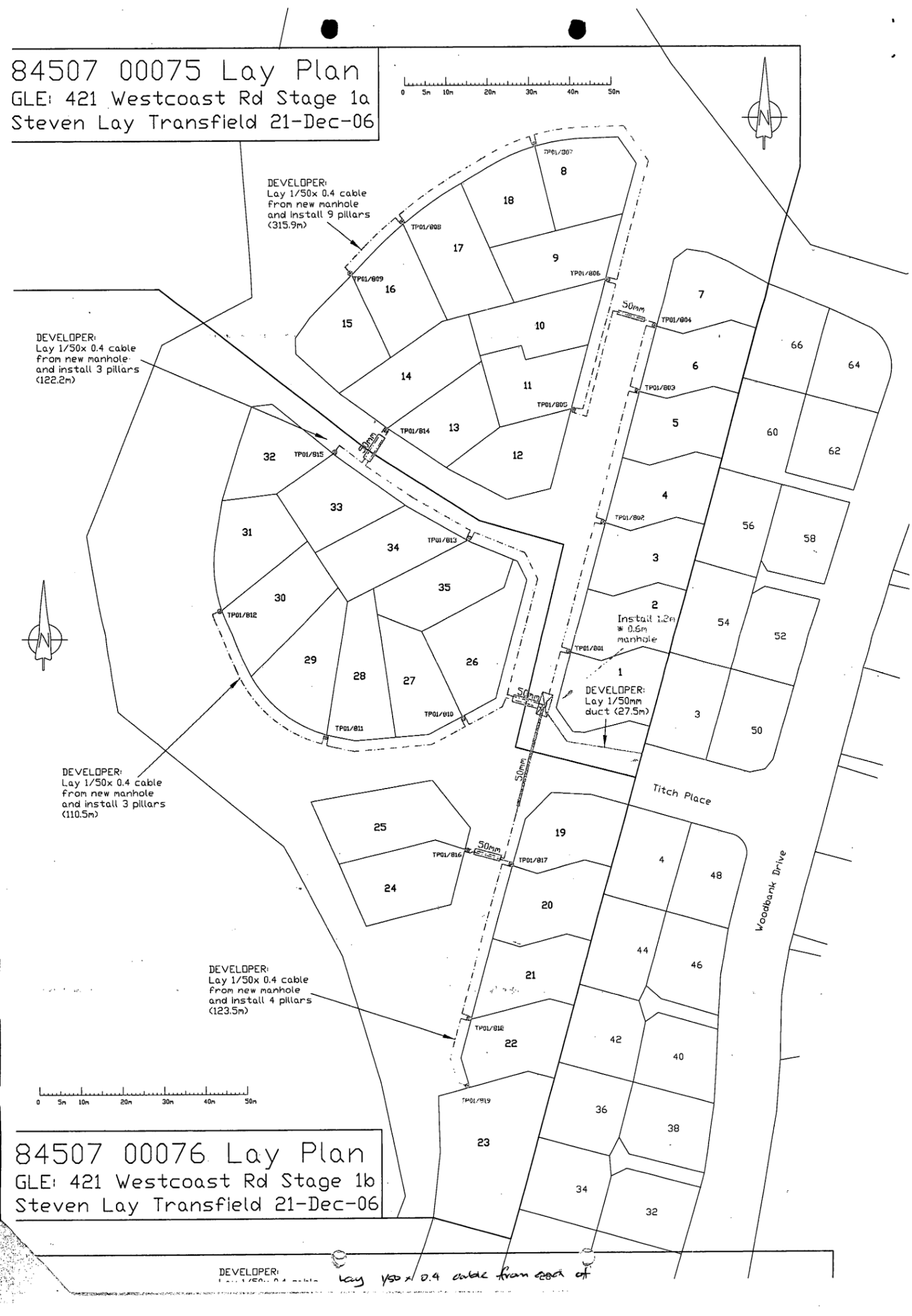
TELEPHONE NETWORK PROVISIONING
SUBDIVISION SIGN OFF CERTIFICATE

The above subdivision has been reticulated to the standards of Telecom New Zealand Ltd.

It should be noted that this certificate does not cover service lead-ins to individual lots.

Yours faithfully

Mike Kirke
Network Deployment Specialist


84507 00075 Lay Plan
GLE: 421 Westcoast Rd Stage 1a
Steven Lay Transfield 21-Dec-06
0 5m 10m 20m 30m 40m 50m
DEVELOPER:
Lay 1/50x 0.4 cable
from new manhole
and install 9 pillars
(315.9m)
DEVELOPER:
Lay 1/50x 0.4 cable
from new manhole
and install 3 pillars
(122.2m)
DEVELOPER:
Lay 1/50x 0.4 cable
from new manhole
and install 3 pillars
(110.5m)
DEVELOPER:
Lay 1/50x 0.4 cable
from new manhole
and install 4 pillars
(123.5m)
DEVELOPER:
Lay 1/50mm
duct (27.5m)
Install 1.2m
x 0.6m
manhole
50mm
TP01/807
TP01/808
TP01/809
TP01/805
TP01/804
TP01/803
TP01/802
TP01/801
TP01/814
TP01/815
TP01/813
TP01/812
TP01/810
TP01/811
TP01/816
TP01/817
TP01/818
TP01/819
Titch Place
Woodbank Drive
84507 00076 Lay Plan
GLE: 421 Westcoast Rd Stage 1b
Steven Lay Transfield 21-Dec-06
DEVELOPER:
Lay 1/50 x 0.4 cable from each of

Take-Over & Completion Certificate

(On Behalf of UnitedNetworks a division of Vector Limited)

Client:	**Babbage Consultants** PO Box 2027 Auckland Attention: Fiona Keir

Contractor:	Siemens Energy Services Limited.
Contractors Address:	PO Box 101 694 North Shore Mail Centre
Contact:	Midhat Husaric

Description of the Works

Installation of 11kV and 400V reticulation to supply 19 new dwellings (Stage 1) contained within the development at 423-429 West Coast Road, Henderson UnitedNetworks Project No. EC-N1-07-CIP4-016

1.0 **Electrical Reticulation**
Extension of the11kV, 400V, pilot cables and associated equipment including the installation of a 100kVA transformer to supply 19 new dwellings (Stage 1) with a single phase 60 Amp supply.

It is hereby certified that the part works as detailed and amended on construction plans EC-N1-07-CIP4-016 have been practically completed in accordance with the Contract Documents and UnitedNetworks Design and Construction Manual criteria.

1.1 Specifically these works encompass the extension of the electrical underground 11kV network. The design capacity is for single-phase 60-amp supply per dwelling and one dwelling per allotment.

2.0 The works, following tests where required, have been commissioned and taken over by UnitedNetworks/Vector as Network Operator.

3.0 UnitedNetworks a division of Vector Limited is the Electrical Operator of the distribution system which will provide Line Function Services at the Point of Supply to the subdivision.

4.0 Street lighting installation is not included in this certificate

Engineer to Contract: Damon Newton Date 01 October 2007

(Name) (Signature)

water Care
services limited

Watercare Services Limited
2 Nuffield St
Newmarket
Auckland 1023
New Zealand
Private Bag 92 521, Wellesley Street
Auckland 1141

Telephone
+64 9 539-7300
Facsimile
+64 9 539-7494

Fax Message

To Paddy Lunsford.

Company Babbage Cons. Ltd Fax 377 1170

Subject 423 Wairau Coast Rd. No of Pages 3.

From Merv Popham Date 20/2/07

This facsimile message contains information that is confidential and which may be subject to statutory restrictions on its use. If you are not the intended recipient, you must not peruse, use, pass on or copy this message. If you have received this message in error, please telephone us (collect) and return the original message to us by mail. Thank you.

We confirm that due site specific conditions as outlined in your letter of 8 Feb 07 the impermeable clay blanket is not required.

MPopham.

Regards

Merv Popham
Works Services

Babbage
CONSULTANTS
BABBAGE CONSULTANTS LIMITED
109 EANSHAWE STREET, AUCKLAND 1010
PO BOX 2027, AUCKLAND 1140, NEW ZEALAND
PHONE: 0-9-379 9980, FAX: 0-9-377 1170
EMAIL: admin@babbage.co.nz

RECEIVED
- 9 FEB 2007
ANSWERED.....

Watercare Services Ltd
Private Bag 92521
Wellesley Street
Auckland
New Zealand

Job Number: 42608/C
fk
8 February 2007

Attention: Merv Popham

Dear Merv

Housing Development
West Coast Rd (No. 423-429), Henderson
Watercare Consent Conditions

We enclose a copy of plans C17 and C18 showing the pond layout. It is a condition of the Waitakere City Council consent (based on a requirement of Watercare) that the pond have a compacted clay blanket 0.5m thick to retain the pond water. We note that Watercare conditions only requires this in permeable ground conditions.

The contractor has constructed the deeper of the ponds (identified as stormwater detention basin 1 on C17). The site ground conditions consist of impermeable clay materials to within 200 of the base of the pond where the groundwater table is encountered in a thin sandy seam overlying very stiff to hard dark grey mudstone. It is our opinion that these conditions do not represent permeable ground conditions and therefore the pond does not require a clay liner. Further it would not be practical to achieve a liner over the permeable sand seam as the liner would lift off the base of the pond.

We understand that the valid concern of Watercare is that the presence of stormwater within the pond could track down the pipeline trench and erode the bedding materials. In our opinion the soils encountered at this site will not allow this to happen because a) the soils surrounding the Watercare pipeline are impervious and b) the pond water will generally be founded at a level below the base of the pipeline (see plan C18) and will only rise above the base of the pipelines for short periods of time insufficient to saturate the ground around the pipeline.

Further to our telephone conversation and on the basis of the above explanation could you please return a signed copy of this letter to confirm your acceptance that under item 4 of the Watercare consent issued on 21 November 2006 "Specific Requirements" Consent No. D 1415/06 regarding the 0.5m impermeable compacted clay blanket in the wetland pond is not necessary for the soil conditions as described in this letter.

Yours faithfully

pp N S (Paddy) Luxford
Babbage Consultants Limited

Further to site inspection

I confirm on behalf of Watercare that based on the conditions as described in this letter that there is no requirement for a 0.5m thick compacted clay liner.

Signed _____ 19/2/07
Merv Popham

Watercare Services Limited
273a Church Street
Onehunga
Private Bag 92802 Penrose
Auckland

FORM 5.4

SUBDIVIDER'S/DEVELOPER'S TAX INVOICE

(Company Name) NEW ZEALAND HOUSING FOUNDATION

(Address) PO BOX 36 027

NORTHCOTE, AUCKLAND 1310

GST Number: 79 808 962

Date: 20/11/07

Issued to: **WAITAKERE CITY COUNCIL**

Dr to: NEW ZEALAND HOUSING FOUNDATION (Subdivider/Developer)

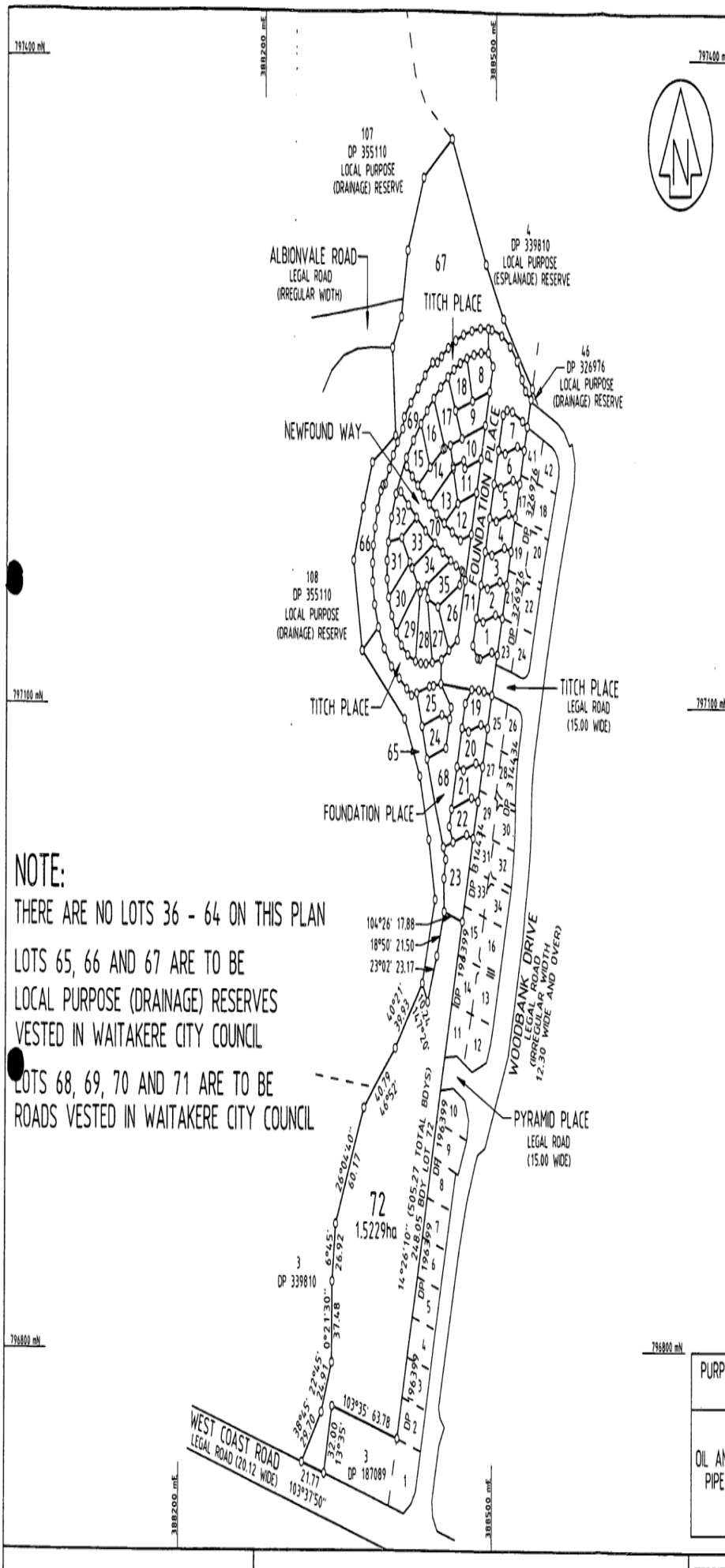
For barter with WAITAKERE CITY COUNCIL of roading, reserve, drainage and watermains included in SP W 22816 being a subdivision/ development located at

423-429 WEST COAST ROAD, GLEN EDEN - STAGE ONE ONLY

L.T. Number: LT 389289

Land to vest 19,628 m^2 at $ ..... m^2 ..... As per WCC valuation assessment

Construction Cost	1,511,000.00
TOTAL	.....
GST @ 0%	.....
INVOICE TOTAL	.....



NOTE:

THERE ARE NO LOTS 36 - 64 ON THIS PLAN

LOTS 65, 66 AND 67 ARE TO BE LOCAL PURPOSE (DRAINAGE) RESERVES VESTED IN WAITAKERE CITY COUNCIL

LOTS 68, 69, 70 AND 71 ARE TO BE ROADS VESTED IN WAITAKERE CITY COUNCIL

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF SUPPORT	(A)	LOT 1	LOT 2
	(B)	LOT 2	LOT 3
	(C)	LOT 3	LOT 4
	(D)	LOT 4	LOT 5
	(E)	LOT 5	LOT 6
	(F)	LOT 6	LOT 7
	(G)	LOT 8	LOT 18
	(H)	LOT 9	LOT 8
	(I)	LOT 10	LOT 9
	(J)	LOT 11	LOT 10
	(K)	LOT 12	LOT 11
	(L)	LOT 12	LOT 13
	(M)	LOT 13	LOT 14
	(N)	LOT 14	LOT 15
	(O)	LOT 17	LOT 16
	(P)	LOT 18	LOT 17
	(Q)	LOT 9	LOT 17
	(R)	LOT 27	LOT 28
	(S)	LOT 28	LOT 27
	(T)	LOT 28	LOT 29
	(U)	LOT 29	LOT 30
	(V)	LOT 30	LOT 31
	(W)	LOT 33	LOT 32
	(X)	LOT 33	LOT 34
	(Y)	LOT 34	LOT 33
	(Z)	LOT 34	LOT 35
	(AA)	LOT 20	LOT 19
	(AB)	LOT 21	LOT 20
	(AC)	LOT 22	LOT 21
RIGHT OF SUPPORT	(AD)	LOT 23	LOT 22
	(AE)	LOT 24	LOT 25

EXISTING EASEMENTS IN GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
OIL AND GAS PIPELINES	(AF)	LOT 67	B344219.1
	(AG)	LOT 69	
	(AH)	LOT 71	

I HEREBY CERTIFY THAT THIS PLAN WAS APPROVED BY THE WAITAKERE CITY COUNCIL PURSUANT TO SECTION 223 OF THE RESOURCE MANAGEMENT ACT 1991

ON THE ____ DAY OF _____ 2007

SUBJECT TO THE GRANTING OR RESERVING OF THE EASEMENTS SET OUT IN THE MEMORANDUM HEREON

_____
AUTHORISED OFFICER

NEW CT ALLOCATED

LOT 1 - 357044	LOT 19 - 357062
LOT 2 - 357045	LOT 20 - 357063
LOT 3 - 357046	LOT 21 - 357064
LOT 4 - 357047	LOT 22 - 357065
LOT 5 - 357048	LOT 23 - 357066
LOT 6 - 357049	LOT 24 - 357067
LOT 7 - 357050	LOT 25 - 357068
LOT 8 - 357051	LOT 26 - 357069
LOT 9 - 357052	LOT 27 - 357070
LOT 10 - 357053	LOT 28 - 357071
LOT 11 - 357054	LOT 29 - 357072
LOT 12 - 357055	LOT 30 - 357073
LOT 13 - 357056	LOT 31 - 357074
LOT 14 - 357057	LOT 32 - 357075
LOT 15 - 357058	LOT 33 - 357076
LOT 16 - 357059	LOT 34 - 357077
LOT 17 - 357060	LOT 35 - 357078
LOT 18 - 357061	LOT 72 - 357079

NOTES

1. FOR LOT AREAS AND BOUNDARY DIMENSIONS SEE SHEETS 2, 3 AND 4
2. FOR EASEMENT BOUNDARY DIMENSIONS SEE DIAGRAMS A AND B ON SHEET 2 AND DIAGRAMS C, D AND E ON SHEET 5.

SHEET 1 OF 5

CLASS OF SURVEY: I

Total Area 4.9331ha

Comprised in CT 163628

I KEVIN RAYMOND MEIKLE

Being a person entitled to practise as a licensed cadastral surveyor, certify that —

(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2;

(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed _____ Date _____

Field Book p. Traverse Book p.

Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File
Received
Instructions

DP389289

LAND DISTRICT NORTH AUCKLAND

LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY

42608

Surveyed by BABBAGE CONSULTANTS LTD.

Scale 1 : 2000 Date MAY 2007

W22816

Waitakere City Council
Te Taiao o Waitakere

City of Waitakere District Plan

REPORT FOR DISCRETIONARY ACTIVITY APPLICATION SECTION 94 AND 104 ASSESSMENT AND DETERMINATION IN ACCORDANCE WITH THE RESOURCE MANAGEMENT ACT 1991

1.0 SUMMARY OF PROPOSAL

To subdivide a 5.7284 hectare site into 61 residential lots with net site areas ranging from 263m² to 840m², with reserves and roads to vest.

2.0 APPLICATION DETAILS

Resource Planner:		Felicitas Dhliwayo
Site Address:		423-429 West Coast Road & 4 Pyramid Place, Glen Eden
Applicant:		New Zealand Housing Foundation
Date Received:		26 June 2006
Resource Consent No:		RMA20061078
Scheme Plan No:		SPW 22816
Ward:		Waitakere
Legal Description:		Lot 2 DP 339810 (CT 163628) & Lot 3 DP339810 (CT 163629).
Address for Service:		Matthew Paetz Babbage Consultants P O Box 2027 Auckland.
Total Area:		Lot 2- 4.9336 hectares Lot 3- 7948m²
Lot Areas (Net Areas):		Net unit areas vary from 263m² to 840m² (see table One below)
Operative Plan:	Human Environment:	Living
	Natural Area:	General / Riparian/ Restoration
	Landscape Elements:	Riparian Margin - 7metres
	Hazards:	**Lot 3 DP 339810** Special Feature Nos: 7762 (Flooding); 11689 (drainage easement); 11690 (ROW easement); 12074 (natural flowpath); 12077(overland flowpath) **Lot 2 DP 339810** High Pressure Natural Gas Pipeline Special Feature Nos: 12071 (replanting of reserve); 12073 (natural flowpath); 12076 (overland flowpath); 12087 (flooding)
	Roading Hierarchy:	District
Further Information Required:		Tree Planting Plan, Ecowater requirements, Revised Landscaping Plan.
Date Requested:		24/07/06, 03/08/06, 25/08/06

Date Received:	17/08/06, 29/09/06, 16/10/06
Any Affected Persons:	No
Approval Given:	NA

TABLE ONE- LOT SIZES

Lot No	Area m²	Lot No	Area m²	Lot No	Area m²	Lot No	Area m²
1	415*	16	395*	31	371*	46	377*
2	380*	17	475**	32	349	47	372*
3	380*	18	353*	33	383*	48	361*
4	380*	19	405*	34	411*	49	369*
5	380*	20	434*	35	415*	50	363*
6	380*	21	397*	36	446*	51	366*
7	381*	22	405*	37	426*	52	364*
8	403*	23	840**	38	439*	53	354*
9	402*	24	404*	39	439*	54	469**
10	388*	25	506**	40	439*	55	370*
11	353*	26	451**	41	370*	56	1416*
12	374*	27	354*	42	431*	57	268
13	350*	28	413*	43	444*	58	263
14	433*	29	412*	44	459**	59	273
15	363*	30	438*	45	370*	60	318
						61	3743
62 (Drainage Reserve to vest)	3005	66	1511 (Drainage reserve to vest)				
63 (Road to vest)	3302	67	7012 (Drainage reserve to vest)			70 (road to vest)	997
64 (Drainage Reserve to vest)	2556	68	1289 (Road to vest)			71 (Road to vest)	3684
65 (Drainage reserve to vest)	1956	69	3177 (Road to vest)				

** Site areas > permitted activity density of 450m²
* Site areas > limited discretionary activity density of 350m²

Locality Diagrams

Figure 1- View of the subject site(s) as shown on Colour Orthography Map (March 2000)

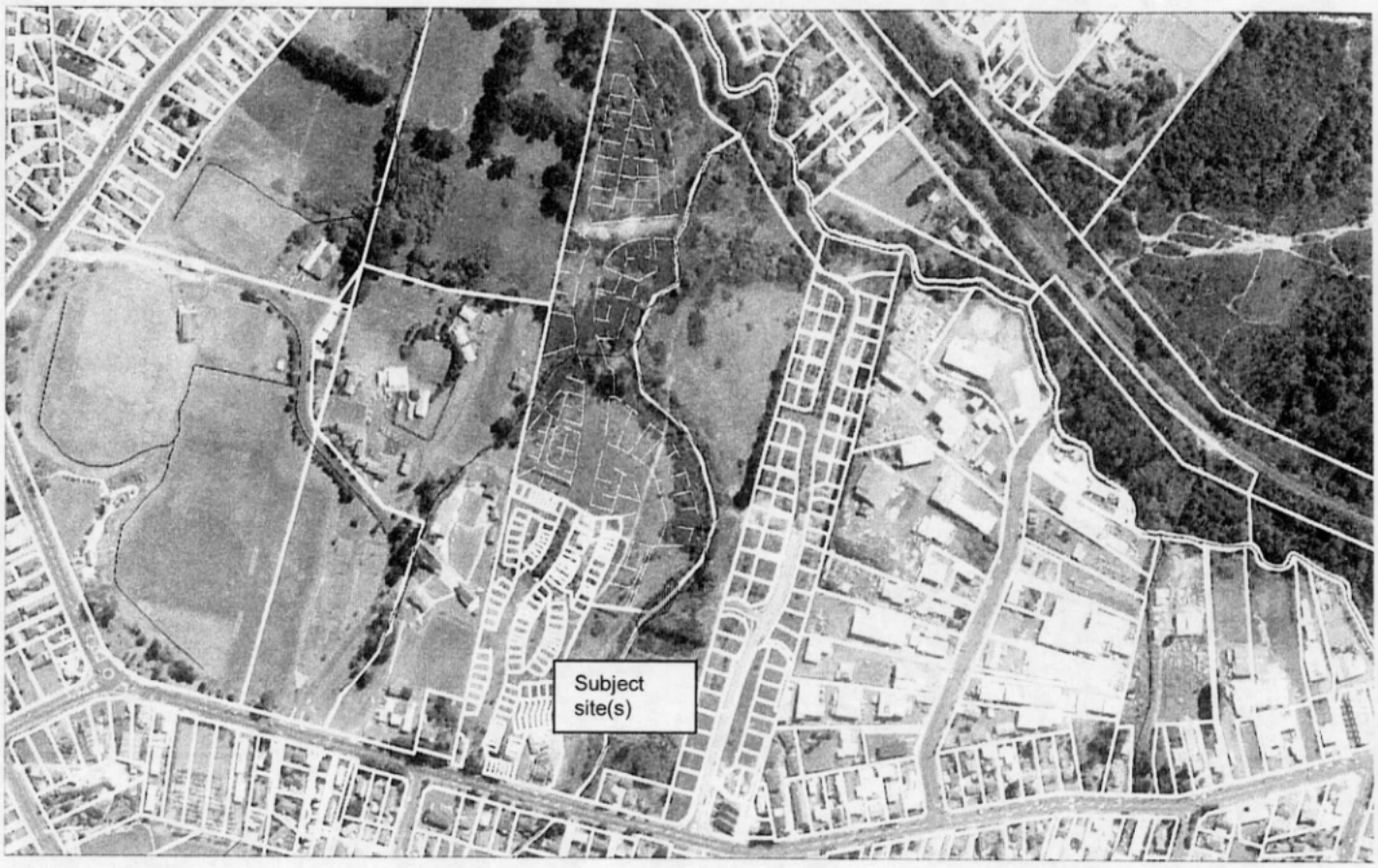
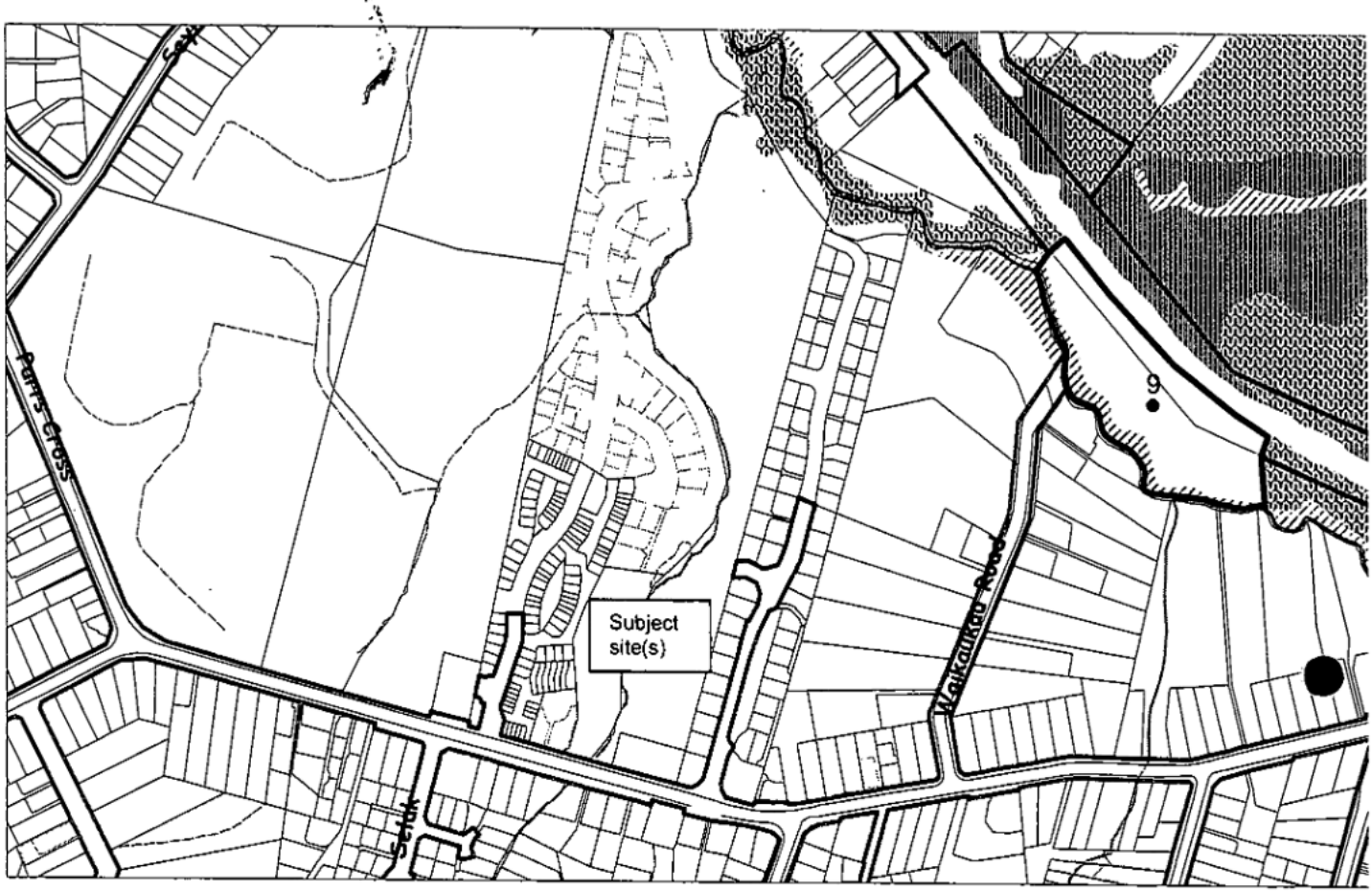


Figure 2- Location of subject site(s) as shown on Natural Environment Map.



2.1 Documents considered for this report include the application documentation and the site visit checklist completed on 10/07/2006. Specialists reports provided included;

- Landscape/Visual Assessment/ Arborist Report prepared by SOUL Environments.
- Traffic Assessment Report prepared by Traffic Design Group.
- Geotechnical Assessment Report prepared by Babbage Consultants.

2.2 BACKGROUND

The landuse part of this application, being RMA20061077 was granted by Council on 30 October 2006. RMA20061077 covered a comprehensive development of the site into 77 unit medium density development and consent was granted for medium density housing, shared driveway, earthworks, vegetation alteration, impermeable surfaces & building within the Riparian Margin, height, height in relation to boundary, and development on a flood sensitive site. Please refer to RMA20061077 for details.

3.0 REASON FOR APPLICATION- RELEVANT DISTRICT PLAN RULES
Extent Of Infringement And Type Of Activity Proposed

3.1 Subdivision - Operative Plan - March 2003

SUBDIVISION- GREENFIELDS

Rule 4.2- Greenfields Subdivision

Discretionary Activity consent is required for subdivision of an existing site 3 hectares or more in net site area, comprising the net unit area specified in a resource consent and meeting the specified performance standards for driveways and provision of infrastructure (drainage, telecommunications, gas electricity).

Overall the application is considered to be a **Discretionary Activity**. The proposal complies with all other development control rules under the District Plan.

4.0 SITE AND PROPOSAL

4.1 Site Description

The subject site comprises two properties (being 423-429 West Coast Road and 4 Pyramid Place), each on separate certificates of title, with a combined site area of 5.7284 hectares. The site is described in the application as follows; "The development site is located on West Coast Road, Glen Eden, in close proximity to the intersection of that road with Woodbank Drive. The site has legal frontage to four roads – West Coast Road, Pyramid Place, Titch Place and Woodbank Drive."

The site is of an irregular shape, which is largely a result of the topographical characteristics of the locality, in particular the location and route of the watercourse (Parrs Stream) running through the site roughly in a meandering north-south direction. To the south of Pyramid Place there is a row of mature pine trees running from east to west.

In the southern portions of the site the land is gently sloping downwards from east to west, towards the stream channel and associated riparian margins, before sloping upwards from the stream channel to the western site boundary. The land to the north of Pyramid Place on the site becomes steeper as part of the site drops quite steeply into a gully towards the stream. The west side of the site is moderately steep.

The larger area at the north end of the site is relatively flat with a gentle slope down to the stream. The site is presently covered in overgrown grass, weeds, gorse and trees. There is a mixture of native and exotic trees, predominantly located around the edge of the stream and at the northern boundary.

The area has a new subdivision on its western boundary which has the roading network laid and the construction of some houses has commenced. A more mature subdivision borders the site on the eastern side. There are no structures currently on the site.

The neighbourhood character is varied containing a mix of land use activities within 400 metres of the site, including developed and undeveloped residential land, open space developed for active and passive recreation, undeveloped open space, Marae, school, dairy and fruit and vegetable shops.

The surrounding neighbourhood contains a mix of housing styles, including medium density terraced housing, free-standing town houses on sites generally ranging between 350m² and 450m² (i.e. Woodbank Drive development), and conventional house and garden development where the site areas are in excess of 600m² (i.e. West Coast Road)".

Figure 3- View of subject site looking North from West Coast Road.

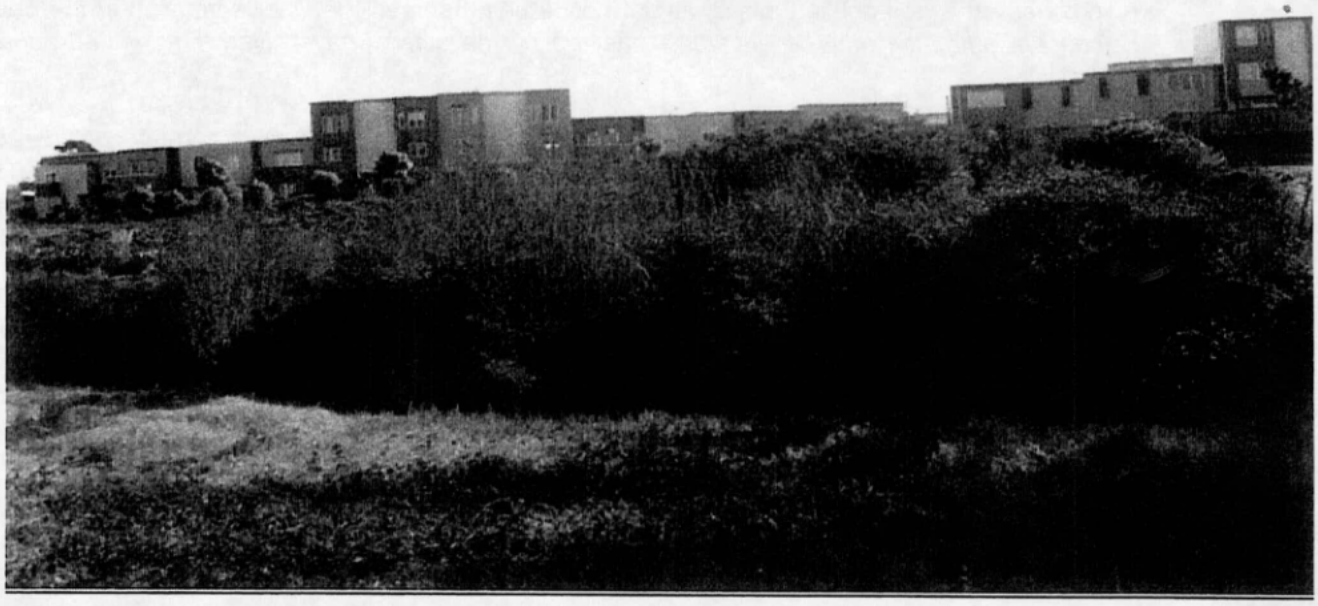


Figure 4- Looking west from Pyramid Place- Note the existing neighbouring Albionvale development.

4.2 Proposal

The proposal is for a 3-stage 61 lot subdivision around 77 units as outlined in detailed under RMA20061077. Roads and drainage reserves are proposed and these will be vested in Waitakere City Council.

The 3-staged development will be carried out as follows;

Stage 1 (Subdivision of Lot 2 DP339810)

Lots 1-35, Drainage reserves to vest (Lots 65-67) and Roads to vest (Lots 68-71) and a balance lot from Lot 2 DP339810.

Stage 2 (Subdivision of balance of Lot 2 DP 339810)

Lots 36-56, Road to vest (Lot 63), Drainage reserve to vest (Lot 64).

Stage 3 (Subdivision of Lot 3 DP 339810)

Lots 57-61, Drainage reserve to vest (Lot 62).

5.0 SECTION 94 ASSESSMENT

5.1 Statutory Context

As a Discretionary Activity, the application for resource consent should be publicly notified in accordance with section 93 of the Resource Management Act, unless it can be demonstrated that the requirements of sections 93 and 94 of the Act can be satisfied. Applications must be notified (either publicly or in a limited manner) if the adverse effects of the activity on the environment are more than minor or all affected persons have not given their written approval.

Section 93 provides that applications for resource consent need not be notified where:

"(a) The application is for a controlled activity ;or
(b) *The consent authority is satisfied that the adverse effects of the activity on the environment will be minor.*

Section 94 provides for limited notification if not all adversely affected persons have given their written approval, whereby all affected persons will be notified (but not the public at large) and have the opportunity to make a submission and be heard. Section 94(2) also provides for an application to proceed on a non-notified basis without notice being served, *"if all persons who in the opinion of the consent authority, may be adversely affected by the activity have given their written approval to the activity."*

Recent case law has indicated that consent authorities should give careful consideration to the question of notification, and should publicly notify applications for resource consent unless it can be clearly demonstrated that the criteria of sections 93 and 94(2) are met. A comprehensive assessment of any potential adverse effects is required. This conservative approach is underscored by the relatively wide definitions of "environment" and "effects" that are set out respectively in sections 2 and 3 of the Act. In determining whether or not an adverse effect on the environment of any activity will be minor, Council may take no account of the adverse effect of an activity on the environment or any person if the Plan permits an activity with that effect (sections 94A and 94B).

In relation to adversely affected persons, case law has established that the Council is only able to disregard adverse effects that would be 'de minimis' (Bayley CA 115/98). This concept can be taken to describe effects that are negligible or whose occurrence would be remote. In the case of the current application, this threshold has been adopted as the correct basis for assessing whether any person may be adversely affected by the activity.

In terms of determining adverse effects on the environment and whether a person would be adversely affected by the proposed activity, Section 94A and 94B gives Council the discretion to make permitted baseline comparisons i.e. a comparison between the environment (which includes both the subject site and the neighbouring environment) as it exists at the time the application is considered and (the effects) of activities that are permitted by the Plan even if hypothetical, as compared with the effects of the proposed activity. Case law has established that any such hypothetical developments must be not be "fanciful" in terms of what could reasonably be expected to establish there.

When considering effects under Section 94A and 94B, regard may be had to any condition which, if imposed under any decision to grant consent would eliminate or reduce the adverse effect to one which would be minor for the purposes of section 94A or to a point where it would be de minimis or only a remote possibility for the purposes of section 94B.

5.2 ADVERSE EFFECTS ASSESSMENT

The adverse effects of the proposal on water quality and quantity, vegetation, land, soil and amenity of the area was addressed under the landuse consent that will be comprehensively developed under RMA20061077 granted on 30 October 2006.

The proposed subdivision would result in 61 lots with net areas ranging from 263m² to 840m². It is considered that the proposed development would be in keeping with the character of the existing residential environment, and is a development that could reasonably be expected in the area. All the lots will allow for adequate open space for the future residents and the proposed reserves will also be used as passive recreation.

The proposal has been assessed by Council's Subdivision Engineer, Lucy Lunevich with regard to infrastructural issues, such as stormwater, water supply and wastewater (refer to memorandum dated 6 October 2006). Ms Lunevich has made a number of recommendations with respect to the proposed subdivision. It is concluded that subject to the implementation of her recommendations any adverse effect of the development on the existing sanitary sewer system would be no more than de minimis.

The proposal has also been reviewed by council's Transport Assets Engineer, Mr John Carroll who supports the proposal and has recommended the inclusion of conditions of consent (in the event that consent is granted) to ensure that the proposal complies with Council's Code of Practice, payment of bonds, road signs and the vesting of the roads in Council.

5.3 Conclusion in relation to Sections 93(1)(b) and 94 A:

Overall the adverse effect on the environment of the activity for which consent is sought would be no more than minor for the reasons stated above.

5.4 Sections 94 and 94B - Adversely Affected Persons

There are no persons considered to be adversely affected by the proposed activity because:

As stated before a landuse consent has already been granted for this application. The proposed subdivision will be in keeping with the existing character as the area is characterised by a variety of lot sizes similar to the ones being proposed. The proposed roading network will fit in well with the existing neighbourhood amenity and will be designed to provide safe and efficient movement of people, vehicles and goods. The proposal will be provided with adequate infrastructure and any adverse effects on existing infrastructure will be adequately mitigated through conditions of consent.

5.5 Special Circumstances

In accordance with section 94C(2) of the RMA it is considered that there are no special circumstances that warrant notification of the proposal.

6.0 SECTIONS 93 AND 94 RECOMMENDATION

Pursuant to Sections 93 and 94 of the Resource Management Act 1991, it is recommended that this application be processed without being publicly notified for the following reasons:

- The adverse effect on the environment of the activity for which consent is sought will be no more than minor because the proposal is in keeping with existing neighbourhood character and amenity and is one which could reasonably be expected on such a site close to a town centre and which has been anticipated by the provisions of the District Plan.
- There are no persons considered to be adversely affected by the activity.
- There are no special circumstances to warrant notification of this application.

Reporting Planner:..... **Date**:27/11/2007
Felicitas Dhliwayo

7.0 SECTION 94 DETERMINATION

Acting under delegated authority and for the reasons set out in the above assessment this application for resource consent shall be non-notified as recommended.

..... **Date**:.....
Jeannette Ibrahim/ Sonya McCall
Team Leader Consents

8.0 STATUTORY ASSESSMENT

9.0 ENVIRONMENTAL ASSESSMENT

In order to make a decision in terms of Section 104B of the Act it is necessary to undertake an analysis and assessment to determine whether the purpose and principles of the Act are being met (Part II) having regard to the matters set out in Section 104, the Fourth Schedule and any other statutory considerations.

Section 104(1) of the Act requires that Council have regard to any actual or potential effects on the environment, any relevant objectives, policies, rules or other provisions of a plan or proposed plan and any relevant regional policy statement and regional plan or proposed plan, and any other matters the consent authority considers relevant and reasonably necessary to determine the application.

When considering an application Council must not have regard to any effect on a person who has given their written approval to the application (section 104 (3)(a)).

9.1 SECTION 104 ASSESSMENT

9.2 Actual and Potential Effects on the Environment

As a Discretionary Activity a variety of issues are relevant when determining the nature and scale of adverse effects on the environment including effects on visual amenity, privacy, aural amenity, traffic generation, infrastructural capacity and construction effects. These aspects have been discussed previously in Section 5.2 of the accompanying Sections 93 and 94 Assessment and Determination Report. The assessment of effects concluded that there would be adverse effects from bulk earthworks and vegetation alteration but these would be short term, largely confined to the subject site and managed through proposed conditions of consent and that medium to long term effects would be mitigated or remedied through the sealing or re-grassing of exposed surfaces and through landscaping and restoration planting. The proposed medium density housing development is of a scale, intensity and design that has been anticipated by the District Plan and is a development that could reasonably be expected to occur on this site given its Living Environment zoning.

In addition the Plan has been prepared with a clear "effects-based" emphasis. Consideration of the proposed development in relation to each of the Plan's assessment criteria would ensure that all the relevant matters contained in Section 104 of the Act have been addressed. The relevant assessment criteria from the Operative District Plan, together with comments as to whether each criterion can be satisfied are as follows:

9.3 SUBDIVISION – GREENFIELDS

a) The extent to which the subdivision design and likely future development made possible by the subdivision will adversely affect the overall resilience, biodiversity and integrity of the Green Network.
(b) The extent to which the subdivision design recognises the natural qualities of the land and encourages strong and positive amenity values and neighbourhood character through: • responding to landmarks and views • providing continuity, coherence and focal points through the use of road and open space networks.
(e) The extent to which proposed sites enable efficient provision of infrastructure.
(f) The extent to which site orientation and site dimension facilitates the siting and design of 'dwellings' which can maximise use of passive solar energy.
(g) The extent to which the subdivision design minimises necessity for earthworks, avoids development on flood plains and encourages on-site water retention.
(h)The extent to which the design and location of roads and driveways minimises alteration to landform, avoids visible scars on the landscape and takes advantage of natural drainage systems
(i) The extent to which the subdivision design takes account of personal safety concerns.
(j) The extent to which open space is provided in convenient locations, having considered: • the accessibility and adequacy of the scale and linkages between open space for intended users • having sites and roads facing toward open space rather than backing on to open space • the quality of the

open space in terms of protecting or linking natural features • the quality of the open space for passive or active recreational use • the relationship of the open space to the road, such that personal safety, amenity and ease of use is encouraged • the ease of maintenance of open space • the presence of other open space in the vicinity (ie if there is sufficient open space already a cash contribution rather than land may be preferred) • any Parks Strategy adopted by the Council.

(t) The extent to which sufficient lighting is provided to provide light for safety purposes on public pedestrian accessways, open space entrances and pathways, road intersections and road junctions and all roads.

(u) The extent to which provision is made for vehicle turning, particularly on no-through roads.

(v) The extent to which provision is made for retaining existing trees, and incorporation of prominent trees as features within the subdivision.

(ad) The extent to which the design of stormwater systems incorporates measures to reduce runoff rates where there may be damage caused to natural waterway systems.

(ae) The extent to which, where a connection is proposed or required to a public stormwater system, there is sufficient capacity within that system to accommodate the proposed and future planned development.

(af) The extent to which sufficient secondary flow paths are provided to avoid adverse effects from damage in flood conditions, and, if over private land, are protected by appropriate easements and consent notices.

(ag) The extent to which the design and capacity of the wastewater treatment and disposal system give regard to the upstream catchment and effect on the downstream catchment, including likely future development.

(ai) The extent to which gravity systems are utilised to dispose of wastewater.

(al)The extent to which more than minor adverse effects can be adequately avoided, remedied, mitigated or offset through provision works and services on or off the site and/ through payment or provision of a financial contribution on-site or, if this is not possible, can be adequately remedied, mitigated offset by a financial contribution off-site.

As discussed previously, the higher density development is concentrated towards the western end of the subject site where it adjoins a similar medium density housing development. It is acknowledged that Medium Density style living can offer only limited on-site amenity by its very nature and is therefore reliant on proximity to community facilities to provide a range of amenities normally experienced within suburban residential development. Public open space is provided by the esplanade reserve and drainage reserves within the proposed development. In addition, Parrs Park located further to the west of the subject site can also be used by residents as a public open space.

Communal facilities available within reasonable walking distance include the Glen Eden shops, Library and Playhouse theatre. The Glen Eden and Sunnyvale railway stations would also be reasonably accessible from the development though access to them would most likely be by car. A range of parks, playing fields and nature walks are also available slightly further afield.

As discussed in previous sections of this report, the proposed development will adjoin a recently established medium density development to the west, also accessed from West coast Road, and hence will be easily identified. A recently completed single level housing development is also located to the east, along Woodbank Road. The proposed roading network will connect into the existing developments to the east and west and hence the proposed development will fit in well with existing neighbourhood character and amenity. The proposed roading network has been designed to provide safe and efficient movement of people, vehicles and goods and will complement the existing roading network. Adequate visitor car parks and pedestrian footpaths will also be provided on site. Therefore it is considered that there would be no conflict between pedestrians and vehicles and the safety of both within and beyond the site will be ensured.

Infrastructure requirements have been assessed by Council's EcoWater Subdivision Engineer (Ms Lucy Lunevich) and would be required to meet Council's Code of Practice requirements for infrastructure – see Ms Lunevich's Memorandum of 6 October 2006. Conditions have been recommended to ensure all units can be properly serviced and the impact of existing and future infrastructure is minimised. Financial contributions would also be required to offset the cost of upgrading and/or installing new services and this would become a condition of consent.

The proposal would therefore meet the relevant assessment criteria by providing appropriate amenities, safe exit and entry for pedestrians and vehicles, infrastructure that meets the necessary standards and financial contributions that would offset the cost of providing upgrade or renewal of services.

9.4 Other Matters (Section 104(1(c)))

(a) The proposal also requires the following resource consent from the Auckland Regional Council:

- Land Use Consent: Sediment Control for land disturbing activities over more than 1.0 hectare of land;
- Land Use Consent : Section 13 (RMA) for works within a watercourse for the construction of a road crossing and culvert.

The above consents have been granted.

(b) A high pressure gas pipeline cuts across the proposed drainage reserve to the northern end of the subject site. The Scheme Plan shows an existing easement through the site to accommodate this. The proposed residential lots will be outside of this easement. A portion of the proposed road will be within the easement. The applicants have confirmed that prior to the works being carried out an inspection will be carried out and a permit issued by Vector Gas Limited.

(c) Potential contamination: The site is large and has had a pastoral use in the past. It has **not** been identified on the Auckland Regional Council contamination maps and there is no indication of any contamination sources. Soil testing has therefore not been required.

9.5 Long Term Council Community Plan

It is noted that the creation of a 59 new additional Lots and 77 new residential units including medium density development attracts a development contribution in accordance with the Waitakere City Council LTCCP.

A Development Contribution of $613, 657.09 (incl. GST) was estimated at lodgement for this application. This development contribution has already been paid.

There are no other matters relevant to this application.

9.6 POLICIES AND OBJECTIVES

It is considered that the proposed development would be consistent with the objectives and policies of the District Plan. The District Plan is "effects-based" in its approach to natural and physical resources and it has been demonstrated in the previous environmental assessment of effects that subject to conditions any adverse effects arising from the proposal would be no more than minor.

The District Plan Assessment Criteria, developed to address the issues covered in the objectives and policies, have already been discussed in section 9.3.

The proposed development is considered to be consistent with these assessment criteria. For this reason the proposed development is also considered to be consistent with the relevant Objectives and Policies. The relevant objectives and policies have been discussed in detail under the landuse consent (RMA20061077).

10.0 PART II OF THE ACT- PURPOSE AND PRINCIPLES

Section 5 in Part II of the Act identifies the purpose of the Act as being the sustainable management of natural and physical resources. This means managing the use of natural and physical resources in a way that enables people and communities to provide for their social, cultural and economic well-being while sustaining those resources for future generations, protecting the life supporting capacity of ecosystems, and avoiding, remedying or mitigating adverse effects on the environment.

It is considered that the proposal is consistent with sustainable resource management. In particular this proposal is concerned with the sustainable management of the Living Environment, General Natural area and Riparian Margins in such a way that the communities' social and cultural well being are enhanced through maintaining the existing neighbourhood character and amenity. The proposal would allow for the establishment of Medium Density Housing with unit areas ranging from 263m² - 840m² that would be appropriate within the environment and would be able to establish and operate in such a way that the amenities of the neighbourhood would not be adversely affected.

The proposal is not considered to adversely affect any matters of national importance nor affect Council's obligations under the Treaty of Waitangi. It is considered that the adverse effects arising from the proposal and the proposed mitigation are limited in significance to the surrounding urban neighbourhood.

Council's iwi partners, Ngati Whatua and Te Kawerau a Maki have been given the opportunity to discuss this proposal and no issues have arisen in regard to the Treaty of Waitangi.

Section 7 identifies a number of "other matters" to be given particular regard by Council in the consideration of any assessment for resource consent, and includes the efficient use of natural and physical resources, and the maintenance and enhancement of amenity values.

The potential effects of the proposal on the amenity and character of the area have been discussed in detail in the effects assessment contained in Section 8 of this report. Subject to conditions such as compliance with Council's Code of Practice for infrastructure (drainage and roading), it is concluded that the proposed development would be compatible with the surrounding built and natural environment and the existing amenity of the area would not be reduced.

11.0 TIME PERIOD IN WHICH TO IMPLEMENT THE CONSENT

Under section 125 of the Resource Management Act 1991, a consent lapses either on the date that is specified in the consent or if no date is specified, 5 years after the date of commencement of the consent. A 5 year lapse period has been granted for this consent.

12.0 MONITORING

The proposal will need to be monitored in accordance with the conditions specified in this report, and the requirements contained in the District Plan.

13.0 RESERVE CONTRIBUTION

The reserve contribution has been considered in accordance with the Resource Management Act 1991. The sum to be paid in lieu of reserves will be computed from the gross realisation value of Lots 3 – 61 based on the average site value for the new lots created (supplied by QV Valuations), as shown on the plans submitted with the application at the time of survey plan approval. A condition requiring payment of this contribution is recommended.

14.0 RECOMMENDED DECISION

That Subdivision Consent Application **RMA20061078** (SPW 22816) being a Discretionary Activity and being a 61 Lot subdivision for Lot 2 DP 339810 (CT 163628) and Lot 3 DP 339810 (CT 163628) situated at 4 Pyramid Place and 423-429 West Coast Road, Glen Eden, by New Zealand Housing Foundation be granted subdivision consent pursuant to Sections 104, 104B, 108 and 220 of the Resource Management Act 1991.

Pursuant to Section 113 of the Resource Management Act, the reasons for granting consent are as follows;

1) No persons may be adversely affected by the proposal.
2) The proposal has been considered in terms of the relevant assessment criteria, meets the relevant policies and objectives of the District Plan, and would create no more than minor adverse effects on the environment.

Conditions imposed on the consent are as follows:

1: STAGING REQUIREMENTS

(a) Consent is hereby given to carry out the subdivision of this property in stages as follows:-

Stage 1: Comprising Lots 1-35, Roads to Vest (Lots 68, 69, 70 & 71), Drainage reserves to vest (Lots 65, 66 & 67) and balance lot.

Stage 2: Comprising Lots 36-56, Road to vest (Lot 63), Drainage reserve to vest (Lot 64).

Stage 3: Comprising Lots 57-61, Drainage reserve to vest (Lot 62).

(b) The conditions listed in the Section 223 and 224 requirements below shall be applied as appropriate to each stage.

(c) Separate 223C and 224C certificates will be issued at each stage.

2: SECTION 223 REQUIREMENTS

(a) A survey plan of the subdivision shall be in accordance with the Subdivision Scheme Plans titled, Proposed Subdivision of Lots 2 and 3 DP 339810 Stage 1 (Sheet ST01), Stage 2 (Sheet ST02) & Stage 3 (Sheet ST03), Job No. 42608, dated October 2006 and Roading Plan for NZ Housing Foundation Sheet 1 (C20- Rev A), dated June 2006 all drawn by Babbage Consultants and will be approved pursuant to Section 223 of the Act provided that the survey plan signing fee has been paid and that the following conditions have been complied with to the satisfaction of Council.

(b) Provide drainage and services easements (for the services through Lots to Lots to protect the existing or proposed connections) in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon."

(c) Provide for the right of way easement lettered A over Lot 61 in favour of Lots 57, 58, 59 and 60.

(d) Provide for right of way easements A & B in gross in favour of Council over proposed Lot 61 in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon." Notes:

(i) The easement document will be prepared by Council's Solicitor at the applicant's cost.

(e) Define the 1 in 100 year flood plain of the Parrs Stream, and the areas required for the stormwater quality treatment ponds and provide separate Lot(s) to vest in Council as drainage reserve. Specific requirements:

(i) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage reserve boundaries.

(ii) The existing drainage easement(s) on Lot 2 DP 339810 can be surrendered once the drainage reserve(s) vests in Council under each Stage as required above.

(iii) The existing drainage easement(s) on Lot 3 DP 339810 can be surrendered once the existing pond has been replaced with an alternative treatment device and the drainage reserve vests in Council under stage 3 as required above.

(f) Define the 1 in 100 year overland flowpath and provide a drainage easement(s) in gross in favour of Council in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon." Specific requirements:

(i) The easement document will be prepared by Council's Solicitor at the applicant's cost.

(ii) The easement document shall advise the owner of their responsibility to maintain the overland flowpath in its approved state, and to keep it unobstructed by buildings, earthworks, solid walls or fences, or any other impediments to the free flow of water through the easement area.

(iii) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage easement.

(g) Provide for water supply easement(s) in gross in favour of Council over the ROW serving Lots 57-62 under Stage 3 in a Memorandaum of Easements endorsed on the survey Plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon." Specific requirements:

(i) The easement document will be prepared by Council's Solicitor at the applicant's cost.

(ii) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage easement.

Take note that street numbers for the lots on the survey plan will be allocated by Council subsequent to Section 223 approval, and these numbers must be used for future applications for building consent. A copy of the survey plan with the Council allocated numbers will be provided.

3. SECTION 224C REQUIREMENTS

Prior to the release by the Council of the Section 224(c) compliance certificate for this subdivision the applicant shall comply with the following conditions to the satisfaction of Council:-

Note: The application requesting the 224 release shall be in writing, shall include the advertised processing fee, shall address how each of the following conditions have been satisfied, and shall be accompanied with Compliance Certificates from each of Council section(s) named below.

ECOWATER CONDITIONS (PUBLIC DRAINAGE)

(EW 1) Provide a catchment analysis detailing any 1 in 100 year overland flowpaths that will exist through the proposed residential lots upon completion of earthworks, including a possible overland flowpath occurring over proposed Lots 44-46. Wherever possible, keep all overland flowpaths contained within the legal road reserve and discharge to the drainage reserve with a minimum of nuisance. Provide an As-Built plan, long section and cross sections, prepared by a Licenced Cadastral Surveyor to demonstrate that completed overland flowpath(s) meets the design requirements. Provide a drainage easement in favour of Council over all areas required to maintain unobstructed overland flow. All buildings are required to be located entirely outside the 1 in 100 year overland flowpath area, and with a finished floor level not less than 500mm above the 1 in 100 year overland flowpath level for catchments over 2 hectares (200mm for catchments less than 2 hectares). This information will be recorded on Council's Hazards and Special Features register.

(EW 2) Design, provide and install a complete public wastewater reticulation system to serve all Lots in compliance with Councils Code of Practice for City Infrastructure and Land Development (Refer Section 5.0). Provide engineering plans and calculations to council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(ii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(iii) Locate all drainage lines in the front Lots where possible to provide ease of access for future maintenance requirements.

(iv) Re-route the existing public drainage lines passing through Lot(s) 31-32 to provide more adequate building sites for those Lots. At the stage of engineering approval a quote will be obtained from Councils contractor for the new manholes required on the existing wastewater network.

(EW 3) Design, provide and install a complete public storm water drainage system to serve all Lots in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Provide engineering plans and calculations to council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(ii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(iii) Collect all existing stormwater discharges onto the land and provide for these catchments in the capacity of the new systems. This includes the existing public stormwater drains discharging at proposed Lots 44 and 23, and any others encountered during construction.

(iv) Clearance between the proposed stormwater pipes and the existing Watercare Services Ltd trunk wastewater drain is required to be a minimum of 0.5 m, and no pipe points area permitted above the trunk wastewater drain, in accordance with the conditions of Watercare Services Ltd consent number D1415/06.

(v) Abandoned public drainage is required to be either removed and backfilled with certified engineered fill, or grout filled. If grout filled, then foundations of future buildings will need to bridge over the trench and abandoned pipes.

(vi) New stormwater outlets to the stream are required to discharge in the direction of flow to minimise erosion on the opposite bank.

(EW 4) Design, provide and install a complete storm water quality treatment system for the site in accordance with the Auckland Regional Council's TP10 "*Stormwater Management Devices Design Guideline Manual*", and WCC Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Provide a copy of the engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All stormwater treatment and detention devices are required to be located clear of existing or proposed public drainage lines.

(ii) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain. This includes provision of a 0.5m thick impermeable compacted clay liner under the pond base, embankment and spillway to avoid seepage of pond water into the trenching material surround the drain. Provide evidence that this has been completed in the geotechnical completion report. Heavy machinery is required to be kept 2m clear of the watercare Services Ltd trunk wastewater drain at all times during construction.

(iii) Provide in the design of the device for treatment of a fully developed upstream catchment. Detain the 2 year storm event and discharge at pre-development levels as required by the Parrs Stream Catchment Management Plan.

(iv) The existing pond on Lot 3 DP 339810 can be replaced by a quality treatment device that provides the equivalent level of treatment. Provide engineering plans and calculations to demonstrate that the proposed swale can achieve this, or alternatively provide written confirmation from ARC that the proposed swale is an acceptable form of treatment in this situation.

(v) Provide a planting plan, including species list, quantities, and methodology to Ecowater and Parks for approval prior to commencing planting.

(vi) Provide a surveyed as-built plan of the device showing all lid and invert levels, permanent water level, and contours at 200mm intervals below water level.

(vii) Provide a geotechnical completion report certifying construction of the pond.

(viii) Provide a maintenance manual for the treatment device.

(vii) Provide a drainage reserve over the entire area occupied by the treatment device, associated maximum flood water levels, and all areas necessary to access and maintain the treatment device.

(EW 5) Design, provide and install a complete public water supply reticulation system and fire fighting services to serve all Lots/Units in compliance with Council's Code of Practice for City Infrastructure and Land Development (refer section 6). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All Lots/Units are to be individually metered at the road reserve boundary. Ducting of private lines is recommended where they cross driveways.

(ii) Locate all water connections at the same position as the power and telephone connection to each Lot/ Unit.

(iii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(iv) Pay to the Council the cost of supervising the shut down of Council's water supply mains. This service includes Council providing written advice to all affected property owners and tenants.

(v) Provide fire hydrants within 135m of the furthest point on any property, and within 65m of the end of a cul-de-sac.

(vi) Where the required public system is on private property, easements over the course of such a system in favour of council will be necessary.

(EW 6) Design, provide and install a complete ICT Network along all new public roads for the future provision of ICT services within the development in compliance with council's Code of Practice for City Infrastructure and Land Development (Refer section 8). Provide engineering plans to Council for approval prior to commencing works.

GEOTECHNICAL CONDITIONS – Ant Refer I gne to Engg

Arising from the geotechnical conditions (GT 1- GT 10) listed below, further foundation design conditions may be applicable on receipt of the earthworks completion report. A **consent notice** pursuant to Section 221 of the Act may be required to be issued and registered on the new titles to be issued for any affected lots.

(GT 1) A geotechnical investigation shall be completed by an experienced geotechnical engineer for the detailed design of earthworks at the site. This shall include recommendations for the batter slopes and an assessment of overall stability off site slopes (supported by limit equilibrium analysis), consolidation characteristics of the soils, fill quality and compaction requirements. All the requirements for constructing and controlling engineered fill shall be detailed. The report on this work shall accompany the earthworks construction management report.

(GT 2) Groundwater drainage measures for the development shall be designed by an experienced geotechnical engineer, taking into account existing information on shallow groundwater levels, anticipated maximum winter high and summer low groundwater levels, and potential effects on adjacent developed properties or roadways.

(GT 3) Building consents shall be required for the retaining walls which shall be no higher that 2.0 metres on all boundaries.

(GT 4) Pavement designs shall be confirmed by an experienced geotechnical engineer following the completion of earthworks.

(GT 5) A producer statement must be provided on completion of earthworks together with an earthworks completion report stating what requirements if any are necessary for the individual lots.

(GT 6) Unless there is clear evidence in the earthworks completion report to be provided by an engineer that NZS 3604 requirements have been fully met, all foundations shall require specific design.

(GT 7) Foundations of all lots shall be verified by an experienced geotechnical engineer familiar with the geotechnical report and shall take into account the potential for shrink/swell behaviour.

(GT 8) Stormwater pond construction shall be supervised by an experienced engineer familiar with the geotechnical report.

(GT 9) The proposed stormwater management systems to be used during construction shall be reviewed by an experienced engineer familiar with the geotechnical report.

(GT 10) The proposed stormwater management systems to be used during construction shall be reviewed by an experienced engineer familiar with the geotechnical report.

TRANSPORT ASSETS CONDITIONS – Coding

Please contact the Transportation Engineer on 836-8000 (extension 8793) to book an inspection.

(TA 1) Before commencement of work, obtain the approval of Council to engineering plans and specifications prepared in accordance with Council's "Code of Practice for City Infrastructure and Land Development" detailing the nature and extent of any proposed work; and pay the Engineering Approval Fee.

(TA 2) The roads (Lots 63 & 68 to 71) vested to Council shall be designated as a Local road.

ROADING CONDITIONS

(RD 1) Take note that the street intersection geometry, street furniture and safety features will be finalised through the engineering plan approval process, and this may result in minor amendments to lot boundaries at these locations to accommodate necessary design details. Lot areas shall not be altered.

(RD 2) Design, form and completely construct the proposed roads (Lots 63 & 68 to 71) in accordance to Council's Code of Practice for City Infrastructure and Land Development to the satisfaction of the Council.
Notes:

(1) Street tree planting shall be carried out (subject to prior approval of a plan showing the location and the species to be used) to the satisfaction of the Service Manager: Parks Green Assets (refer to PK 16 below).
(2) The intersection geometry, street furniture and safety features will be finalised through the engineering plan approval process.
(3) Footpaths shall be provided full length on both sides of the road.
(4) Provide indented on-street parking (normally at a ratio of one parking space per three dwellings).
(5) Access to properties that have indented parking bays on the frontage will not be permitted to locate a driveway that intersects or interferes with the operation of the parking bay. A consent notice pursuant to section 221 of the Act is required to be issued and registered on the new title for the lots affected, restricting access to the lots to the locations clear of the parking bay.

(RD 3) Ensure, where practicable, that not less than a 150mm deep layer of topsoil free of deleterious material is replaced on all allotments to the satisfaction of the Council.

SHARED DRIVEWAYS & VEHICLE CROSSINGS

(SD 1) Form the shared driveway (ROW) Lot 61, lettered A & B and construct thereon a carriageway and storm water controls in accordance with Council's Code of Practice for City Infrastructure and Land Development, and to the satisfaction of Council.
Notes:

1. The construction shall include the vehicle crossing with storm water control, using standard detail SD 3.11 Heavy Commercial Vehicle Crossing and refer to SD 3.14 High Volume / Speed Vehicle Crossing for the left turn-in flare details; and for which a vehicle crossing forms shall be completed and returned to Council.
2. The construction shall include the vehicle crossing with storm water control, using standard detail SD 3.11 Heavy Commercial Vehicle Crossing at distance 70 on Road 1 for service access to the storm water ponds; and for which a vehicle crossing forms shall be completed and returned to Council.
3. Inspection of the shared driveway and vehicle crossing subgrade prior to pavement construction (or boxing prior to pouring) is required. Contact phone 836 8000 Ext. 8725 at least 48-hours prior to inspection being required.
4. Ensure that the longitudinal section of the driveway and the vehicle crossing comply with standard detail SD 3.15 Maximum Vehicle Crossing Profile.
5. All bends shall have a minimum inside radius of not less than 6.5m.
6. The minimum width carriageway on shared driveways is specified in council's District Plan and the construction details are given in the Code of Practice. Provide a carriageway width for 6-10 lots/dwellings, 3.5m wide with passing bay and 1.5m services strip. All to the satisfaction of Council.

(SD 2) Ensure a hard stand area for solid waste bins complies with standard detail SD 3.07 Urban Private Way Details.

ROAD TO VEST

(RV 1) Take note that Lots 63 & 68 to 71 shall vest in the Waitakere City Council as road pursuant to Section 238 of the Act.

(RV 2) Provide to Council prior to the release of the 224 Certificate, all RAMM as built data and as built plans of the new roads formed (electronic and compatible with WCC GIS system). This will be inclusive of kerb lines, cesspits, street lighting, footpaths, parking bays, intersection control devices, pavement markings and signs, street furniture, landscaping, vehicle crossings, and property boundaries.

Bernie

PARKS CONDITIONS

Please contact the Parks Assets Planning Co-ordinator on 836-8000 (extension 8768) to book an inspection.

(PK 1) Carry out the removal of environmentally damaging plants from all lots including the proposed reserves, as listed in the Waitakere City Council Proposed District Plan. Submit a Weed Control Programme to the satisfaction of the Manager, Resource Consents within 2 months of the issue of this consent. This Weed Control Programme shall be implemented on the site within 6 months of the date of issue of this resource consent to the satisfaction of the Manager, Resource Consents. The programme needs to include:

a) an inventory of the weed species to be removed;
b) removal techniques to be utilised; weed disposal methods;
c) time frames for work and whether the weed removal needs to be staged (particularly relevant for sensitive areas such as coastal edges or riparian margins);
d) any re-vegetation programme required to prevent re infestation of weeds;
e) an assessment of any ecological issues around the removal of vegetation;
f) methods for addressing stability and erosion and sediment control methods.

(PK 2) Enter into a registerable fencing agreement with Council in regards to Lots 23, 24, 25, and 46 – 60 to the effect that the Council will not be liable to contribute towards the cost of creating or maintaining any dividing fence between any reserve or other land vested in or administered by the Council. Also, that any fences facing the reserve shall be of visually permeable construction such as swimming pool fencing and 1.2metres maximum height in order to ensure good surveillance of the reserve, and to reduce the likelihood of graffiti.

(PK 3) Prior to work commencing on the site, protective fencing shall be placed around the dripline of the Totara (#4), Kahikatea (#7), Cabbage (#13), Pear (#10) and groups of native revegetation (references #4 and #6) as shown on the plan titled "Housing Foundation HZ, West Coast Road Development (Part of 423-429 West Coast Road) vegetation and major features, Sheets 1 & 2", dated 12 June 2006 prepared by Willy Coenradi. The fencing shall remain in place throughout the vegetation alteration, earthworks and construction stages.

(PK 4) Monitoring of the health of the vegetation referenced in (PK3) above shall be undertaken prior to the commencement of, and during the vegetation alteration, earthworks and construction stages. This monitoring shall be undertaken by an appropriately qualified arborist engaged by the applicant in conjunction with a WCC arborist to provide progressive on-site assessment of the effects of the work on the health of the Riparian vegetation.

(PK 5) That a silt fence and dirty water diversion run-off bund as depicted on the Erosion and Sediment Control Plan prepared by Babbage Consultants dated 23/06/06 contained in Appendix 10 of the application shall be implemented along the full length of the western side of the stream to the satisfaction of prior to Parks Consent Planner prior to earthworks or vegetation alteration commencing on the site.

(PK 6) Landscaping and street tree planting is to be established within the development to the satisfaction of the Parks Consent Planner. The landscaping and street tree plans prepared by SOUL Environments specifically:

- Landscape Master Plan dated 16/06/06 Revision C Reference LSP-01
- Street Tree Planting Plan, Plan 1 of 2 and 2 of 2, dated 15/08/06 Revision B
- Accompanying information titled "NZ Housing Foundation Babbage Consultants 423 -429 West Coast Road, Henderson. Additional information on proposed planting 13-October-06, Revision C".

are to be implemented in accordance with WCC parks guidelines and subject to the following:

(ii) That the bollards along the road frontage of the drainage reserve at the northern end shall be implemented in accordance with the WCC Code of Practice Standard Detail

7.17 and 7.71. That a 3 metre chain entry for maintenance access to the stormwater pond and wetland area shall be located in an appropriate location to the satisfaction of the Parks Consents Planner.

(iii) Street Lighting shall be implemented in accordance with the WCC Code of Practice Section 3.3.14 and Standard Detail 7.91 attached and located so as to not conflict with street tree planting.

(iv) In accordance with Section 7.3.7.3 of the WCC Code of Practice all footpath concrete paving in the reserve shall be 1.5 metres wide and exposed aggregate.

(v) That the plants along the footpath adjacent to the Stream shall be low level and set back a suitable distance so as to not restrict access or visibility along the pathway.

(vi) That the parking areas provided on the streets adjacent to footpaths shall be curbed or wheel stops implemented to the satisfaction of the Parks Consent Planner.

(vii) All plants shall be best nursery stock, healthy vigorous and eco-sourced.

(PK 7) The street tree planting shall be implemented to the satisfaction of the Parks Consent Planner. All plantings are to be in accordance with the WCC parks guidelines, Code of Practice and the landscape specification submitted with the Landscape Plan. An option exists for the applicant to pay Council the cost of supplying, planting and staking of street trees per plan, to carry out the planting of street trees following the completion of the building works. The cost for this would be $153 plus GST per tree (the current contract price for supply, planting, and staking of a PB95 tree as at April 2003).

(PK 8) The consent holder is to be responsible for the maintenance of all street trees and reserve landscaping for a period of two years (from the date of its certified establishment from Council) including the replacement of any dead or dying vegetation, to the satisfaction of the Parks Consent Planner. A bond, based on $7 per sq metre per annum for gardens/shrubbery, and $75 per tree per annum, will be required to ensure the satisfaction of this condition. The consent applicant is to advise the Parks Consent Planner of a maintenance schedule and the name of the qualified person/company responsible for the planting maintenance. Alternatively, a maintenance cash contribution may be paid, and the maintenance will be undertaken by Council. The contribution will be calculated at a rate of $75 per tree per annum and $7 per square metre of garden per annum.

(PK 9) The details of the pedestrian footpath, footbridge and boardwalk shall be finalised at the Engineering Plan stage to the satisfaction of the Parks Consent Planner. Engineering plans for the footpath, footbridge and boardwalk shall be submitted within 3 months of the issue of this consent. All works shall comply with the Waitakere City Council Code of Practice for City Infrastructure and Land Development. The developer must advise the Parks Consent Planner of when work will commence and prior to any works being carried out. Engineering plan details shall be provided at Engineering Plan stages for the following:

a. The exposed aggregate footpath alignment details shall be to a width of 1.5m and constructed in accordance with the Waitakere City Council Code of Practice for City Infrastructure and Land Development Standard Detail 7.102 for Parks Walkway Types attached.

b. That the footbridge shall be constructed in accordance with the Waitakere City Council Code of Practice City Infrastructure and Land Development Standard Detail 7.106 for Typical Foot Bridge attached.

c. The boardwalk along the stream shall be constructed in accordance with the WCC Code of Practice Standard detail 7.105 for Typical Boardwalk attached.

(PK 10) Ensure that the reserves are left in a condition suitable for maintenance and mowing in accordance with section 7.3 of the WCC Code of Practice and to the satisfaction of the Parks Asset Planner.

LEGAL DOCUMENTATION

These conditions will be signed off by Consent Services.

(LD 1) Take note that:
(a) The consent notices required by Condition (GT 1) above; and
(b) The drainage easement in gross required by Condition 2 (f) above;

(c) The right of way easement in gross required by Condition 2 (d) above;
(d) The water supply easement in gross; and
(c) The fencing agreement required by condition (PK 2) above.

will be prepared by the City Solicitor at the applicants cost when the following information has been received:

(i) All necessary technical information.

(ii) A copy of the Land Transfer plan showing the Deposited Plan and Certificate(s) of Title numbers allocated by Land Information New Zealand, and

(iii) The name and address of the solicitor acting for the owner.

(LD 2) Where any condition imposed upon this consent to subdivision is to be complied with on an ongoing basis by the subdividing owner and subsequent owners after the deposit of a survey plan (not being a condition in respect of which a Bond is required to be entered into by the subdividing owner of a completion certificate is capable of being or has been issued) the subdividing owner shall pay the Council's Solicitors legal costs and disbursements relating to the preparation and registration of a Consent Notice pursuant to Section 221 of the Resource Management Act 1991, and shall do all acts and things necessary to enable registration of such Notice to be completed.

(LD 3) Council will agree to a partial cancellation pursuant to section 243(e) & (f) of the Resource Management Act in respect of Right of way easement 607022.1 in so far as it relates to all Lots except Lot 61.

(LD 4) Council will agree to a cancellation pursuant to section 243(e) & (f) of the Resource Management Act in respect of Stormwater Detention and Drainage easements 6070221.2 and 6135712.4 in so far as it relates to all Lots.

FEES, BONDS & CONTRIBUTIONS

Invoices will be prepared by Consent Services. If paying by personal/company cheque the standard 5 days clearance will apply. If you require the 224C certificate immediately, you must provide a bank cheque.

(FC 1) Pay to Council any engineering, works supervision, monitoring, 224(c) processing and administrative fees as incurred which will be charged at Councils advertised schedule of fees.

(FC 2) Pay to Council a street damage bond of $5000 prior to the commencement of work. This bond shall be refunded in full after inspection by Council's Construction Supervisor confirms no damage to Council's roading assets has occurred. The inspection is to take place once all work is completed.

(FC 3) Pursuant to Sections 407 of the Resource Management Act, the following financial contributions have been assessed for the proposed development, and are required to be paid in full prior to the issue to the 224c:

(i) Twin Streams Contribution (Oratia catchment) totalling $207,492.01 inclusive of GST- calculated based on 59 residential Lots @ $3,007.13 (incl. GST) per additional Lot.

(FC 4) Pursuant to Section 108(2)(b) and 108A and in accordance with Council's Code of Practice for City Infrastructure and Land Development, the applicant is required to provide a maintenance bond to Council, equivalent to 2½% (minimum $500.00) of the value of works being taken over by Council. This maintenance bond will be held for six months from the date of 224c issue, or until 31 October, whichever is longer. Maintenance of these assets are the responsibility of the developer during the maintenance period. At the end of the maintenance period the QA Supervisor will undertake a maintenance inspection to ascertain whether the assets are still in satisfactory condition and if so, will instruct the bond to be released, and Council will take over maintenance responsibilities from that time forward. Where defects occur during the developer's maintenance liability period, the costs of repairing such defects are the full responsibility of the developer. Where the developer does not repair the defects, Council will retain the bond monies for use in repairing the defects, and refund any residual monies held to the developer. The developer's liability is not limited to the amount of the maintenance bond, and any additional costs will be invoiced to the developer and will become a debt due to the Council.

(FC 6) Pay to the Council a financial contribution equal to 6% (plus GST at 12.5%) of Quotable New Zealand's market values, to be obtained for Lots 1 – 55, and 57-60 as of the date of issue of this subdivision

consent (or as at the date of any subsequent re-approval of subdivision consent or at intervals of not greater than three years) for reserve purposes.

On stage 1 payment will be required for Lots 1-35 inclusive;
On stage 2 payment will be required for Lots 36-55 inclusive; and
On stage 3 payment will be required for Lots 57-60 inclusive.

GENERAL

These conditions are to be signed off by Consent Services, fees will be charged on an hourly basis.

(GL 1) Advise Council of the Land Transfer plan number allocated by Land Information New Zealand.

(GL 2) Satisfy all requirements of the Inland Revenue Department in respect of Goods and Services Tax including any requirements that may be made in respect of proposed public services and land to vest in and be transferred to the Council.

(GL 3) Advise Council the name of the Consultant and/or person/s who will be the developers representative fulfilling engineering responsibilities as detailed in section 1.4.1 of Councils Code of Practice for City Infrastructure and Land Development.
A résumé stating the qualifications and experience of the nominated representative may be required at the Council's discretion.
Note: WCC COP requires the developer to appoint a suitably qualified and experienced person for any projects that involve development works for which standards are specified in the COP. On larger projects (those with public roading) a Registered Engineer or Registered Surveyor will be deemed to meet these criteria. The developer's representative shall have insurance liability and indemnity cover as appropriate, and be responsible for the following:

(i) Investigating, designing and obtaining approvals for the works.

(ii) Providing contract administration and engineering supervision of the works.

(iii) Co-ordination of specialist responses e.g. geotechnical, hydrology, structural reporting.

(iv) Certification of the works upon completion.

(GL 4) Obtain the reticulation of electric power to all Lots by underground methods and provide to the Council satisfactory confirmation that the completed installation has been installed in compliance with the requirements of the Electrical Network Operator (including the requirements of the Operator of the network to which the subdivision network is to be connected).

(GL 5) Obtain the reticulation of telephone services to all Lots by underground methods and provide to the Council satisfactory confirmation that the completed installation has been installed in compliance with the requirements of the Network Operator.

(GL 6) Provide confirmation that the relevant network utility operators are satisfied with the electric power and telephone connections to each allotment; or, if necessary, carry out any remedial work required.

(GL 7) Before commencement of any works, adequate sediment and erosion measures shall be constructed and maintained in accordance with Erosion and Sediment Control Measures Appendix to the Natural Area Rules of the Waitakere City Council District Plan.

(GL 8) Pursuant to Section 125 of the Resource Management Act 1991, if not given effect to earlier, this consent shall lapse five (5) years after the grant date of the consent.

ADVICE NOTES

1. A Development Contribution of $613, 657.09 (incl. GST) was estimated at lodgement for this subdivision. This development contribution has been paid.

2. Upon the applicant's request, Council will agree to a partial cancellation according to Section 243(e) & (f) of the Resource Management Act in respect of the Oil and Gas easement B344219.1 in so far as it relates to all lots except Lot 67(drainage reserve).

3. Waitakere City Council holds a Comprehensive discharge Consent from the ARC for the Parrs Stream catchment, and this proposal meets the recommendations of the Parrs Stream Catchment

Management Plan subject to these conditions being met. It is the applicant's responsibility to obtain all other necessary consents, or evidence of dispensation, from the Auckland Regional Council, pay all associated costs and comply with any conditions imposed by the regional Council.

4. **Engineering Approval and Quality Assurance Process:** Public infrastructure works, as conditioned above, require Council's approval of engineering plans and specifications prepared by the applicant's engineer in accordance with Council's Code of Practice for City Infrastructure and Land Development.
   (i) Submit full engineering plans, long sections and calculations, prepared in accordance with Council's Code of Practice, to Council for approval.
   (ii) Comply with all conditions of the approval from Watercare Service Ltd for working close to their trunk wastewater drain.
   (iii) Advise the name of the appointed developer's representative fulfilling engineering responsibilities as detailed in section 1.4.1 of the Code of Practice.
   (iv) After engineering approval has been given and prior to commencing construction, contact Council's Call Centre on 839 0400 to arrange a QA Pre-Start Meeting. Allow 3 working days for the QA Pre-Start Meeting to be booked.
   (v) The applicant is required to ensure that the contracted drainlayer and developer's representative attend the QA Pre-Start Meeting, and that construction materials are on-site for inspection.
   (vi) EcoWater's QA Supervisor will then undertake random site inspections throughout the construction process.
   (vii) Upon completion of construction the applicant's surveyor is required to prepare As-Built plans in accordance with the Code of Practice, and CCTV inspection of the drains are to be carried out.
   (viii) The developer's representative is required to fully inspect the drainage including overseeing the drainage tests, view the cctv's and check against the as-builts, and ensure that any remedial works are completed.
   (ix) When the developer's representative is satisfied that all works meet Council standards, they are required to complete the 'QA Final Inspection Request Form' and lodge this at Council together with As-Builts, CCTV (all footage on one DVD), log sheets, chlorination certificate for watermains, and inspection reports.
   (x) EcoWater's QA Supervisor will check all information against the approved design and Code of Practice, then undertake a field check and testing of the new drainage systems in conjunction with Council's approved maintenance contractor.
   (xi) When all public works and documentation are completed to Council's satisfaction the QA Completion Certificate will be issued to the applicant.
   (xii) Submit a copy of the QA Completion Certificate with the application for s224c Certificate as evidence of compliance with the conditions of consent requiring construction of infrastructure to public standards.
   (xiii) Pay all of Council's engineering fees and costs associated with engineering approvals, quality assurance site inspections, as-built & cctv approvals, final inspections, testing and bond management.

5. Regarding the proposed road being within the existing gas and oil easement, the applicants have provided evidence of confirmation from Vector that an inspection and issuing of a permit will be required prior to works commencing. It was further confirmed that Vector is aware that once the road is constructed, the easement will be cancelled where it falls under the road.

Reporting Planner:..... **Date**: 25/01/2007
Felicitas Dhliwayo

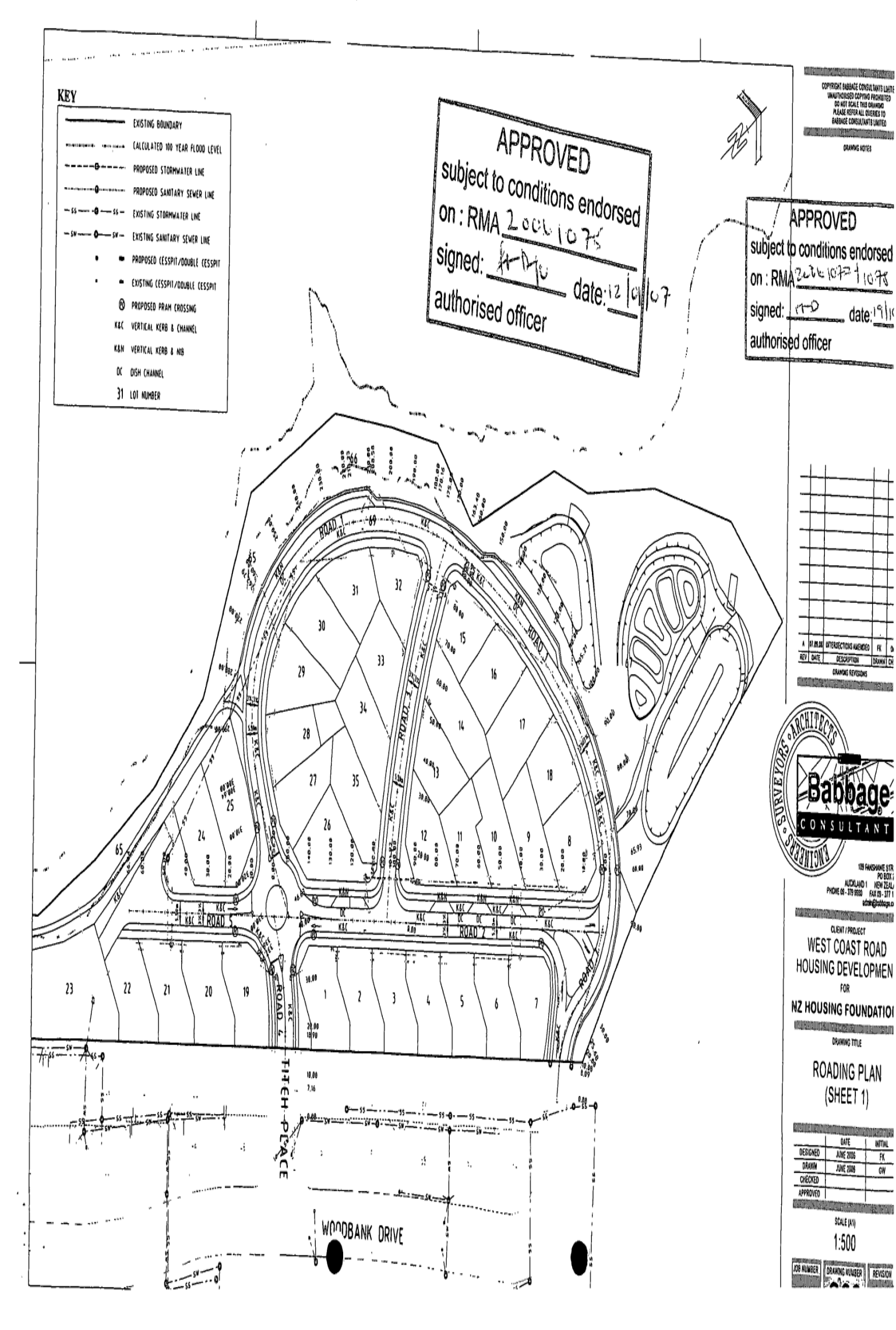
..... **Date**: 25 January 2007
Ted Barwell
Resource Planner (Subdivisions)

14.0 CONSENT GRANTED AS RECOMMENDED

..... **Date**: 30/1/07
Jeannette Ibrahim/ Sonya McCall
Team Leader Consents

Manager, Resource Consents

Please contact Council (Ph 839 0400) if you have any queries about this resource consent and associated report.


KEY
EXISTING BOUNDARY
CALCULATED 100 YEAR FLOOD LEVEL
PROPOSED STORMWATER LINE
PROPOSED SANITARY SEWER LINE
EXISTING STORMWATER LINE
EXISTING SANITARY SEWER LINE
PROPOSED CESSPIT/DOUBLE CESSPIT
EXISTING CESSPIT/DOUBLE CESSPIT
PROPOSED PRAM CROSSING
K&C VERTICAL KERB & CHANNEL
K&N VERTICAL KERB & NIB
DC DISH CHANNEL
31 LOT NUMBER
APPROVED
subject to conditions endorsed
on : RMA 2006/1075
signed: date: 12/9/07
authorised officer
APPROVED
subject to conditions endorsed
on : RMA 2006/1077 / 1078
signed: date: 19/
authorised officer
ROAD 1
ROAD 2
ROAD 3
ROAD 4
ROAD 5
ROAD 6
ROAD 7
TITEH PLACE
WOODBANK DRIVE
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DRAWING NOTES
A 07.09.06 INTERSECTIONS AMENDED FK
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DRAWING REVISIONS
SURVEYORS • ARCHITECTS • ENGINEERS
Babbage CONSULTANT
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PO BOX
AUCKLAND 1 NEW ZEAL
PHONE 09 - 379 9550 FAX 09 - 377 1
admin@babbage.co
CLIENT / PROJECT
WEST COAST ROAD
HOUSING DEVELOPMEN
FOR
NZ HOUSING FOUNDATIOI
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ROADING PLAN
(SHEET 1)
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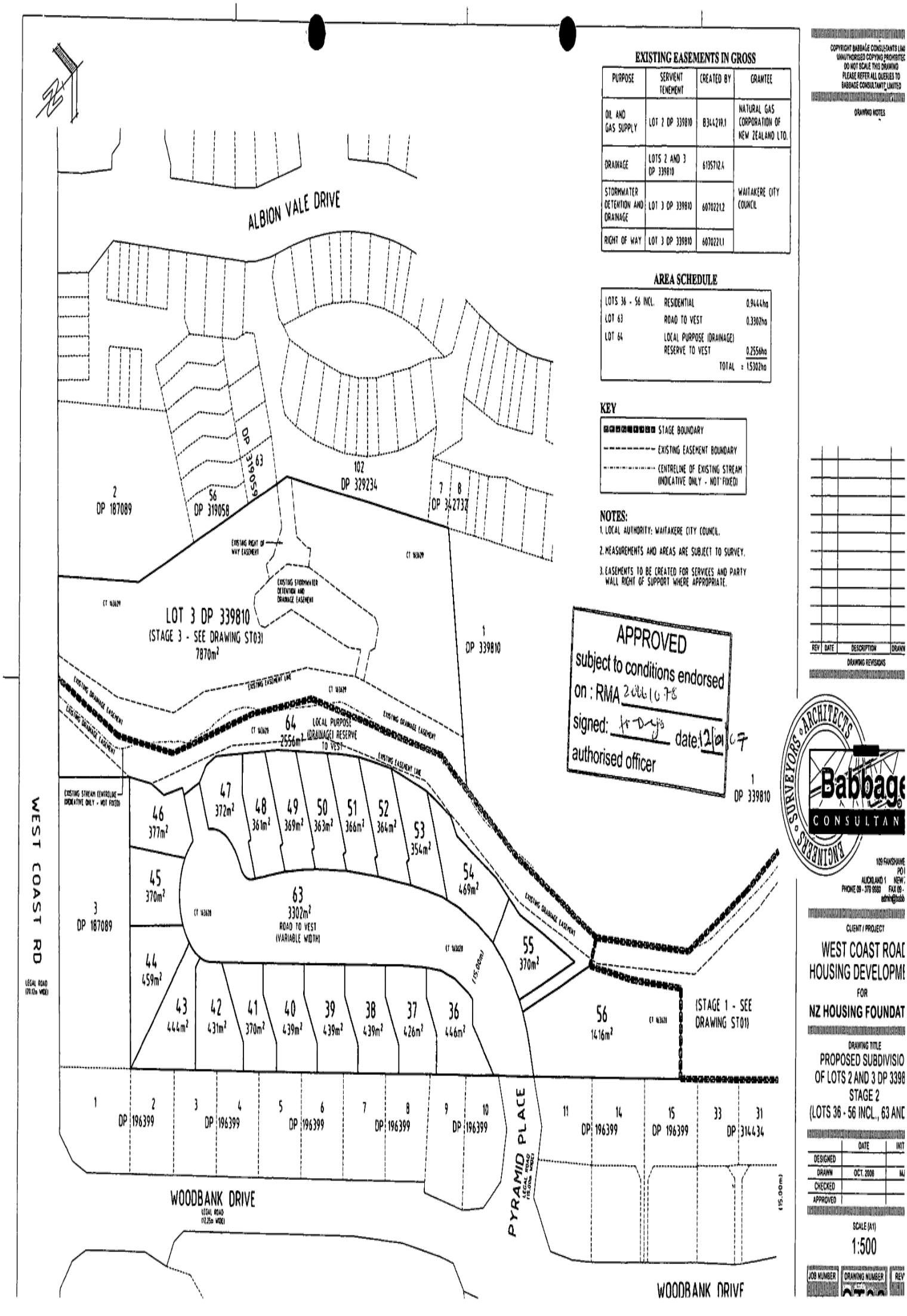

EXISTING EASEMENTS IN GROSS

PURPOSE	SERVIENT TENEMENT	CREATED BY	GRANTEE
OIL AND GAS SUPPLY	LOT 2 DP 339810	B344219.1	NATURAL GAS CORPORATION OF NEW ZEALAND LTD.
DRAINAGE	LOTS 2 AND 3 DP 339810	6135712.4	WAITAKERE CITY COUNCIL
STORMWATER DETENTION AND DRAINAGE	LOT 3 DP 339810	6070221.2	
RIGHT OF WAY	LOT 3 DP 339810	6070221.1	

AREA SCHEDULE

LOTS 36 - 56 INCL.	RESIDENTIAL	0.9444ha
LOT 63	ROAD TO VEST	0.3302ha
LOT 64	LOCAL PURPOSE (DRAINAGE) RESERVE TO VEST	0.2556ha
	TOTAL ±	1.5302ha

KEY

- STAGE BOUNDARY
- EXISTING EASEMENT BOUNDARY
- CENTRELINE OF EXISTING STREAM (INDICATIVE ONLY - NOT FIXED)

NOTES:

1. LOCAL AUTHORITY: WAITAKERE CITY COUNCIL.
2. MEASUREMENTS AND AREAS ARE SUBJECT TO SURVEY.
3. EASEMENTS TO BE CREATED FOR SERVICES AND PARTY WALL RIGHT OF SUPPORT WHERE APPROPRIATE.

APPROVED
subject to conditions endorsed
on : RMA 20061078
signed: [signature] date: 12/01/07
authorised officer

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REV	DATE	DESCRIPTION	DRAWN

DRAWING REVISIONS

SURVEYORS · ARCHITECTS · ENGINEERS
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AUCKLAND 1 NEW
PHONE 09 - 379 0680 FAX 09 -
admin@babb

CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPME
FOR
NZ HOUSING FOUNDAT

DRAWING TITLE

PROPOSED SUBDIVISIO
OF LOTS 2 AND 3 DP 3398
STAGE 2
(LOTS 36 - 56 INCL., 63 AND

	DATE	INIT
DESIGNED		
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CHECKED		
APPROVED		

SCALE (A1)
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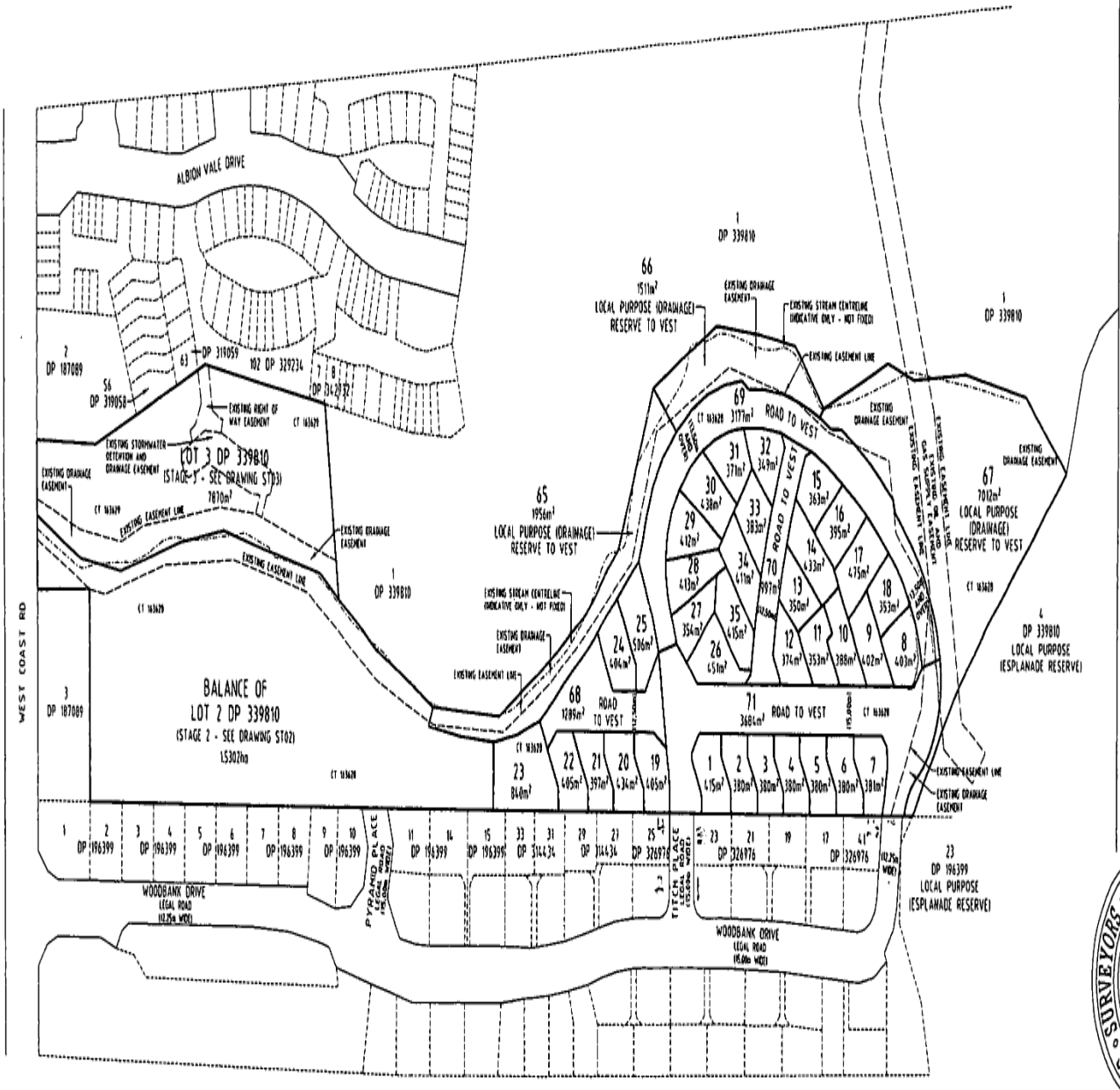

REV	DATE	DESCRIPTION	DRAWN

DRAWING REVISIONS

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PHONE 09 - 379 0580 FAX 09 -
admin@babba

CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPME

FOR

NZ HOUSING FOUNDAT

DRAWING TITLE

PROPOSED SUBDIVISION
OF LOTS 2 AND 3 DP 33981
STAGE 1
(LOTS 1 - 35 INCL.,
65 - 67 INCL. AND 68 - 71 INC

	DATE	INIT
DESIGNED		
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CHECKED		
APPROVED		

SCALE (A1)

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EXISTING EASEMENTS IN GROSS

PURPOSE	SERVIENT TENEMENT	CREATED BY	GRANTEE
OIL AND GAS SUPPLY	LOT 2 DP 339810	B344219.1	NATURAL GAS CORPORATION OF NEW ZEALAND LTD.
DRAINAGE	LOTS 2 AND 3 DP 339810	6035712.4	WAITAKERE CITY COUNCIL
STORMWATER DETENTION AND DRAINAGE	LOT 3 DP 339810	6070221.2	
RIGHT OF WAY	LOT 3 DP 339810	6070221.1	

AREA SCHEDULE - STAGE ONE

LOTS 1 - 35 INCL.	RESIDENTIAL	1.4373ha
LOTS 65 - 67 INCL.	LOCAL PURPOSE (DRAINAGE) RESERVE TO VEST	1.0479ha
LOTS 68 - 71 INCL.	ROAD TO VEST	0.9147ha
	TOTAL :	3.3999ha

KEY

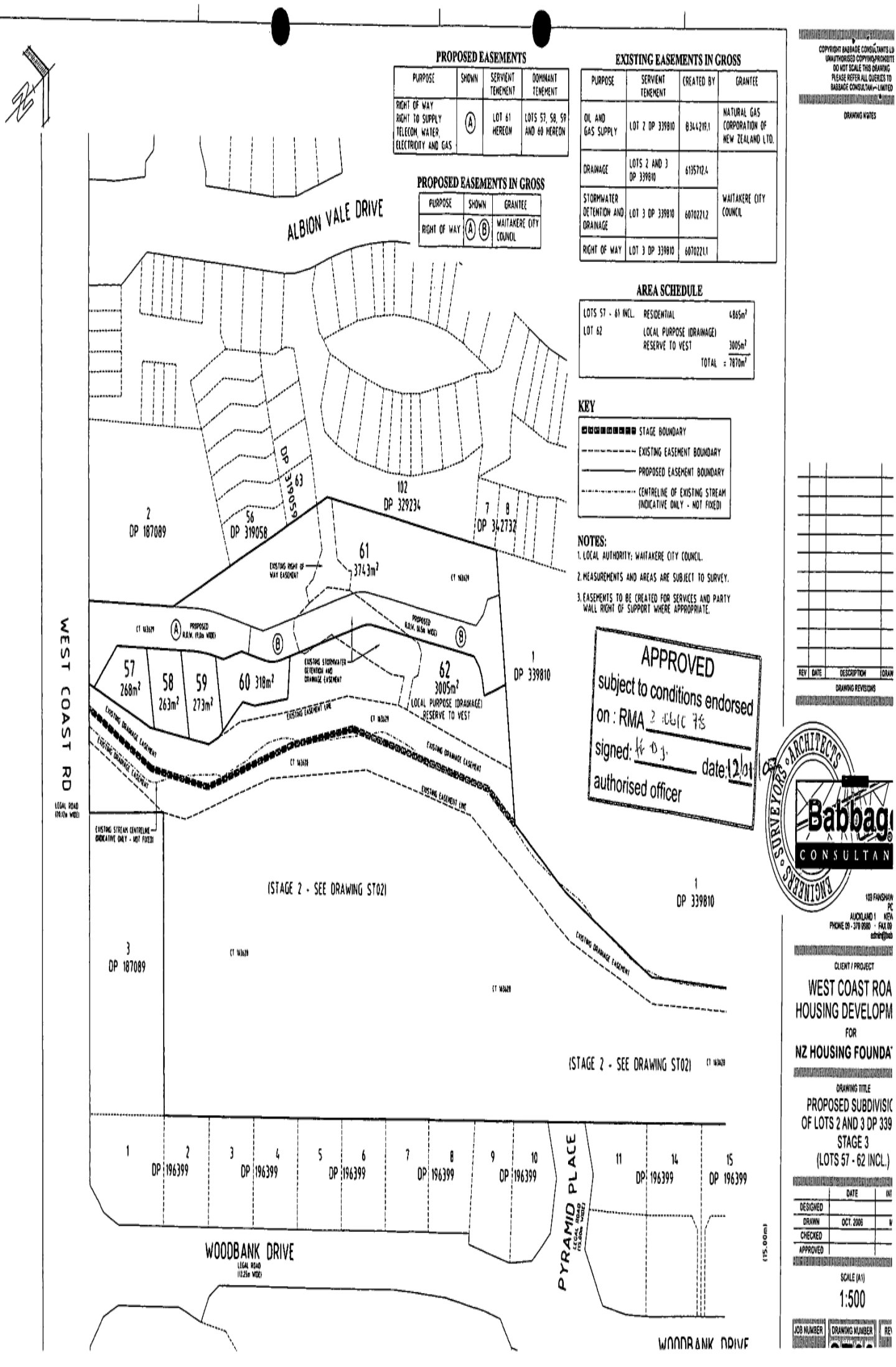
EXISTING EASEMENT BOUNDARY

CENTRELINE OF EXISTING STREAM INDICATIVE ONLY - NOT FIXED!

NOTES:

1. LOCAL AUTHORITY: WAITAKERE CITY COUNCIL.
2. MEASUREMENTS AND AREAS ARE SUBJECT TO SURVEY.
3. EASEMENTS TO BE CREATED FOR SERVICES AND PARTY WALL RIGHT OF SUPPORT WHERE APPROPRIATE.

APPROVED
subject to conditions endorsed
on : RMA 20061078
signed: _____ date: 12/01/07
authorised officer



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admin@bab

CLIENT / PROJECT

WEST COAST ROA
HOUSING DEVELOPM

FOR

NZ HOUSING FOUNDA

DRAWING TITLE

PROPOSED SUBDIVISIC
OF LOTS 2 AND 3 DP 339
STAGE 3
(LOTS 57 - 62 INCL.)

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DRAWN	OCT. 2006	M
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REV

COPYRIGHT BABBAGE CONSULTANTS LIMITED
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BABBAGE CONSULTANTS LIMITED

DRAWING NOTES

KEY

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- PROPOSED STORMWATER LINE
- PROPOSED SANITARY SEWER LINE
- EXISTING STORMWATER LINE
- EXISTING SANITARY SEWER LINE
- PROPOSED CESSPIT/DOUBLE CESSPIT
- EXISTING CESSPIT/DOUBLE CESSPIT
- PROPOSED PRAM CROSSING
- K&C VERTICAL KERB & CHANNEL
- K&N VERTICAL KERB & NB
- DC DISH CHANNEL
- 31 LOT NUMBER

APPROVED
subject to conditions endorsed
on : RMA 2006 1078
signed: _____ date: 12/10/07
authorised officer

APPROVED
subject to conditions endorsed
on : RMA 2006 1077 / 1078
signed: _____ date: 19/10
authorised officer

ROAD 1 ROAD 2 ROAD 3 ROAD 4 ROAD 5 ROAD 6 ROAD 7

TITCH PLACE

WOODBANK DRIVE

REV	DATE	DESCRIPTION	DRAWN	CHKD
A	07.09.06	INTERSECTIONS AMENDED	FK	BMR

DRAWING REVISIONS

SURVEYORS • ARCHITECTS • ENGINEERS
Babbage CONSULTANTS
109 FANSHAWE STREET
PO BOX 202
AUCKLAND 1 NEW ZEALAND
PHONE 09 - 379 9980 FAX 09 - 377 1170
admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

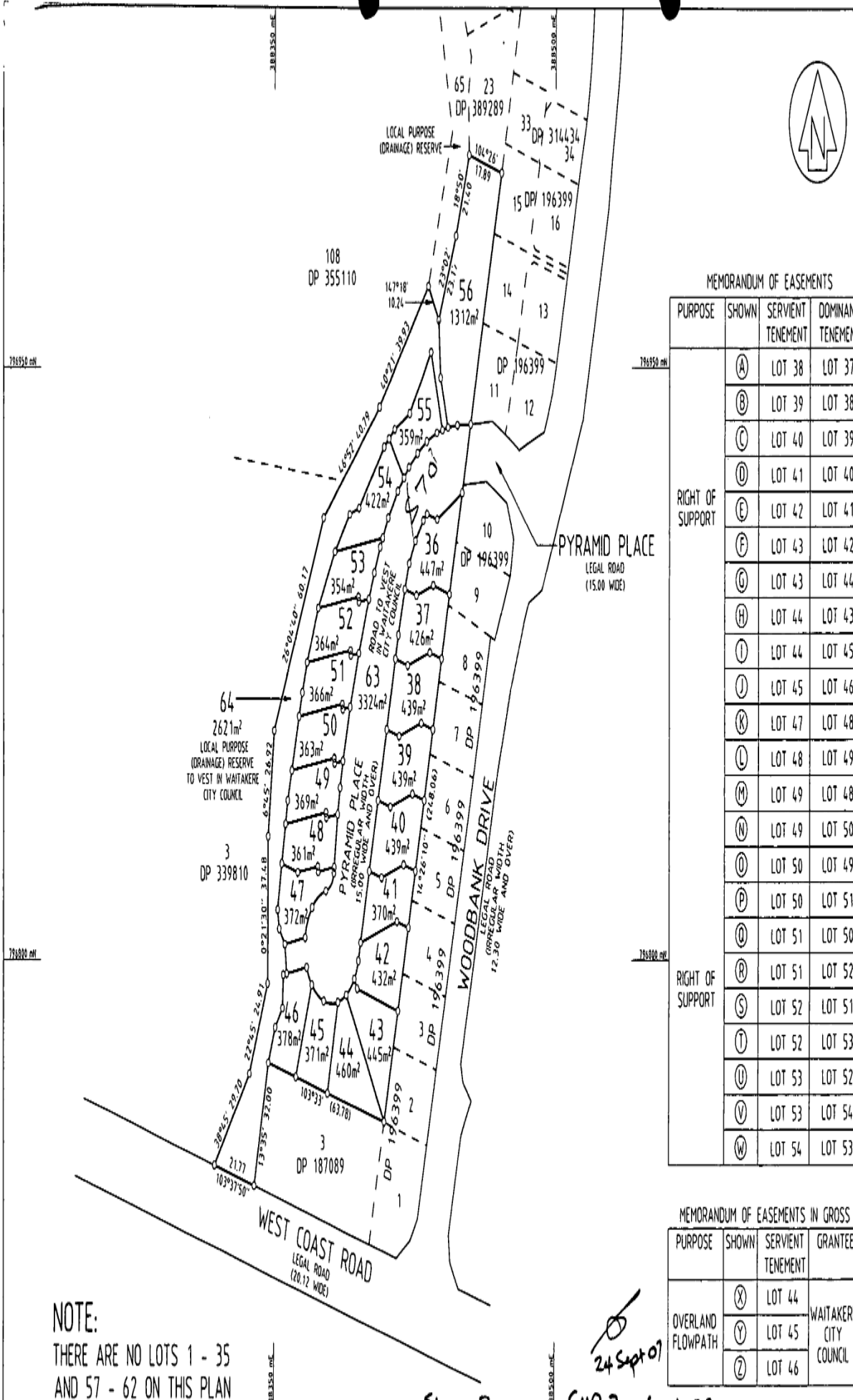
DRAWING TITLE

ROADING PLAN
(SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

SCALE (A1)
1:500

JOB NUMBER | DRAWING NUMBER | REVISION



I HEREBY CERTIFY THAT THIS PLAN WAS APPROVED BY THE WAITAKERE CITY COUNCIL PURSUANT TO SECTION 223 OF THE RESOURCE MANAGEMENT ACT 1991

ON THE ____ DAY OF _____ 2007
SUBJECT TO THE GRANTING OR RESERVING OF THE EASEMENTS SET OUT IN THE MEMORANDUM HEREON

_____
AUTHORISED OFFICER

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF SUPPORT	Ⓐ	LOT 38	LOT 37
	Ⓑ	LOT 39	LOT 38
	Ⓒ	LOT 40	LOT 39
	Ⓓ	LOT 41	LOT 40
	Ⓔ	LOT 42	LOT 41
	Ⓕ	LOT 43	LOT 42
	Ⓖ	LOT 43	LOT 44
	Ⓗ	LOT 44	LOT 43
	Ⓘ	LOT 44	LOT 45
	Ⓙ	LOT 45	LOT 46
	Ⓚ	LOT 47	LOT 48
	Ⓛ	LOT 48	LOT 49
	Ⓜ	LOT 49	LOT 48
	Ⓝ	LOT 49	LOT 50
	Ⓞ	LOT 50	LOT 49
	Ⓟ	LOT 50	LOT 51
	Ⓠ	LOT 51	LOT 50
RIGHT OF SUPPORT	Ⓡ	LOT 51	LOT 52
	Ⓢ	LOT 52	LOT 51
	Ⓣ	LOT 52	LOT 53
	Ⓤ	LOT 53	LOT 52
	Ⓥ	LOT 53	LOT 54
	Ⓦ	LOT 54	LOT 53

MEMORANDUM OF EASEMENTS IN GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	GRANTEE
OVERLAND FLOWPATH	Ⓧ	LOT 44	WAITAKERE CITY COUNCIL
	Ⓨ	LOT 45	
	Ⓩ	LOT 46	

NEW CT ALLOCATED

LOT 36 - 364340	LOT 47 - 364351
LOT 37 - 364341	LOT 48 - 364352
LOT 38 - 364342	LOT 49 - 364353
LOT 39 - 364343	LOT 50 - 364354
LOT 40 - 364344	LOT 51 - 364355
LOT 41 - 364345	LOT 52 - 364356
LOT 42 - 364346	LOT 53 - 364357
LOT 43 - 364347	LOT 54 - 364358
LOT 44 - 364348	LOT 55 - 364359
LOT 45 - 364349	LOT 56 - 364360
LOT 46 - 364350	

NOTES

1. FOR LOT AND EASEMENT BOUNDARY DIMENSIONS SEE SHEETS 2 AND 3.

SHEET 1 OF 3

CLASS OF SURVEY: I

Total Area 1.5233ha

Comprised in CT 357078
PETER BRIAN REED

I KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —

(a) *The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2.*

(b) *This dataset is accurate, and has been created in accordance with that Act and those Rules.*

Signed _____ Date 25 June '07

Field Book p. Traverse Book p.
Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ---/---/---

Deposited by Land Information NZ on ---/---/---

File
Received
Instructions

DP390735

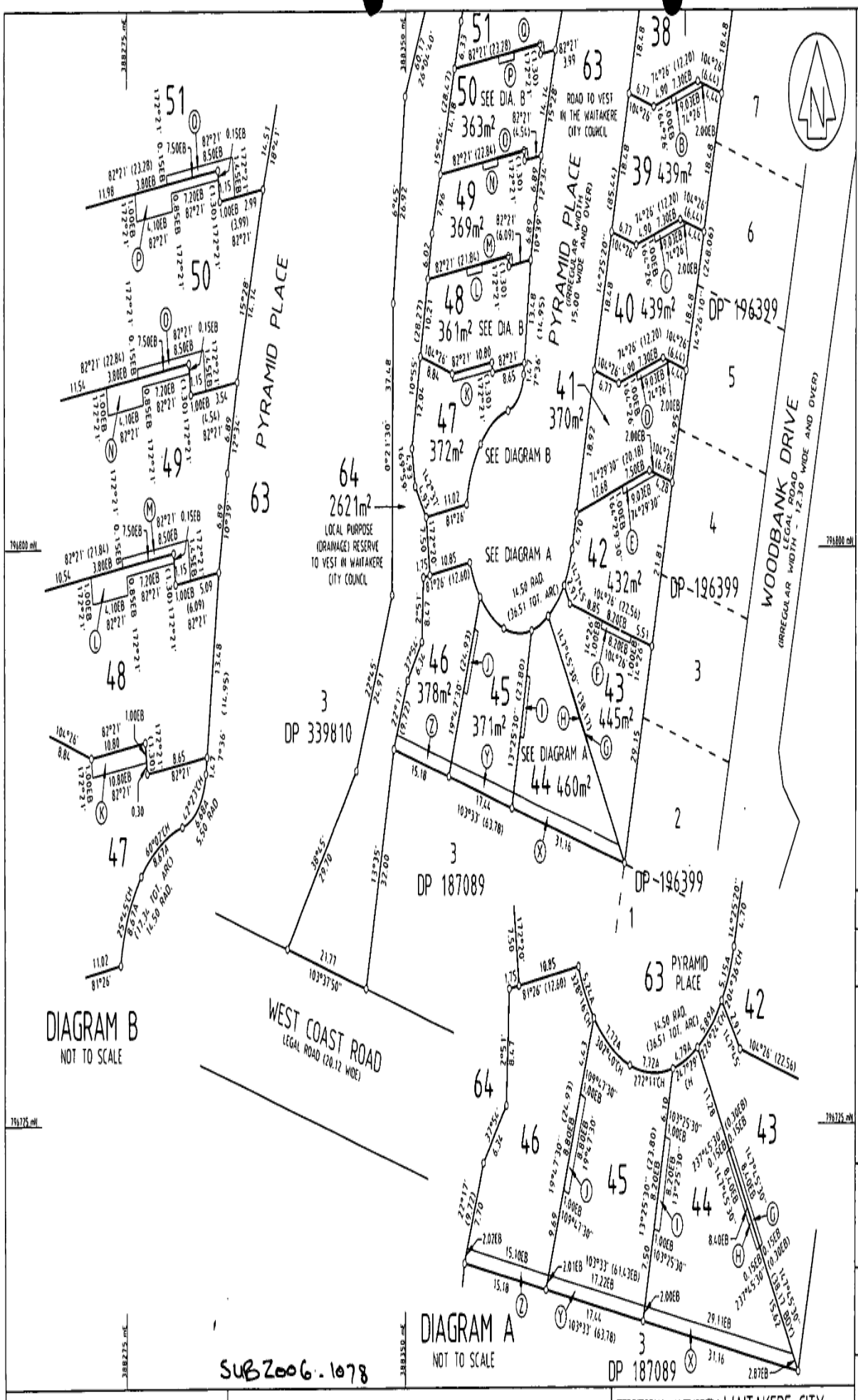
NOTE:
THERE ARE NO LOTS 1 - 35 AND 57 - 62 ON THIS PLAN

24 Sept 07

Stage 2

SUB 2006-1078

LAND DISTRICT NORTH AUCKLAND	LOTS 36 - 56, 63 AND 64 BEING A SUBDIVISION OF LOT 72 DP 389289	TERRITORIAL AUTHORITY WAITAKERE CITY Surveyed by BABBAGE CONSULTANTS LTD. 42608 Scale 1 : 1000 Date MAY 2007



SUB2006.1078

NOTE:
FOR EASEMENT SCHEDULE
SEE SHEET 1

SHEET 2 OF 3

CLASS OF SURVEY: 1

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2;
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed ..... Date .....

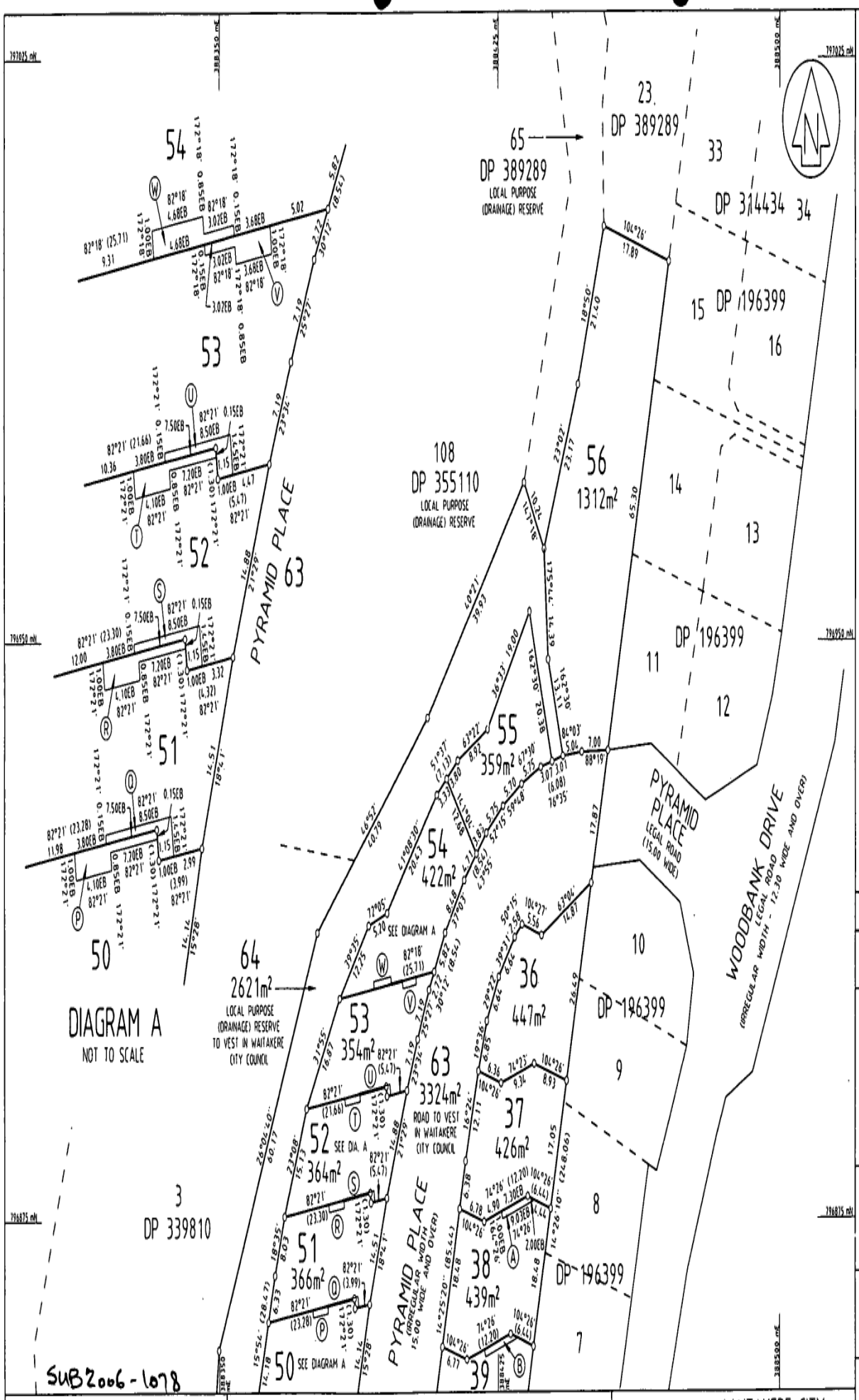
Field Book p. Traverse Book p.
Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on .../.../...

Deposited by Land Information NZ on .../.../...

LAND DISTRICT NORTH AUCKLAND	LOTS 36 - 56, 63 AND 64 BEING A SUBDIVISION OF LOT 72 DP 389289	TERRITORIAL AUTHORITY WAITAKERE CITY 42608 Surveyed by BABBAGE CONSULTANTS LTD. Scale 1 : 500 Date MAY 2007	File Received Instructions DP390735



NOTE:
FOR EASEMENT SCHEDULE
SEE SHEET 1

SHEET 3 OF 3

CLASS OF SURVEY: 1

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2;
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed ..... Date .....

Field Book p. Traverse Book p.

Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ---/---/---

Deposited by Land Information NZ on ---/---/---

File Received Instructions

DP390735

LAND DISTRICT NORTH AUCKLAND

LOTS 36 - 55, 63 AND 64 BEING A SUBDIVISION OF LOT 72 DP 389289

TERRITORIAL AUTHORITY WAITAKERE CITY

Surveyed by BABBAGE CONSULTANTS LTD. 42608

Scale 1 : 500 Date MAY 2007

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
6 Henderson Valley Road
Henderson 0612

Private Bag 93109
Henderson 0650
Waitakere

Telephone
09 836 8000

24Hr Call Centre
09 839 0400

Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

Refer: Helen Fleming: Consent Services
Extension No. 8970 : Civic Centre

7 May 2008

NEW ZEALAND HOUSING FOUNDATION
C/- Matthew Paetz - Babbage Consultants Ltd
PO Box 2027
Shortland Street
AUCKLAND 1140

Your Ref: 42608

Dear Sir/Madam

CERTIFICATE RELATING TO SCHEME PLAN **SUB-2006-1078**
ADDRESS: 423-429 West Coast Road, GLEN EDEN
Owner: NEW ZEALAND HOUSING FOUNDATION

I am pleased to advise that your Section 224 Certificate for STAGE 1 has been approved by Council, and is enclosed with this letter.

Please ensure that the original of each of the documents enclosed is delivered to the solicitor acting for the subdivider as they will have to be registered at the Land Titles Office to allow new certificates of title to issue for the lots shown on the survey plan.

Yours faithfully

Helen Fleming
SENIOR TECHNICAL SUBDIVISIONS OFFICER

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
6 Henderson Valley Road
Henderson 0612

Private Bag 93109
Henderson 0650
Waitakere

Telephone
09 836 8000

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Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

LAND TRANSFER PLAN CERTIFICATION

IN THE MATTER of Land Transfer Plan Number 389289 Stage 1 and Application Number SUB-2006-1078 and pursuant to Section 224(c) of the Resource Management Act 1991.

I HEREBY CERTIFY that some of the conditions of the subdivision consent have been complied with to the satisfaction of THE WAITAKERE CITY COUNCIL and that a consent notice has been issued in respect of those conditions that have not been complied with.

DATED at Waitakere this 7th day of May 2008

Resource Planner (Subdivisions)

The Waitakere City Council

Corporate Data
Date 19 MAY 2008

IN THE MATTER of a Plan lodged for Deposit under Number 389289

Pursuant to Section 221 of the Resource Management Act 1991 the **WAITAKERE CITY COUNCIL HEREBY GIVES NOTICE** that its subdivision consent given in respect of Land Transfer Plan 389289 is conditional inter alia upon the compliance on a continuing basis by the Subdivider and the subsequent owners of the land in the Second Schedule hereto with the condition/s set forth in the First Schedule hereto.

FIRST SCHEDULE

1. The Owner shall not carry out any development nor place, erect, construct or permit to remain any buildings on any part of the land described in the Second Schedule hereto unless The foundations of all buildings have been the subject of specific design by a registered engineer who is familiar with the content of the Geotechnical Completion Report prepared by Babbage Consultants Reference 42608/GE and dated October 2007 (held in Council's records under RMA20061078) (hereinafter referred to as "the said Geotechnical Completion Reports)

2. All earthworks, development and construction on any part of the land described in the Second Schedule hereto shall be carried out in accordance with:

   (a) The report referred to herein where applicable; and

   (b) All specific design requirements referred to herein where applicable; and

   (c) To the entire satisfaction of the Waitakere City Council.

SECOND SCHEDULE

An estate in fee simple in all those parcels of land situated in the North Auckland Registry described as follows:

Lot	D.P.	C.T.
1	389289	357044
2	389289	357045
3	389289	357046
4	389289	357047
5	389289	357048
6	389289	357049
7	389289	357050
8	389289	357051
9	389289	357052
10	389289	357053
11	389289	357054
12	389289	357055
13	389289	357056
14	389289	357057
15	389289	357058
16	389289	357059
17	389289	357060
18	389289	357061
19	389289	357062
20	389289	357063
21	389289	357064
22	389289	357065
23	389289	357066
24	389289	357067
25	389289	357068
26	389289	357069
27	389289	357070
28	389289	357071

SECOND SCHEDULE (continued)

Lot	D.P.	C.T.
29	389289	357072
30	389289	357073
31	389289	357074
32	389289	357075
33	389289	357076
34	389289	357077
35	389289	357078

DATED this 7th day of May 2008

SIGNED for and on behalf of
the **WAITAKERE CITY COUNCIL**

.....
Resource Planner (Subdivisions)

WCC Ref: RMA 20061078 - stg /

AN AGREEMENT made this day of 2008

BETWEEN NEW ZEALAND HOUSING FOUNDATION (hereinafter called "the Subdivider")

A N D WAITAKERE CITY COUNCIL (hereinafter called "the City")

WHEREAS

I **THE** Subdivider is registered as proprietor of an estate in fee simple in (inter alia) all the land comprised in 163628.

II **AS** a condition of its approval of subdivision pursuant to the Local Government Act 1974 and/or the Resource Management Act 1991 of the above described land the City required (inter alia) that prior to deposit of the Survey Plans proposed in respect of that subdivision the Subdivider enter into a registrable agreement with the City binding on the successors in title of the Subdivider that the City would not be liable to contribute towards the cost of creating or maintaining any dividing fence between any reserve or other land vested to be vested in or occupied by the City as a consequence of such subdivision and the balance of the land shown on the said Survey Plans.

III **THE** Subdivider has or is about to submit to the City for its approval in terms of the approval of the aforesaid subdivision survey plans of subdivision approved by the Chief Surveyor under No. 389289 and intended to be deposited in the Land Transfer Office ("the survey plan").

IV **ALL** those parcels of land described in the Schedule hereto being lots on the survey plan have common boundaries with land vested, or to be vested in or occupied by the City upon the deposit of the survey plan.

NOW THIS AGREEMENT WITNESSETH that **IN CONSIDERATION OF THE PREMISES** and in satisfaction of the conditions imposed by the City on its approval of the aforesaid subdivision the Subdivider for itself and its successors in title hereby agrees with the City as follows:-

1. **THE** Subdivider will not call upon the City and the City will not be liable for any contribution towards the costs of creating or maintaining any dividing fence between:

   (a) Any public reserve; or

   (b) Any other land vested or to be vested in or occupied by the City;

   and the land shown on the survey plan as adjoining such public reserves or other land the allotments on the survey plan which are to be subject to this agreement being those listed in the Schedule hereto all of which adjoin public reserves or other land vested or to be vested in or administered by the City.

2. The Subdivider will not erect or permit to be erected any dividing fence or replace any existing fence on any part of the abovementioned boundaries unless the fence or replacement fence is constructed with visually permeable materials.

DATED this day of 2008

EXECUTED by **NEW ZEALAND HOUSING FOUNDATION** by two of its ~~directors~~ TRUSTEES'

.....

.....

New Zealand Housing Foundation The Common Seal of

THE COMMON SEAL of the **WAITAKERE CITY COUNCIL** was hereunto affixed in the presence of:

.....

~~Mayor/Deputy Mayor~~

WAITAKERE CITY COUNCIL The Common Seal of ★4458

.....

Chief Executive Officer

THE SCHEDULE

An estate in fee simple in all those parcels of land situated in the North Auckland Land Registry described as follows:-

Lot	Deposited Plan	CT Reference
23	389289	357066
24	389289	357067
25	389289	357068

ANNEXURE SCHEDULE – CONSENT FORM

Land Transfer Act 1952 section 238(2)

Fencing Agreement

Person giving consent *Surname must be underlined*	**Capacity and interest of Person giving consent** *(eg Caveator under Caveat no)*
HOUSING NEW ZEALAND CORPORATION	Mortgagee under Mortgage No. 6551320.5

Consent

Delete words in [ ] if inconsistent with the consent
State full details of the matter for which consent is required

[Without prejudice to the rights and powers existing under the interest of the person giving consent.]

the Person giving consent hereby consents to registration of the within Fencing Agreement

Dated this 5th day of May 2008

Attestation

Signature (Common seal) of Person giving consent	**Signed in my presence by the Person giving consent** Signature of witness *Witness to complete in BLOCK letters (unless legibly printed)* Witness name: Gwenda Aronson Occupation: Administration Officer Address: Housing New Zealand National Office Auckland

An Annexure Schedule in this form may be attached to the relevant instrument, where consent is required to enable registration the Land Transfer Act 1952, or other enactments, under which no form is prescribed.

CERTIFICATE OF NON-REVOCATION OF POWER OF ATTORNEY

I, Graeme Rollo of Auckland holding the office of Administration Co-ordinator in Housing New Zealand Corporation:

HEREBY CERTIFY:

1. **THAT** by Deed dated 30 June 2006 a copy of which is deposited in the Land Registry Office at Wellington under number 6934797.1 each of Housing New Zealand Corporation, Housing New Zealand Limited, Community Housing Limited, Property Lease (No 1) Limited, Property Lease (No 13) Limited, and HNZC Property Developments Limited appointed me as its attorney on the terms and subject to the conditions set out in the said Deed and the attached document is executed by me under the powers thereby conferred.

2. **THAT** at the date hereof I hold the position of Administration Co-ordinator in Housing New Zealand Corporation.

3. **THAT** at the date hereof I have not received any notice of the revocation of that appointment.

SIGNED this 5th day of May 2008

By Graeme Rollo

UnitedNetworks
A division of Vector Limited

Take-Over & Completion Certificate

(On Behalf of UnitedNetworks a division of Vector Limited)

UnitedNetworks
101 Carlton Gore Road
Newmarket
PO Box 99882
Newmarket
Auckland
New Zealand
Tel 64 9 **978 7788**
Fax 64 9 **978 7799**
www.unitednetworks.co.nz

Client:	**Babbage Consultants** **PO Box 2027** **Auckland** Attention: Fiona Keir

Contractor:	Siemens Energy Services Limited.
Contractors Address:	PO Box 101 694 North Shore Mail Centre
Contact:	Midhat Husaric

Description of the Works

Installation of 400V reticulation to supply 35 new dwellings (Stage 1) contained within the development at 423-429 West Coast Road, Glen Eden - UnitedNetworks Project No. EC-N1-07-CIP4-016

1.0 **Electrical Reticulation**
Extension of the 11kV, 400V, pilot cables and associated equipment including the instalation of a 100kVA transformer to supply 35 new dwellings with a single phase 60 Amp supply.

It is hereby certified that the part works as detailed and amended on construction plans EC-N1-07-CIP4-016 have been practically completed in accordance with the Contract Documents and UnitedNetworks Design and Construction Manual criteria.

1.1 Specifically these works encompass the installing 100kVA0kVA Transformer. The design capacity is for single-phase 60-amp supply per dwelling and one dwelling per allotment.

2.0 The works, following tests where required, have been commissioned and taken over by UnitedNetworks/Vector as Network Operator.

3.0 UnitedNetworks a division of Vector Limited is the Electrical Operator of the distribution system which will provide Line Function Services at the Point of Supply to the subdivision.

4.0 Street lighting installation is not included in this certificate

Engineer to Contract: Damon Newton _____ Date 01 October 2007.

(Name) (Signature)

Natashia Ogbourne

From: Steven Rankin
Sent: Monday, 17 March 2008 1:04 p.m.
To: 224c Clearances
Subject: SUB-2006-1078, 423-429 West Coast Road, GLEN EDEN, S224C CLEARANCE ADVICE

Pathway.pth (300 B)

Hello
All 224C conditions are now satisfied.
.....subject to the preparation of a consent notice and/or drainage easement in accordance with condition Regards

Additional Info:
Attachment links to SUB-2006-1078, 423-429 West Coast Road, GLEN EDEN

TO PROCESS SUPPORT

Date: 12 March 2008
EcoWater Engineer: Steven Rankin

Application Number: SUB-2006-1078
Applicant Name: NEW ZEALAND HOUSING FOUNDATION
Application Address: 423-429 West Coast Road, GLEN EDEN

STAGE ONE - SECTION 224 – ECOWATER APPROVAL

EcoWater's Section 224 conditions applying to the above subdivision application have been met and are now approved for the purposes of certifying compliance with the consent conditions, subject to the satisfactory completion of all items noted below each condition in BOLD.

PUBLIC DRAINAGE INFRASTRUCTURE – ECOWATER SECTION 224 CONDITIONS

(DE 1) Provide a catchment analysis detailing any 1 in 100 year overland flowpaths that will exist through the proposed residential Lots upon completion of earthworks, including a possible overland flowpath occurring over proposed Lots 44-46. Wherever possible, keep all overland flowpaths contained within the legal road reserve and discharge to the drainage reserve with a minimum of nuisance. Provide an As-Built plan, long section and cross sections, prepared by a Licenced Cadastral Surveyor to demonstrate that completed overland flowpath(s) meets the design requirements. Provide a drainage easement in favour of Council over all areas required to maintain unobstructed overland flow. All buildings are required to be located entirely outside the 1 in 100 year overland flowpath area, and with a finished floor level not less than 500mm above the 1 in 100 year overland flowpath level for catchments over 2 hectares (200mm for catchments less than 2 hectares). This information will be recorded on Council's Hazards and Special Features Register. **Satisfied – Not applicable to Stage 1**

(DE 2) Design, provide and install a complete public wastewater reticulation system to serve all Lots in compliance with Councils Code of Practice for City Infrastructure and Land Development (Refer Section 5.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Locate all drainage lines in the front of Lots where possible to provide ease of access for future maintenance requirements.

(iii) Re-route the existing public drainage lines passing through Lot(s) 31-32 to provide more adequate building sites for those Lots. At the stage of engineering approval a quote will be obtained from Councils contractor for the new manholes required on the existing wastewater network.

Satisfied / Complete EcoWater QA complete on Stage 1

(DE 3) Design, provide and install a complete public stormwater drainage system to serve all Lots in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Provide engineering

plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Collect all existing stormwater discharges onto the land and provide for these catchments in the capacity of the new systems. This includes the existing public stormwater drains discharging at proposed Lots 44 and 23, and any others encountered during construction.

(iii) Clearance between the proposed stormwater pipes and the existing Watercare Services Ltd trunk wastewater drain is required to be a minimum of 0.5m, and no pipe points are permitted above the trunk wastewater drain, in accordance with the conditions of Watercare Services Ltd consent number D1415/06.

(iv) Abandoned public drainage is required to be either removed and backfilled with certified engineered fill, or grout filled. If grout filled, then foundations of future buildings will need to bridge over the trench and abandoned pipes.

(v) New stormwater outlets to the stream are required to discharge in the direction of flow to minimise erosion on the opposite bank.

Satisfied / Complete EcoWater QA complete on Stage 1

(DE 4) Design, provide and install a complete stormwater quality treatment system for the site in accordance with the Auckland Regional Council's TP10 '*Stormwater Management Devices Design Guideline Manual*', and WCC Code of Practice for City Infrastructure and Land Development (refer Section 4). Provide a copy of the engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All stormwater treatment and detention devices are required to be located clear of existing or proposed public drainage lines.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain. This includes provision of a 0.5m thick impermeable compacted clay liner under the pond base, embankment and spillway to avoid seepage of pond water into the trenching material surrounding the drain. Provide evidence that this has been completed in the geotechnical completion report. Heavy machinery is required to be kept 2m clear of the Watercare Services Ltd trunk wastewater drain at all times during construction. **Liner not required as per instructions from Watercare Services and as advised by Babbage.**

(ii) Provide in the design of the device for treatment of a fully developed upstream catchment. Detain the 2 year storm event and discharge at pre-development levels as required by the Parrs Stream Catchment Management Plan. **Satisfied**

(iii) The existing pond on Lot 3 DP 339810 can be replaced by a quality treatment device that provides the equivalent level of treatment. Provide engineering plans and calculations to demonstrate that the proposed swale can achieve this, or alternatively provide written confirmation from ARC that the proposed swale is an acceptable form of treatment in this situation. **Satisfied**

(iv) Provide a planting plan, including species list, quantities, and methodology to EcoWater and Parks for approval prior to commencing planting. **Complete**

(v) Provide a surveyed as-built plan of the device showing all lid and invert

levels, permanent water level, and contours at 200mm intervals below water level. **Complete**

(vi) Provide a geotechnical completion report certifying construction of the pond. **Complete / report included in Pond manual**

(vii) Provide a maintenance manual for the treatment device. **Complete**

(viii) Provide a drainage reserve over the entire area occupied by the treatment device, associated maximum flood water levels, and all areas necessary to access and maintain the treatment device. **Complete under 223**

(DE 5) Waitakere City Council holds a Comprehensive Discharge Consent from the ARC for the Parrs Stream catchment, and this proposal meets the recommendations of the Parrs Stream Catchment Management Plan subject to these conditions being met. It is the applicant's responsibility to obtain all other necessary consents, or evidence of dispensation, from the Auckland Regional Council, pay all associated costs and comply with any conditions imposed by the Regional Council. **Satisfied**

(DE 6) Design, provide and install a complete public water supply reticulation system and fire fighting services to serve all Lots/Units in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 6). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All Lots/Units are to be individually metered at the road reserve boundary. Ducting of private lines is recommended where they cross driveways.

(i) Locate all water connections at the same position as the power and telephone connection to each Lot/Unit.

(ii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(iii) Pay to the Council the cost of supervising the shut down of Council's water supply mains. This service includes Council providing written advice to all affected property owners and tenants.

(iv) Provide fire hydrants within 135m of the furthest point on any property, and within 65m of the end of a cul-de-sac.

(v) Where the required public system is on private property, easements over the course of such system in favour of Council will be necessary.

Satisfied / Complete EcoWater QA complete on Stage 1

Design, provide and install a complete ICT Network along all new public roads for the future provision of ICT services within the development in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 8). Provide engineering plans to Council for approval prior to commencing works. **Satisfied / Complete EcoWater QA complete on Stage 1**

(DE 7) **Engineering Approval and Quality Assurance Process:** Public infrastructure works, as conditioned above, require Council's approval of engineering plans and specifications prepared by the applicant's engineer in accordance with Council's Code of Practice for City Infrastructure and Land Development.

(i) Submit full engineering plans, long sections and calculations, prepared in accordance with Council's Code of Practice, to Council for approval.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain.

(ii) Advise the name of the appointed developer's representative fulfilling engineering responsibilities as detailed in section 1.4.1 of the Code of Practice.

(iii) After engineering approval has been given and prior to commencing construction, contact Council's Call Centre on 839 0400 to arrange a QA Pre-Start Meeting. Allow 3 working days for the QA Pre-Start Meeting to be booked.

(iv) The applicant is required to ensure that the contracted drainlayer and developer's representative attend the QA Pre-Start Meeting, and that construction materials are on-site for inspection.

(v) EcoWater's QA Supervisor will then undertake random site inspections throughout the construction process.

(vi) Upon completion of construction the applicant's surveyor is required to prepare As-Built plans in accordance with the Code of Practice, and CCTV inspection of the drains are to be carried out.

(vii) The developer's representative is required to fully inspect the drainage including overseeing the drainage tests, view the cctv's and check against the as-builts, and ensure that any remedial works are completed.

(viii) When the developer's representative is satisfied that all works meet Council standards, they are required to complete the 'QA Final Inspection Request Form' and lodge this at Council together with As-Builts, CCTV (all footage on one DVD), log sheets, chlorination certificate for watermains, and inspection reports.

(ix) EcoWater's QA Supervisor will check all information against the approved design and Code of Practice, then undertake a field check and testing of the new drainage systems in conjunction with Council's approved maintenance contractor.

(x) When all public works and documentation are completed to Council's satisfaction the QA Completion Certificate will be issued to the applicant.

(xi) Submit a copy of the QA Completion Certificate with the application for s224c Certificate as evidence of compliance with the conditions of consent requiring construction of infrastructure to public standards.

(xii) Pay all of Council's engineering fees and costs associated with engineering approvals, quality assurance site inspections, as-built & cctv approvals, final inspections, testing and bond management.

Satisfied / Complete EcoWater QA complete on Stage 1

FEES, BONDS & CONTRIBUTIONS

(FC 1) Pursuant to Sections 407 & 409 of the Resource Management Act, the following financial contributions have been assessed for the proposed development, and are required to be paid in full prior to issue of the 224c:

(i) Twin Streams Contribution (Oratia catchment) totalling $207,492.01 inclusive of GST - calculated based on 18 medium density Units @ $1,670.63 (incl. GST) per additional Unit, and 59 residential Lots @ $3,007.13 (incl. GST) per additional Lot.

WCC Consent Services – Charge for 35 Lots @ $3,007.13 = $105,249.55

(FC 1) Pursuant to Section 108(2)(b) and Section 108A, and in accordance with Council's Code of Practice for City Infrastructure and Land Development, the applicant is required to provide a maintenance bond to Council, equivalent to 2½% (minimum $500.00) of the value of works being taken over by Council. This maintenance bond will be held for six months from the date of 224c issue, or until 31 October, whichever is longer. Maintenance of these assets are the responsibility of the developer during the maintenance period. At the end of the maintenance period the QA Supervisor will undertake a maintenance inspection to ascertain whether the assets are still in satisfactory condition and if so, will instruct the bond to be released, and Council will take over

maintenance responsibilities from that time forward. Where defects occur during the developer's maintenance liability period, the costs of repairing such defects are the full responsibility of the developer. Where the developer does not repair the defects, Council will retain the bond monies for use in repairing the defects, and refund any residual monies held to the developer. The developer's liability is not limited to the amount of the maintenance bond, and any additional costs will be invoiced to the developer and will become a debt due to the Council. **WCC Consent Services – Maintenance Bond = 2.5% of $663,500.00 = Bond $16,587.50 (Stage 1)**

Glendyr Donaldson

From: Ani Bell
Sent: Wednesday, 12 March 2008 3:03 p.m.
To: 224c Clearances
Subject: SUB-2006-1078, 423-429 West Coast Road, GLEN EDEN, S224C CLEARANCE ADVICE

Attachments: Pathway.pth

Pathway.pth (300 B)

Hello
All 224C conditions relevant in STAGE 1 have now been completed including Survey Certificate if required.

Additional Info:
Attachment links to SUB-2006-1078, 423-429 West Coast Road, GLEN EDEN

Subdivisions

Memo

To: Bernie Sheary **Transport Asset**

From: Natashia

Date: 28/11/07

Re: SPW 22816 RMA 2006-1078 **address 423 – 429 West Coast Rd**

Dear Bernie

Please check conditions **TA1- TA2, RD1-RD3, RV2** for 224c approval.

Thanks

Natashia

Stage 1 – DCAMM Sheets to Jin 27/12/07.

Fifth Place
Foundation Place
New Lond Way
Woodbank drive.

23/2/08

224c approved

BENKELMAN BEAM PAVEMENT DEFLECTION TESTS

TEST STANDARD - NRB TI 1977

Provisional Results Only - Subject to Confirmation

Civil Lab Ltd
7 Newark Place, East Tamaki - Tel: (09) 272 3375, Fax: (09) 272 3378
14F Flexman Place, Silverdale - Tel: (09) 427 9555, Fax: (09) 427 9055
PO Box 58 877, Greenmount, Auckland, New Zealand

JOB NAME: Titch Place		REPORT No: 6615 02	
STREET:			PAGE: 1 of:
DATE OF ORDER: 24-01-08		AXLE LOAD: 8.2 Tonnes	TYRE PRESSURE: 122 (TSE) kPa

DISTANCE (m)	LANE	READINGS IN mm x 10^{-2} START	INT	FINAL	mm	DISTANCE FROM K/L	REMARKS
60	RHS	80	244	246	1.66	0.5m	
110	↓	98	184	186	0.88	↓	
110	LHS	96	150	152	0.56		
115	↓	90	178	180	0.90		
126		88	268	270	1.82		
130	↓	94	252	254	1.60	↓	
30	RHS	98	240	242	1.44	0.5m	
40	↓	90	180	190	1.29	↓	Beam 10 = 29
50	↓	90	218	220	1.30	↓	

MEASUREMENT STARTS: As Per Clients Chainage.		START TIME: 2:45	
TYPE OF SURFACE: AC		TEMP CORRECTION (time / deg C): N/A	
COMMENTS: Fine			

TESTED BY: KT & HH	CALCULATED BY: HH	CHECKED BY:
DATE: 24-01-08	DATE: 24-01-08	DATE:

CIVIL LAB

LPS-07F
Revision 7

BENKELMAN BEAM PAVEMENT DEFLECTION
TEST STANDARD - NRB T1 1977

JOB OR SUB-DIVISION NAME: Titch Place
SUB-DIVISION STAGE: -
JOB No. - STREET NAME OR No. Road 2
TYRE PRESSURE 122 psi REPORT NO. 6655 06
TYRE SIZE mm: 1000x200 AXLE LOAD: 8.2 tonnes PAGE 1
DATE OF ORDER: 24.01.08

Please note dial gauge has been modified to read directly

Distance / Chainage (m)	Lane	[All Readings in mm x 10-2] Start S	Inter I	Final F	Rebound Deflection mm	Distance From (m) Kerbline	Remarks
60	RHS	80	244	246	1.66	0.5	
110	RHS	96	164	166	0.68	0.5	
110	LHS	96	150	152	0.56	0.5	
115	LHS	90	178	180	0.90	0.5	
126	LHS	86	268	270	1.62	0.5	
130	LHS	94	252	254	1.60	0.5	
30	RHS	98	240	242	1.44	0.5	
40	RHS	90	190	190	1.29	0.5	Bowl correction applied
50	RHS	90	218	220	1.30	0.5	

MEASUREMENT STARTS: As per client's chainage
TYPE OF SURFACE: Asphaltic concrete
TEMPERATURE CORRECTION: Less than 40mm, not tested
START TIME: 2.45pm
COMMENTS: Weather-fine

TESTED BY: KT and JL DATE: 24.01.08
CALCULATED BY: JL DATE: 24.01.08
CHECKED BY: DATE:
APPROVED SIGNATORY: DATE:

CIVILAB

BENKELMAN BEAM PAVEMENT DEFLECTION
TEST STANDARD - NRB T1 1977

JOB OR SUB-DIVISION NAME: **Titch Place**
SUB-DIVISION STAGE: -
JOB No. -
STREET NAME OR No. -
TYRE PRESSURE 122 psi
TYRE SIZE mm: 1000x200
AXLE LOAD: 8.2 tonnes
DATE OF ORDER: 16.10.07
REPORT NO: 6655 03
PAGE 2 of 3

Please note dial gauge has been modified to read directly

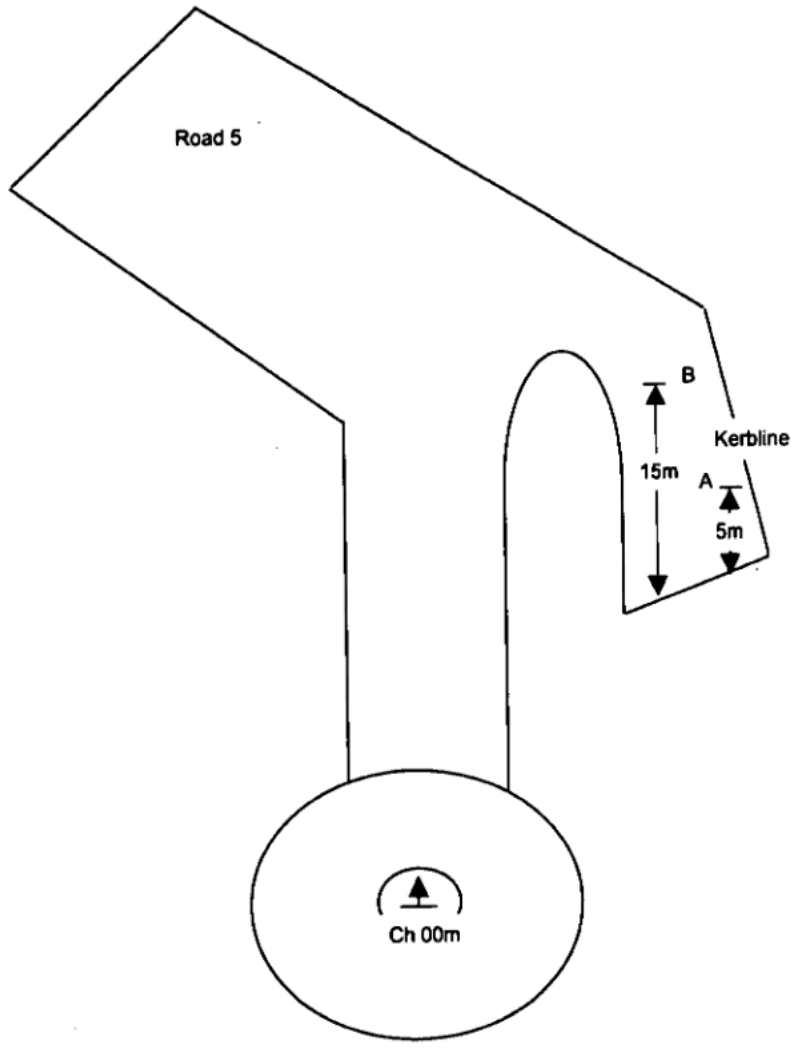
Distance / Chainage (m)	Lane	[All Readings in mm x 10-²] Start S	Inter I	Final F	Rebound Deflection mm	Distance From (m) Kerbline	Remarks
Road 1							
260	LHS	98	270	276	**1.78**	2.5	
265	LHS	98	218	220	**1.22**	0.5	
270	LHS	96	314	320	**2.24**	2.5	
275	LHS	98	282	286	**1.88**	0.5	
280	LHS	98	290	296	**1.98**	2.5	
Foundation Place - Road 2							
115	RHS	98	162	164	**0.66**	0.5	
20	RHS	98	300	306	**2.08**	0.5	
30	RHS	98	348	350	**2.52**	0.5	Visible movement
40	RHS	98	350	352	**2.54**	0.5	Visible movement
50	RHS	>5mm deflection			**>5**	0.5	Visible movement
60	RHS	98	320	324	**2.26**	0.5	Visible movement
70	RHS	98	242	244	**1.46**	0.5	
80	RHS	80	218	220	**1.40**	0.5	
30	RHS	98	218	220	**1.22**	1.5	
40	RHS	90	312	316	**2.26**	1.5	
50	RHS	98	298	304	**2.06**	1.5	
60	RHS	98	310	316	**2.18**	1.5	
Road 5 (Ch 00m = centreline of roundabout)							
80	RHS	98	158	160	**0.62**	0.5	
60	RHS	90	220	230	**1.69**	2.5	Bowl correction applied
40	RHS	98	196	200	**1.02**	0.5	
20	RHS	90	210	216	**1.26**	2.5	
80	LHS	90	206	210	**1.20**	0.5	
60	LHS	60	260	264	**2.04**	2.5	
40	LHS	90	220	224	**1.34**	0.5	
20	LHS	80	210	216	**1.36**	2.5	
5	A	98	250	254	**1.56**	1.5	
15	B	98	160	164	**0.66**	1.5	

MEASUREMENT STARTS: As per client's chainage
TYPE OF SURFACE: Basecourse
TEMPERATURE CORRECTION: Not applicable
START TIME: 2.00pm
COMMENTS: Weather - overcast

TESTED BY: KT and AS DATE: 17.10.07
CALCULATED BY: KT DATE: 17.10.07
CHECKED BY: DATE: 21.10.07
APPROVED SIGNATORY: DATE: 31.10.07

Job Name : **Titch Place**
Location : -

Site Plan - Not to scale



Tested By :	KT and AS	Date :	17.10.07
Checked By :	TB	Date :	31.10.07

BENKELMAN BEAM PAVEMENT DEFLECTION
TEST STANDARD - NRB T1 1977

JOB OR SUB-DIVISION NAME: **Titch Place**
SUB-DIVISION STAGE: -
JOB No. - STREET NAME OR No. Road 2
TYRE PRESSURE 122 psi REPORT NO: 6655 04
TYRE SIZE mm: 1000x200 AXLE LOAD: 8.2 tonnes PAGE 4 of 4
DATE OF ORDER: 26.10.07

Please note dial gauge has been modified to read directly

Distance / Chainage (m)	Lane	[All Readings in mm x 10-²] Start S	Inter I	Final F	Rebound Deflection mm	Distance From (m) Kerbline	Remarks
50	RHS	98	268	270	1.72	0.5	
40	RHS	74	220	222	1.48	0.5	
30	RHS	60	250	252	1.92	0.5	

MEASUREMENT STARTS:	As per client's chainage		
TYPE OF SURFACE:	Basecourse		
TEMPERATURE CORRECTION:	Not applicable		
START TIME:	2.00pm		
COMMENTS:	Weather-fine Retest		
TESTED BY:	JV and HH	DATE:	26.10.07
CALCULATED BY:	HH	DATE:	26.10.07
CHECKED BY:	TB	DATE:	02-11-07
APPROVED SIGNATORY:		DATE:	02-11-07

BENKELMAN BEAM PAVEMENT DEFLECTION
TEST STANDARD - NRB T1 1977

JOB OR SUB-DIVISION NAME: **Titch Place**
SUB-DIVISION STAGE: -
JOB No. - STREET NAME OR No. -
TYRE PRESSURE 122 psi REPORT 6655 00
TYRE SIZE mm: 1000x200 AXLE LOAD: 8.2 tonnes PAGE 2 of 3
DATE OF ORDER: 14.08.07

Please note dial gauge has been modified to read directly

Distance / Chainage (m)	Lane	[All Readings in mm x 10-2] Start S	Inter I	Final F	Rebound Deflection mm	Distance From (m) Kerbline	Remarks
Road 1							
10	LHS	70	138	142	**0.72**	0.5	
30	LHS	74	146	148	**0.74**	2.5	
50	LHS	80	176	180	**1.00**	0.5	
70	LHS	50	146	148	**0.98**	2.5	
90	LHS	20	220	228	**2.31**	0.5	Bowl correction applied
110	LHS	50	210	212	**1.62**	2.5	
130	LHS	70	160	164	**0.94**	0.5	
150	LHS	80	168	170	**0.90**	2.5	
170	LHS	60	350	352	**2.92**	0.5	
190	LHS	80	236	240	**1.60**	2.5	
210	LHS	70	180	184	**1.14**	0.5	
230	LHS	80	288	294	**2.14**	2.5	
250	LHS	80	356	358	**2.78**	0.5	
270	LHS	90	248	252	**1.62**	2.5	
290	LHS	64	188	190	**1.26**	0.5	
310	LHS	80	192	196	**1.16**	2.5	
330	LHS	70	216	220	**1.50**	0.5	
320	RHS	80	184	198	**1.59**	2.5	Bowl correction applied
300	RHS	40	330	336	**2.96**	0.5	
280	RHS	-220	318	320	**5.40**	2.5	
260	RHS	20	300	304	**2.84**	0.5	
240	RHS	22	478	480	**4.58**	2.5	
220	RHS	80	254	260	**1.80**	0.5	
200	RHS	82	352	358	**2.76**	2.5	
180	RHS	78	348	350	**2.72**	0.5	
160	RHS	8	558	562	**5.54**	2.5	
140	RHS	90	166	170	**0.80**	0.5	
120	RHS	62	228	230	**1.68**	2.5	
100	RHS	70	264	268	**1.98**	0.5	
80	RHS	70	398	398	**3.28**	2.5	
60	RHS	70	298	304	**2.34**	0.5	
40	RHS	96	316	320	**2.24**	2.5	
20	RHS	82	250	256	**1.74**	0.5	

MEASUREMENT STARTS: As per client's chainage
TYPE OF SURFACE: Basecourse
TEMPERATURE CORRECTION: Not applicable
START TIME: 3.00pm
COMMENTS: Weather - overcast

TESTED BY: KT and AS DATE: 21.08.07
CALCULATED BY: KT and AS DATE: 21.08.07
CHECKED BY: JB DATE: 01.09.07
APPROVED SIGNATORY: DATE: 01.09.07

BENKELMAN BEAM PAVEMENT DEFLECTION
TEST STANDARD - NRB T1 1977

JOB OR SUB-DIVISION NAME: **Titch Place**
SUB-DIVISION STAGE: -
JOB No. - STREET NAME OR No. -
TYRE PRESSURE 122 psi REPORT 6655 00
TYRE SIZE mm: 1000x200 AXLE LOAD: 8.2 tonnes PAGE 3 of 3
DATE OF ORDER: 14.08.07

Please note dial gauge has been modified to read directly

Distance / Chainage (m)	Lane	[All Readings in mm x 10-²] Start S	Inter I	Final F	Rebound Deflection mm	Distance From (m) Kerbline	Remarks
Road 2							
~~10~~	~~LHS~~	~~10~~	420	422	4.32	~~0.5~~	
30	LHS	80	248	250	1.70	2.5	
50	LHS	>10mm deflection			>10	0.5	
70	LHS	>10mm deflection			>10	2.5	
90	LHS	80	248	250	1.70	0.5	
110	LHS	80	220	222	1.42	2.5	
130	LHS	50	270	272	2.22	0.5	
150	LHS	50	150	154	1.04	2.5	
160	RHS	80	194	200	1.20	0.5	
140	RHS	90	214	218	1.28	2.5	
120	RHS	-20	218	220	2.40	0.5	
100	RHS	30	186	190	1.60	2.5	
80	RHS	60	148	150	0.90	0.5	
60	RHS	10	244	250	2.40	2.5	
40	RHS	10	290	294	2.84	0.5	
20	RHS	50	248	250	2.00	2.5	
Right Turn Lane		90	262	268	1.78	2.0	
Road 3							
10	LHS	30	260	262	2.32	0.5	
30	LHS	50	130	132	0.82	2.5	
50	LHS	-20	160	162	1.82	0.5	
70	LHS	50	196	200	1.50	2.5	
80	RHS	50	148	150	1.00	0.5	
60	RHS	70	198	200	1.30	2.5	
40	RHS	60	138	140	0.80	0.5	
20	RHS	20	178	180	1.60	2.5	
Road 4							
20	LHS	70	310	330	3.18	2.5	Bowl correction applied
40	LHS	30	210	212	1.82	0.5	
30	RHS	70	180	182	1.12	2.5	
Road 5							
0	LHS	>10mm deflection			>10	2.5	
5	LHS	90	180	210	2.07	0.5	
20	LHS	-60	380	382	4.42	0.5	Visible movement
40	LHS	-40	580	582	6.22	2.5	Visible movement
60	LHS	-40	400	410	4.79	0.5	Visible movement, bowl correction applied
80	LHS	>6mm deflection			>6	2.5	Proof rolled, visible movement
70	RHS	>6mm deflection			>6	0.5	Proof rolled, visible movement
50	RHS	>6mm deflection			>6	2.5	Proof rolled, visible movement
30	RHS	>6mm deflection			>6	0.5	Proof rolled, visible movement
10	RHS	>6mm deflection			>6	2.5	Proof rolled, visible movement

MEASUREMENT STARTS: As per client's chainage
TYPE OF SURFACE: Basecourse
TEMPERATURE CORRECTION: Not applicable
START TIME: 3.00pm
COMMENTS: Weather - overcast

TESTED BY: KT and AS DATE: 21.08.07
CALCULATED BY: KT DATE: 21.08.07
CHECKED BY: TB DATE: 01.09.07
APPROVED SIGNATORY: DATE: 01.09.07

CIVILAB

BENKELMAN BEAM PAVEMENT DEFLECTION
TEST STANDARD - NRB T1 1977

JOB OR SUB-DIVISION NAME: **Titch Place**
SUB-DIVISION STAGE:
JOB No. - STREET NAME OR No. -
TYRE PRESSURE 122 psi
TYRE SIZE mm: 1000x200 AXLE LOAD: 8.2 tonnes
DATE OF ORDER: 20.09.07

REPORT 6655 02
PAGE 2 of 2

Please note dial gauge has been modified to read directly

Distance / Chainage (m)	Lane	[All Readings in mm x 10-2] Start S	Inter I	Final F	Rebound Deflection mm	Distance From (m) Kerbline	Remarks
Road 2							
100	Left	90	242	244	1.54	0.5	
105	Left	98	292	294	1.96	0.5	
110	Left	92	506	508	4.16	0.5	
115	Left	98	428	430	3.32	0.5	
120	Left	96	292	296	2.00	0.5	
125	Left	80	240	242	1.62	0.5	
126	Left	60	370	372	3.12	0.5	
130	Left	80	488	492	4.12	0.5	
105	Right	82	202	208	1.26	0.5	
110	Right	96	338	340	2.44	0.5	
Road 1							
260	Left	98	230	232	1.34	0.5	
265	Left	96	222	224	1.28	0.5	
270	Left	70	254	256	1.86	0.5	
275	Left	92	278	278	1.86	0.5	
280	Left	94	286	288	1.94	2.5	

MEASUREMENT STARTS: As per client's chainage
TYPE OF SURFACE: Basecourse
TEMPERATURE CORRECTION: Not applicable
START TIME: 8.30am
COMMENTS: Weather-overcast

TESTED BY: JV and JL DATE: 24.09.07
CALCULATED BY: JL DATE: 24.09.07
CHECKED BY: TB DATE: 06.10.07
APPROVED SIGNATORY: DATE: 06.10.07

BENKELMAN BEAM PAVEMENT DEFLECTION
TEST STANDARD - NRB T1 1977

JOB OR SUB-DIVISION NAME: **Titch Place**
SUB-DIVISION STAGE: -
JOB No. - STREET NAME OR No. -
TYRE PRESSURE 122 psi
TYRE SIZE mm: 1000x200 AXLE LOAD: 8.2 tonnes
DATE OF ORDER: 11.09.07

REPORT 6655 01
PAGE 2 of 4

Please note dial gauge has been modified to read directly

Distance / Chainage (m)	Lane	[All Readings in mm x 10-²] Start S	Inter I	Final F	Rebound Deflection mm	Distance From (m) Kerbline	Remarks
Road 4							
20	LHS	84	152	158	0.74	2.5	
40	LHS	84	216	224	1.63	0.5	Bowl correction applied
30	RH	98	126	128	0.30	2.5	
28	RH	98	150	152	0.54	2.5	
Road 2							
10	LHS	90	304	304	2.14	0.5	
30	LHS	70	242	244	1.74	2.5	
50	LHS	62	230	232	1.70	0.5	
70	LHS	86	164	170	0.84	2.5	
90	LHS	88	314	316	2.28	0.5	
110	LHS	90	318	320	2.30	2.5	
130	LHS	66	450	452	3.86	0.5	Visible movement
150	LHS	70	276	280	2.10	2.5	
160	RHS	96	264	268	1.72	0.5	
140	RHS	94	206	210	1.16	2.5	
120	RHS	98	376	380	2.82	0.5	
100	RHS	90	210	214	1.24	2.5	
80	RHS	70	360	364	2.94	0.5	
30	RHS	98	226	230	1.32	2.5	
40	RHS	90	228	230	1.40	0.5	
20	RHS	90	196	196	1.06	2.5	
Right Turn Lane							
		80	250	250	1.70	2.0	
Road 2							
95	LHS	76	304	306	2.30	0.5	
100	LHS	80	356	360	2.80	0.5	Visible movement
105	LHS	84	318	320	2.36	0.5	Visible movement
110	LHS	>10mm deflection			>10	0.5	Visible movement
115	LHS	>10mm deflection			>10	0.5	Visible movement
Road 3							
10	LHS	96	276	278	1.82	0.5	
30	LHS	98	160	164	0.66	2.5	
50	LHS	70	194	198	1.28	0.5	
70	LHS	70	250	256	1.86	2.5	
80	RHS	70	176	182	1.12	0.5	
60	RHS	98	200	204	1.06	2.5	
40	RHS	90	150	156	0.66	0.5	
20	RHS	90	238	240	1.50	2.5	

MEASUREMENT STARTS: As per client's chainage
TYPE OF SURFACE: Basecourse
TEMPERATURE CORRECTION: Not applicable
START TIME: 8.15am
COMMENTS: Weather - overcast

TESTED BY: CA and MR DATE: 13.09.07
CALCULATED BY: MR DATE: 13.09.07
CHECKED BY: JB DATE: 30.09.07
APPROVED SIGNATORY: DATE: 30.09.07

BENKELMAN BEAM PAVEMENT DEFLECTION
TEST STANDARD - NRB T1 1977

JOB OR SUB-DIVISION NAME: **Titch Place**
SUB-DIVISION STAGE: -
JOB No. - STREET NAME OR No. -
TYRE PRESSURE 122 psi REPORT 6655 01
TYRE SIZE mm: 1000x200 AXLE LOAD: 8.2 tonnes PAGE 3 of 4
DATE OF ORDER: 11.09.07

Please note dial gauge has been modified to read directly

Distance / Chainage (m)	Lane	[All Readings in mm x 10-²] Start S	Inter I	Final F	Rebound Deflection mm	Distance From (m) Kerbline	Remarks
Road 1							
10	LHS	90	200	204	**1.14**	0.5	
30	LHS	86	250	252	**1.66**	0.5	
50	LHS	84	270	274	**1.90**	0.5	
70	LHS	66	290	290	**2.24**	2.5	
90	LHS	76	306	310	**2.34**	0.5	
110	LHS	96	226	230	**1.34**	2.5	
130	LHS	94	258	260	**1.66**	0.5	
150	LHS	96	160	162	**0.66**	2.5	
170	LHS	96	150	154	**0.58**	0.5	
190	LHS	90	150	150	**0.60**	2.5	
210	LHS	82	200	204	**1.22**	0.5	
230	LHS	86	180	186	**1.00**	2.5	
250	LHS	80	178	184	**1.04**	0.5	
270	LHS	50	386	396	**3.75**	2.5	Bowl correction applied
290	LHS	98	166	170	**0.72**	0.5	
310	LHS	94	144	148	**0.54**	2.5	
330	LHS	98	150	152	**0.54**	0.5	
320	RHS	92	146	152	**0.60**	2.5	
300	RHS	98	152	156	**0.58**	0.5	
280	RHS	60	256	260	**2.00**	2.5	
260	RHS	90	164	168	**0.78**	0.5	
240	RHS	80	166	170	**0.90**	2.5	
220	RHS	80	184	196	**1.51**	0.5	Bowl correction applied
200	RHS	94	146	150	**0.56**	2.5	
180	RHS	98	220	222	**1.24**	0.5	
160	RHS	90	250	256	**1.66**	2.5	
140	RHS	90	140	142	**0.52**	0.5	
120	RHS	86	192	196	**1.10**	2.5	
100	RHS	78	236	242	**1.64**	0.5	
80	RHS	92	270	276	**1.84**	2.5	
60	RHS	90	284	288	**1.98**	0.5	
40	RHS	82	254	258	**1.76**	2.5	
20	RHS	92	276	280	**1.88**	0.5	

MEASUREMENT STARTS: As per client's chainage
TYPE OF SURFACE: Basecourse
TEMPERATURE CORRECTION: Not applicable
START TIME: 8.15am
COMMENTS: Weather - fine

TESTED BY: CA and MR DATE: 13.09.07
CALCULATED BY: MR DATE: 13.09.07
CHECKED BY: TB DATE: 20.09.07
APPROVED SIGNATORY: DATE: 30.09.07

BENKELMAN BEAM PAVEMENT DEFLECTION
TEST STANDARD - NRB T1 1977

JOB OR SUB-DIVISION NAME: **Titch Place**
SUB-DIVISION STAGE: -
JOB No. - STREET NAME OR No. -
TYRE PRESSURE 122 psi REPORT 6655 01
TYRE SIZE mm: 1000x200 AXLE LOAD: 8.2 tonnes PAGE 4 of 4
DATE OF ORDER: 11.09.07

Please note dial gauge has been modified to read directly

Distance / Chainage (m)	Lane	[All Readings in mm x 10-²] Start S	Inter I	Final F	Rebound Deflection mm	Distance From (m) Kerbline	Remarks
Road 2							
120	LHS	90	270	272	1.82	0.5	
125	LHS	98	508	510	4.12	0.5	Visible movement
135	LHS	88	276	280	1.92	0.5	
145	LHS	94	310	312	2.18	2.5	
155	LHS	70	198	200	1.30	2.5	
140	LHS	90	268	270	1.80	2.5	
125	RHS	94	230	234	1.40	0.5	
115	RHS	94	324	326	2.32	0.5	
110	RHS	80	478	480	4.00	0.5	Visible movement
100	RHS	98	216	220	1.22	0.5	
105	RHS	60	506	512	4.52	0.5	
115	LHS	86	230	232	1.46	2.5	
105	LHS	90	250	256	1.66	2.5	
85	RHS	90	274	278	1.88	0.5	
75	RHS	84	254	260	1.76	0.5	
50	RHS	90	222	224	1.34	2.5	
Road 1							
265	LHS	98	750	760	6.91	2.5	Bowl correction applied
275	LHS	>10mm deflection			>10	2.5	

MEASUREMENT STARTS: As per client's chainage
TYPE OF SURFACE: Basecourse
TEMPERATURE CORRECTION: Not applicable
START TIME: 8.15am
COMMENTS: Weather - fine

TESTED BY: CA and MR DATE: 13.09.07
CALCULATED BY: MR DATE: 13.09.07
CHECKED BY: TB DATE: 30.09.07
APPROVED SIGNATORY: DATE: 30.09.07

Take-Over & Completion Certificate

(On Behalf of UnitedNetworks a division of Vector Limited)

Client:	**Babbage Consultants** PO Box 2027 Auckland Attention: Fiona Keir

Contractor:	Siemens Energy Services Limited.
Contractors Address:	PO Box 101 694 North Shore Mail Centre
Contact:	Midhat Husaric

Description of the Works

Installation of 11kV and 400V reticulation to supply 19 new dwellings (Stage 1) contained within the development at 423-429 West Coast Road, Henderson UnitedNetworks Project No. EC-N1-07-CIP4-016

1.0 **Electrical Reticulation**
Extension of the11kV, 400V, pilot cables and associated equipment including the installation of a 100kVA transformer to supply 19 new dwellings (Stage 1) with a single phase 60 Amp supply.

It is hereby certified that the part works as detailed and amended on construction plans EC-N1-07-CIP4-016 have been practically completed in accordance with the Contract Documents and UnitedNetworks Design and Construction Manual criteria.

1.1 Specifically these works encompass the extension of the electrical underground 11kV network. The design capacity is for single-phase 60-amp supply per dwelling and one dwelling per allotment.

2.0 The works, following tests where required, have been commissioned and taken over by UnitedNetworks/Vector as Network Operator.

3.0 UnitedNetworks a division of Vector Limited is the Electrical Operator of the distribution system which will provide Line Function Services at the Point of Supply to the subdivision.

4.0 Street lighting installation is not included in this certificate

Engineer to Contract: Damon Newton _____ Date 01 October 2007

(Name) (Signature)

Telecom New Zealand Limited
Network Delivery
Level 1
Zespri House
Private Bag 92028
Auckland

Telecom Ref: T 48755
Your Ref:

Telephone: 09 357 7036
Facsimile: 09 358 1273

NZ Housing Foundation
C/- Babbage Consultants Ltd
PO Box 2027
Auckland

Attention: Fiona Keir

Date: 3.9.07

RE: **Proposed Subdivision** West Coast Rd Housing Development Stage 1a
Location Auckland

TELEPHONE NETWORK PROVISIONING
SUBDIVISION SIGN OFF CERTIFICATE

The above subdivision has been reticulated to the standards of Telecom New Zealand Ltd.

It should be noted that this certificate does not cover service lead-ins to individual lots.

Yours faithfully

Mike Kirke
Network Deployment Specialist

Telecom New Zealand Limited
Network Delivery
Level 1
Zespri House
Private Bag 92028
Auckland

Telecom Ref: T 48761
Your Ref:

Telephone: 09 357 7036
Facsimile: 09 358 1273

NZ Housing Foundation
C/- Babbage Consultants Ltd
PO Box 2027
Auckland

Attention: Fiona Keir

Date: 31 8 07.

RE: **Proposed Subdivision** West Coast Rd Housing Development Stage 1b
Location Auckland

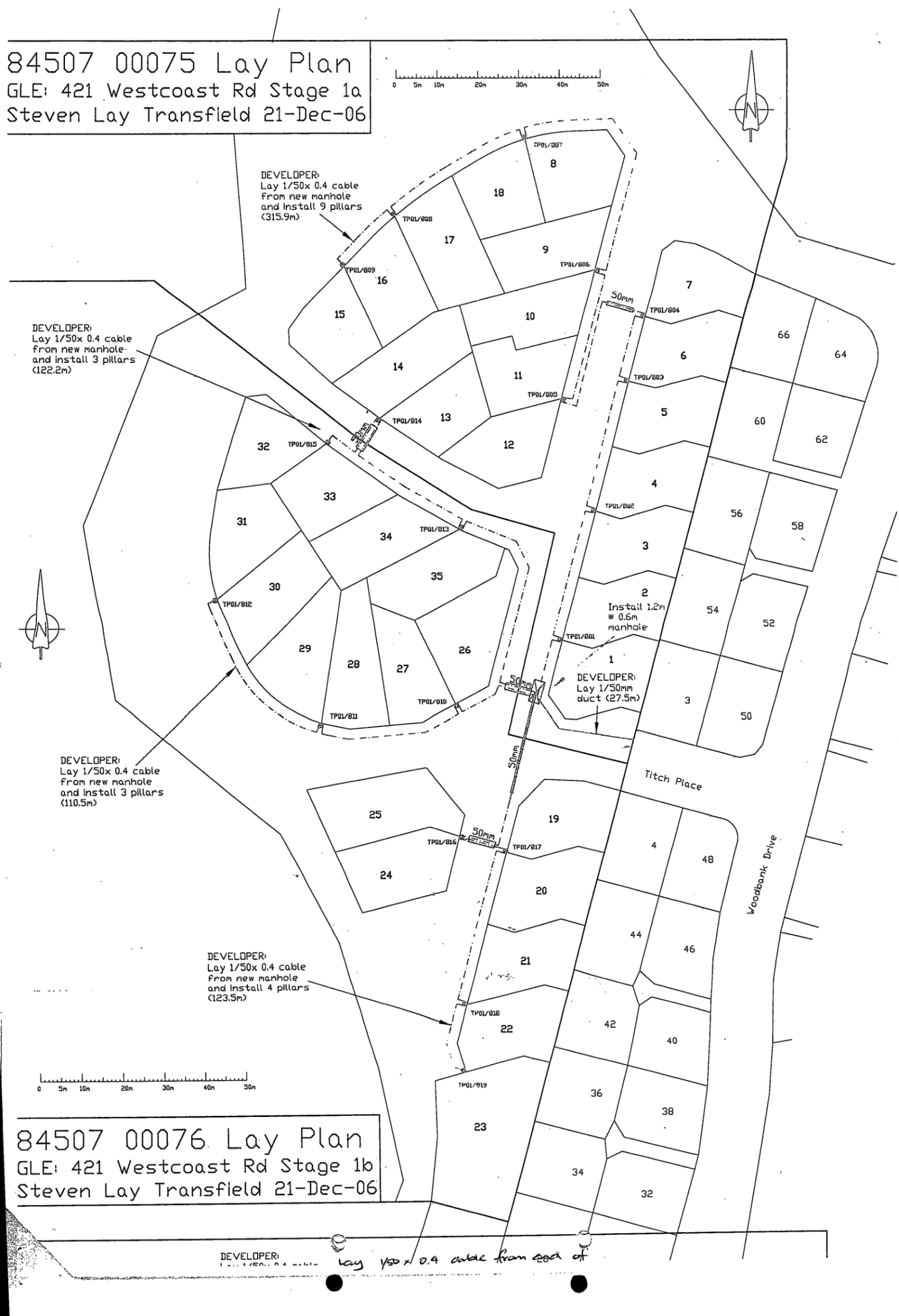
TELEPHONE NETWORK PROVISIONING
SUBDIVISION SIGN OFF CERTIFICATE

The above subdivision has been reticulated to the standards of Telecom New Zealand Ltd.

It should be noted that this certificate does not cover service lead-ins to individual lots.

Yours faithfully

Mike Kirke
Network Deployment Specialist


84507 00075 Lay Plan
GLE: 421 Westcoast Rd Stage 1a
Steven Lay Transfield 21-Dec-06
0 5m 10m 20m 30m 40m 50m
DEVELOPER:
Lay 1/50x 0.4 cable
from new manhole
and install 9 pillars
(315.9m)
DEVELOPER:
Lay 1/50x 0.4 cable
from new manhole
and install 3 pillars
(122.2m)
DEVELOPER:
Lay 1/50x 0.4 cable
from new manhole
and install 3 pillars
(110.5m)
DEVELOPER:
Lay 1/50x 0.4 cable
from new manhole
and install 4 pillars
(123.5m)
DEVELOPER:
Lay 1/50mm
duct (27.5m)
Install 1.2m
x 0.5m
manhole
50mm
TP01/807
TP01/808
TP01/809
TP01/806
TP01/804
TP01/803
TP01/805
TP01/814
TP01/815
TP01/813
TP01/812
TP01/811
TP01/810
TP01/802
TP01/801
TP01/816
TP01/817
TP01/818
TP01/819
Titch Place
Woodbank Drive
84507 00076 Lay Plan
GLE: 421 Westcoast Rd Stage 1b
Steven Lay Transfield 21-Dec-06
DEVELOPER:
Lay 1/50 x 0.4 cable from each of

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
6 Henderson Valley Road
Henderson 0612

Private Bag 93109
Henderson 0650
Waitakere

Telephone
09 836 8000

24Hr Call Centre
09 839 0400

Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

15 September 2007

Ted Barwell
Consent Services

Application Number: SUB-2006-1078
Applicant Name: NEW ZEALAND HOUSING FOUNDATION
Application Address: 423-429 West Coast Road, GLEN EDEN

SECTION 223 – SURVEY PLAN ECOWATER APPROVAL

EcoWater's Section 223 conditions applying to the above subdivision application have been met and are now approved for the purposes of signing the survey plan. The assessment notes are shown below each condition in BOLD. For enquiries or clarification regarding the items noted below please contact Shelley Renkema.

PUBLIC DRAINAGE INFRASTRUCTURE – ECOWATER SECTION 223 CONDITIONS

(a) Define the 1 in 100 year floodplain of the Parrs Stream, and the areas required for the stormwater quality treatment ponds and provide separate Lot(s) to vest in Council as drainage reserve. Specific requirements:
   (i) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage reserve boundaries.
   (ii) The existing drainage easement(s) on Lot 2 DP 339810 can be surrendered once the drainage reserve(s) vest in Council under each Stage as required above.
   (iii) The existing drainage easement(s) on Lot 3 DP 339810 can be surrendered once the existing pond has been replaced with an alternative treatment device and the drainage reserve vests in Council under Stage 3 as required above.

   Flood levels provided by Babbage Consultants, August 2007, showing 1%AEP floodplain contained within drainage reserve boundaries. Completed.

(b) Define the 1 in 100 year overland flowpath and provide a drainage easement(s) in gross in favour of Council in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon." Specific requirements:
   (i) The easement document will be prepared by Council's Solicitor at the applicant's cost.
   (ii) The easement document shall advise the owner of their responsibility to maintain the overland flowpath in it's approved state, and to keep it unobstructed by buildings, earthworks, solid walls or fences, or any other impediments to the free flow of water through the easement area.
   (iii) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage easement.

   Overland flowpath easements, approx 2m wide, provided over Lots 44-46. No calculations provided at this stage. As-builts will be required at 224c stage to confirm construction of overland flowpath is contained within easement boundaries.

(c) Provide for water supply easement(s) in gross in favour of Council over the ROW serving Lots 57-62 under Stage 3 in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out

in the Memorandum hereon." Specific requirements:

(i) The easement document will be prepared by Council's Solicitor at the applicant's cost.

(ii) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage easement.

Provided over access Lot 61.

Shelley Renkema
Principal Subdivision & Consents Engineer

EWRB 551

Electrical Certificate of Compliance

for prescribed electrical work that is carried out on electrical installations and involves the placing or positioning or the replacing or repositioning of conductors (including fittings attached to those conductors).

To be completed whether or not an Inspection is required.

No. 2570464

No. of attachments

OMER INFORMATION - PLEASE PRINT CLEARLY

of customer BABBAGE CONSULTANTS Phone:

s of installation 423-429 WEST COAST RD, GLEN EDEN. (STAGE 1)

ad s of customer (If not as above) PO BOX 2027, AUCKLAND

DETAILS

No. of lighting outlets

No. of socket outlets

y installation work carried out homeowner? Yes No

No. of ranges

No. of water heaters

Please tick (✓) as appropriate where work includes:

Mains

Switchboard

Main earthing system

Electric lines

iption INSTALL STREET LIGHTS, BEDDING AND CONNECT 46 LIGHTS FULLY. ALL LIGHTS HAVE SEPARATE EARTH PEG.

essary attach any pages with sketches of work done

It is recommended that test results be recorded here:

Visual Examination ✓

Earth Continuity ✓

Bonding ✓

Polarity ✓

Insulation Resistance > 10 Mohm

Other

FICATION OF WORK

hat the above electrical work has been carried out in accordance with the requirements of the Electricity Act 1992 and Electricity Regulations 1997.

ICAL WORKER DETAILS

ation no.

ny

ure

t Ph No.

CERTIFICATION OF ELECTRIC LINES

(to be completed where a separate electrical worker has installed the electric line portion of the mains)

Name Michael McMAHON

Registration no. LM 2310

Company Siemens Energy Svcs

Signature

Date 18/12/07

Contact Ph No. 09 479 4538

CTION DETAILS Electrical work requiring inspection by a registered electrical inspector

New mains

Switchboard

Earthing system

Installation work in hazardous areas

UnitedNetworks Pole 1 of K.

RECEIVED

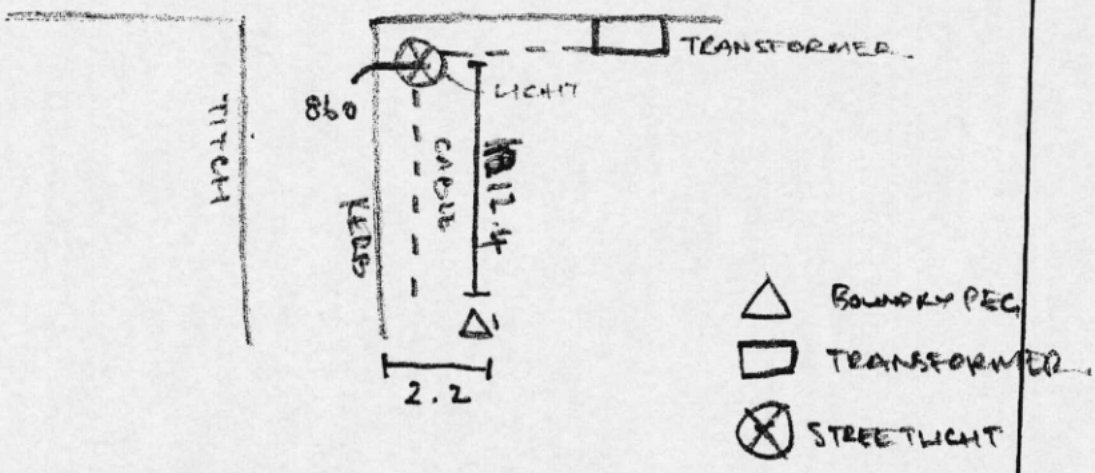
STREETLIGHT CONNECTION/ALTERATION FORM

Contractors Nb: ONE FORM PER CONNECTION, UPGRADE OR REMOVAL OF STREETLIGHT

NAME OF OWNER: WCC	
STREET ADDRESS: 423-429 WEST COAST RD, GLEN EDEN.	
NEW CONNECTION	
Date Installed: SEPTEMBER 2007.	
Lamp Size & Type: 70W SON-T (1 x SYLVANIA URBAN FITTING)	
UPGRADE	
Date Installed:	**Date Upgraded:**
Lamp Size & Type:	**Lamp Size & Type:**
REMOVAL	
Date Removed:	
Lamp Size & Type:	
CONDUCTOR DETAILS	
No. of Phases: 1	**Size:** 10 mm²
Type: N/S	**Depth:** 0.6 m

SKETCH SHOWING NEW UNDERGROUND CABLE & LAMP LOCATION:

WOODBANK



The Plan of underground cables shall show sufficient dimensions to enable any person, equipped with only a sketch and measuring tape, to locate (or avoid) any section of the cable. Cable is to be dimensioned to permanent and readily identifiable features on site, preferably to legal boundaries, or fences, kerbs, power poles or streetlight standards. Dimensions shall be to nearest 0.05m e.g., 17.35m. Plans not meeting these requirements will be returned and processing to liven the installation will not begin until an acceptable plan is received.

Contractor to keep original and submit one copy to UNL. This will ensure information is not lost if this form does not reach UNL.

UNITEDNETWORKS LIMITED USE ONLY:	Phone; (Region)
	Fax: (Region)

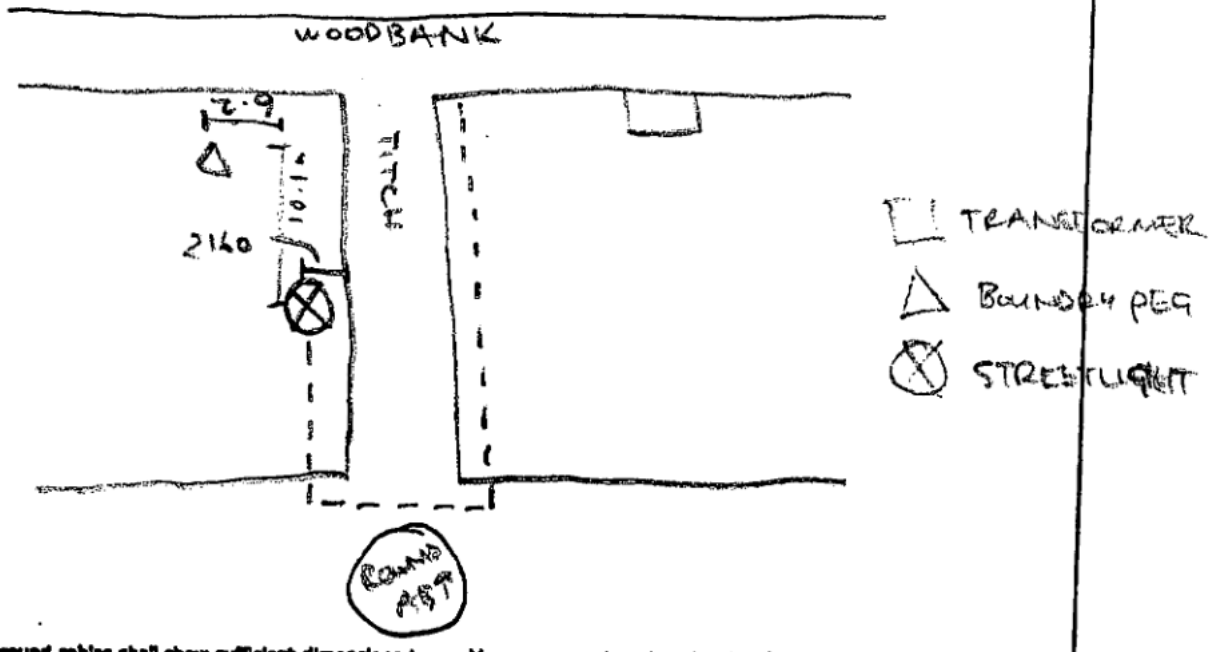
UnitedNetworks pole 2

STREETLIGHT CONNECTION/ALTERATION FORM

Contractors Nb: ***ONE FORM PER CONNECTION, UPGRADE OR REMOVAL OF STREETLIGHT***

NAME OF OWNER:	WCC
STREET ADDRESS:	423-429 WEST COAST RD, GLEN EDEN
NEW CONNECTION	
Date Installed:	SEPTEMBER 2007.
Lamp Size & Type:	70W SON-T (1 x SYLVANIA URBAN FITTING)
UPGRADE	
Date Installed:	**Date Upgraded:**
Lamp Size & Type:	**Lamp Size & Type:**
REMOVAL	
Date Removed:	
Lamp Size & Type:	
CONDUCTOR DETAILS	
No. of Phases: 1	**Size:** 10 mm²
Type: N/S	**Depth:** 0.6 m

SKETCH SHOWING NEW UNDERGROUND CABLE & LAMP LOCATION:



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UNITEDNETWORKS LIMITED USE ONLY:	**Phone; (Region)**
	Fax: (Region)

UnitedNetworks

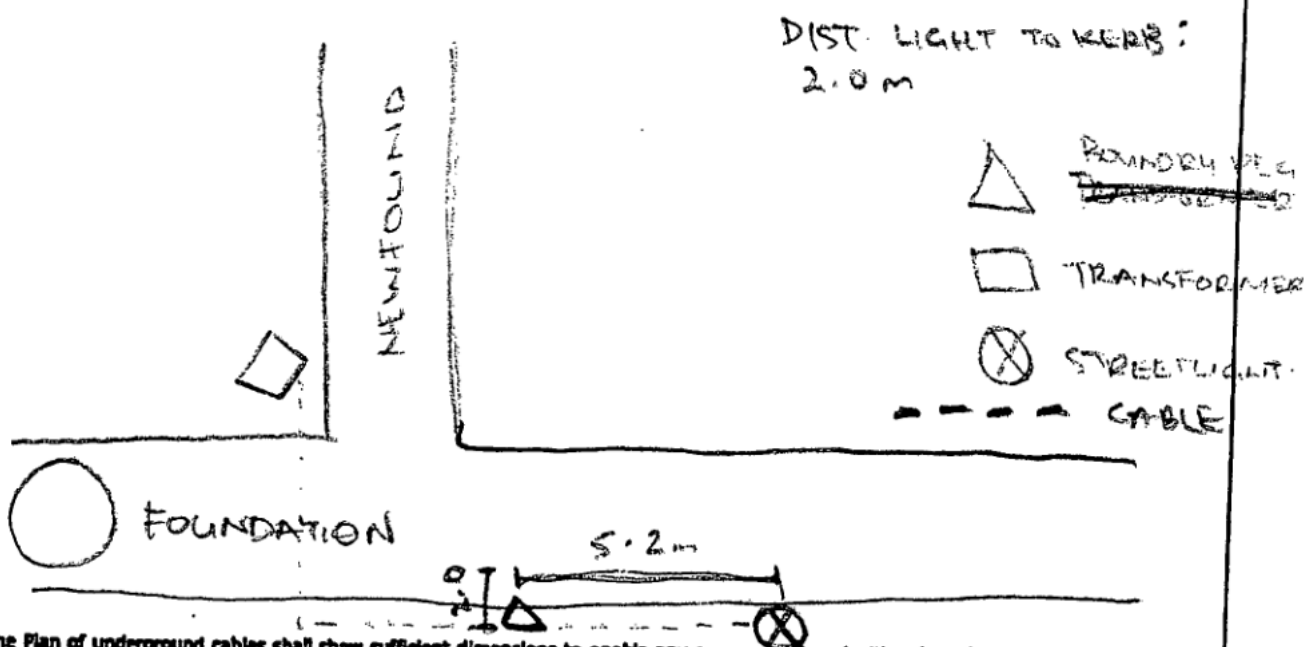
POLE 3

STREETLIGHT CONNECTION/ALTERATION FORM

Contractors Nb: ***ONE FORM PER CONNECTION, UPGRADE OR REMOVAL OF STREETLIGHT***

NAME OF OWNER:	WCC
STREET ADDRESS:	423-429 WEST COAST RD, GLEN EDEN.
NEW CONNECTION	
Date Installed:	SEPTEMBER 2007.
Lamp Size & Type:	70W SON-T, (1 x SYLVANIA URBAN FITTING)
UPGRADE	
Date Installed:	**Date Upgraded:**
Lamp Size & Type:	**Lamp Size & Type:**
REMOVAL	
Date Removed:	
Lamp Size & Type:	
CONDUCTOR DETAILS	
No. of Phases: 1	**Size:** 10 mm²
Type: N/S	**Depth:** 0.6 m

SKETCH SHOWING NEW UNDERGROUND CABLE & LAMP LOCATION:



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UNITEDNETWORKS LIMITED USE ONLY:	**Phone; (Region)**
	Fax: (Region)

UnitedNetworks

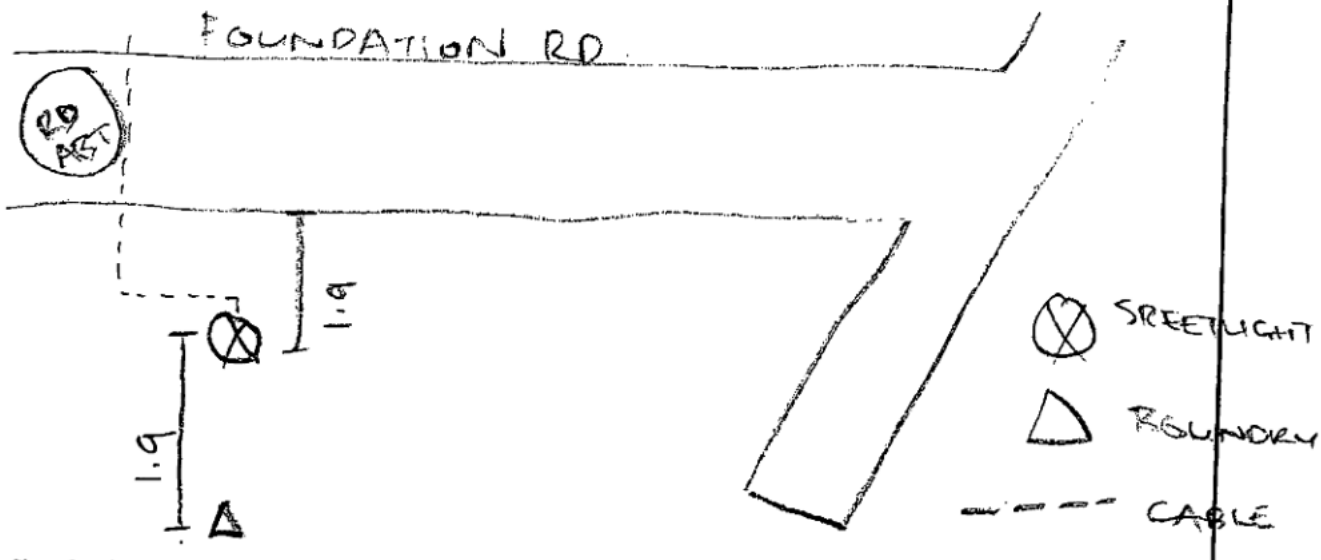
POLE 4

STREETLIGHT CONNECTION/ALTERATION FORM

Contractors Nb: ***ONE FORM PER CONNECTION, UPGRADE OR REMOVAL OF STREETLIGHT***

NAME OF OWNER:	WCC
STREET ADDRESS:	423-429 WEST COAST RD, GLEN EDEN
NEW CONNECTION	
Date Installed:	SEPTEMBER 2007.
Lamp Size & Type:	70W SON-T, (1 x SYLVANIA URBAN FITTING)
UPGRADE	
Date Installed:	Date Upgraded:
Lamp Size & Type:	Lamp Size & Type:
REMOVAL	
Date Removed:	
Lamp Size & Type:	
CONDUCTOR DETAILS	
No. of Phases: 1	Size: 10 mm²
Type: N/S	Depth: 0.6 m

SKETCH SHOWING NEW UNDERGROUND CABLE & LAMP LOCATION:



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	Fax: (Region)

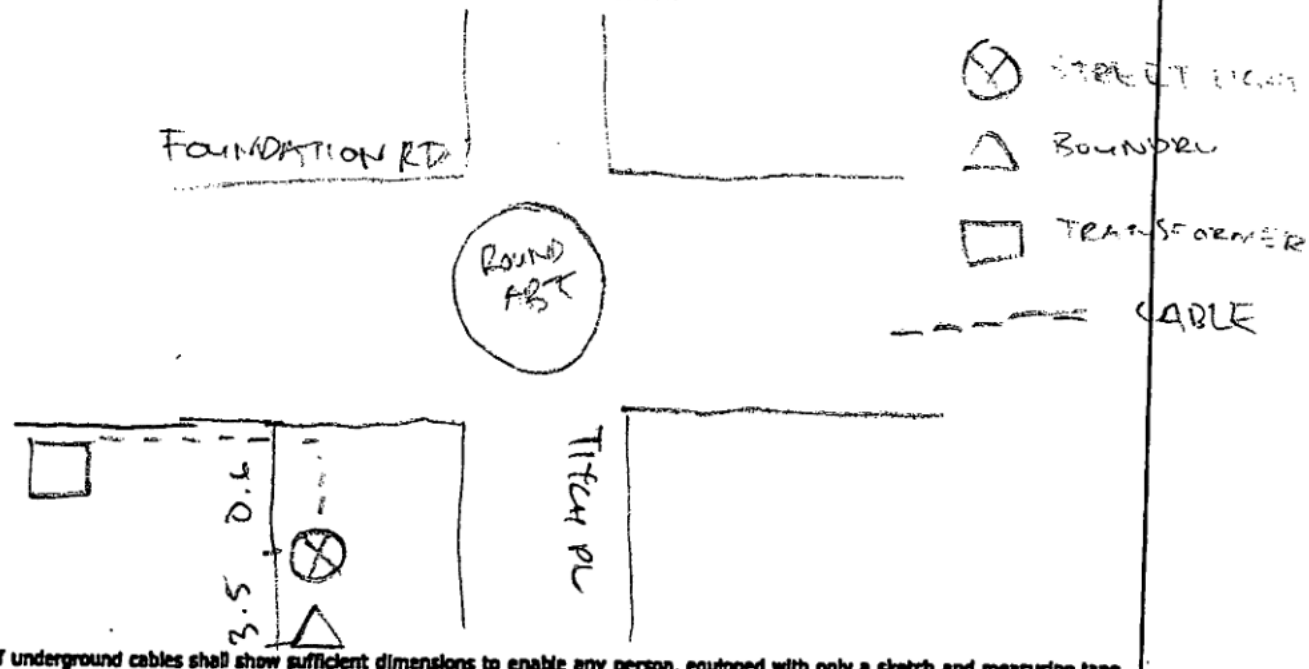
UnitedNetworks

STREETLIGHT CONNECTION/ALTERATION FORM

Contractors Nb: ONE FORM PER CONNECTION, UPGRADE OR REMOVAL OF STREETLIGHT

NAME OF OWNER:	WCC	
STREET ADDRESS:	423-429 WEST COAST RD, GLEN EDEN	
NEW CONNECTION		
Date Installed:	SEPTEMBER 2007.	
Lamp Size & Type:	70W SON-T (1 x SYLVANIA URBAN FITTING)	
UPGRADE		
Date Installed:		Date Upgraded:
Lamp Size & Type:		Lamp Size & Type:
REMOVAL		
Date Removed:		
Lamp Size & Type:		
CONDUCTOR DETAILS		
No. of Phases:	1	Size: 10 mm²
Type:	N/S	Depth: 0.6 m

SKETCH SHOWING NEW UNDERGROUND CABLE & LAMP LOCATION:



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UNITEDNETWORKS LIMITED USE ONLY:	Phone; (Region)
	Fax: (Region)

UnitedNetworks

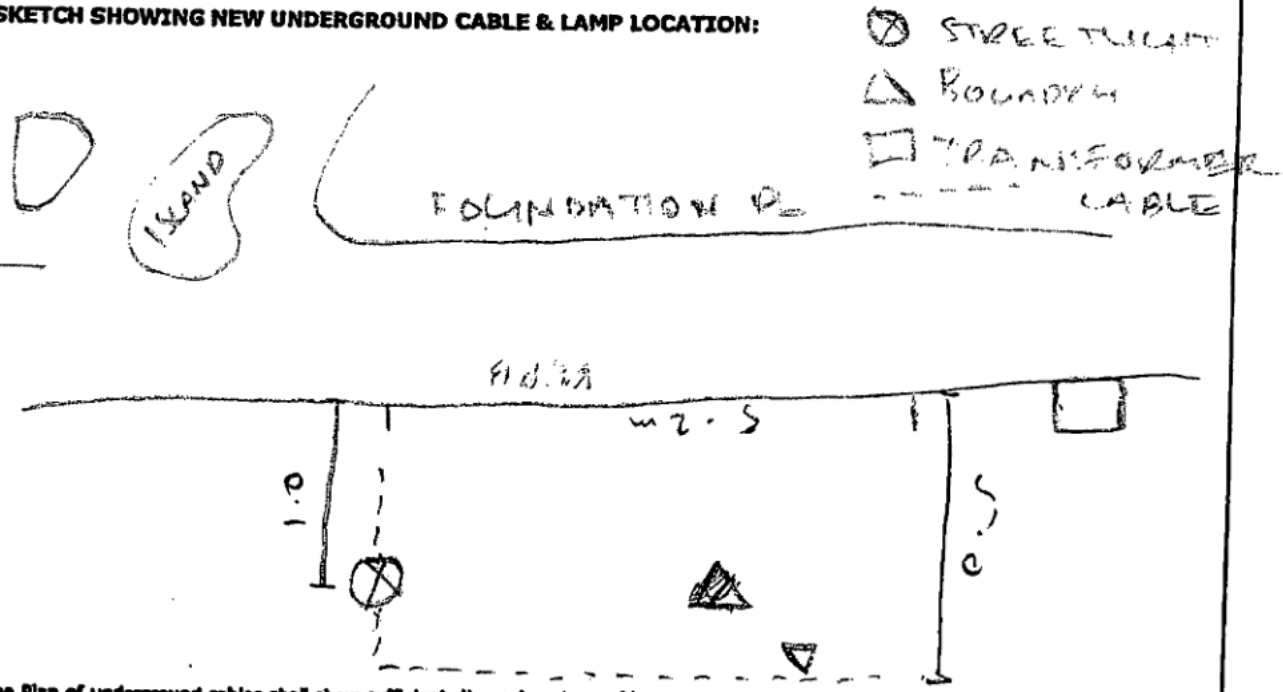
Pole 6

STREETLIGHT CONNECTION/ALTERATION FORM

Contractors Nb: ***ONE FORM PER CONNECTION, UPGRADE OR REMOVAL OF STREETLIGHT***

NAME OF OWNER:	WCC
STREET ADDRESS:	423-429 WEST COAST RD, GLEN EDEN
NEW CONNECTION	
Date Installed:	SEPTEMBER 2007.
Lamp Size & Type:	70W SON-T, (1 x SYLVANIA URBAN FITTING)
UPGRADE	
Date Installed:	**Date Upgraded:**
Lamp Size & Type:	**Lamp Size & Type:**
REMOVAL	
Date Removed:	
Lamp Size & Type:	
CONDUCTOR DETAILS	
No. of Phases: 1	**Size:** 10 mm²
Type: N/S	**Depth:** 0.6 m

SKETCH SHOWING NEW UNDERGROUND CABLE & LAMP LOCATION:



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UNITEDNETWORKS LIMITED USE ONLY:	**Phone; (Region)**
	Fax: (Region)

UnitedNetworks

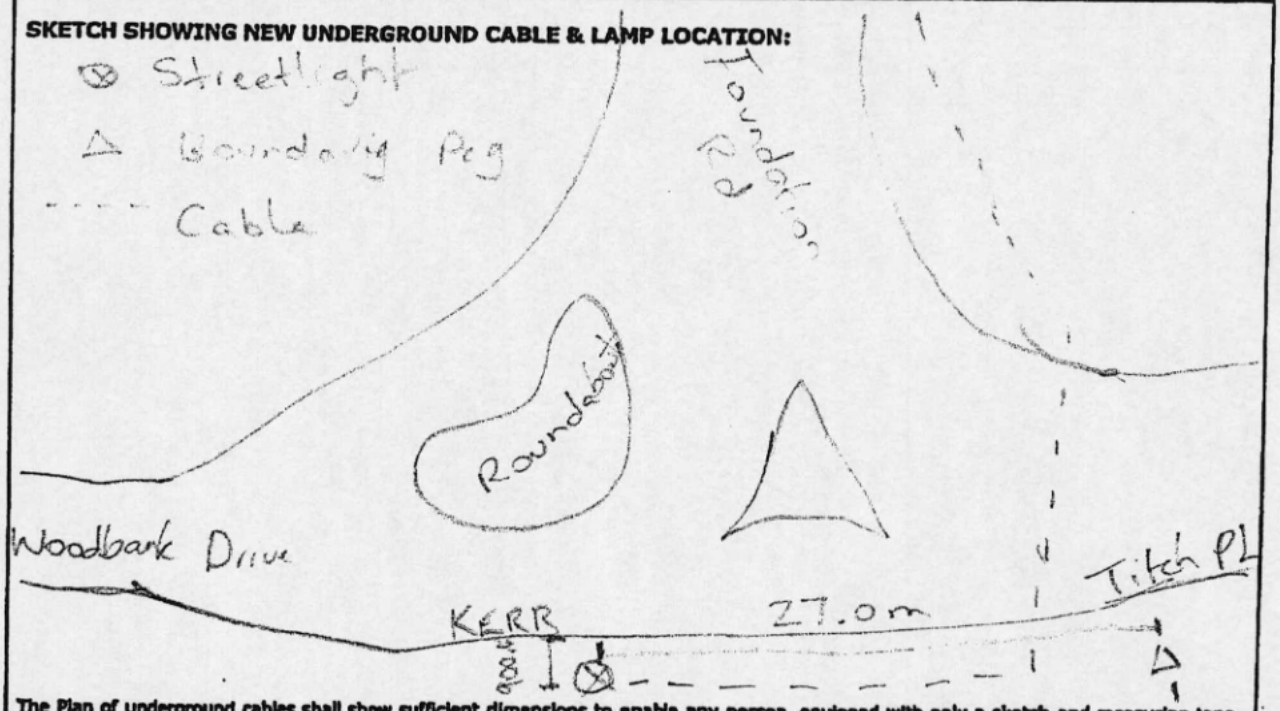
7

STREETLIGHT CONNECTION/ALTERATION FORM

Contractors Nb: ***ONE FORM PER CONNECTION, UPGRADE OR REMOVAL OF STREETLIGHT***

NAME OF OWNER:	WCC
STREET ADDRESS:	423-429 WEST COAST RD, GLEN EDEN.
NEW CONNECTION	
Date Installed:	SEPTEMBER 2007.
Lamp Size & Type:	70W SON-T (1 x SYLVANIA URBAN FITTING)
UPGRADE	
Date Installed:	**Date Upgraded:**
Lamp Size & Type:	**Lamp Size & Type:**
REMOVAL	
Date Removed:	
Lamp Size & Type:	
CONDUCTOR DETAILS	
No. of Phases: 1	**Size:** 10 mm²
Type: N/S	**Depth:** 0.6 m

SKETCH SHOWING NEW UNDERGROUND CABLE & LAMP LOCATION:



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UNITEDNETWORKS LIMITED USE ONLY:	**Phone; (Region)**
	Fax: (Region)

UnitedNetworks

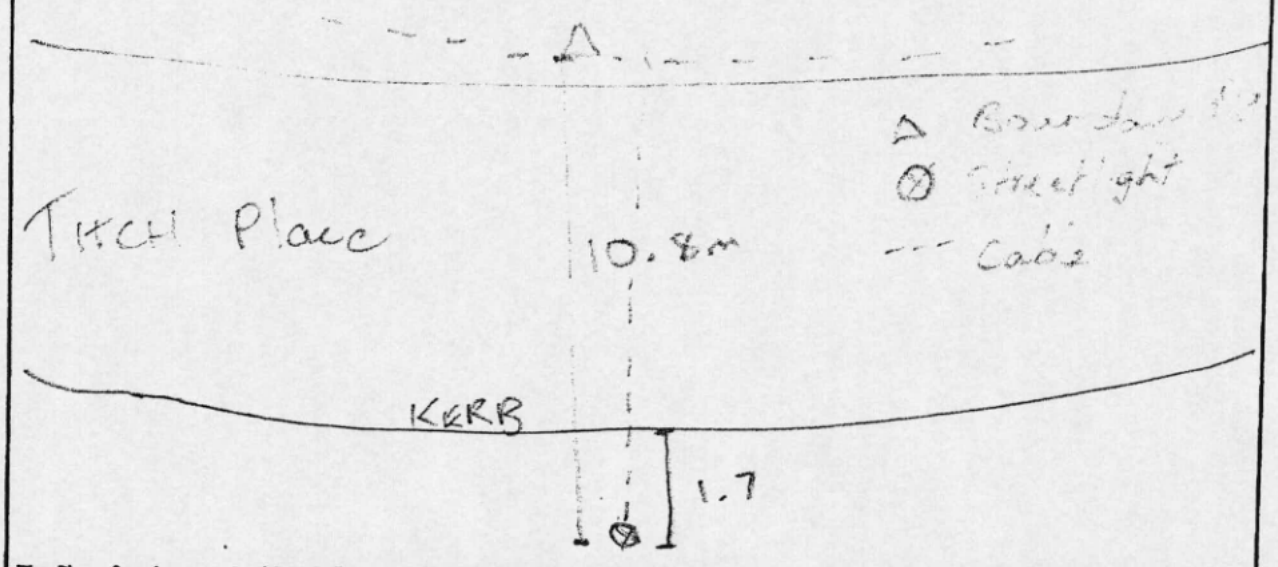
6

STREETLIGHT CONNECTION/ALTERATION FORM

Contractors Nb: ONE FORM PER CONNECTION, UPGRADE OR REMOVAL OF STREETLIGHT

NAME OF OWNER:	WCC
STREET ADDRESS:	423-429 WEST COAST RD, GLEN EDEN.
NEW CONNECTION	
Date Installed:	SEPTEMBER 2007.
Lamp Size & Type:	70W SON-T (1 x SYLVANIA URBAN FITTING)
UPGRADE	
Date Installed:	Date Upgraded:
Lamp Size & Type:	Lamp Size & Type:
REMOVAL	
Date Removed:	
Lamp Size & Type:	
CONDUCTOR DETAILS	
No. of Phases: 1	Size: 10 mm²
Type: N/S	Depth: 0.6 m

SKETCH SHOWING NEW UNDERGROUND CABLE & LAMP LOCATION:



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UNITEDNETWORKS LIMITED USE ONLY:	Phone; (Region)
	Fax: (Region)

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9

STREETLIGHT CONNECTION/ALTERATION FORM

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NAME OF OWNER:	WCC
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NEW CONNECTION	
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UPGRADE	
Date Installed:	Date Upgraded:
Lamp Size & Type:	Lamp Size & Type:
REMOVAL	
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CONDUCTOR DETAILS	
No. of Phases: 1	Size: 10 mm²
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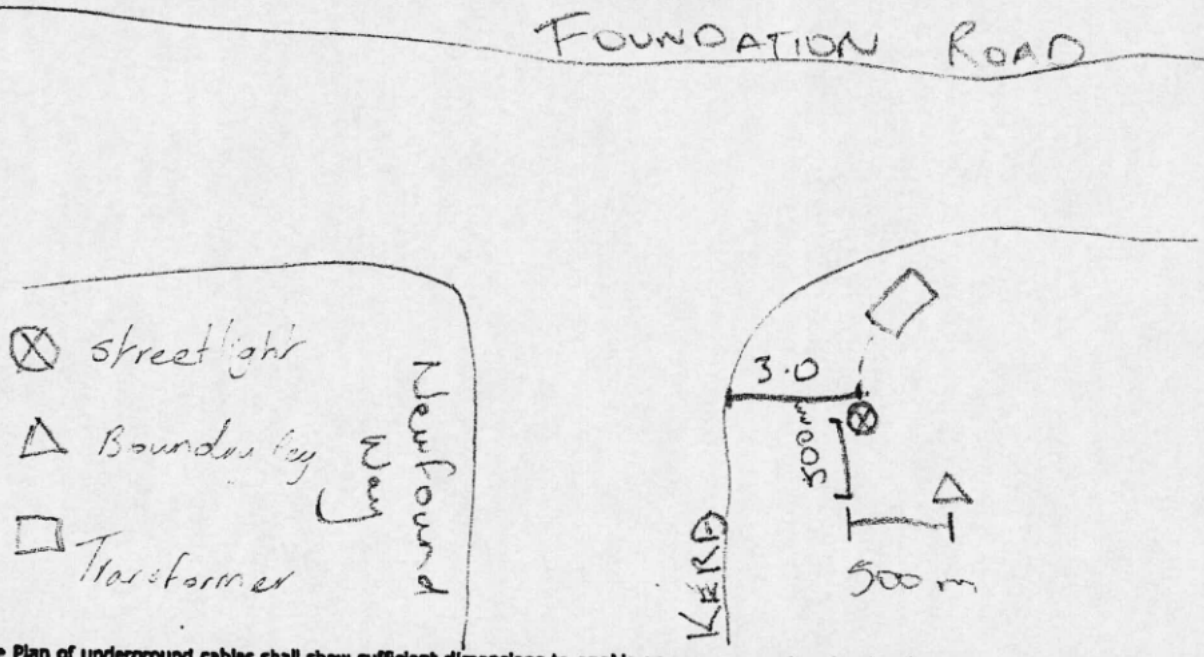

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10

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NEW CONNECTION	
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Lamp Size & Type:	70W SON-T (1 x SYLVANIA URBAN FITTING)
UPGRADE	
Date Installed:	**Date Upgraded:**
Lamp Size & Type:	**Lamp Size & Type:**
REMOVAL	
Date Removed:	
Lamp Size & Type:	
CONDUCTOR DETAILS	
No. of Phases: 1	**Size:** 10 mm²
Type: N/S	**Depth:** 0.6 m

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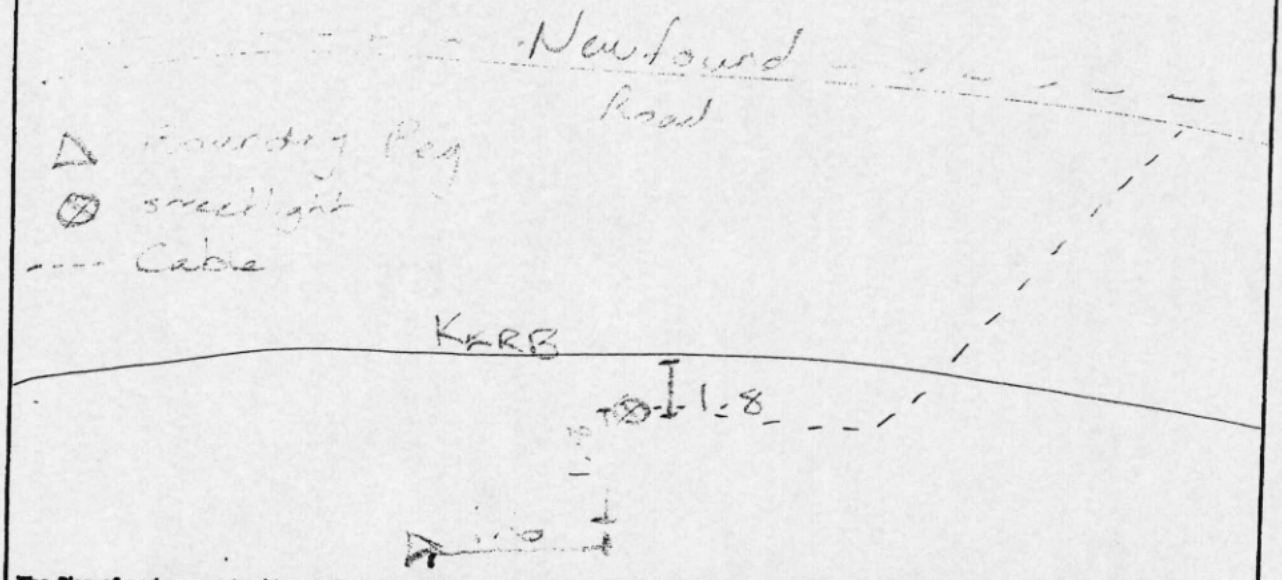

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11

STREETLIGHT CONNECTION/ALTERATION FORM

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UPGRADE	
Date Installed:	Date Upgraded:
Lamp Size & Type:	Lamp Size & Type:
REMOVAL	
Date Removed:	
Lamp Size & Type:	
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Type: N/S	Depth: 0.6 m

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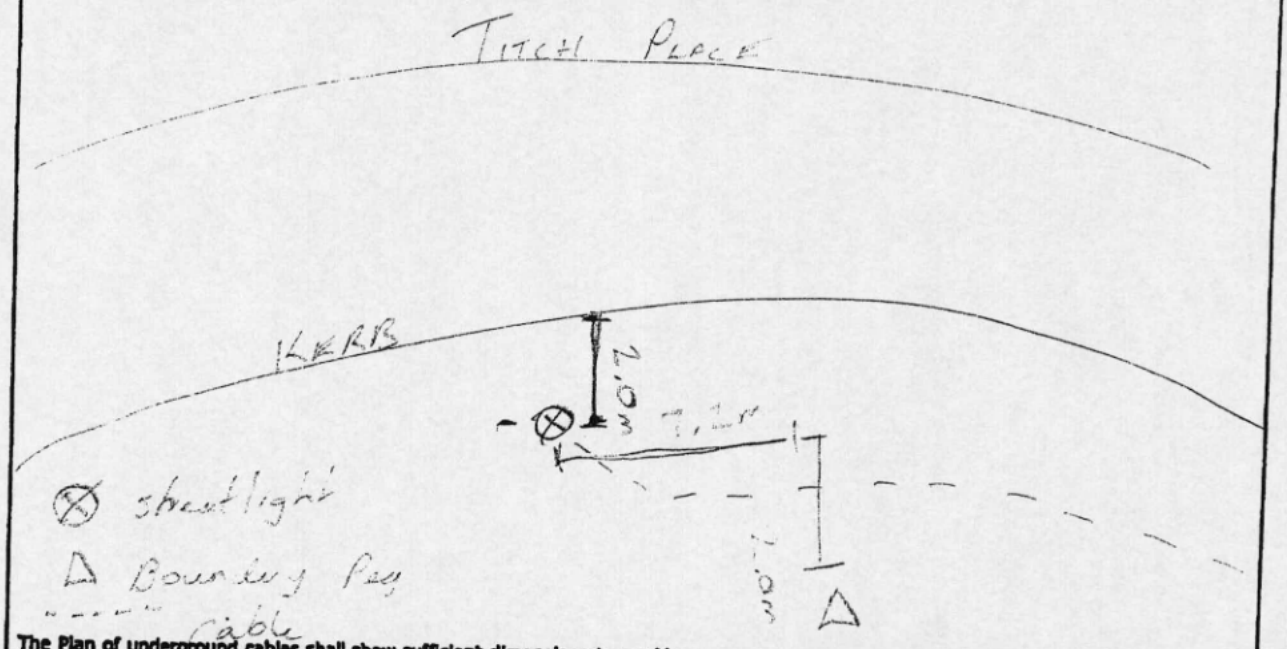

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STREETLIGHT CONNECTION/ALTERATION FORM

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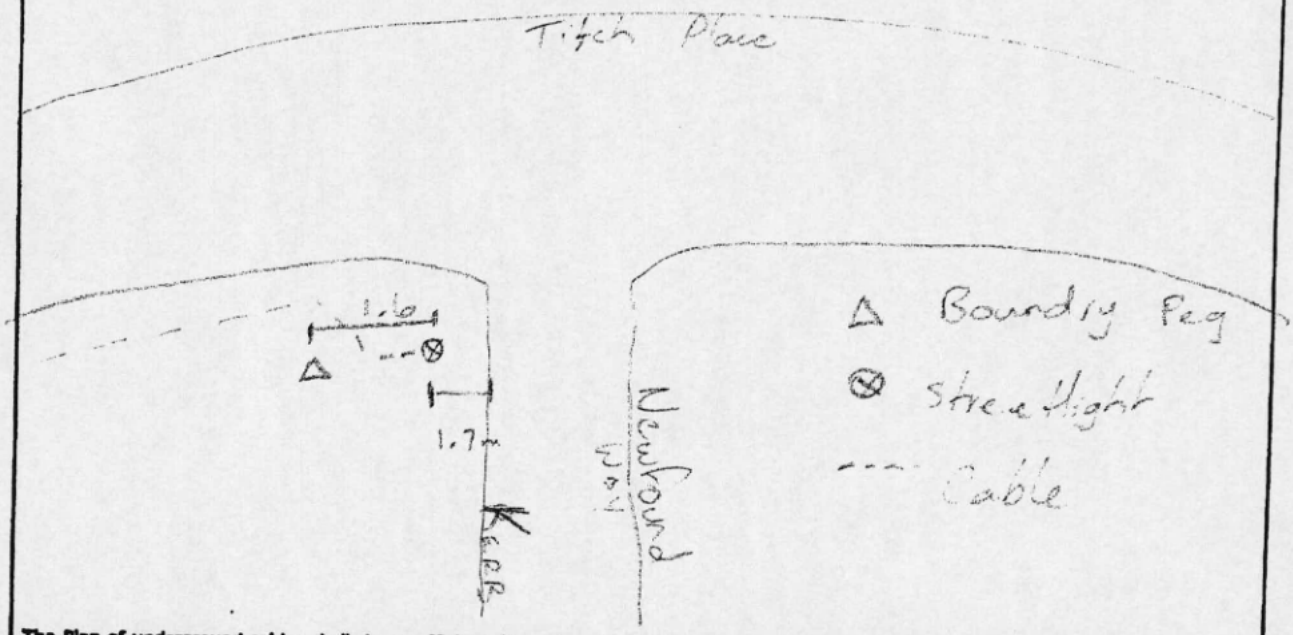

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DOC 15

STREETLIGHT CONNECTION/ALTERATION FORM

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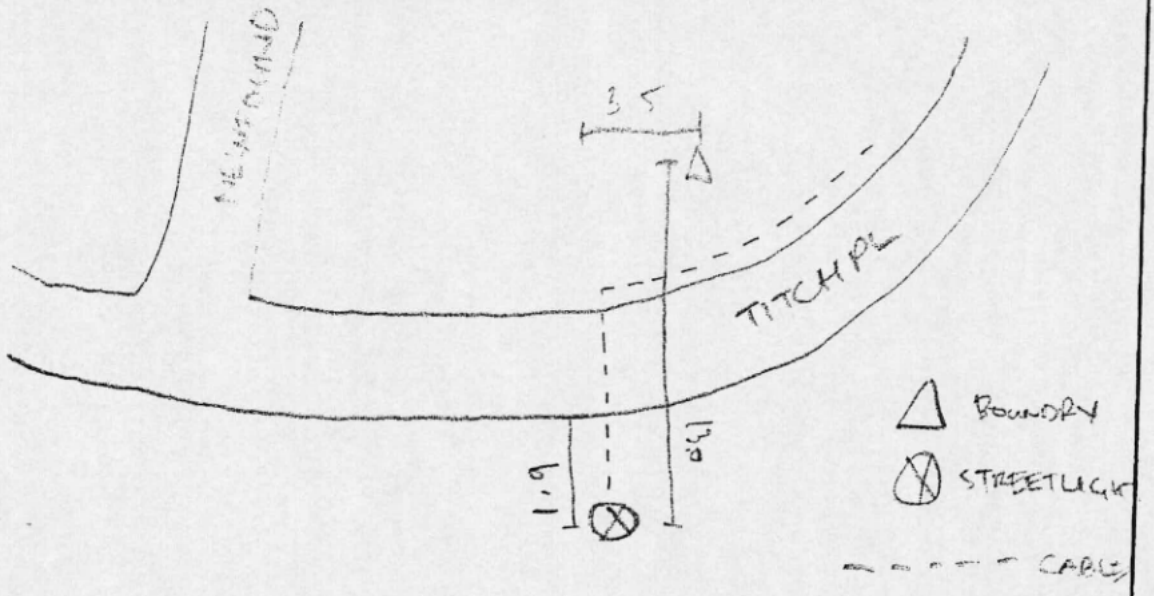

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Pole 16

STREETLIGHT CONNECTION/ALTERATION FORM

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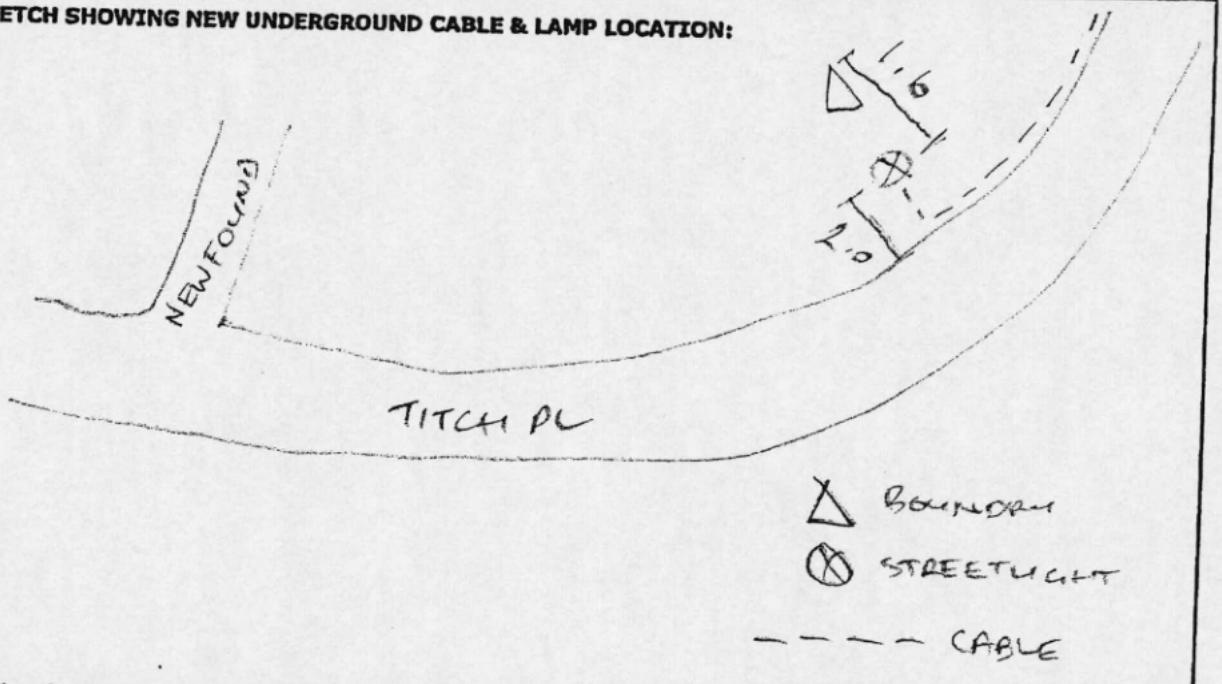

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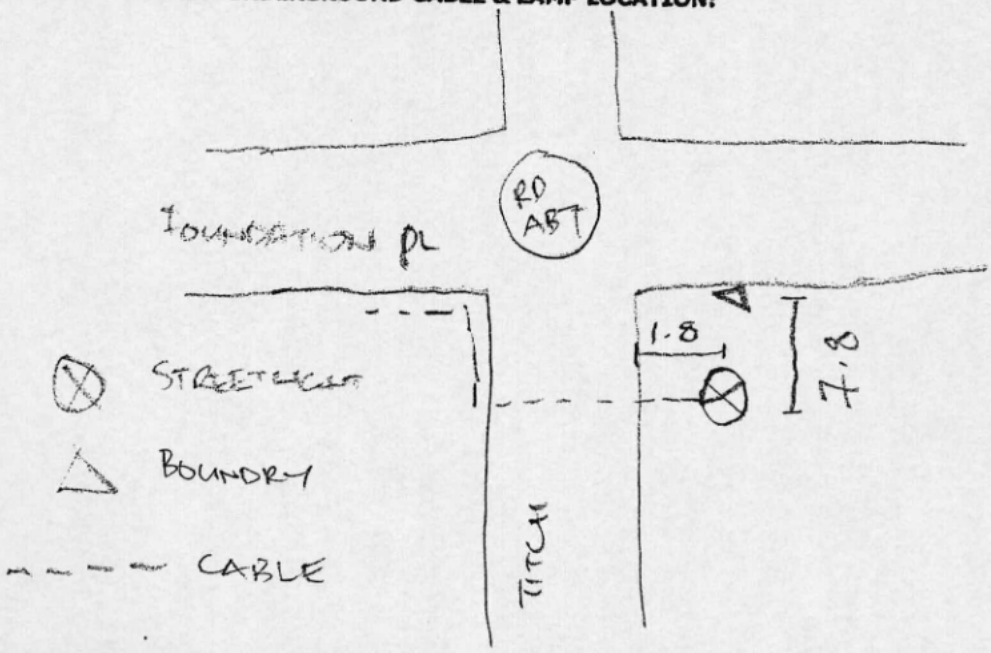

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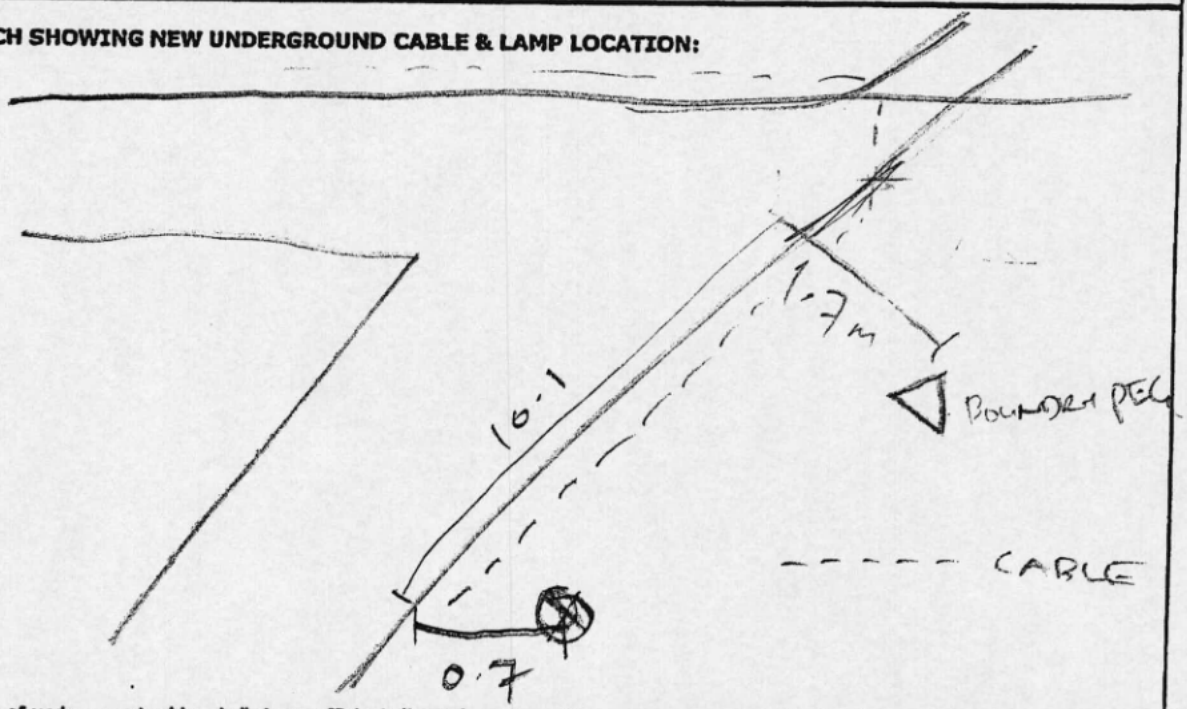

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Called Lisa ++ Heather @ 3:15 on 4/6/08 → Said Simon will pick up docs.

Helen H – no additional charges.

WAITAKERE CITY COUNCIL
- 3 JUN 2008

15330

CORBAN REVELL
LAWYERS

30 May 2008

Your ref: Helen Fleming
Our ref: 20441.500 / Lisa Roberts

The Chief Executive Officer
Waitakere City Council
DX CX10250
AUCKLAND MAIL CENTRE

RECEIVED IN
0 3 JUN 2008
SUBDIVISIONS

Dear Helen

RMA 20061078 – NEW ZEALAND HOUSING FOUNDATION
423-429 WEST COAST ROAD, GLEN EDEN

We refer to previous correspondence and now **enclose** the Surrender of Drainage Easement for execution by Council. → 3/6 Rec'd 4/6

Yours faithfully
CORBAN REVELL

Lisa Roberts
Associate
DDI +64 9 837 5737
lroberts@corbanrevell.co.nz
20441500\30051516

Partner ref: John Kahukiwa

Chief Executive	
Corporate Services	
City Services Moselle	
Consultancy Services	
ECO - WATER	
Strategic Group	
Consent Services	✓
Field Services	
Copy letter + doc delivered	

cc Gregory Simon Law
Barristers and Solicitors
PO Box 90880
AUCKLAND MAIL CENTRE
Attention: Gregory Simon

Partners
Lawrence Ponniah
John P Kahukiwa
Bruce Johnson

Associates
Lisa Roberts
Spencer Webster

Consultants
Philip G Revell
Alan P Goodwin
Brian PN Corban QSO.

WAITAKERE CITY COUNCIL
- 3 JUN 2008

CORBAN REVELL
LAWYERS

30 May 2008

Your ref: Helen Fleming
Our ref: 20441.500 / Lisa Roberts

The Chief Executive Officer
Waitakere City Council
DX CX10250
AUCKLAND MAIL CENTRE

COPY

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423-429 WEST COAST ROAD, GLEN EDEN

We refer to previous correspondence and now **enclose** the Surrender of Drainage Easement for execution by Council.

doc → legal services for sign 3/6/08

Yours faithfully
CORBAN REVELL

Lisa Roberts
Associate
DDI +64 9 837 5737
lroberts@corbanrevell.co.nz
20441500\30051516

Partner ref: John Kahukiwa

Chief Executive	
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133A Central Park Drive, Henderson
DX DP92558 PO Box 21-180 Waitakere City, New Zealand
Telephone: 64-9-837 0550 Facsimile: 64-9-838 7187
Email: info@corbanrevell.co.nz Website: www.corbanrevell.co.nz

Land Transfer Regulations 2002, Schedule 2, Form 4

EASEMENT INSTRUMENT TO SURRENDER EASEMENT, *PROFIT A PRENDRE*, OR LAND COVENANT

SECTIONS 90A AND 90F, LAND TRANSFER ACT 1952

Land registration district
North Auckland

BARCODE

Grantee *Surname must be underlined*

WAITAKERE CITY COUNCIL (continued on page 2 Annexure Schedule)

Grantor *Surname must be underlined*

NEW ZEALAND HOUSING FOUNDATION

Surrender* of easement, *profit à prendre* or covenant

The Grantee, being the registered proprietor of the dominant tenement(s) set out in Schedule A, or being the Grantee in gross, **surrenders to the Grantor** the easement(s), *profit(s) à prendre* or covenant(s) set out in Schedule A, and the Grantor accepts the surrender of those easement(s), *profit(s) à prendre* or covenant(s) (continued on page 2 Annexure Schedule)

Dated this day of 20

Attestation

WAITAKERE CITY COUNCIL The Common Seal of ★ 4477 **Signature [common seal] of Grantee**	~~**Signed in my presence by the Grantee**~~ THE COMMON SEAL of the **WAITAKERE CITY COUNCIL** was hereunto affixed in the presence of: ~~*Signature of witness*~~ Mayor / Deputy Mayor Chief Executive Officer ~~*Witness to complete in BLOCK letters (unless legibly printed)*~~ ~~**Witness name**~~ ~~**Occupation**~~ ~~**Address**~~
Signature [common seal] of Grantor	**Signed in my presence by the Grantor** *Signature of witness* *Witness to complete in BLOCK letters (unless legibly printed)* **Witness name** **Occupation** **Address**

Certified correct for the purposes of the Land Transfer Act 1952

[Solicitor for] the Grantor

*If the consent of any person is required for the grant, the specified consent form must be used

Annexure Schedule 1

Easement surrender instrument | Dated |

Schedule A *Continue in additional Annexure Schedule if required*

Nature of easement, *profit*, or covenant	Unique identifier (Document number)	Servient tenement (Identifier/CT)	Dominant tenement (Identifier/CT *or* in gross)
Drainage	6135712.4 marked "K", "B" and "G" on Deposited Plan 339810	163628	in gross

All signing parties and either their witnesses or solicitors must sign or initial in this box

Annexure Schedule 3

Easement Surrender Instrument	Dated	2	of	3	pages

Continuation of 'Grantee'

1. The Waitemata City Council is a successor to the Chairman, Councillors and Inhabitants of the County of Waitemata by virtue of an Order in Council appearing in the New Zealand Gazette on the 25th day of July 1974 at page 1512.

2. Waitakere City Council is a successor to the Waitemata City Council by virtue of an order in Council appearing in the New Zealand Gazette on the 13th day of June 1989 and the Waitakere City Council is now the territorial authority having jurisdiction in respect of the locality in which the land contained in Certificate of Title 163628 is situated.

Continuation of 'Operative Clause'

PROVIDED HOWEVER that nothing herein contained shall prejudice, release or affect the said easement and other rights created by and contained in Transfer 6135712.4 as to the remainder of the land thereby affected.

Pursuant to Section 243(f)(ii) of the Resource Management Act 1991 the Waitakere City Council hereby certifies that it has cancelled the condition requiring creation of the said Drainage Easement in favour of the Waitakere City Council over the land lettered "K", "B" and "G" on DP 339810.

20061078

Continued on page 3 Annexure Schedule

All signing parties and either their witnesses or solicitors must sign or initial in this box

ANNEXURE SCHEDULE – CONSENT FORM

Land Transfer Act 1952 section 238(2)

Easement Surrender Instrument

Person giving consent *Surname must be underlined*	**Capacity and interest of Person giving consent** *(eg Caveator under Caveat no)*
HOUSING NEW ZEALAND CORPORATION	Mortgagee under and by virtue of Mortgage No. 6551320.5

Consent

Delete words in [ ] if inconsistent with the consent
State full details of the matter for which consent is required

[Without prejudice to the rights and powers existing under the interest of the person giving consent.]

the Person giving consent hereby consents to surrender of Drainage Easement 6135712.4

Dated this day of 20

Attestation

	Signed in my presence by the Person giving consent
	_____ *Signature of witness*
_____ Signature (Common seal) of Person giving consent	*Witness to complete in BLOCK letters (unless legibly printed)* **Witness name** **Occupation** **Address**

An Annexure Schedule in this form may be attached to the relevant instrument, where consent is required to enable registration under the Land Transfer Act 1952, or other enactments, under which no form is prescribed.

MEMORANDUM

TO: Hazards Clerks- **Loretta Parker & Kevin Fan**

FROM: Process Support Subdivisions- Natashia

DATE: 08/5/2008

SUBJECT: **SUB** 2006-1078

NAME NEW ZEALAND HOUSING FOUNDATION

ADDRESS 423-429 West Coast Rd

The Section 224 certificate has been issued and acceptable arrangements made to deposit

D.P. 389289 (copy attached)

Yes - Existing hazard on underlying property
Yes / No - If horticulture site was a soils report found

Specific restrictions are required on the Lot(s) as scheduled in the attached

Consent Notice

Consent notice

It is in order to process building consents subject to compliance with the District Plan Rules.

PROCESS SUPPORT - SUBDIVISIONS

Natashia Ogbourne

From: Heather Harmes [hharmes@corbanrevell.co.nz]

Sent: Tuesday, 6 May 2008 4:16 p.m.

To: 224c Clearances

Cc: Helen Fleming

Subject: RMA 2006/1078 - NEW ZEALAND HOUSING FOUNDATION - 423-429 WEST COAST ROAD, GLEN EDEN - CORBAN REVELL REFERENCE : 20441.500

We advise that our clearance is available for the above subdivision. The Consent Notice is attached herewith. The Fencing Agreement is being delivered to Helen this afternoon.

Heather Harmes
Legal Administrator
for Lisa Roberts
Associate
CORBAN REVELL SOLICITORS
DDI: (09) 837-3508

.....

The information in this e-mail and in any attachment(s) is confidential and intended solely for the named addressee(s). The information may also be subject to legal professional or other privilege. If you are not the named addressee, please notify us immediately by reply e-mail and then delete this message from your system. Please do not copy, disclose, distribute, or use it for any purpose. Thank you for your co-operation.

Sender : Corban Revell, Barristers and Solicitors

Ph : + 64 (9) 837 0550

Fx : + 64 (9) 838 7187

WAITAKERE CITY COUNCIL
RECEIVED IN 7 MAY 2008
- 7 MAY 2008
SUBDIVISIONS

CORBAN REVELL
LAWYERS

6 May 2008

Our ref: 20441.500 / Lisa Roberts
Your ref: Helen Fleming

The Chief Executive Officer
Waitakere City Council
DX CX10250
AUCKLAND MAIL CENTRE

013376

Dear Helen

RMA 200611078 - NEW ZEALAND HOUSING FOUNDATION
423-429 WEST COAST ROAD, GLEN EDEN

We confirm our email advice that it would appear in order for release of the executed Consent Notice, Fencing Agreement and Section 224 Certificate subject of course to any other requisitions Council may have.

The Fencing Agreement is **enclosed** for execution by Council.

→ legal 7/5/08
rec from legal services 7/5/08

Yours faithfully
CORBAN REVELL

Lisa Roberts
Associate
DDI +64 9 837 5737
lroberts@corbanrevell.co.nz
20441500\06051527

Partner ref: John Kahukiwa

Chief Executive	
Corporate Services	
City Services Moselle	
Consultancy Services	
ECO - WATER	
Strategic Group	
Consent Services	✓
Field Services	

COPY OF LETTER DELIVERED and ATTACHMENT

Partners
Lawrence Ponniah
John P Kahukiwa
Bruce Johnson

Associates
Lisa Roberts
Spencer Webster

Consultants
Philip G Revell
Alan P Goodwin
Brian PN Corban QSO.

WAITAKERE CITY COUNCIL
- 1 MAY 2008

CORBAN REVELL
LAWYERS

012881

24 April 2008

Your ref: Helen Fleming
Our ref: 20441.500 / Lisa Roberts

The Chief Executive Officer
Waitakere City Council
DX CX10250
AUCKLAND MAIL CENTRE

RECEIVED IN
- 1 MAY 2008
SUBDIVISIONS

Dear Helen

RMA 20061078 – NEW ZEALAND HOUSING FOUNDATION
423-429 WEST COAST ROAD, GLEN EDEN

Thank you for your instructions of 31 March 2008. We now **enclose**:

1. Consent Notice for execution by Council.
2. Copy Fencing Agreement
3. Copy letter to Gregory Simon Law.

We note your advice the Drainage Easement is not required at Stage one of this development.

We will advise once it is in order to release the Consent Notice and Section 224 Certificate to the Subdivider.

Yours faithfully
CORBAN REVELL

Lisa Roberts
Associate
DDI +64 9 837 5737
lroberts@corbanrevell.co.nz
20441500\01041718

Partner ref: John Kahukiwa

Chief Executive	
Corporate Services	
City Services Moselle	
Consultancy Services	
ECO - WATER	
Strategic Group	
Consent Services	✓
Field Services	

* COPY OF LETTER & DOCS DELIVERED

Partners
Lawrence Ponniah
John P Kahukiwa
Bruce Johnson

Associates
Lisa Roberts
Spencer Webster

Consultants
Philip G Revell
Alan P Goodwin
Brian PN Corban QSO.

CORBAN REVELL
LAWYERS

24 April 2008

Our ref: 20441.500 / Lisa Roberts
Your ref: Gregory Simon

Gregory Simon Law
Barristers and Solicitors
PO Box 90880
AUCKLAND MAIL CENTRE

COPY

Dear Colleagues

WAITAKERE CITY COUNCIL - NEW ZEALAND HOUSING FOUNDATION
423-429 WEST COAST ROAD, GLEN EDEN

1. We have been instructed by the Waitakere City Council in regard to the above development and now **enclose** the following:

   (a) Copy Consent Notice - the original notice is with Council for execution.
   (b) Fencing Agreement.
   (c) A note of our costs.

2. Please note at a later stage of this development Council will require the drainage easement in gross contemplated by condition 2(f) of the consent. Also the right of way easements in gross will be required to be created at a later stage of this development in accordance with condition 2(d) of the consent.

3. The Fencing Agreement is to be signed by your client and requires the consent of your client's mortgagee.

4. Once this document has been signed and the consent obtained, the document is to be returned to the writer and we will then arrange for it to be signed under seal by Waitakere City Council.

5. Assuming all other conditions imposed on the subdivision are satisfied, Council will be authorised to release the executed documents and Section 224 Certificate upon the writer's receipt from you of the following:

   (a) The Fencing Agreement duly signed including the appropriate consents.

   (b) Your undertaking to:

      (i) Register the Fencing Agreement on the same abstract as all other documentation required to deposit Plan 389289.

Partners
Lawrence Ponniah
John P Kahukiwa
Bruce Johnson

Associates
Lisa Roberts
Spencer Webster

Consultants
Philip G Revell
Alan P Goodwin
Brian PN Corban QSO.

133A Central Park Drive, Henderson
DX DP92558 PO Box 21-180 Waitakere City, New Zealand
Telephone: 64-9-837 0550 Facsimile: 64-9-838 7187
Email: info@corbanrevell.co.nz Website: www.corbanrevell.co.nz

(ii) Return the original registered Fencing Agreement to the writer immediately following registration together with copies of the affected Certificate(s) of Title.

(c) Payment of the enclosed account.

6. Please note that if the documents are to be signed by one Director only then we require confirmation from you that the Director who has signed is the sole Director of the Company, or if he/she is not the sole Director, that the Constitution permits execution by one Director only.

7. If further attendances are required in regard to the terms and conditions of the enclosed documents, we reserve the right to charge your client for the additional time expended on this matter.

8. We will provide you with written authority to sign the documents correct on our behalf once we are satisfied with them.

9. We look forward to hearing from you.

Yours faithfully
CORBAN REVELL

Lisa Roberts
Associate
DDI +64 9 837 5737
lroberts@corbanrevell.co.nz
20441500\02041033

Partner ref: John Kahukiwa

Helen Fleming

From: Helen Fleming
Sent: Tuesday, 1 April 2008 12:58 p.m.
To: 'Lisa Roberts'
Subject: SUB 20061078-stg1 - 423 West coast road
Importance: High

Hi Lisa

Please could this be processed urgently too - its a real time line to meet with this one!
Thank you

I think the existing easement cancellation could occur at later staging after the drainage reserves have vested on deposit - however will be guided by your interpretation also
thanks
Helen

stg 1 - 224c -

Babbage
CONSULTANTS

BABBAGE CONSULTANTS LIMITED
109 FANSHAWE STREET, AUCKLAND 1010
PO BOX 2027, AUCKLAND 1140, NEW ZEALAND
PHONE: 0-9-379 9980, FAX: 0-9-377 1170
EMAIL: admin@babbage.co.nz

WAITAKERE CITY COUNCIL
14 MAR 2008
09574

Waitakere City Council
Private Bag 93 109
Henderson
Waitakere City 1231, New Zealand

Job Number: 42608/GE
NSL
13 March 2008

Attention: The Manager

Dear Sir

Housing Development
West Coast Rd (No. 423-429) Henderson
Lots 19 to 22

In our Earthworks Completion Report for Stage 1 we noted that Lots 19 to 22 were exclude from the evaluation as there was still earth working to be completed on these lots and they would be subject of a supplementary report.

We have included the certification of these lots in the supplementary report on Stages 2 & 3 so that the information will be readily discoverable for this subdivision in the future. This report will be submitted to the Waitakere City Council in the next few days.

However, to enable 224c to be released on Stage 1 we hereby quote from the certification of such lots:

> *"From our inspection of cut platforms and drainage lines within areas of cut we can confirm that natural soils exposed are as anticipated from our geotechnical appraisal of the site. Any dwellings created under the normal items of NZS3604:1999 within the normal building envelope will in our opinion be within stable land in the lots.*
>
> *We note that footings should be taken to at least 600mm below finished ground level to minimise the effects of shrinkage / swell movements. We recommend that normal inspection of footings during the building process be carried out by a suitably qualified geotechnical engineer or his representative to confirm the ground conditions."*

Until receipt of the Earthworks Completion Report for Stages 2 & 3 and part Stage 1 this letter should be taken as certification of lots 19 to 22.

Yours faithfully

N S (Paddy) Luxford
Babbage Consultants Limited

Astrid Caldwell

From: Huia Kingi
Sent: Thursday, 6 March 2008 10:48 a.m.
To: 224c Clearances
Subject: 224c Release Parks 423-429 West Coast Road.doc
Attachments: 224c Release Parks 423-429 West Coast Road.doc

Hi, I have an updated release form for the above and we won't bond at this stage.

cheers

Huia

Subdivision Consent

224c Release

To:	Astrid Caldwell
Subdivision:	RMA 2006 1077 Sub 1078
Address:	423-429 West Coast Road
Owner/Contact:	New Zealand Housing Federation
Telephone No:	**Facsimile No:**
Consultant:	
Address:	
Telephone No:	**Facsimile No:**

The following comments relate to the Park development within the above subdivision. Incomplete work will be rectified or a bond held prior to issue of a section 224c.

Consultant/Owner Notified Yes

Bond Required

Uncompleted Works	**$0**
Maintenance	**$0**
Total	**$0**

Comments

The following are Parks Plannings conditions of consent together with our comments regarding the satisfaction of the conditions.

Note that bond shall be held for a period of two years. Bond will be released subject to the satisfaction of the conditions as below. Site visits will be required to ensure works have been completed to parks satisfaction.

PK1. Removal of environmentally damaging plants and provide a weed control programme for all lots and the proposed esplanade reserve. Parks Planning is satisfied with the weed management proposed in the landscape master plan prepared by Soul dated 24/8/2007 revision E. NZ Housing is to commence weed removal as per the weed control proposal in order to commence planting for stage 1 and 2 in autumn 2008.

PK2. Enter into a registrable fencing agreement. NZ Housing agrees to register fencing covenants in respect of lots 23, 24, 25 and 46-60 and will provide proposed wording of covenant to the Parks Consent Planner.

PK3. Protective fencing around specified trees. NZ Housing has installed fencing around the trees and this condition has been satisfied.

PK4. Monitor the health of protected trees. Parks Planning will arrange for the Park's arborist to carry out progressive on-site inspections. A written report is not required from NZ Housing.

PK5. Implement silt fence etc. Parks Planning is satisfied as to this condition.

PK6. Landscaping and street tree planting for stage 1. Parks Planning has agreed that this will commence in the next planting season between April/May/June 2008 alongside stage 2 planting. NZ Housing has agreed that Parks Planning will require a bond in respect of this. In terms of the planting required within the stormwater ponds, NZ Housing will carry out wetland planting of the pond slopes during the next planting season. In terms of the planting required around the top area between the ponds, Ecowater and Parks Planning have agreed that planting can commence during stage 2 of the development in the next planting season and NZ Housing agrees that a bond will be required in this respect for Stage2.

PK7. Street tree planting to be implemented to the satisfaction of the Parks Consent Planner. Parks Planning is satisfied in principle with the street tree planting provided in the landscape master plan referred to above. The street tree planting will be undertaken in stage 2 planting in the next planting season.

PK8. Maintenance of all planting for two year period. This condition has not yet been satisfied as planting has not been undertaken. Parks Planning considers that this does not prevent the issues of the section 224(c) certificate as a bond can be taken for maintenance as part of the release for Stage 2.

Pk9. Details of Pedestrian footpath etc. Parks Planning has reviewed the reserve boardwalk plan sheet 2 dated December 2007 drawing number c63. Parks Planning is happy with the revised drawing excepting that we require the concrete footpath and the footbridge to be 2m wide. We are happy with the 3m wide access way between lots 59 and 60 as well as the elevated footbridge. In terms of the fencing along the access way between lots 59 and 60 we require open fencing together with planting. The details of this still need to be agreed through the detailed design phase during Stage 2.

PK10. Ensure the reserves are left in a condition suitable for maintenance. This condition will not be satisfied until the completion of Stage 2 of the development. Parks Planning will therefore assess this during Stage 2.

Uncompleted Works Bond

PK 6. Planting

Street Trees - supply, plant and mulch 107 street trees

To be determined at Stage 2.

Storm water planting and landscaping – supply, plant and mulch 2000m2

To be determined at Stage 2.

Total for Uncompleted Works Bond $0

Maintenance Bond

PK 6.

Street Trees

To be determined at Stage 2.

Comment [HK1]:

Storm water planting and landscaping

To be determined at Stage 2.

Total for Maintenance Bond $0

The consent holder is required to keep the reserve areas in a neat and tidy condition during the maintenance period including regular mowing and rubbish collection.

Signed: Huia Kingi
Parks Planning

Date: 7 February 2008

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
6 Henderson Valley Road
Henderson 0612

Private Bag 93109
Henderson 0650
Waitakere

Telephone
09 836 8000

24Hr Call Centre
09 839 0400

Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

DX CX 10250 Auckland Mail Centre
E-mail : info@waitakere.govt.nz

Refer:
Huia Kingi – Parks Planning
Telephone: (09) 836 8000 ext. 8174
Facsimile: (09) 836 8046
E-mail: huia.kingi@waitakere.govt.nz

Astrid fo info.
Ask me if you have any queies!
Thanks Rhonda.

5 March 2008

Frank Rientjes
c/o Housing Foundation
AUCKLAND

Dear Frank

LUC
WEST COAST ROAD PROJECT - SUB 2006 1077 - RESERVE CONTRIBUTION STAGE 1
SUB-2006-1078

We are writing regarding you email of 3 March 2008 to Rhonda Hobson in terms of your proposal regarding the reserve contribution.

We understand that you propose to pay the reserve contribution at the time of release of the section 224(c) certificate for Stage 2.

We agree to your proposal on the following terms.

- That the valuation provided for Stage 1 by Quoteable Valuation has been agreed to by the Council being the amount of $404,325.00.

- That the costs of the works set out below will be deducted from the amount of the reserve contribution for Stage 1. The costs of the works are agreed in principle as set out below and the final costs of the works will be agreed to by Council once you have obtained final pricing for the works.

- That in accordance with the above, the reserve contribution less the costs of the works will be paid to the Council at the time of release of section 224(c) certificate for Stage 2 of the project.

Works and Costs

In accordance with your email, the works to be carried out and the indicative costs of which will off-set the reserve contribution are set out below.

- bridge $126,000.00;
- footpaths and board walks $15,000.00 (including abutment fences to bridge approach); and
- landscaping for Stage 1$168,000.00 (including pond areas).

The final costs for the works will be agreed to by the Council once you have obtained the final pricing for the work.

Total = $95,325.00
INV → LC →

Consent Conditions

In terms of the landscaping required under the conditions of consent, Parks Planning has approved the designs and as set out in our section 224(c) release form we will require a bond for the uncompleted landscaping.

In terms of the pedestrian footpath and bridge the design has been approved in terms of location and the details still require approval as noted in the section 224(c) release form.

The Council has agreed that these works will be completed during Stage 2 of the development as set out in the section 224(c) release form for Stage 1.

Yours faithfully

Huia Kingi
Parks Planning
Waitakere City Council

Natashia Ogbourne

From: Bernie Sheary
Sent: Saturday, 23 February 2008 9:48 a.m.
To: Astrid Caldwell
Cc: 'Fiona Keir'; Sefton Mills
Subject: RMA 20050106/20040351/20061078 423-429 West Coast road 224c

Hi Astrid

I have received the require documents for the above sub division with regard to roading related items of this subdivision.
Processing of the 224c can commence however this approval does not include works on Pyramid place , this approval only applies to:Foundation Pl, Newfound Way,and titch place. The roading related sud division bond will be 2.5% of $505,496.00 being $12637.40.

Site audit time has been entered into pathways.

Can you please include 3 hours 224c processing time in to pathways.

As there is still a fence to be installed can I please be contacted prior to final issuing of 224c.

Bernie Sheary
Senior Transport Engineer - Construction
Transport Assets
Waitakere City Council
DDI 09 8368000 extn 8509
Fax 09 8368001
Mobile 021 244 3651
www.waitakere.govt.nz

Bernie Sheary

From: Bernie Sheary
Sent: Saturday, 23 February 2008 9:48 a.m.
To: Astrid Caldwell
Cc: 'Fiona Keir'; Sefton Mills
Subject: RMA 20050106/20040351/20061078 423-429 West Coast road 224c Release

Hi Astrid

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Processing of the 224c can commence however this approval does not include works on Pyramid place , this approval only applies to:Foundation Pl, Newfound Way,and titch place. The roading related sud division bond will be 2.5% of $505,496.00 being $12637.40.

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As there is still a fence to be installed can I please be contacted prior to final issuing of 224c.

Bernie Sheary
Senior Transport Engineer - Construction
Transport Assets
Waitakere City Council
DDI 09 8368000 extn 8509
Fax 09 8368001
Mobile 021 244 3651
www.waitakere.govt.nz

Glendyr Donaldson

From: Huia Kingi
Sent: Thursday, 21 February 2008 12:38 p.m.
To: 224c Clearances
Subject: FW: 224c Release Parks 423-429 West Coast Road

Attachments: 224c Release Parks 423-429 West Coast Road.doc

2006-1078.

Hi Astrid, here is the parks release form for the above. I sent this to you on 8 February.

Cheers

Huia

From: Huia Kingi
Sent: Friday, 8 February 2008 10:22 a.m.
To: Astrid Caldwell
Cc: Renee Davies
Subject: 224c Release Parks 423-429 West Coast Road

224c Release Parks 423-429 Wes...

Hi Astrid, here is the 224c release for parks relating to the above.

Cheers

Huia

see Huia's new Parks 224C clearance e-mail dated 6 March 2008.

Subdivision Consent

224c Release

To: Astrid Caldwell

Subdivision: RMA 2006 1077 Sub 1078

Address: 423-429 West Coast Road

Owner/Contact: New Zealand Housing Federation

Telephone No: **Facsimile No:**

Consultant:
Address:
Telephone No: **Facsimile No:**

The following comments relate to the Park development within the above subdivision. Incomplete work will be rectified or a bond held prior to issue of a section 224c.

Consultant/Owner Notified Yes

Bond Required	**Uncompleted Works**	**$44,556.50**
	Maintenance	**$30,050.00**
	Total	**$74,606.50**

Comments

The following are Parks Plannings conditions of consent together with our comments regarding the satisfaction of the conditions.

Note that bond shall be held for a period of two years. Bond will be released subject to the satisfaction of the conditions as below. Site visits will be required to ensure works have been completed to parks satisfaction.

PK1. Removal of environmentally damaging plants and provide a weed control programme for all lots and the proposed esplanade reserve. Parks Planning is satisfied with the weed management proposed in the landscape master plan prepared by Soul dated 24/8/2007 revision E. NZ Housing is to commence weed removal as per the weed control proposal in order to commence planting for stage 1 and 2 in autumn 2008.

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PK3. Protective fencing around specified trees. NZ Housing has installed fencing around the trees and this condition has been satisfied.

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PK5. Implement silt fence etc. Parks Planning is satisfied as to this condition.

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PK7. Street tree planting to be implemented to the satisfaction of the Parks Consent Planner. Parks Planning is satisfied in principle with the street tree planting provided in the landscape master plan referred to above. The street tree planting will be undertaken in stage 2 planting in the next planting season.

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Pk9. Details of Pedestrian footpath etc. Parks Planning has reviewed the reserve boardwalk plan sheet 2 dated December 2007 drawing number c63. Parks Planning is happy with the revised drawing excepting that we require the concrete footpath and the footbridge to be 2m wide. We are happy with the 3m wide access way between lots 59 and 60 as well as the elevated footbridge. In terms of the fencing along the access way between lots 59 and 60 we require open fencing together with planting. The details of this still need to be agreed through the detailed design phase during Stage 2.

PK10. Ensure the reserves are left in a condition suitable for maintenance. This condition will not be satisfied until the completion of Stage 2 of the development. Parks Planning will therefore assess this during Stage 2.

Uncompleted Works Bond

PK 6. Planting

Street Trees - supply, plant and mulch 107 street trees

$153 (PB95) per tree x 107 x 1.5 (multiplier) = $24,556.50

Storm water planting and landscaping – supply, plant and mulch 2000m2

$6 x 2000m2 x 1.5 = $18,000

PK9. Fencing Covenant

$2000 for costs of registration of fencing covenant

Total for Uncompleted Works Bond $44,556.50

Maintenance Bond

PK 6.

Street Trees

107 x $75 per tree / per year x 2 years (6 visits) = $16,050

Storm water planting and landscaping

$7 x 2000m2 x 2 years (6 visits) = $14,000

Comment [HK1]:

Total for Maintenance Bond $30,050

The consent holder is required to keep the reserve areas in a neat and tidy condition during the maintenance period including regular mowing and rubbish collection.

Signed: Huia Kingi
Parks Planning

Date: 7 February 2008

residential • rural • commercial • asset

QV VALUATIONS AUCKLAND
LEVEL 1, 60-64 UPPER QUEEN STREET, NEWTON, P O BOX 3698, AUCKLAND, NEW ZEALAND
PHONE (09) 375 3828, FAX (09) 375 3820, FREEPHONE 0800 16 44 44

WAITAKERE CITY COUNCIL
6 DEC 2007

Our Ref: 33650/27000 $1560 inc. GST

5th December 2007

03406

The Chief Executive Officer
Waitakere City Council
Private Bag 93109
Henderson
WAITAKERE CITY

Attention: Natashia Ogbourne

VALUATION FOR RESERVE CONTRIBUTION PURPOSES ONLY
423-429 WEST COAST ROAD, GLEN EDEN, SUB 2006-1078

In accordance with your recent instructions, I inspected the above property on 4 December 2007, for the purpose of providing a current market valuation to the proposed subdivision effective as at 25 January 2007. My report and valuation are as follows:

APPLICANT	NEW ZEALAND HOUSING FOUNDATION
ZONING	Under the Waitakere City Council Operative District Plan the Human Environment is Living and the Natural Area is General.
LAND VALUED	Lots 1-55 and 57-60 inclusive being a proposed subdivision of Lot 2 DP 339810 and Lot 72 DP 389289.
VALUATION SUMMARY	The current market value has been assessed on the basis of sales where GST is not a factor and is as follows:

$9,900,000 × 6% × 1.125 = $668.250
(Nine Million Nine Hundred Thousand Dollars)

stage 1 = $5,990,000.00 × 6% + GST = $404,325.00
stage 2 = $3,345,000.00 × 6% + GST = $225,787.50
stage 3 = $565,000.00 × 6% + GST = $38,137.50

www.qv.co.nz
QV Valuations
A division of Quotable Value Limited

GENERAL DESCRIPTION

The proposed subdivision is located on the northern side of West Coast Road within the suburb of Glen Eden. The development adjoins the recently established Woodbank Drive residential estate. Glen Eden is an established residential area characterised by average quality housing built from the 1960's onward, interspersed with more recent infill development and a number of new subdivisions established since the mid 1990's. Normal amenities such as local shopping, schools, public transport, parks and reserves are all close to hand.

The development land comprises an irregular shaped block, zoned for residential development,containing a land area of 4.93 hectares.

The proposal is to develop and subdivide the land into 59 freehold sites ranging from 350 square metres to 809 square metres.

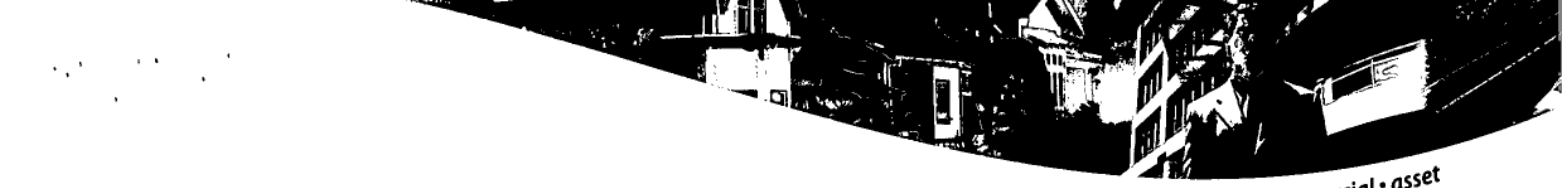
INDIVIDUAL SITE VALUES

The individual sites have been valued on the basis of the contours and locations as per SUB 2006-1078.

LOT NO	AREA (m^2)	DESCRIPTION	LAND VALUE
1	414	Corner site.	$170,000
2	379	Front site.	$170,000
3	379	Front site.	$170,000
4	379	Front site.	$170,000
5	379	Front site.	$170,000
6	379	Front site.	$170,000
7	380	Corner site.	$170,000
8	404	Corner site.	$170,000
9	402	Front site.	$170,000
10	389	Front site.	$165,000
11	353	Front site.	$165,000
12	374	Corner site.	$170,000
13	351	Front site.	$160,000
14	433	Front site.	$170,000
15	363	Corner site.	$165,000
16	395	Front site.	$170,000
17	475	Front site.	$175,000
18	353	Front site.	$160,000
19	405	Corner site.	$170,000
20	434	Front site.	$175,000

stage 1

21	397	Front site.	$170,000
22	403	Front site.	$175,000
23	809	Rear site.	$230,000
24	370	Front site.	$170,000
25	440	Corner site.	$175,000
26	451	Corner site.	$175,000
27	354	Corner site.	$165,000 stage1
28	413	Front site.	$170,000
29	412	Front site.	$170,000
30	438	Front site.	$175,000
31	371	Front site.	$170,000
32	350	Corner site.	$165,000
33	383	Front site.	$165,000
34	411	Front site.	$170,000
35	415	Front site.	$170,000
36	447	Corner site.	$175,000
37	426	Front site.	$170,000
38	439	Front site.	$170,000
39	439	Front site.	$170,000
40	439	Front site.	$170,000
41	370	Front site.	$165,000
42	432	Front site.	$170,000
43	445	Front site.	$170,000
44	460	Front site.	$170,000
45	371	Front site.	$160,000
46	378	Front site.	$165,000 stage2
47	372	Front site.	$165,000
48	361	Front site.	$165,000
49	369	Front site.	$165,000
50	363	Front site.	$165,000
51	366	Front site.	$165,000
52	364	Front site.	$165,000
53	354	Front site.	$165,000
54	422	Front site.	$170,000



55	359	Front site.	$165,000 Stage 2
57	268	Front site.	$140,000
58	263	Front site.	$140,000
59	273	Front site.	$140,000 Stage 3
60	318	Front site.	$145,000
		Total	**$9,900,000**

PLEASE NOTE

In accordance with your instructions, this abbreviated report has been prepared for reserve fund contribution purposes only, and is not to be used for any other purpose without my written consent.

If there are any further inquiries please do not hesitate to contact me.

Yours faithfully
QV VALUATIONS

Hugh Robson
Registered Valuer
ANZIV, SPINZ

Chief Executive	
Corporate Services	
City Services Moselle	
Consultancy Services	
ECO - WATER	
Strategic Group	
Consent Services	✓
Field Services	

INVOICE
TRIM REF #
CI2007/ 7490

APPENDIX

LOCATION	SALE PRICE	DATE	AREA
1. 29A Nandana Drive	$162,500	10/06	404 m^2
2. 147D Glengarry Road	$220,000	08/06	771 m^2
3. 103K Glengarry Road	$185,000	07/06	600 m^2
4 3A Claridge Street	$160,000	10/06	450 m^2
5. 13A James Laurie Street	$195,000	01/07	480 m^2
6. 4202B Great North Road	$175,000	07/06	494 m^2

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
6 Henderson Valley Road
Henderson 0612

Private Bag 93109
Henderson 0650
Waitakere

Telephone
09 836 8000

24Hr Call Centre
09 839 0400

Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

29 November 2007

The Area Valuer
Quotable Value Ltd
P O Box 3698
Auckland

Dear Sir / Madam

(ASSESSMENT RESERVES) RESOURCE MANAGEMENT ACT 1991

Site Address:	**423-429 West Coast Road, GLEN EDEN**
Applicant:	**NEW ZEALAND HOUSING FOUNDATION**
Subdivision Plan No:	**SUB 2006-1078**

A copy of the Scheme Plan is enclosed for your information.

Please supply this office with your department's estimate of the current market value of the following allotments on the plan.

LOT NO.	**EFFECTIVE DATE**
Lots1-35; 36-55; 57-60	25/01/07

These valuations are to be used for the purpose of computation of contributions by the owner in accordance with the requirements of Section 285 of the Local Government Act.

Yours faithfully

Natashia Ogbourne
Process Support

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
6 Henderson Valley Road
Henderson 0612

Private Bag 93109
Henderson 0650
Waitakere

Telephone
09 836 8000

24Hr Call Centre
09 839 0400

Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

29 November 2007

NEW ZEALAND HOUSING FOUNDATION
C/- Matthew Paetz
Babbage Consultants Limited
PO Box 2027
Shortland Street
AUCKLAND 1020

Dear Sir/Madam

Resource Consent Application: **SUB-2006-1078**

Proposal: **61 LOT SUB**

NOTE: COMBO REFER RMA 20061077 FOR LUC

E15461

Site Address: **423-429 West Coast Road, GLEN EDEN**

Thank you for your application for the release of the s.224(c) certificate. I also require the following information to process the application:

GL4 Obtain the reticulation of electric power to all lots by underground methods and provide to the Council satisfactory confirmation that the completed installation has been installed in compliance with the requirements of the Electrical Network Operator (including the requirements of the Operator of the network to which the subdivision network is to be connected).

Please provide a Network Provider's Certificate (either a "Take –over and Completion Certificate" from United Networks" or a "224C letter Completion Certificate" from Siemens). The certificate shall also address each lot(s) as specified in the relevant condition. The certificate you have provided **only specifies 19 new dwellings and stage 1 is for Lot 1-35**.

Yours faithfully

PROCESS SUPPORT ASSISTANT

Helen Fleming

From: Louise Dunn [louise.d@housingfoundation.co.nz]
Sent: Tuesday, 17 March 2009 3:12 p.m.
To: Helen Fleming
Cc: Rhonda Hobson; Jeannette Ibrahim; 'Gregory Simon'
Subject: FW: Territorial Certification Complete LT 403809
Importance: High

Hi Helen

As per attached 223 has been issued; please could you now proceed with the issuance of our 224 certificate for Stages 2 and 3 - as separate certificates. I understand that you use Corban Revell for this part, therefore please let me know when the documents have been forwarded to them.

Thanks and regards

Louise Dunn

Office Manager
New Zealand Housing Foundation

PO Box 36-027
Northcote 0748
Auckland

Phone: 09 849 4395
Mobile: 027 559 4524
Email: louise.d@housingfoundation.co.nz

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-----Original Message-----
From: Kevin Meikle [mailto:km@babbage.co.nz]
Sent: Tuesday, 17 March 2009 1:58 p.m.
To: louise.d@housingfoundation.co.nz
Cc: fionak@babbage.co.nz
Subject: FWD: Territorial Certification Complete LT 403809

Hi Louise,

Attached Stage3 223 confirmation.

Regards,
Kevin

| - - - - - Original Message - - - - -
| From: , loladmin@linz.govt.nz
| Date : Sent 17 Mar 2009 13:50:49
| To : km@babbage.co.nz

| CC :
| Subject: Territorial Certification Complete LT 403809
|
| Landonline notice(s)
| attached.
|

| _____
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| Thank
| you.
|

Kevin Meikle
Babbage Consultants Limited
Ph (09) 379-9980 Fax (09)377-1170

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Attached: < TACS 17-03-2009 12-51-01 - Page 001.tif >
Ref: 42608/SV : West Coast Rd (No. 423-429), Henderson

Helen Fleming

From: Kevin Meikle [km@babbage.co.nz]
Sent: Wednesday, 18 March 2009 10:43 a.m.
To: Rhonda Hobson; louise.d@housingfoundation.co.nz
Cc: Jeannette Ibrahim; Helen Fleming; km@babbage.co.nz
Subject: RE: RE: FW: 423 West Coast Road - NZ Housing Foundation - Stage 3 survey plan

Hi Rhonda,

Jeannette has already actioned the 223 Certification. This was signed off by Nitya Reddy yesterday.

Regards,
Kevin

| - - - - - Original Message - - - - -
| From: Rhonda Hobson, Rhonda.Hobson@waitakere.govt.nz
| Date : Sent 17 Mar 2009 10:42:43
| To : louise.d@housingfoundation.co.nz
| CC :
Jeannette.Ibrahim@waitakere.govt.nz,Helen.Fleming@waitakere.govt.nz,km@babbage.co.nz
| Subject: RE: RE: FW: 423 West Coast Road - NZ Housing Foundation - Stage 3 survey plan
|
| Hi Louise,
| Could you confirm that an instruction has been emailed to either Helen
| or Astrid as per my email 27/02 (see attached) ?
| If not they will not have actioned this.
|
| Regards
|
| Rhonda Hobson| Key Account Manager - Building and Resource Consents
| Customer Services - Waitakere City Council
| Ph: 09-836 8000 ext: 8670 Fax: 09-836-8001
|
| Mobile : +64 21 926 346
|
|
|
| From: Louise Dunn [mailto:louise.d@housingfoundation.co.nz]
| Sent: Tuesday, 17 March 2009 10:26 a.m.
| To: Jeannette Ibrahim
| Cc: Rhonda Hobson
| Subject: RE: RE: FW: 423 West Coast Road - NZ Housing Foundation - Stage 3 survey plan
| Importance: High
|
|
|
| Hi Jeanette
|
|
|
| Are you able to give me an update please on our 223 as per Kevin's email below?
|
|
|
| Thanks and regards
|
|
|
| Louise Dunn
|

Office Manager

New Zealand Housing Foundation

PO Box 36-027

Northcote 0748

Auckland

Phone: 09 849 4395

Mobile: 027 559 4524

Email: louise.d@housingfoundation.co.nz

P Be nice to the world. Please don't print this e-mail unless you really need to

-----Original Message-----
From: Kevin Meikle [mailto:km@babbage.co.nz]
Sent: Tuesday, 10 March 2009 1:29 p.m.
To: Jeannette.Ibrahim@waitakere.govt.nz
Cc: louise.d@housingfoundation.co.nz; fionak@babbage.co.nz
Subject: RE: RE: FW: 423 West Coast Road - NZ Housing Foundation - Stage 3 survey plan

Hi Jeannette,

We have just checked with LINZ and note that the on line 223 Certification is still on hold.

I would appreciate it if you would give Helen a gentle reminder.

NZ Housing Foundation lawyers will be applying for the issue of new titles as soon as they receive the 224 (c).

We understand that issue of the 224(c) Certificate is imminent.

Thanks,

Kevin

| - - - - - Original Message - - - - -

| Date : Sent 04 Mar 2009 14:28:08

| To : km@babbage.co.nz

| CC :

| | Subject: RE: RE: FW: 423 West Coast Road - NZ Housing Foundation - Stage 3 survey plan
| |
| | |
| |
| | |
| |
| | Will do
| |
| | |
| |
| | |
| |
| | -----Original Message-----
| |
| | From: Kevin Meikle [mailto:km@babbage.co.nz]
| |
| | Sent: Wednesday, 4 March 2009 1:37 p.m.
| |
| | To: Jeannette Ibrahim
| |
| | Cc: fionak@babbage.co.nz
| |
| | Subject: RE: RE: FW: 423 West Coast Road - NZ Housing Foundation - Stage
| |
| | 3 survey plan
| |
| | |
| |
| | Hi Jeannette,
| |
| | |
| |
| | We have been advised that the Consent is ready for collection and the
| |
| | Housing Foundation have today paid all outstanding consent fees.
| |
| | |
| |
| | Would you please request Helen to sign off the 223 Certificate.
| |
| | |
| |
| | Thanks,
| |
| | Kevin
| |
| | |
| |
| | | - - - - - Original Message - - - - -
| |
| | | From: Jeannette Ibrahim, Jeannette.Ibrahim@waitakere.govt.nz
| |
| | | Date : Sent 18 Feb 2009 16:49:54
| |
| | | To : km@babbage.co.nz
| |
| | | CC : fionak@babbage.co.nz
| |
| | | Subject: RE: RE: FW: 423 West Coast Road - NZ Housing Foundation -
| |
| | Stage 3 survey plan
| |
| | | |
| |
| | | |
| |
| | | Hi Kevin

| | |

| | I will ask Helen Fleming to sign off the plan once the resource consent

| | has been approved which should be Friday this week or Monday next

| | week.

| | Your planning people sent in an application to cover the changes so

| | that

| | everything would be quite clear cut and this is about to be peer

| | reviewed prior to sign off.

| | |

| | Regards

| | Jeannette

| | |

| | |

| | |

| | |

| | -----Original Message-----

| | From: Kevin Meikle [mailto:km@babbage.co.nz]

| | Sent: Wednesday, 18 February 2009 4:43 p.m.

| | To: Jeannette Ibrahim

| | Cc: fionak@babbage.co.nz

| | Subject: FWD: RE: FW: 423 West Coast Road - NZ Housing Foundation -

| | Stage 3 survey plan

| | |

| | Hi Jeannette,

| | |

| | We have recently checked with LandonLine and noticed that the 223

| | Certification for the Stage 3 survey plan (LT 403809) is still being

| | actioned by Council.

| | |

| | Would you please advise when this will be completed.

| | |

| | | Regards,

| | | Kevin

| | |

| | | | - - - - - Original Message - - - - -

| | | | From: Kevin Meikle, km@babbage.co.nz

| | | | Date : Sent 09 Dec 2008 17:38:51

| | | | To : Jeannette.Ibrahim@waitakere.govt.nz

| | | | CC :

| | | | Subject: RE: FW: 423 West Coast Road - NZ Housing Foundation -

| Stage

| | | 3 survey plan

| | | |

| | | | Hi Jeannette,

| | | |

| | | | Further to this morning's meeting I wish to advise that we have

| | | amended the title plan to

| | | | include the description of the Local Purpose Reserve on the

| face of

| | | the plan(Refer

| | | | attached pdf)

| | | | We would appreciate your arranging for online issue of the 223

| | | Certificate.

| | | |

| | | | I have initiated action for the amended LUC application with our

| | | planner Matthew Paetz and

| | | | would expect this to be lodged early in the New Year.

| | | |

| | | | Thanks for your assistance.

| | | |

| | | | Kevin

| | | |

| | | | | - - - - - Original Message - - - - -

| | | | | From: Jeannette Ibrahim, Jeannette.Ibrahim@waitakere.govt.nz

| | | | | Date : Sent 05 Dec 2008 13:35:10

| | | | | To : km@babbage.co.nz

| | | | | CC :

| | | | | Subject: RE: FW: 423 West Coast Road - NZ Housing Foundation

| -

| | Stage 3 survey plan

| | | | |

| | | | |

| | | | | Hi Kevin

| | | | |

| | | | | I have set up a meeting with Huia Kingi for 11.00am Tuesday

| 9

| | December

| | | | | at the Council offices. If you come to reception and ask for

| me

| | I will

| | | | | come and get you.

| | | | |

| | | | | regards

| | | | | Jeannette

| | | | |

| | | | |

| | | | |

| | | | | -----Original Message-----

| | | | | From: Kevin Meikle [mailto:km@babbage.co.nz]

| | | | | Sent: Thursday, 4 December 2008 5:11 p.m.

| | | | | To: Jeannette Ibrahim

| | | | | Cc: matthew.paetz@babbage.co.nz; nsl@babbage.co.nz

| | | | | Subject: RE: FW: 423 West Coast Road - NZ Housing Foundation

| -

| | Stage 3

| | | | | survey plan

| | | | |

| | | | | Hi Jeannette,

				I do not understand why the Local Purpose Reserve would not be readily accessible to the public even though the primary purpose is for drainage. Part of the Stage 1 Local Purpose (Drainage) Reserve which has vested in Council will also be used for pedestrian access.
				The Landonline parcel intent description does not qualify the specific usage of the reserve. The only available description is "Vesting on Deposit for Local Purpose Reserve" We normally add the intended Local Authority designation to the face of the plan as required.
				The Description on the face of the Stage 3 Title plan has been amended to read "Local Purpose Reserve (Drainage and Access) To Vest in Waitakere City Council"
				The plan also shows a ROW easement in gross in favour of

| | Waitakere City

| | | | Council over Lot 61.

| | | | We cannot create an easement over Lot 62 as this Reserve

| will be

| | vested

| | | | in Council.

| | | |

| | | | We anticipate issue of the 224 (c) Certificate in the
near

| | future, so it

| | | | is imperative for us to advance the 223 Certificate to

| enable

| | our client

| | | | to apply for new titles.

| | | | To this end I would be pleased to meet with Huia Kingi
as

| soon

| | as

| | | | possible.

| | | | Please advise me of a suitable time for the meeting.

| | | |

| | | | Thanks,

| | | | Kevin

| | | |

| | | | | - - - - - Original Message - - - - -

| | | | | From: Jeannette Ibrahim,

| Jeannette.Ibrahim@waitakere.govt.nz

| | | | | Date : Sent 04 Dec 2008 15:01:04

| | | | | To : km@babbage.co.nz

| | | | | CC : matthew.paetz@babbage.co.nz

| | | | | Subject: FW: 423 West Coast Road - NZ Housing
Foundation

| -

| | Stage 3

| | | | survey plan

| | | | |

| | | | | Hi Kevin

| | | |

| | | | | from the development to West Coast Road.

| | | | |

| | | | | It may be appropriate to get together with you and Huia

| | Kingi from

| | | | Parks

| | | | | to work out how to present this survey plan - at the very

| | least it

| | | | may

| | | | | require a variation to the underlying subdivision consent

| | with a new

| | | | | land use consent being applied for later, when the designs

| | for Stage

| | | | 3

| | | | | have been clarified.

| | | | |

| | | | | Please let me know if you wish me to arrange a meeting

| with

| | Huia - I

| | | | will try to arrange something for early next week.

| | | | |

| | | | | regards

| | | | |

| | | | | Jeannette Ibrahim | Team Leader

| | | | |

| | | | | _____

| | | | |

| | | | |

| | | | |

| | | | | Waitakere City Council

| | | | |

| | | | | Phone 09-836 8000 ext 8535

Facsimile 09-836 8001

6 Henderson Valley Road, Henderson 0612

Private Bag 93109 Henderson 0650 Waitakere

From: Jeannette Ibrahim

Sent: Wednesday, 12 November 2008 3:56 p.m.

To: 'Matthew Paetz'

Cc: 'km@babbage.co.nz'; Helen Fleming

Subject: 423 West Coast Road - NZ Housing Foundation - Stage 3 survey plan

Hi Matthew

I am writibng to let you know some of the difficulty the Council is facing with respect to signing off the above part of the West Coast Road development. Our senior subdivision officer is being asked to approve a

survey plan that is different from the plan originally lodged with LINZ. Fortunately the Stage 3 plan has not yet apparently been approved as to survey. However the 223 has issued for all the stages and as Stage 3 is different from what was originally approved our opinion is that a new application is required.

I recall that this requirement was discussed some time ago when the planning department was first made aware that the location of the footbridge had been changed. At that time we informed you (i.e.Babbage) that the most appropriate way forward was to lodge a combined application for subdivision and land use for Stage 3 that would also address the changes proposed to the site layout and development.

Since

| | | | | then, we have had discussions but no application has been | | | | lodged. | | | | | | | | I would also like to take the opportunity to point out | | | | that | | | | the | | | | Stage 2 | | | | survey plan has been approved as to survey and LINZ would | | | | not | | | | therefore | | | | accept any changes to this survey plan. Any changes to | | | | the | | | | housing | | | | on | | | | Stage 2 will therefore need to be accommodated within | | | | the | | | | approved | | | | survey boundaries or a new application will be required | | | | for | | | | this | | | | component also. | | | | | | | | I appreciate that this has been a difficult development | | | | and | | | | we will | | | | certainly make every endeavour to meet deadlines but we | | | | cannot | | | | proceed | | | | without an approved consent matching what is being | | | | proposed.

Happy to discuss this at any time.

regards

Jeannette Ibrahim | Team Leader

Waitakere City Council

Phone 09-836 8000 ext 8535

Facsimile 09-836 8001

6 Henderson Valley Road, Henderson 0612

Private Bag 93109 Henderson 0650 Waitakere

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| | | | |
| | | | Thank You.
| | | | http://www.waitakere.govt.nz
| | | |
| | | |
| | | Kevin Meikle
| | | Babbage Consultants Limited
| | | Ph (09) 379-9980 Fax (09)377-1170
| | | |
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| | | Kevin Meikle
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| Ref: 42608/SV : West Coast Rd (No. 423-429), Henderson

Kevin Meikle
Babbage Consultants Limited
Ph (09) 379-9980 Fax (09)377-1170

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Ref: 42608/SV : West Coast Rd (No. 423-429), Henderson

GENERAL NOTES AND KEY:

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL PIPELINES SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL.
3. THE CONTRACTOR IS TO CONFIRM ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.

EXISTING BOUNDARY
CALCULATED 100 YEAR FLOOD LEVEL
DRAINAGE EASEMENT
31 LOT NUMBER

WATERMAIN NOTES AND KEY:

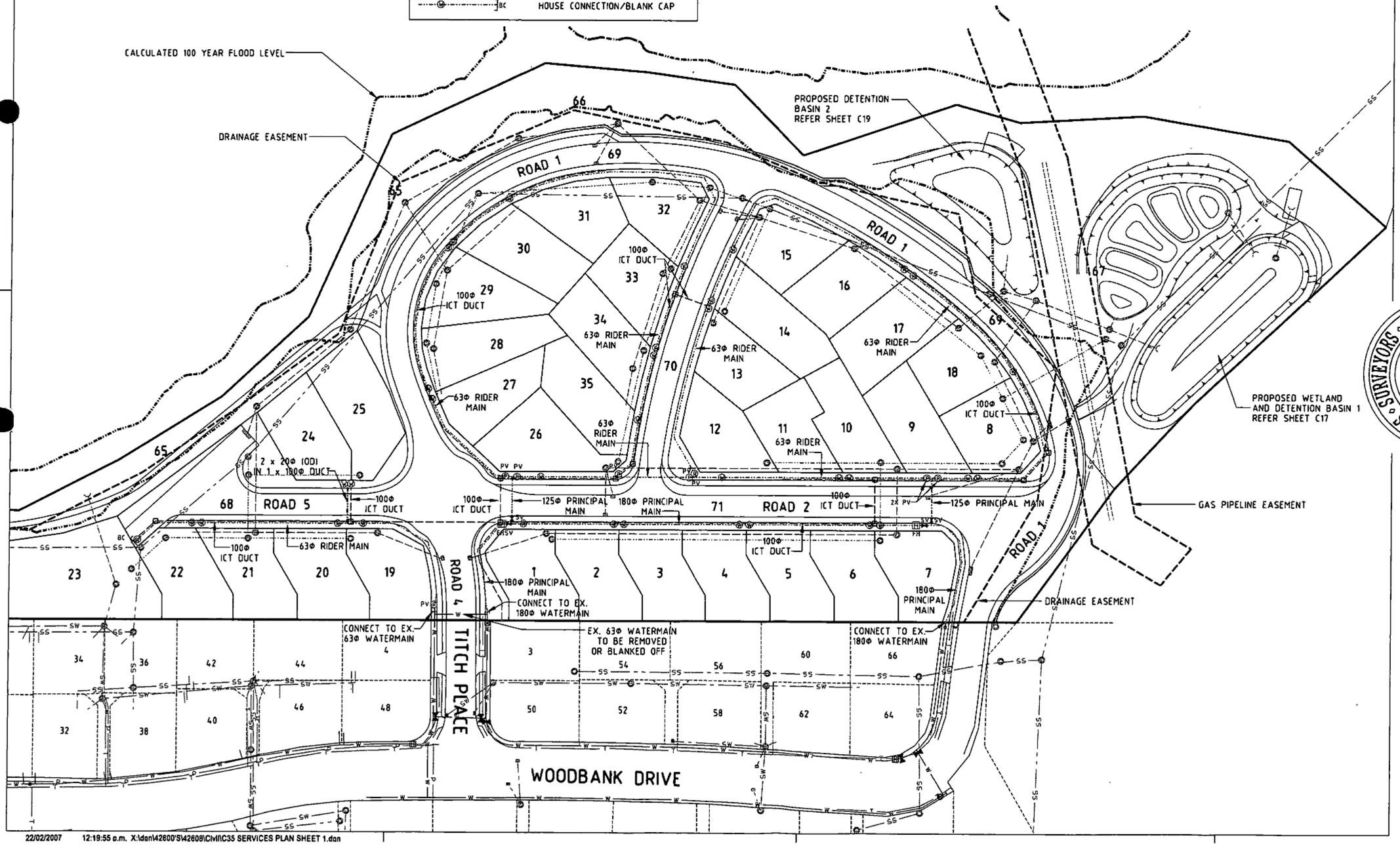
1. APPROVED 'DETECTABLE' WARNING TAPE SHALL BE INSTALLED WITH ALL WATERMAIN PIPES.
2. PRINCIPAL MAINS - 180mmΦ (OD) PE (SDR 11 PE 80) UNLESS OTHERWISE NOTED
   - 125Φ (OD) PE (SDR 11 PE 80) UNLESS OTHERWISE NOTED
   - 600mm COVER IN BERM AND 900 COVER IN CARRIAGEWAY
3. RIDER MAINS - 63mmΦ (OD) PE PRESSURE RATING 12.5 (PE 80) UNLESS OTHERWISE NOTED
   - 450mm COVER IN BERM AND 900 COVER IN CARRIAGEWAY
4. HOUSE CONNECTIONS - 20Φ PE (OD) LEAD LESS THAN 15m
   - 25Φ PE (OD) LEAD LONGER THAN 15m

EXISTING WATERMAIN
PROPOSED WATERMAIN
SV SLUICE VALVE/PEET VALVE PV
FH FIRE HYDRANT
CC CONNECTION CHAMBER
HOUSE CONNECTION/BLANK CAP BC

ICT DUCT NOTES AND KEY:

1. APPROVED 'DETECTABLE' WARNING TAPE SHALL BE INSTALLED A MINIMUM OF 300mm IMMEDIATELY ABOVE THE DUCT.
2. ALL PIPES SHALL BE uPVC PLAIN WALL WITH A MINIMUM SN14 RATING TO AS/NZS 1260 (1999) WITH RUBBER RING OR SOLVENT WELED JOINTS AND SALMON IN COLOUR.
3. ALL PIPES SHALL BE LAID A MINIMUM OF 600mm BELOW GROUND LEVEL.

ICT DUCT
600 x 600 ICT CHAMBER



22/02/2007 12:19:55 p.m. X:\dan\42600'S\42608\Civil\C35 SERVICES PLAN SHEET 1.dgn

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DRAWING NOTES

APPROVED 26/2/07

REV	DATE	DESCRIPTION	DRAWN	CHE
C	22.02.07	WCC AMENDMENTS	FK	
B	19.02.07	WCC AMENDMENTS	FK	
A	07.09.06	ROADING AMENDED	FK	DM

DRAWING REVISIONS

ENGINEERS ARCHITECTS SURVEYORS
Babbage CONSULTANTS
109 FANSHAWE STRE
PO BOX 2
AUCKLAND 1 - NEW ZEALA
PHONE 09 - 379 9880 - FAX 09 - 377 11
admin@babbaga.co

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN
FOR
NZ HOUSING FOUNDATIO

DRAWING TITLE

SERVICES PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED		

SCALE (A1)
1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C35	C

GENERAL NOTES AND KEY:

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL PIPELINES SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL.
3. THE CONTRACTOR IS TO CONFIRM ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.

- EXISTING BOUNDARY
- CALCULATED 100 YEAR FLOOD LEVEL
- DRAINAGE EASEMENT
- 31 LOT NUMBER

WATERMAIN NOTES AND KEY:

1. APPROVED 'DETECTABLE' WARNING TAPE SHALL BE INSTALLED WITH ALL WATERMAIN PIPES.
2. PRINCIPAL MAINS - 180mmΦ (OD) PE (SDR 11 PE 80) UNLESS OTHERWISE NOTED
   - 125Φ (OD) PE (SDR 11 PE 80) UNLESS OTHERWISE NOTED
   - 600mm COVER IN BERM AND 900 COVER IN CARRIAGEWAY
3. RIDER MAINS - 63mmΦ (OD) PE PRESSURE RATING 12.5 (PE 80) UNLESS OTHERWISE NOTED
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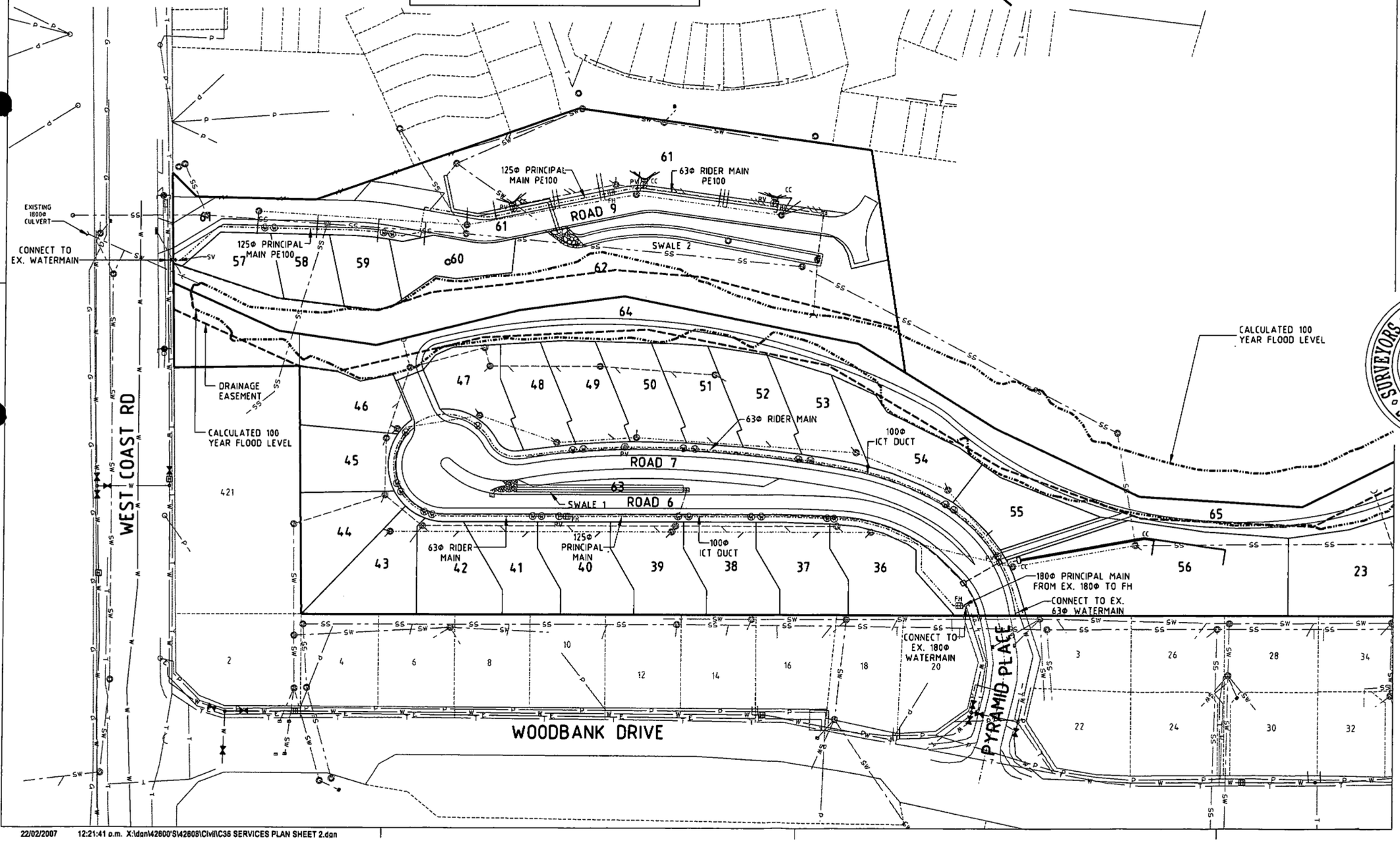
4. HOUSE CONNECTIONS - 20Φ PE (OD) LEAD LESS THAN 15m
   - 25Φ PE (OD) LEAD LONGER THAN 15m

- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- SLUICE VALVE/PEET VALVE
- FIRE HYDRANT
- CONNECTION CHAMBER
- HOUSE CONNECTION/BLANK CAP

ICT DUCT NOTES AND KEY:

1. APPROVED 'DETECTABLE' WARNING TAPE SHALL BE INSTALLED A MINIMUM OF 300mm IMMEDIATELY ABOVE THE DUCT.
2. ALL PIPES SHALL BE uPVC PLAIN WALL WITH A MINIMUM SN14 RATING TO AS/NZS 1260 (1999) WITH RUBBER RING OR SOLVENT WELED JOINTS AND SALMON IN COLOUR.
3. ALL PIPES SHALL BE LAID A MINIMUM OF 600mm BELOW GROUND LEVEL.

- ICT DUCT
- 600 x 600 ICT CHAMBER



22/02/2007 12:21:41 p.m. X:\dan\42600'S\42608\Civil\C36 SERVICES PLAN SHEET 2.dgn

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DRAWING NOTES

APPROVED
26/2/07

REV	DATE	DESCRIPTION	DRAWN	CHE
C	22.09.06	WCC AMENDMENTS	FK	
B	19.09.06	WCC AMENDMENTS	FK	
A	07.09.06	ROADING AMENDED	FK	DM

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN

FOR

NZ HOUSING FOUNDATIO

DRAWING TITLE

SEVICES PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISIO
42608	C36	C

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26 February 2007

BABBAGE CONSULTANTS LTD
PO Box 2027
Shortland Street
AUCKLAND 1140

Dear Sir / Madam

Application Number: SUB-2006-1078
Applicant Name: NEW ZEALAND HOUSING FOUNDATION
Application Address: 423-429 West Coast Road, GLEN EDEN

ENGINEERING PLAN APPROVAL

The engineering plans submitted by Babbage Consultants Ltd, and as listed below are hereby APPROVED FOR CONSTRUCTION, subject to the engineering conditions noted below each subdivision condition in BOLD.

Ref	42608	Sheet	C35	Revision	C	Dated	22.02.07
Ref	42608	Sheet	C36	Revision	C	Dated	22.09.06

The engineering plans have been assessed against the subdivision consent conditions and Council's Code of Practice for City Infrastructure and Land Development.

Engineering Plan Approval is valid for 6 months from the date of issue to cater for technical updates to the Code of Practice. This engineering plan approval will lapse on (26/08/2006), unless a QA Pre-Start Meeting has been held, and construction has commenced prior to the lapse date.

PUBLIC DRAINAGE INFRASTRUCTURE – ECOWATER SECTION 224 CONDITIONS

(DE 1) Provide a catchment analysis detailing any 1 in 100 year overland flowpaths that will exist through the proposed residential Lots upon completion of earthworks, including a possible overland flowpath occurring over proposed Lots 44-46. Wherever possible, keep all overland flowpaths contained within the legal road reserve and discharge to the drainage reserve with a minimum of nuisance. Provide an As-Built plan, long section and cross sections, prepared by a Licenced Cadastral Surveyor to demonstrate that completed overland flowpath(s) meets the design requirements. Provide a drainage easement in favour of Council over all areas required to maintain unobstructed overland flow. All buildings are required to be located entirely outside the 1 in 100 year overland flowpath area, and with a finished floor level not less than 500mm above the 1 in 100 year overland flowpath level for catchments over 2 hectares (200mm for catchments less than 2 hectares). This information will be recorded on Council's Hazards and Special Features Register.

(DE 1) Design, provide and install a complete public wastewater reticulation system to serve all Lots in compliance with Councils Code of Practice for City Infrastructure and Land Development (Refer Section 5.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Locate all drainage lines in the front of Lots where possible to provide ease of access for future maintenance requirements.

(iii) Re-route the existing public drainage lines passing through Lot(s) 31-32 to provide more adequate building sites for those Lots. At the stage of engineering approval a quote will be obtained from Councils contractor for the new manholes required on the existing wastewater network.

(DE 2) Design, provide and install a complete public stormwater drainage system to serve all Lots in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) Provide each Lot with a separate public connection at the lowest point within the boundary.

(i) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(ii) Collect all existing stormwater discharges onto the land and provide for these catchments in the capacity of the new systems. This includes the existing public stormwater drains discharging at proposed Lots 44 and 23, and any others encountered during construction.

(iii) Clearance between the proposed stormwater pipes and the existing Watercare Services Ltd trunk wastewater drain is required to be a minimum of 0.5m, and no pipe points are permitted above the trunk wastewater drain, in accordance with the conditions of Watercare Services Ltd consent number D1415/06.

(iv) Abandoned public drainage is required to be either removed and backfilled with certified engineered fill, or grout filled. If grout filled, then foundations of future buildings will need to bridge over the trench and abandoned pipes.

(v) New stormwater outlets to the stream are required to discharge in the direction of flow to minimise erosion on the opposite bank.

(DE 3) Design, provide and install a complete stormwater quality treatment system for the site in accordance with the Auckland Regional Council's TP10 '*Stormwater Management Devices Design Guideline Manual*', and WCC Code of Practice for City Infrastructure and Land Development (refer Section 4). Provide a copy of the engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All stormwater treatment and detention devices are required to be located clear of existing or proposed public drainage lines.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain. This includes provision of a 0.5m thick impermeable compacted clay liner under the pond base, embankment and spillway to avoid seepage of pond water into the trenching material surrounding the drain. Provide evidence that this has been completed in the geotechnical completion report. Heavy machinery is required to be kept 2m clear of the Watercare Services Ltd trunk

wastewater drain at all times during construction.

(ii) Provide in the design of the device for treatment of a fully developed upstream catchment. Detain the 2 year storm event and discharge at pre-development levels as required by the Parrs Stream Catchment Management Plan.

(iii) The existing pond on Lot 3 DP 339810 can be replaced by a quality treatment device that provides the equivalent level of treatment. Provide engineering plans and calculations to demonstrate that the proposed swale can achieve this, or alternatively provide written confirmation from ARC that the proposed swale is an acceptable form of treatment in this situation.

(iv) Provide a planting plan, including species list, quantities, and methodology to EcoWater and Parks for approval prior to commencing planting.

(v) Provide a surveyed as-built plan of the device showing all lid and invert levels, permanent water level, and contours at 200mm intervals below water level.

(vi) Provide a geotechnical completion report certifying construction of the pond.

(vii) Provide a maintenance manual for the treatment device.

(viii) Provide a drainage reserve over the entire area occupied by the treatment device, associated maximum flood water levels, and all areas necessary to access and maintain the treatment device.

(DE 4) Waitakere City Council holds a Comprehensive Discharge Consent from the ARC for the Parrs Stream catchment, and this proposal meets the recommendations of the Parrs Stream Catchment Management Plan subject to these conditions being met. It is the applicant's responsibility to obtain all other necessary consents, or evidence of dispensation, from the Auckland Regional Council, pay all associated costs and comply with any conditions imposed by the Regional Council.

(DE 5) Design, provide and install a complete public water supply reticulation system and fire fighting services to serve all Lots/Units in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 6). Provide engineering plans and calculations to Council for approval prior to commencing works. Specific requirements:

(i) All Lots/Units are to be individually metered at the road reserve boundary. Ducting of private lines is recommended where they cross driveways.

(i) Locate all water connections at the same position as the power and telephone connection to each Lot/Unit.

(ii) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.

(iii) Pay to the Council the cost of supervising the shut down of Council's water supply mains. This service includes Council providing written advice to all affected property owners and tenants.

(iv) Provide fire hydrants within 135m of the furthest point on any property, and within 65m of the end of a cul-de-sac.

(v) Where the required public system is on private property, easements over the course of such system in favour of Council will be necessary.

(DE 6) Design, provide and install a complete ICT Network along all new public roads for the future provision of ICT services within the development in compliance

with Council's Code of Practice for City Infrastructure and Land Development (Refer section 8). Provide engineering plans to Council for approval prior to commencing works.

(DE 7) **Engineering Approval and Quality Assurance Process:** Public infrastructure works, as conditioned above, require Council's approval of engineering plans and specifications prepared by the applicant's engineer in accordance with Council's Code of Practice for City Infrastructure and Land Development.

(i) Submit full engineering plans, long sections and calculations, prepared in accordance with Council's Code of Practice, to Council for approval.

(i) Comply with all conditions of the approval from Watercare Services Ltd for working close to their trunk wastewater drain.

(ii) Advise the name of the appointed developer's representative fulfilling engineering responsibilities as detailed in section 1.4.1 of the Code of Practice.

(iii) After engineering approval has been given and prior to commencing construction, contact Council's Call Centre on 839 0400 to arrange a QA Pre-Start Meeting. Allow 3 working days for the QA Pre-Start Meeting to be booked.

(iv) The applicant is required to ensure that the contracted drainlayer and developer's representative attend the QA Pre-Start Meeting, and that construction materials are on-site for inspection.

(v) EcoWater's QA Supervisor will then undertake random site inspections throughout the construction process.

(vi) Upon completion of construction the applicant's surveyor is required to prepare As-Built plans in accordance with the Code of Practice, and CCTV inspection of the drains are to be carried out.

(vii) The developer's representative is required to fully inspect the drainage including overseeing the drainage tests, view the cctv's and check against the as-builts, and ensure that any remedial works are completed.

(viii) When the developer's representative is satisfied that all works meet Council standards, they are required to complete the 'QA Final Inspection Request Form' and lodge this at Council together with As-Builts, CCTV (all footage on one DVD), log sheets, chlorination certificate for watermains, and inspection reports.

(ix) EcoWater's QA Supervisor will check all information against the approved design and Code of Practice, then undertake a field check and testing of the new drainage systems in conjunction with Council's approved maintenance contractor.

(x) When all public works and documentation are completed to Council's satisfaction the QA Completion Certificate will be issued to the applicant.

(xi) Submit a copy of the QA Completion Certificate with the application for s224c Certificate as evidence of compliance with the conditions of consent requiring construction of infrastructure to public standards.

(xii) Pay all of Council's engineering fees and costs associated with engineering approvals, quality assurance site inspections, as-built & cctv approvals, final inspections, testing and bond management.

FEES, BONDS & CONTRIBUTIONS

(FC 1) Pursuant to Sections 407 & 409 of the Resource Management Act, the following financial contributions have been assessed for the proposed

development, and are required to be paid in full prior to issue of the 224c:

(i) Twin Streams Contribution (Oratia catchment) totalling $207,492.01 inclusive of GST - calculated based on 18 medium density Units @ $1,670.63 (incl. GST) per additional Unit, and 59 residential Lots @ $3,007.13 (incl. GST) per additional Lot.

(FC 1) Pursuant to Section 108(2)(b) and Section 108A, and in accordance with Council's Code of Practice for City Infrastructure and Land Development, the applicant is required to provide a maintenance bond to Council, equivalent to 2½% (minimum $500.00) of the value of works being taken over by Council. This maintenance bond will be held for six months from the date of 224c issue, or until 31 October, whichever is longer. Maintenance of these assets are the responsibility of the developer during the maintenance period. At the end of the maintenance period the QA Supervisor will undertake a maintenance inspection to ascertain whether the assets are still in satisfactory condition and if so, will instruct the bond to be released, and Council will take over maintenance responsibilities from that time forward. Where defects occur during the developer's maintenance liability period, the costs of repairing such defects are the full responsibility of the developer. Where the developer does not repair the defects, Council will retain the bond monies for use in repairing the defects, and refund any residual monies held to the developer. The developer's liability is not limited to the amount of the maintenance bond, and any additional costs will be invoiced to the developer and will become a debt due to the Council.

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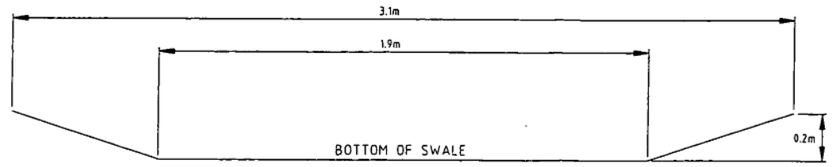
DRAWING NOTES

TYPICAL SWALE CROSS SECTION



4/7/07

REV	DATE	DESCRIPTION	DRAWN	CHEC
C	030707	SWALE AMENDED	FK	
B	300607	DETAILS AMENDED	FK	
A	270607	DETAILS ADDED	FK	

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMEN

FOR

NZ HOUSING FOUNDATIOI

DRAWING TITLE

STAGE 2 SWALE LAYOUT

	DATE	INITIAL
DESIGNED	SEPT 2006	FK
DRAWN	SEPT 2006	FK
CHECKED		
APPROVED		

SCALE (A1)

1:125

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C15	C

3/07/2007 5:49:34 p.m. X:\dan\42600\S\42608\Civil\C15 STAGE 2 SWALE LAYOUT.dan

WEST COAST ROAD

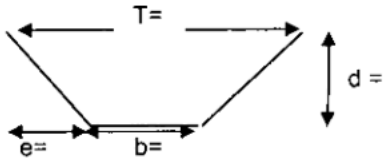
Job No. 42608

Swale Calculation - Stage 2 Swale 1

Following steps laid out in TP10 Stormwater Management Devices: Design Guidelines Manual
Chapter 9 Swale and Filter Strip Design, Construction and Maintenance

Hydrology

	Previous Data	Impervious Data
CN	74	98
2yr-24 hour rainfall =	89	



Section	IMPR	PERV	TOTAL	
Area (m^2)	3486	492		
Water Quality Storm Depth (P_{24}) (mm)	29.7	29.7		TP108 - 2 year-24 hr rainfall = 89mm/24hr
Peak Rainfall Rate (mm/hr)	20.0	20.0		
Storage (mm)	5.2	89.2		TP108 - Parameters Used: Group C (soil group); Paved cover type = CN 98
Peak Runoff Rate (Imp. I_a = 0 Per. I_a=5))				
Runoff/Rainfall	0.93	0.19		
Peak Runoff Rate (m^3/s)	0.0181	0.0005		
Peak Runoff Flow Rate (m^3/s)	0.0181	0.0005	0.0186	
Peak Flow Rate in Swale (m^3/s)			0.0166	

Design Steps

Vegetation Cover	Grass - 150mm tall		
	Slope - 1%		
	d>60mm	200	
	s=1/100	0.01	
	design depth (d)	0.2	
Mannings n =		0.090	
Z =		3	3:1 Slope

Section			**1**
Bottom Width (b) (m) (between 0.6 & 2.0m)			-0.38
Cross Sectional Area (A) (m^2)			0.04
Top Width (W) (m)			0.82
Hydraulic Radius (R)			0.10
Flow Velocity V = QA (m/s)			0.38
(max. allowed 0.8m/s)			
Swale Length (m) (min. 30m)			204.82
(for 9 minute t/ment time)			
So if I want b =			0.60
b=(A-Zd^2)/d	A=bd+Zd^2	Area (m^2)	0.24
V=Q/A		Velocity (m/s)	0.07
V=L/60t	L=V60t	Length (m)	**37.3**
Top Width (W) (m)		Top width	1.80

WEST COAST ROAD

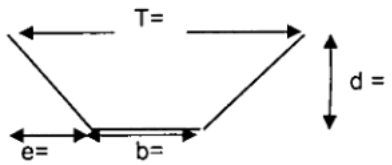
Job No. 42608

Swale Calculation - Stage 3 Swale 2

Following steps laid out in TP10 Stormwater Management Devices: Design Guidelines Manual
Chapter 9 Swale and Filter Strip Design, Construction and Maintenance

Hydrology

	Previous Data	Impervious Data
CN	74	98
2yr-24 hour rainfall =	89	



Section	IMPR	PERV	TOTAL	
Area (m^2)	11284	9367		Albionvale Catchment - Imp = 9482m^2 Per = 8078m^2
Water Quality Storm Depth (P_{24}) (mm)	29.7	29.7		TP108 - 2 year-24 hr rainfall = 89mm/24hr
Peak Rainfall Rate (mm/hr)	20.0	20.0		
Storage (mm)	5.2	89.2		TP108 - Parameters Used: Group C (soil group); Paved cover type = CN 98
Peak Runoff Rate (Imp. I_a = 0 Per. I_a=5))				
Runoff/Rainfall	0.93	0.19		
Peak Runoff Rate (m^3/s)	0.0586	0.0098		
Peak Runoff Flow Rate (m^3/s)	0.0586	0.0098	0.0684	
Peak Flow Rate in Swale (m^3/s)			0.0609	

Design Steps

Vegetation Cover	Grass - 150mm tall		
	Slope - 1%		
	d>60mm	200	
	s=1/100	0.01	
	design depth (d)	0.2	
Mannings n =		0.090	
Z =		3	3:1 Slope

Section			**1**
Bottom Width (b) (m) (between 0.6 & 2.0m)			0.20
Cross Sectional Area (A) (m^2)			0.16
Top Width (W) (m)			1.40
Hydraulic Radius (R)			0.16
Flow Velocity V = QA (m/s)			0.38
(max. allowed 0.8m/s)			
Swale Length (m) (min. 30m)			204.82
(for 9 minute t/ment time)			
So if I want b =			2.00
b=(A-Zd^2)/d	A=bd+Zd^2	Area (m^2)	0.52
V=Q/A		Velocity (m/s)	0.12
V=L/60t	L=V60t	Length (m)	**63.2**
Top Width (W) (m)		Top width	3.20

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Job No. ***42608***
Project ***West Coast Road***
Date ***Nov-06*** **(Rev B)**
By ***FK***
20% AEP Rainfall Event $k_s = 1.5$ ≤ 1000mm dia.

MH to MH	Catchment Breakdown		Catchment Area (m^2)	C	CA	Σ CA	I mm/hr	Required Q (l/s)	Adopted Pipe Size	Grade	Length	Q	V	Manhole LL	IL OUT	IL IN
A9-A8	Lots 1-7	Grass	594.1	0.3	178.2											
		Roof	1765.7	0.95	1677.4											
	CP5	Road/Dr	126.4	0.95	120.1											
		Berm	210.5	0.3	63.2	2038.9	90	***51.0***	**225**	5.8	88.8	110		27.50	26.00	20.81
A8-A7						2038.9	90	***51.0***	**225**	3.9	17.0	90		22.24	20.76	20.10
(ROAD 2)																
A7-A6	Lot 9	Grass	292.7	0.3	87.81											
		Roof	80.1	0.95	76.1											
	Line B				1281.2	1445.1										
						3483.9	90	**87.2**	**300**	1.0	30.4	98		22.44	20.02	19.73
A6-A5	DCP4	Road	612.8	0.95	582.2											
		Berm	208.9	0.3	62.7											
		F/Paths	163.1	0.95	154.9											
		Drives	30.0	0.95	28.5											
		Drives 3-7	336.2	0.95	319.4											
	CP8	Road/Parking	263.8	0.95	250.6											
		Berm	98.2	0.3	29.5											
		F/Paths	95.1	0.95	90.3											
		Drives	30.0	0.95	28.5											
		Drives 9-12	121.9	0.95	115.8	1662.4										
						5146.3	90	***128.8***	**375**	0.7	8.1	148.0		20.63	19.68	19.62
A5-A4	Lot 8	Grass	267.5	0.3	80.3											
		Roof	96.8	0.95	92.0											
	DCP1	Road	615.2	0.95	584.4											
		Berm	425.1	0.3	127.5											
		F/Path	281.1	0.95	267.0											
		Drive	34.1	0.95	32.4											

		Drives 8&16-18	208.8	0.95	198.4											
	DCP2	Road/Parking	561.1	0.95	533.0											
		F/Path	253.0	0.95	240.4	2155.4										
						7301.7	90	**182.7**	**450**	0.7	22.8	240.0		20.54	19.55	19.38
A4-A3	Lot 18	Grass	201.6	0.3	60.5											
		Roof	96.8	0.95	92.0	152.4										
						7454.1	90	**186.5**	**450**	0.5	19.0	203.0		20.21	19.33	19.24
A3-A2						7454.1	90	**186.5**								
	Line C	20l/s						**206.5**	**450**	1.0	20.0	287.0		20.00	18.99	18.80
A2-A1	Wetland	$^1/_3$ 2YR = 50l/s				7454.1	90	**50.0**	**225**	0.0	3.1	50.0		20.00	18.75	18.75
A2-S1	To DB1	Less 50l/s						**156.5**	**300**	5.1	10.7	221.8		20.00	19.20	18.65

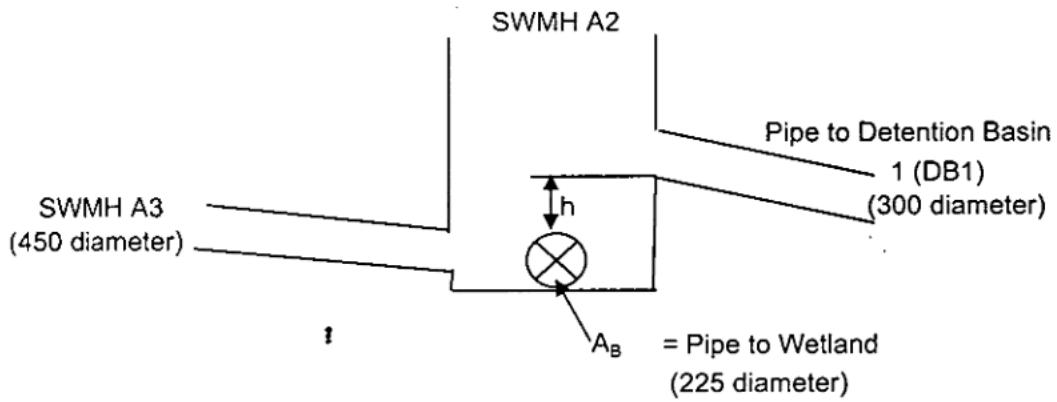
Calculations for sizing of 50 l\s outlet pipe into wetland 50 l/s

$Q = 0.6A_B \sqrt{2gh}$ $h = ((Q/0.6A)^2)/(2g)$

Pipe Diameter	Q m^3/s	A_B m^2	g m/s	h m
50	0.05	0.002	9.81	91.90
100	0.05	0.008	9.81	5.74
150	0.05	0.018	9.81	1.13
200	0.05	0.031	9.81	0.36
250	0.05	0.049	9.81	0.15
225	0.05	0.040	9.81	0.22

Calculation for sizing of outlet pipe to pond

Pipe to Wetland	Q l/s	Pipe Gradient	Pipe to Pond
225	156.5	5.1 (19.20-18.65)	300



Dia.	A_B
0.05	0.002
0.1	0.008
0.15	0.018
0.2	0.031
0.25	0.049
0.225	0.040

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STORMWATER CALCULATIONS

Job No *42608*
Project *West Coast Road*
Date *Nov-06* (Rev B)
By *FK*
20% AEP Rainfall Event

MH to MH	Catchment Breakdown		Catchment Area (m^2)	C	CA	Σ CA	I mm/hr	Required Q (l/s)	Adopted Pipe					Manhole		
									Size	Grade	Length	Q	V	LL	IL OUT	IL IN
B1-A7	Lots 9-12&26	Grass	1084.5	0.3	325.4											
		Roofs	353.8	0.95	336.1											
	CP6	Road	189.9	0.95	180.4											
		Berm	78.1	0.3	23.4											
		F/Paths	59.9	0.95	56.9											
		Drives	12.5	0.95	11.9											
		Drives 1-2	112.8	0.95	107.2											
	CP7	Road/Parking	137.3	0.95	130.4											
		Berm	84.4	0.3	25.3											
		F/Paths	46.1	0.95	43.8											
		Drives	7.5	0.95	7.1											
		Drives 26	35.0	0.95	33.3	1281.2	90	***32.1***	**225**	5.0	73.8	102.0		27.00	23.82	20.10
A7														22.45	20.02	

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Job No. *42608*
Project *West Coast Road*
Date *Nov-06* (Rev B)
By *FK*
20% AEP Rainfall Event

MH to MH	Catchment Breakdown		Catchment Area (m^2)	C	CA	Σ CA	I mm/hr	Required Q (l/s)	Adopted Pipe Size	Grade	Length	Q	V	Manhole LL	IL OUT	IL IN
C13-C12	Lots 19-20	Grass	517.4	0.3	155.2											
		Roof	193.6	0.95	183.9											
	CP4	Road/Dway	169.3	0.95	160.8											
		Berm	82.2	0.3	24.7											
		F/Path	46.5	0.95	44.2	568.8	90	***14.2***	**225**	6.7	31.1	118.0		28.50	27.00	24.91
C12-C11	Lots 21	Grass	271.5	0.3	81.5											
(ROAD 5)		Roof	80.1	0.95	76.1											
	Line H				162.8	320.3										
						889.1	90	***22.2***	**225**	9.7	32.6	143.0		27.50	24.86	21.71
C11-C10	Lots 24-25	Grass	595.8	0.3	178.74											
		Roof	193.6	0.95	183.92											
		Drives	120.6	0.95	114.57											
	DCP3	Road	708.6	0.95	673.2											
		Berm	152.3	0.3	45.7											
		F/Path	182.6	0.95	173.5											
		Drive	34.2	0.95	32.5											
		Drives 19-22	209.4	0.95	198.9	1601.0										
						2490.1	90	***62.3***	**300**	0.8	31.0	87.6		23.78	21.63	21.38
C10-C9						2490.1	90	***62.3***	**300**	0.8	35.8	87.6		23.66	21.33	21.04

C9-C8	Line F				812.2	812.2										
						3302.3	90	***82.6***	**300**	0.8	33.4	87.6		23.33	20.99	20.72
C8-C7						3302.3	90	***82.6***	**300**	0.8	25.6	87.6		23.58	20.67	20.46
C7-C6	CP2	Road/Parking	655.6	0.95	622.8											
(ROAD 1)		Berm	33.6	0.3	10.1											
		F/Path	190.8	0.95	181.3											
	CP3	Road	369.8	0.95	351.3											
		Berm	206.9	0.3	62.1											
		F/Path	174.3	0.95	165.6											
		Drive	41	0.95	39.0											
		Drives 27-31	271	0.95	257.5	1689.5										
						4991.8	90	**124.9**	**375**	0.8	28.9	158.0		21.91	20.38	20.15
C6-C5	Lot 32	Grass	196.6	0.3	59.0											
(ROAD 3)		Roof	96.8	0.95	92.0											
	Line E				469.6	620.5										
						5612.3	90	**140.4**	**375**	0.8	15.8	158.0		23.40	20.10	19.98
C5-C4	CP8	Road	244.7	0.95	232.5											
		Berm	133	0.3	39.9											
		F/Path	118.7	0.95	112.8											
		Drive	37.7	0.95	35.8											
		Drives 32-35	337.3	0.95	320.4											
	CP9	Road	220	0.95	209.0											
		Berm	143.1	0.3	42.9											
		F/Path	108.9	0.95	103.5											
		Drive	33.3	0.95	31.6											
		Drives 13-15	101.8	0.95	96.7											
	Line D				320.4											
	Lot 15	Grass	226.4	0.3	67.9											

		Roof	96.8	0.95	92.0	1705.4										
						7317.7	90	**183.1**	**450**	0.8	25.3	256.0		22.12	19.91	19.71
C4-C3	Lots 16&17	Grass	560.9	0.3	168.27											
		Roof	193.6	0.95	183.92	352.2										
						7669.9	90	**191.9**	**450**	0.8	33.4	256.0		21.06	19.67	19.40
C3-C2						7669.9	90	**191.9**	**450**	1.2	14.7	314.0		20.43	19.37	19.20
C2-C1	To DB2	Less 20l/s				7669.9	90	**171.9**	**300**	5.8	9.6	236.5		20.04	19.36	18.80
C2-A3		$^1/_3$ 2 YR - 20 l/s						**20.0**	**200**	0	8.4	20.0		20.04	19.10	19.10
(for Wetland)																

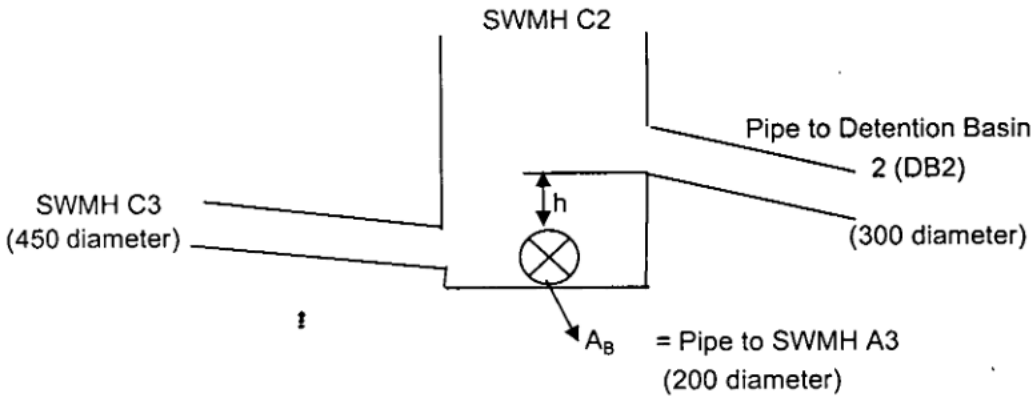
Calculations for sizing of 20 l\s outlet pipe for wetland 20 l/s

$Q = 0.6A_B \sqrt{2gh}$ $h = ((Q/0.6A)^2)/(2g)$

Pipe Diameter	Q m^3/s	A_B m^2	g m/s	h m
50	0.02	0.002	9.81	14.70
100	0.02	0.008	9.81	0.92
150	0.02	0.018	9.81	0.18
200	0.02	0.031	9.81	0.06
250	0.02	0.049	9.81	0.02
225	0.02	0.040	9.81	0.04

Calculation for sizing of outlet pipe to DB2

Pipe to Wetland	Q l/s	Pipe Gradient	Pipe to Pond
225	171.9	5.8 (19.36-18.80)	300



Dia.	A_B
0.05	0.002
0.1	0.008
0.15	0.018
0.2	0.031
0.25	0.049
0.225	0.040

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STORMWATER CALCULATIONS

Job No *42608*
Project *West Coast Road*
Date *Nov-06* (Rev B)
By *FK*
20% AEP Rainfall Event

MH to MH	Catchment Breakdown		Catchment Area (m^2)	C	CA	Σ CA	I mm/hr	Required Q (l/s)	Adopted Pipe Size	Grade	Length	Q	V	Manhole LL	IL OUT	IL IN
D1-C5	Lots 13-14	Grass	560.8	0.3	168.2											
(BRANCH)		Roofs	160.2	0.95	152.2											
						320.4	90	***8.0***	**150**	7.9	29.9	44		23.38	22.58	20.21
C5									**450**					22.12	19.91	
B/Cap-E2	Lot 35	Grass	207.7	0.3	62.3											
(BRANCH)		Roofs	98.8	0.95	93.9	156.2	90	***3.9***	**150**	3	9.7	27		25.50	23.67	23.38
E2-E1	Lot 34	Grass	215.9	0.3	64.8											
		Roofs	98.8	0.95	93.9	158.6										
						314.8	90	**7.9**	**225**	4.2	25.9	94		24.50	23.30	22.22
E1-C6	Lot 33	Grass	209.3	0.3	62.8											
		Roofs	96.8	0.95	92.0	154.8										
						469.6	90	**11.7**	**225**	9.1	21.2	138		23.8	22.17	20.25
C6									**375**					23.4	20.10	

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MH to MH	Catchment Breakdown		Catchment Area (m^2)	C	CA	Σ CA	I mm/hr	Required Q (l/s)	Adopted Pipe					Manhole		
									Size	Grade	Length	Q	V	LL	IL OUT	IL IN
Lot 31	Lots 30-31	Grass	469.8	0.3	140.9											
Blank-F1		Roof	193.6	0.95	183.9	324.9	90	***8.1***	**150**	0.9	24.5	14.7		24.00	22.80	22.59
(Line Q)																
Lot 27	Lot 27	Grass	246.0	0.3	73.8											
Blank-F2		Roof	82.3	0.95	78.2	152.0										
						152.0	90	***3.8***	**150**	9.2	11.9	47.0		26.80	25.60	24.50
F2-F1	Lot 28	Grass	305.9	0.3	91.8											
		Roof	82.3	0.95	78.2	170.0										
						321.9	90	***8.1***	**225**	9.0	20.7	137.0		26.80	24.42	22.56
F1-C9	Lot 29	Grass	238.3	0.3	71.5											
(ROAD 1)		Roof	98.8	0.95	93.9											
	Lot 31 Blk				324.9	490.2										
	to F1					812.2	90	***20.3***	**225**	5.5	20.7	107.0		26.00	22.51	21.07
C9														23.33	20.99	

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STORMWATER CALCULATIONS

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By *FK*
20% AEP Rainfall Event

MH to MH	Catchment Breakdown		Catchment Area (m^2)	C	CA	Σ CA	I mm/hr	Required Q (l/s)	Adopted Pipe Size	Grade	Length	Q	V	Manhole LL	IL OUT	IL IN
I2-I1	Lot 56	Roof	177.0	0.95	168.2											
(O/LET)		Drive	283.0	0.95	268.9											
		F/Path	106.0	0.95	100.7	537.7	90	***13.5***	**225**	9.9	5.9	144.0		25.00	23.18	22.65
J2-J1	Lots 54-55	Roof/Decks	249.0	0.95	236.6											
(O/LET)		Drives	87.0	0.95	82.7	319.2	90	***8.0***	**225**	3.2	8.4	81.8		24.62	23.48	23.23
K2-K1	Lot 53	Roof	99.0	0.95	94.1											
(O/LET)		Drive	57.0	0.95	54.2											
		Grass	75.0	0.3	22.5	170.7	90	***4.3***	**225**	10.0	9.3	105.8		25.37	23.88	23.00
G2-G1	Ex. SW			0.95	0.0											
(EXTSION	Lot 23	Roof	188.0	0.95	178.6											
OF EX.		Drive/Fpaths	93.0	0.95	88.4											
525)		Grass	419.6	0.3	125.9	392.8	90	***9.8***	**525**	8.2	23.8	1237.2		26.33	24.70	22.80
(O/LET)																
H1-C12	Lot 22	Roof	80.1	0.95	76.1											
(BRANCH)		Grass	288.9	0.3	86.7	162.8	90	***4.1***	**225**	6.9	16.3	120.2		27.00	26.00	24.91

NOTE: The grass bank in Lots 23 and 46-55 have not been included in the SW catchment areas.

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MH to MH	Catchment Breakdown		Catchment Area (m^2)	C	CA	Σ CA	I mm/hr	Required Q (l/s)	Adopted Pipe					Manhole		
									Size	Grade	Length	Q	V	LL	IL OUT	IL IN
L6-L5	Lots 50-52	Roof	297.0	0.95	282.2											
		Grass	368.0	0.3	110.4	392.6	90	***9.8***	**225**	4.5	29.2	97.0		27.78	27.14	25.88
L5-L4	Lots 48-49	Roof	198.0	0.95	188.1											
		Grass	279.0	0.3	83.7	271.8										
						664.4	90	***16.6***	**225**	1.0	28.1	45.6		27.78	25.83	25.55
L4-L3	Lot 47	Roof	95.0	0.95	90.3											
		Grass	173.0	0.3	51.9	142.2										
						806.5	90	***20.2***	**225**	9.9	5.0	144.0		27.78	25.50	25.11
L3-L2						806.5	90	***20.2***	**225**	1.0	19.6	45.6		25.63	25.06	24.87
L2-L1	Line M				5639.9											
						6446.4	90	***161.3***	**375**	1.1	7.1	186.0		25.40	24.80	24.73
L1															24.73	

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MH to MH	Catchment Breakdown		Catchment Area (m^2)	C	CA	Σ CA	I mm/hr	Required Q (l/s)	Adopted Pipe					Manhole		
									Size	Grade	Length	Q	V	LL	IL OUT	IL IN
M5-M4	Lots 36-37	Roof	190.0	0.95	180.5											
		Grass	524.0	0.3	157.2	337.7	90	*8.4*	225	0.8	25.7	40.8		29.60	27.14	26.94
M4-M3	Lots 38-43	Roof	577.0	0.95	548.2											
		Grass	1592.0	0.3	477.6											
	Road 6&7		3486.0	0.95	3311.7				375	0.8	79.2	158.0		29.58	26.89	26.22
			492.0	0.3	147.6	4485.1										
						4822.8	90	*120.7*								
M3-M2	Lot 42-43	Roof	197.0	0.95	187.2											
		Grass	544.0	0.3	163.2	350.4										
						5173.1	90	*129.4*	375	2.7	12.4	292.0		29.05	26.17	25.84
M2-M1	Lot 44	Roof	81.0	0.95	77.0											
		Grass	325.0	0.3	97.5	174.5										
						5347.6	90	*133.8*	375	2.7	14.6	292.0		28.90	25.79	25.40
M1-L2	Lots 45-46	Roof	176.0	0.95	167.2											
		Grass	417.0	0.3	125.1	292.3										
						5639.9	90	*141.1*	375	2.5	19.0	292.0		28.31	25.35	24.87
L2														25.37	24.80	

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MH to MH	Catchment Breakdown		Catchment Area (m^2)	C	CA	Σ CA	I mm/hr	Required Q (l/s)	Adopted Pipe Size	Grade	Length	Q	V	Manhole LL	IL OUT	IL IN
B/Cap-N4	Lot 61	Roof 1 unit	104.5	0.95	99.3											
		(incl balconies)														
						99.3	90	***2.5***	**225**	1.0	24.2	45.6		27.06	26.14	25.90
N4-N3	Lot 61	Roof 5 units	470.3	0.95	446.8											
		(incl balconies)														
		Grass	1267.0	0.3	380.1											
						926.2	90	***23.2***	**225**	1.0	53.1	45.6		27.59	25.85	25.32
N3-N2						926.2	90	***23.2***	**225**	1.0	12.0	45.6		28.66	25.27	25.15
N2-N1	Swale 2	Upper C/ment	8078.0	0.3	2423.4											
	(Areas taken from ex.		9482.0	0.95	9007.9	11431.3										
	Pond design data)					12357.5	90	***309.2***	**450**	1.6	14.5	363.0		26.11	24.93	24.69
N1														24.69	24.69	
(O/LET)																

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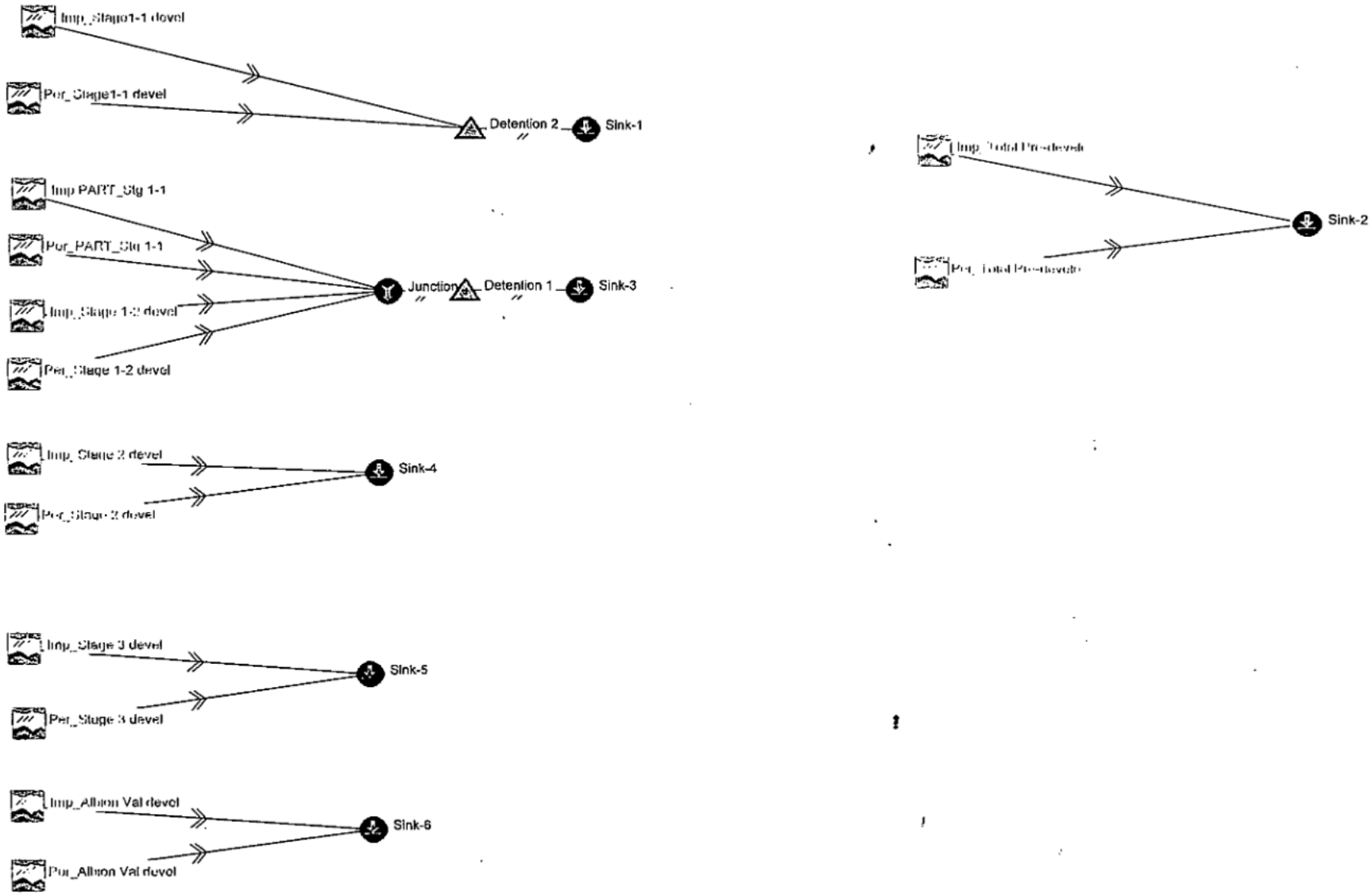
MH to MH	Catchment Breakdown		Catchment Area (m^2)	C	CA	Σ CA	I mm/hr	Required Q (l/s)	Adopted Pipe					Manhole		
									Size	Grade	Length	Q	V	LL	IL OUT	IL IN
B/Cap-R2	Lots 57-60	Roof	320.0	0.95	304.0											
		Grass	360.0	0.3	108.0	412.0	90	***10.3***	**225**	2.0	24.9	64.6		28.64	27.71	26.70
R2-R1						412.0	90	***10.3***	**225**	13.0	10.1	>145		28.15	26.65	25.34
R1														25.34	25.34	
(O/LET)																


Imp_Stage1-1 devel
Per_Stage1-1 devel
Detention 2
Sink-1
Imp PART_Stg 1-1
Per_PART_Stg 1-1
Junction
Detention 1
Sink-3
Imp_Stage 1-2 devel
Per_Stage 1-2 devel
Imp_Stage 2 devel
Sink-4
Per_Stage 2 devel
Imp_Stage 3 devel
Sink-5
Per_Stage 3 devel
Imp_Allison Val devel
Sink-6
Per_Allison Val devel
Sink-2

→ Pre development 2 year Peak discharge (m^3/sec)

→ Post development 2 year Peak discharge (m^3/sec)

→ Attenuated post 2 year Peak discharge (m^3/sec) HEC-HMS.

Hydraulic Modelling Schematic
West Coast Road Subdivision
Sept 2006.
42608.

WWS * Summary of Results

Project : West Coast Road 2 Run Name : Run 1

Start of Run : 01Jan03 0000 Basin Model : Pakuranga
End of Run : 02Jan03 0000 Met. Model : 10-year event
Execution Time : 06Sep06 1604 Control Specs : Control CHicago

Hydrologic Element	Discharge Peak (cms)	Time of Peak	Volume (1000 cu m)	Drainage Area (sq km)
Per_Stage1-1 devel	0.15611	01 Jan 03 1210	0.69791	0.009
Imp_Stage1-1 devel	0.13133	01 Jan 03 1210	0.67675	0.005
Detention 2	0.24751	01 Jan 03 1210	0.95889	0.014
Sink-1	0.24751	01 Jan 03 1210	0.95889	0.014
Per_Stage 1-2 devel	0.055548	01 Jan 03 1210	0.24834	0.003
Per_PART_Stg 1-1	0.076894	01 Jan 03 1210	0.34377	0.005
Imp_Stage 1-2 devel	0.11708	01 Jan 03 1210	0.60336	0.005
Imp PART_Stg 1-1	0.064674	01 Jan 03 1210	0.33328	0.003
Junction-2	0.31420	01 Jan 03 1210	1.5288	0.015
Detention 1	0.018479	01 Jan 03 1501	0.98950	0.015
Sink-3	0.018479	01 Jan 03 1501	0.98950	0.015
Per_Stage 2 devel	0.15169	01 Jan 03 1210	0.67817	0.009
Imp_Stage 2 devel	0.16827	01 Jan 03 1210	0.86713	0.007
Sink-4	0.31996	01 Jan 03 1210	1.5453	0.016
Imp_Stage 3 devel	0.072984	01 Jan 03 1210	0.37610	0.003
Per_Stage 3 devel	0.084464	01 Jan 03 1210	0.37762	0.005
Sink-5	0.15745	01 Jan 03 1210	0.75372	0.008
Imp_Albion Val devel	0.23727	01 Jan 03 1210	1.2227	0.009
Per_Albion Val devel	0.13773	01 Jan 03 1210	0.61574	0.008
Sink-6	0.37500	01 Jan 03 1210	1.8385	0.018
Per_Total Pre-develc	1.2744	01 Jan 03 1210	5.6974	0.075
Imp_Total Pre-develc	0.00025029	01 Jan 03 1210	0.0012898	0.000
Sink-2	1.2746	01 Jan 03 1210	5.6987	0.075

S * Summary of Results

Project : West Coast Road 2 Run Name : Run 2

Start of Run : 01Jan03 0000 Basin Model : Pakuranga
End of Run : 02Jan03 0000 Met. Model : 2 year event
Execution Time : 06Sep06 1607 Control Specs : Control CHicago

Hydrologic Element	Discharge Peak (cms)	Time of Peak	Volume (1000 cu m)	Drainage Area (sq km)
Per_Stage1-1 devel	0.076349	01 Jan 03 1210	0.33952	0.009
Imp_Stage1-1 devel	0.081832	01 Jan 03 1210	0.41503	0.005
Detention 2	0.012961	01 Jan 03 1500	0.40607	0.014
Sink-1	0.012961	01 Jan 03 1500	0.40607	0.014
Per_Stage 1-2 devel	0.027167	01 Jan 03 1210	0.12081	0.003
Per_PART_Stg 1-1	0.037607	01 Jan 03 1210	0.16724	0.005
Imp_Stage 1-2 devel	0.072958	01 Jan 03 1210	0.37002	0.005
Imp PART_Stg 1-1	0.040300	01 Jan 03 1210	0.20439	0.003
Junction-2	0.17803	01 Jan 03 1210	0.86246	0.015
Detention 1	0.014801	01 Jan 03 1402	0.72162	0.015
Sink-3	0.014801	01 Jan 03 1402	0.72162	0.015
Per_Stage 2 devel	0.074189	01 Jan 03 1210	0.32991	0.009
Imp_Stage 2 devel	0.10485	01 Jan 03 1210	0.53178	0.007
Sink-4	0.17904	01 Jan 03 1210	0.86169	0.016
Imp_Stage 3 devel	0.045478	01 Jan 03 1210	0.23065	0.003
Per_Stage 3 devel	0.041310	01 Jan 03 1210	0.18370	0.005
Sink-5	0.086787	01 Jan 03 1210	0.41435	0.008
Imp_Albion Val devel	0.14785	01 Jan 03 1210	0.74986	0.009
Per_Albion Val devel	0.067360	01 Jan 03 1210	0.29954	0.008
Sink-6	0.21521	01 Jan 03 1210	1.0494	0.018
Per_Total Pre-develc	0.62327	01 Jan 03 1210	2.7717	0.075
Imp_Total Pre-develc	0.00015596	01 Jan 03 1210	0.00079099	0.000
Sink-2	0.62343	01 Jan 03 1210	2.7724	0.075

HMS Summary of Results for Detention 1

Project : West Coast Road 2 Run Name : Run 2

Start of Run	: 01Jan03 0000	Basin Model	: Pakuranga
End of Run	: 02Jan03 0000	Met. Model	: 2 year event
Execution Time	: 06Sep06 1607	Control Specs	: Control CHicago

Computed Results

Peak Inflow	: 0.17803 (cms)	Date/Time of Peak Inflow	: 01 Jan 03 1210
Peak Outflow	: 0.014801 (cms)	Date/Time of Peak Outflow	: 01 Jan 03 1402
Total Inflow	: 57.4 (mm)	Peak Storage	: 0.36984(K cu m)
Total Outflow	: 48.0 (mm)	Peak Elevation	: 18.000(m)

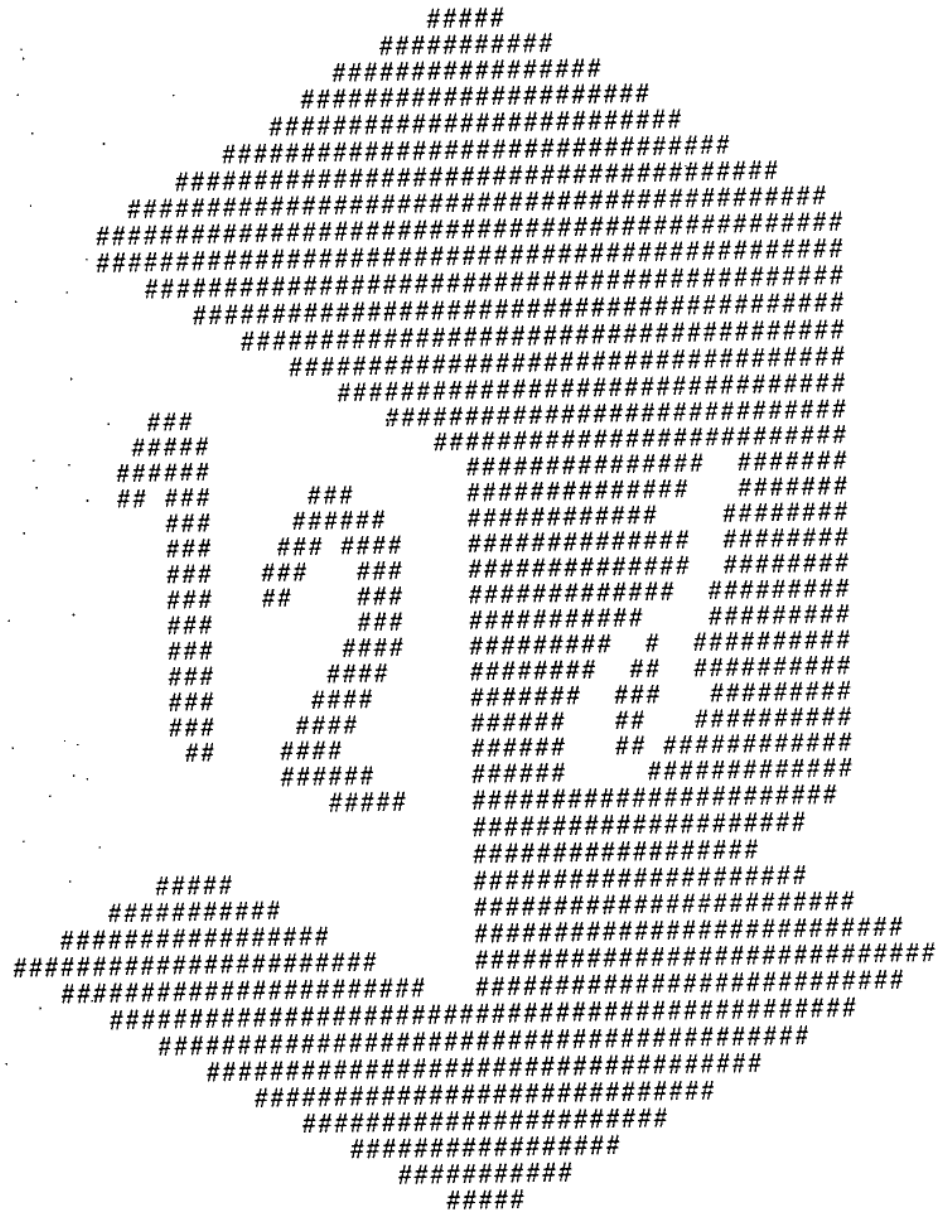
HMS - Summary of Results for Detention 2

Project : West Coast Road 2 Run Name : Run 2

Start of Run	: 01Jan03 0000	Basin Model	: Pakuranga
End of Run	: 02Jan03 0000	Met. Model	: 2 year event
Execution Time	: 06Sep06 1607	Control Specs	: Control CHicago

Computed Results

Peak Inflow	: 0.15818 (cms)	Date/Time of Peak Inflow	: 01 Jan 03 1210
Peak Outflow	: 0.012961 (cms)	Date/Time of Peak Outflow	: 01 Jan 03 1500
Total Inflow	: 52.4 (mm)	Peak Storage	: 0.42090(K cu m)
Total Outflow	: 28.2 (mm)	Peak Elevation	: 19.202(m)



Project: Wetland Pond Design
User: Dylan
Organization: 12d Rental - Babbage Consultants Ltd
Date: Wed Sep 06 11:20:31 2006
Report File: Detention 1 Storage.rpt

Storage calculations to tin "WETLAND" - (with plan polygon "WETLAND LAYOUT->detention 1 extent")

cut volumes are negative
fill volumes are positive

Height	Delta Ht	Vol to Height	Delta Vol	Plan Area	Delta Area	Slope Area	Delta Area
19.250		1289.973		972.429		1016.310	
	0.050		48.120		20.083		21.210
19.200		1241.853		952.346		995.100	
	0.100		93.220		40.334		42.535
19.100		1148.633		912.012		952.565	
	0.100		89.175		40.558		42.689
19.000		1059.458		871.454		909.876	
	0.100		85.201		38.822		40.979
18.900		974.257		832.632		868.897	
	0.100		81.337		38.468		40.583
18.800		892.920		794.164		828.314	
	0.100		77.508		38.113		40.187
18.700		815.412		756.051		788.126	
	0.100		73.714		37.759		39.792
18.600		741.698		718.292		748.335	
	0.100		69.956		37.405		39.396
18.500		671.742		680.887		708.939	
	0.100		66.274		36.223		38.215
18.400		605.468		644.665		670.724	
	0.100		62.673		35.806		37.760
18.300		542.795		608.858		632.964	
	0.100		59.113		35.390		37.306
18.200		483.682		573.468		595.659	
	0.100		55.595		34.974		36.851
18.100		428.088		538.495		558.808	
	0.100		52.118		34.557		36.396
18.000		375.970		503.937		522.411	
	0.100		48.720		33.410		35.248
17.900		327.250		470.528		487.164	
	0.100		45.401		32.961		34.763

18.75 $8000 m^3$ required
778 from original consent

17.800	0.100	281.849	42.127	437.567	32.513	401	34.277
17.700	0.100	239.722	38.898	405.054	32.064	418.124	33.792
17.600	0.100	200.823	35.714	372.990	32.003	384.331	33.695
17.500	0.100	165.109	32.554	340.987	30.792	350.636	32.454
17.400	0.100	132.555	29.508	310.195	30.128	318.182	31.751
17.300	0.100	103.048	26.528	280.067	29.464	286.431	31.048
17.200	0.100	76.520	23.615	250.604	28.799	255.383	30.346
17.100	0.100	52.905	20.768	221.804	28.135	225.037	29.643
17.000	0.100	32.137	16.657	193.669	53.497	195.394	54.229
16.900	0.100	15.480	11.517	140.172	49.301	141.165	49.977
16.800	0.050	3.962	3.962	90.872	90.872	91.189	91.189
16.750	1.000	0.000	0.000	0.000	0.000	0.000	0.000
15.750		0.000		0.000		0.000	

Polygon plan area = 972.429

Project: Wetland Pond Design
User: Dylan
Organization: 12d Rental - Babbage Consultants Ltd
Date: Wed Sep 06 11:36:18 2006
Report File: Detention 2 Storage.rpt

Storage calculations to tin "POND 2" - (with plan polygon "POND2->Detention 2 extent")

cut volumes are negative
fill volumes are positive

Height	Delta Ht	Vol to Height	Delta Vol	Plan Area	Delta Area	Slope Area	Delta Area
19.500		588.385		621.332		640.802	
	0.100		60.349		35.510		37.111
19.400		528.036		585.823		603.692	
	0.100		56.853		34.406		35.964
19.300		471.183		551.417		567.728	
	0.100		53.467		33.302		34.817
19.200		417.716		518.114		532.911	
	0.100		50.192		32.199		33.670
19.100		367.524		485.915		499.241	
	0.100		47.028		31.095		32.523
19.000		320.496		454.820		466.718	
	0.100		43.973		29.992		31.376
18.900		276.523		424.828		435.342	
	0.100		41.029		28.888		30.229
18.800		235.493		395.940		405.112	
	0.100		38.196		27.784		29.082
18.700		197.298		368.156		376.030	
	0.100		35.472		26.681		27.936
18.600		161.826		341.475		348.094	
	0.100		32.859		25.577		26.789
18.500		128.966		315.898		321.306	
	0.100		30.357		24.474		25.642
18.400		98.609		291.424		295.664	
	0.100		27.965		23.370		24.495
18.300		70.645		268.054		271.169	
	0.100		25.683		22.266		23.348
18.200		44.962		245.787		247.821	
	0.100		23.511		21.163		22.201
18.100		21.450		224.624		225.619	
	0.100		21.450		224.624		225.619

Detention 2 Storage

18.000		0.000		0.000		0.000		0.000
	1.000		0.000		0.000		0.000	
17.000		0.000		0.000		0.000		

Polygon plan area = 664.853

TP108 - POND DESIGN GENERAL

Project: *West Coast Road* By: DMR Date: 05/09/06

Job No.: *42608* Checked: Date:

Combination of Stage 1 and 2 and 3 and Albionvale Road Catchment

Pre-Development

Hardstand/Roof area (ha)	0
Other (pervious) area (ha)	7.4745
TOTAL	7.4745

Post-Development

Hardstand/Roof area (ha)	3.2261
Other (pervious) area (ha)	4.2484
TOTAL	7.4745

Hydrology

2 year	84 mm
10 year	134 mm
100 year	195 mm

TP108 - POND DESIGN (EXISTING DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Location: *42608* Checked: Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (hectares)	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Pasture*	74	7.4745	553
	Subtotal for Pervious Areas		7.4745	553
	Impervious Areas (List)			
	Roads / paved	98	0.000	0
	Subtotal for Impervious Areas		0	0
		Totals	7.4745	553

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{553}{7.4745} =$ 74

Ia (weighted) : $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 7.4745}{7.4745} =$ 5.00 mm

2. Time of Concentration

Channelisation Factor : C = 1 (from Table 4.2)

Catchment Length : L = 0.147 km (along drainage path)

Catchment Slope : Sc = 0.109 m/m (by equal area method)

Runoff Factor R : $\frac{CN}{200 - CN}$ = 0.59

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30}$ = 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c$ = 0.11 hrs

3. Soil Storage Parameter : S = ((1000/CN)-10)*25.4

Total = 89.2 mm

Pervious = 89.2 mm

Impervious = 5.2 mm

	Storm #1	Storm #2	Storm #3
4. Average Recurrence Interval, ARI (yr) :	2	10	100
5. 24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)	84	134	195
6. Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$	0.29	0.41	0.51
7. Specific Peak Flow Rate, q*, (from Figure 5.1)	0.082	0.108	0.126
8. Peak Flow Rate, q_p : $= q^* A P_{24}$ (m^3/s)	0.515	1.082	1.836
9. Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm)	Pervious 37.1	76.2	129.3
	Impervious 79.1	129.0	190.0
10. Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m^3)	Pervious 2,773	5,699	9,663
	Impervious 000	000	000
	Total 2,773	5,699	9,663

TP108 - POND DESIGN (POST-DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Location: ## Checked: 0 Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Cut faces*	74	4.2484	314
	Subtotal for Pervious Areas		4.2484	314
	Impervious Areas (List)			
	Roads / paved	98	3.226	316
	Subtotal for Pervious Areas		3.2261	316
		Totals	7.4745	631

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{631}{7.4745} = 84$

Ia (weighted) : $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 4.2484}{7.4745} = 2.8$ mm

2. Time of Concentration

Channelisation Factor : C = 0.6 (from Table 4.2)

Catchment Length : L = 0.147 km (along drainage path)

Catchment Slope : Sc = 0.109 m/m (by equal area method)

Runoff Factor R : $\frac{CN}{200 - CN}$ = 0.73

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30}$ = 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c$ = 0.11 hrs

3. Soil Storage Parameter : S = ((1000/CN)-10)*25.4

Total = 47 mm

Pervious = 89 mm

Impervious = 5 mm

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
4. Average Recurrence Interval, ARI (yr) :	Erosion	1/3 *2	2	10	100
5. 24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)	34.5	28.0	84	134	195
6. Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$	0.23	0.19	0.45	0.58	0.67
7. Specific Peak Flow Rate, q*, (from Figure 5.1)	0.070	0.058	0.118	0.139	0.148
8. Peak Flow Rate, q_p : $= q^* A P_{24}$ (m³/s)	0.18	0.12	0.74	1.39	2.16
9. Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm) Pervious	7.3	4.7	37.1	76.2	129.3
Impervious	30.0	23.6	79.1	129.0	190.0
10. Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m³) Pervious	311	200	1,576	3,239	5,492
Impervious	968	762	2,552	4,162	6,128
Total	1,279	962	4,128	7,401	11,620

TP108 - POND DESIGN GENERAL

Project: *West Coast Road* By: DMR Date: 05/09/06

Job No.: *42608* Checked: Date:

Actual Contributing Catchment, Stage 1-2 less 33% WQV to wetland pond (bypass)

Pre-Development

Hardstand/Roof area (ha)	0
Other (pervious) area (ha)	1.44
TOTAL	1.44

Post-Development

Hardstand/Roof area (ha)	0.5247
Other (pervious) area (ha)	0.9156
TOTAL	1.4403

Hydrology

2 year	84 mm
10 year	134 mm
100 year	195 mm

TP108 - POND DESIGN (EXISTING DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Job No.: *42608* Checked: Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (hectares)	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Pasture*	74	1.44	107
	Subtotal for Pervious Areas		1.44	107
	Impervious Areas (List)			
	Roads / paved	98	0.000	0
	Subtotal for Impervious Areas		0	0
		Totals	1.44	107

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{107}{1.44} =$ 74

Ia (weighted) : $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 1.44}{1.44} =$ 5.00 mm

2. Time of Concentration

Channelisation Factor : C = 1 (from Table 4.2)

Catchment Length : L = 0.147 km (along drainage path)

Catchment Slope : Sc = 0.109 m/m (by equal area method)

Runoff Factor R : $\frac{CN}{200 - CN}$ = 0.59

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30}$ = 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c$ = 0.11 hrs

3. Soil Storage Parameter : S = ((1000/CN)-10)*25.4

Total = 89.2 mm

Pervious = 89.2 mm

Impervious = 5.2 mm

		Storm #1	Storm #2	Storm #3
4. Average Recurrence Interval, ARI (yr) :		2	10	100
5. 24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)		84	134	195
6. Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$		0.29	0.41	0.51
7. Specific Peak Flow Rate, q*, (from Figure 5.1)		0.082	0.108	0.126
8. Peak Flow Rate, q_p : $= q^* A P_{24}$ (m³/s)		0.099	0.208	0.354
9. Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm)	Pervious	37.1	76.2	129.3
	Impervious	79.1	129.0	190.0
10. Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m³)	Pervious	534	1,098	1,862
	Impervious	000	000	000
	Total	534	1,098	1,862

TP108 - POND DESIGN (POST-DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Job No.: ## Checked: Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Cut faces*	74	0.9156	68
	Subtotal for Pervious Areas		0.9156	68
	Impervious Areas (List)			
	Roads / paved	98	0.525	51
	Subtotal for Pervious Areas		0.5247	51
		Totals	1.4403	119

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{119}{1.4403} = 83$

Ia (weighted) : $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 0.9156}{1.4403} = 3.2$ mm

2. Time of Concentration

Channelisation Factor : C = 0.6 (from Table 4.2)

Catchment Length : L = 0.147 km (along drainage path)

Catchment Slope : Sc = 0.109 m/m (by equal area method)

Runoff Factor R : $\frac{CN}{200 - CN}$ = 0.71

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30}$ = 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c$ = 0.11 hrs

3. Soil Storage Parameter : S = ((1000/CN)-10)*25.4

Total = 53 mm

Pervious = 89 mm

Impervious = 5 mm

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
4. Average Recurrence Interval, ARI (yr) :	Erosion	1/3 *2	2	10	100
5. 24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)	34.5	28.0	84	134	195
6. Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$	0.21	0.17	0.42	0.55	0.64
7. Specific Peak Flow Rate, q*, (from Figure 5.1)	0.061	0.054	0.112	0.133	0.145
8. Peak Flow Rate, q_p : $= q^* A P_{24}$ (m^3/s)	0.03	0.02	0.14	0.26	0.41
9. Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm) Pervious	7.3	4.7	37.1	76.2	129.3
Impervious	30.0	23.6	79.1	129.0	190.0
10. Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m^3) Pervious	067	043	340	698	1,184
Impervious	157	124	415	677	997
Total	224	167	755	1,375	2,180

TP10 - WATER QUALITY POND DE

Project: *West Coast Road*

Location: *42608*

Assume Shape

Permanent Water Surface RL

Base Width

Base Length

Assumed side slope

1. Water Quality Treatment Pond Dimensions :

Assumed Depth of WQV

Top Elevation of Water Quality Volume :

Water Quality Volume :

Permanent Water Quality Volume :

Total Forebay Volume Requirement :

2. Extended Detention Outlet Design :

Extended Detention Volume :

Average Discharge Release Rate :

Top Elevation of Extended Detention Volume :

Height of Extended Detention Volume

Maximum Discharge Release Rate :

Selected Orifice Diameter :

Orifice Discharge Rate

3. 100 Year Storm Flood Routing

100 year Post Development Max Flow :

Depth over weir:

Width of Emergency Spillway

Copy data to HEC-HMS

Depth m	Vol 1000m3	Outflow (m3/s)	
18	0.00	0	0.0
18.10	0.02	0	21.5
18.20	0.04	0.002455	45.0
18.30	0.07	0.003473	70.7
18.40	0.10	0.004253	98.6
18.50	0.13	0.004911	129.0
18.60	0.16	0.005491	161.8
18.70	0.20	0.006015	197.3
18.80	0.24	0.006497	235.5
18.90	0.28	0.006945	276.5
19.00	0.32	0.007366	320.5
19.10	0.37	0.007765	367.5
19.20	0.42	0.008144	417.7
19.30	0.47	0.27674	470.0
19.40	0.53	0.767533	528.0
19.50	0.59	1.402972	588.0

TP108 - POND DESIGN GENERAL

Project: *West Coast Road* By: DMR Date: 05/09/06

Job No.: *42608* Checked: Date:

Actual Contributing Catchment, Stage 1-2and PART Stage 1-1, for inflow into detention area

Pre-Development

Hardstand/Roof area (ha)	0
Other (pervious) area (ha)	1.503
TOTAL	1.503

Post-Development

Hardstand/Roof area (ha)	0.7262
Other (pervious) area (ha)	0.7768
TOTAL	1.503

Hydrology

2 year	84 mm
10 year	134 mm
100 year	195 mm

TP108 - POND DESIGN (EXISTING DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Job No.: *42608* Checked: Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (hectares)	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Pasture*	74	1.503	111
	Subtotal for Pervious Areas		1.503	111
	Impervious Areas (List)			
	Roads / paved	98	0.000	0
	Subtotal for Impervious Areas		0	0
		Totals	1.503	111

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{111}{1.503} =$ 74

Ia (weighted) : $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 1.503}{1.503} =$ 5.00 mm

2. Time of Concentration

Channelisation Factor : C = 1 (from Table 4.2)

Catchment Length : L = 0.147 km (along drainage path)

Catchment Slope : Sc = 0.109 m/m (by equal area method)

Runoff Factor R : $\frac{CN}{200 - CN}$ = 0.59

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30}$ = 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c$ = 0.11 hrs

3. Soil Storage Parameter : S = ((1000/CN)-10)*25.4

Total = 89.2 mm

Pervious = 89.2 mm

Impervious = 5.2 mm

	Storm #1	Storm #2	Storm #3
4. Average Recurrence Interval, ARI (yr) :	2	10	100
5. 24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)	84	134	195
6. Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$	0.29	0.41	0.51
7. Specific Peak Flow Rate, q*, (from Figure 5.1)	0.082	0.108	0.126
8. Peak Flow Rate, q_p : $= q^* A P_{24}$ (m^3/s)	0.104	0.218	0.369
9. Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm) Pervious	37.1	76.2	129.3
Impervious	79.1	129.0	190.0
10. Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m^3) Pervious	558	1,146	1,943
Impervious	000	000	000
Total	558	1,146	1,943

TP108 - POND DESIGN (POST-DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Job No.: ## Checked: Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Cut faces*	74	0.7768	57
	Subtotal for Pervious Areas		0.7768	57
	Impervious Areas (List)			
	Roads / paved	98	0.726	71
	Subtotal for Pervious Areas		0.7262	71
		Totals	1.503	129

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{129}{1.503} = 86$

Ia (weighted) : $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 0.7768}{1.503} = 2.6$ mm

2. Time of Concentration

Channelisation Factor : C = 0.6 (from Table 4.2)

Catchment Length : L = 0.200 km (along drainage path)

Catchment Slope : Sc = 0.109 m/m (by equal area method)

Runoff Factor R : $\frac{CN}{200 - CN}$ = 0.75

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30}$ = 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c$ = 0.11 hrs

3. Soil Storage Parameter : S = ((1000/CN)-10)*25.4

Total = 43 mm

Pervious = 89 mm

Impervious = 5 mm

4. Average Recurrence Interval, ARI (yr) :

5. 24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)

6. Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$

7. Specific Peak Flow Rate, q*, (from Figure 5.1)

8. Peak Flow Rate, q_p : $= q^* A P_{24}$ (m^3/s)

9. Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm)

10. Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m^3)

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
	Erosion	1/3 *2	2	10	100
	34.5	28.0	84	134	195
	0.26	0.21	0.48	0.60	0.69
	0.076	0.062	0.123	0.140	0.152
	0.04	0.03	0.16	0.28	0.45
Pervious	7.3	4.7	37.1	76.2	129.3
Impervious	30.0	23.6	79.1	129.0	190.0
Pervious	057	037	288	592	1,004
Impervious	218	172	575	937	1,379
Total	275	208	863	1,529	2,384

TP10 - WATER QUALITY POND DESIGN (Low Flow Orifice)

Project: *West Coast Road* By: DMR Date: 05/09/06

Location: *42608* Checked: 0 Date: 0

Assume Shape

Permanent Water Surface RL		16.85	mRL
Base Width		na	m
Base Length		na	m
Assumed side slope		na	m(hor):m(ver)

1. Water Quality Treatment Pond Dimensions :

Assumed Depth of WQV	d	=	0	m		
Top Elevation of Water Quality Volume :	H	=	16.85	mRL		
Water Quality Volume :	V_d	=	000	m^3		
Permanent Water Quality Volume :	$V_{d(perm)}$	=	0	m^3		
Total Forebay Volume Requirement :	$V_{forebay}$	=	0	m^3		

2. Extended Detention Outlet Design :

Extended Detention Volume :	V_{ex}	=	861	m^3		
Average Discharge Release Rate :	Q_{avg}	=	0.0100	m^3/sec		
Top Elevation of Extended Detention Volume :	Hex	=	18.75	m		
Height of Extended Detention Volume	hex	=	1.90	m		
Maximum Discharge Release Rate :	Q_{max}	=	0.0199	m^3/sec		
Selected Orifice Diameter :	$d_{orifice}$	=	0.08	m		
Orifice Discharge Rate	Q_i	=	0.0188	m^3/sec	< Q_{max}	OK

3. 100 Year Storm Flood Routing

100 year Post Development Max Flow :	Q100	=	0.445	m^3/sec
Depth over weir:	h100	=	0.100	m
Width of Emergency Spillway	h100	=	7.83	m
			8.29	

	Orifice	Notch	Weir	Spillway
Diameter	0.08	0	1.05	7.83
Elevation	18.75	18.75	18.75	18.9
Coefficient	0.62	1.8	1.8	1.8

0.1 Depth	Outflow (m^3/s) Orifice	Notch	Weir	Combined
16.75	0	0	0	0
16.80	0	0	0	0
16.90	0.003087	0	0	0.003087
17.00	0.005346	0	0	0.005346
17.10	0.006902	0	0	0.006902
17.20	0.008167	0	0	0.008167
17.30	0.00926	0	0	0.00926
17.40	0.010237	0	0	0.010237
17.50	0.011129	0	0	0.011129
17.60	0.011955	0	0	0.011955
17.70	0.012727	0	0	0.012727
17.80	0.013455	0	0	0.013455
17.90	0.014145	0	0	0.014145
18.00	0.014803	0	0	0.014803
18.10	0.015434	0	0	0.015434
18.20	0.016039	0	0	0.016039
18.30	0.016622	0	0	0.016622
18.40	0.017186	0	0	0.017186
18.50	0.017732	0	0	0.017732
18.60	0.018261	0	0	0.018261
18.65	0.01852	0	0	0.01852
18.70	0.018776	0	0	0.018776
18.75	0.019028	0	0	0.019028
18.80	0.019277	0	0.066384499	0.085661
18.90	0.019765	0	0.344943976	0.364709
19.00	0.020241	0	0.742201264	0.762442
19.10	0.020706	0	1.229458131	1.250164
19.20	0.021161	0	1.792381479	1.813543
19.25	0.021385	0	2.099262188	2.120648

Copy data to HEC-HMS

Depth m	Vol 1000m3	Outflow (m3/s)
16.75	0.00	0 0.0
16.80	0.00	0 4.0
16.90	0.02	0.003087 15.5
17.00	0.03	0.005346 32.1
17.10	0.05	0.006902 52.8
17.20	0.08	0.008167 76.4
17.30	0.10	0.00926 102.9
17.40	0.13	0.010237 132.3
17.50	0.16	0.011129 164.7
17.60	0.20	0.011955 200.3
17.70	0.24	0.012727 239.0
17.80	0.28	0.013455 280.9
17.90	0.33	0.014145 326.1
18.00	0.37	0.014803 374.6
18.10	0.43	0.015434 426.4
18.20	0.48	0.016039 481.8
18.30	0.54	0.016622 540.7
18.40	0.60	0.017186 603.1
18.50	0.67	0.017732 669.1
18.60	0.74	0.018261 738.8
18.65	0.78	0.01852 775.5
18.70	0.81	0.018776 812.2
18.75	0.85	0.019028 850.0
18.80	0.89	0.085661 889.4
18.90	0.97	0.364709 970.4
19.00	1.05	0.762442 1050.0
19.10	1.13	1.250164 1130.0
19.20	1.22	1.813543 1220.0
19.25	1.31	2.120648 1310.0

TP108 - POND DESIGN GENERAL

Project:	*West Coast Road*	By: DMR	Date: 05/09/06
Job No.:	*42608*	Checked:	Date:

Stage 2 Total Catchment

Pre-Development

Hardstand/Roof	
area (ha)	0
Other (pervious)	
area (ha)	1.562
TOTAL	1.562

Post-Development

Hardstand/Roof	
area (ha)	0.6723
Other (pervious)	
area (ha)	0.8897
TOTAL	1.562

Hydrology

2 year	84 mm
10 year	134 mm
100 year	195 mm

Reference : ARC Technicial Publication No. 108, April 1999
"Guidelines for Stormwater Runoff Modelling in the Auckland Region"

Pre-developed

TP108 - POND DESIGN (EXISTING DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Location: *42608* Checked: Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (hectares)	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Pasture*	74	1.562	116
	Subtotal for Pervious Areas		1.562	116
	Impervious Areas (List)			
	Roads / paved	98	0.000	0
	Subtotal for Impervious Areas		0	0
		Totals	1.562	116

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{116}{1.562} =$ 74

Ia (weighted) : $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 1.562}{1.562} =$ 5.00 mm

2. Time of Concentration

Channelisation Factor : C = 1 (from Table 4.2)

Catchment Length : L = 0.147 km (along drainage path)

Catchment Slope : Sc = 0.109 m/m (by equal area method)

Runoff Factor R : $\frac{CN}{200 - CN}$ = 0.59

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30}$ = 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c$ = 0.11 hrs

3. Soil Storage Parameter : S = ((1000/CN)-10)*25.4

Total	=	89.2 mm
Pervious	=	89.2 mm
Impervious	=	5.2 mm

	Storm #1	Storm #2	Storm #3
4. Average Recurrence Interval, ARI (yr) :	2	10	100
5. 24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)	84	134	195
6. Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$	0.29	0.41	0.51
7. Specific Peak Flow Rate, q*, (from Figure 5.1)	0.082	0.108	0.126
8. Peak Flow Rate, q_p : $= q^* A P_{24}$ (m^3/s)	0.108	0.226	0.384
9. Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm) Pervious	37.1	76.2	129.3
Impervious	79.1	129.0	190.0
10. Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m^3) Pervious	579	1,191	2,019
Impervious	000	000	000
Total	579	1,191	2,019

Reference : ARC Technical Publication No. 108, April 1999
"Guidelines for Stormwater Runoff Modelling in the Auckland Region"

Post-developed

TP108 - POND DESIGN (POST-DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Location: ## Checked: 0 Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Cut faces*	74	0.8897	66
	Subtotal for Pervious Areas		0.8897	66
	Impervious Areas (List)			
	Roads / paved	98	0.672	66
	Subtotal for Pervious Areas		0.6723	66
		Totals	1.562	132

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{132}{1.562} =$ 84*

Ia (weighted) : $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 0.8897}{1.562} =$ 2.8 mm

2. Time of Concentration

Channelisation Factor : C = 0.6 (from Table 4.2)

Catchment Length : L = 0.147 km (along drainage path)

Catchment Slope : Sc = 0.109 m/m (by equal area method)

Runoff Factor R : $\frac{CN}{200 - CN} =$ 0.73

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30} =$ 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c =$ 0.11 hrs

3. Soil Storage Parameter : S = ((1000/CN)-10)*25.4

Total = 47 mm

Pervious = 89 mm

Impervious = 5 mm

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
4. Average Recurrence Interval, ARI (yr) :	Erosion	1/3 *2	2	10	100
5. 24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)	34.5	28.0	84	134	195
6. Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$	0.23	0.19	0.45	0.58	0.67
7. Specific Peak Flow Rate, q*, (from Figure 5.1)	0.070	0.058	0.118	0.139	0.148
8. Peak Flow Rate, q_p : $= q^* A P_{24}$ (m³/s)	0.04	0.03	0.15	0.29	0.45
9. Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm) Pervious	7.3	4.7	37.1	76.2	129.3
Impervious	30.0	23.6	79.1	129.0	190.0
10. Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m³) Pervious	065	042	330	678	1,150
Impervious	202	159	532	867	1,277
Total	267	201	862	1,546	2,427

TP108 - POND DESIGN GENERAL

Project: *West Coast Road* By: DMR Date: 05/09/06

Job No.: *42608* Checked: Date:

Stage 3 Total Catchment (without upstream Albion Vale Catchment)

Pre-Development

Hardstand/Roof	
area (ha)	0
Other (pervious)	
area (ha)	0.787
TOTAL	0.787

Post-Development

Hardstand/Roof	
area (ha)	0.2916
Other (pervious)	
area (ha)	0.4954
TOTAL	0.787

Hydrology

2 year	84 mm
10 year	134 mm
100 year	195 mm

Reference : ARC Technicial Publication No. 108, April 1999
"Guidelines for Stormwater Runoff Modelling in the Auckland Region"

Pre-developed

TP108 - POND DESIGN (EXISTING DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Location: *42608* Checked: Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (hectares)	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Pasture*	74	0.787	58
	Subtotal for Pervious Areas		0.787	58
	Impervious Areas (List)			
	Roads / paved	98	0.000	0
	Subtotal for Impervious Areas		0	0
		Totals	0.787	58

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{58}{0.787} =$ 74

Ia (weighted) : $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 0.787}{0.787} =$ 5.00 mm

2. Time of Concentration

Channelisation Factor :	C	=	1	(from Table 4.2)
Catchment Length :	L	=	0.147	km (along drainage path)
Catchment Slope :	Sc	=	0.109	m/m (by equal area method)
Runoff Factor R :	$\frac{CN}{200 - CN}$	=	0.59	

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30}$ = 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c$ = 0.11 hrs

3. Soil Storage Parameter : $S = ((1000/CN)-10)*25.4$

Total	=	89.2 mm
Pervious	=	89.2 mm
Impervious	=	5.2 mm

		Storm #1	Storm #2	Storm #3
4.	Average Recurrence Interval, ARI (yr) :	2	10	100
5.	24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)	84	134	195
6.	Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$	0.29	0.41	0.51
7.	Specific Peak Flow Rate, q*, (from Figure 5.1)	0.082	0.108	0.126
8.	Peak Flow Rate, q_p : $= q^* A P_{24}$ (m^3/s)	0.054	0.114	0.193
9.	Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm)	Pervious 37.1	76.2	129.3
		Impervious 79.1	129.0	190.0
10.	Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m^3)	Pervious 292	600	1,017
		Impervious 000	000	000
		Total 292	600	1,017

TP108 - POND DESIGN (POST-DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Location: ## Checked: 0 Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Cut faces*	74	0.4954	37
	Subtotal for Pervious Areas		0.4954	37
	Impervious Areas (List)			
	Roads / paved	98	0.292	29
	Subtotal for Pervious Areas		0.2916	29
		Totals	0.787	65

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{65}{0.787} =$

Ia (weighted) : $\frac{\text{5 x pervious area}}{\text{total area}} = \frac{5 \times 0.4954}{0.787} =$ 3.1 mm

2. Time of Concentration

Channelisation Factor : C = 0.6 (from Table 4.2)

Catchment Length : L = 0.147 km (along drainage path)

Catchment Slope : Sc = 0.109 m/m (by equal area method)

Runoff Factor R : $\frac{CN}{200 - CN}$ = 0.71

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30}$ = 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c$ = 0.11 hrs

3. Soil Storage Parameter : $S = ((1000/CN)-10)*25.4$

Total = 52 mm

Pervious = 89 mm

Impervious = 5 mm

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
4. Average Recurrence Interval, ARI (yr) :	Erosion	1/3 *2	2	10	100
5. 24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)	34.5	28.0	84	134	195
6. Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$	0.21	0.17	0.43	0.55	0.64
7. Specific Peak Flow Rate, q*, (from Figure 5.1)	0.061	0.054	0.114	0.133	0.145
8. Peak Flow Rate, q_p : $= q^* A P_{24}$ (m^3/s)	0.02	0.01	0.08	0.14	0.22
9. Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm) Pervious	7.3	4.7	37.1	76.2	129.3
Impervious	30.0	23.6	79.1	129.0	190.0
10. Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m^3) Pervious	036	023	184	378	640
Impervious	087	069	231	376	554
Total	124	092	414	754	1,194

TP108 - POND DESIGN GENERAL

Project:	*West Coast Road*	By: DMR	Date: 05/09/06
Job No.:	*42608*	Checked:	Date:

Albion Vale Catchment determined from existing pond manual summary

Pre-Development

Hardstand/Roof area (ha)	0
Other (pervious) area (ha)	0.787
TOTAL	1.76

Post-Development

Hardstand/Roof area (ha)	0.948
Other (pervious) area (ha)	0.8080
TOTAL	1.756

Hydrology

2 year	84 mm
10 year	134 mm
100 year	195 mm

TP108 - POND DESIGN (EXISTING DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Location: *42608* Checked: Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (hectares)	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Pasture*	74	1.756	130
	Subtotal for Pervious Areas		1.756	130
	Impervious Areas (List)			
	Roads / paved	98	0.000	0
	Subtotal for Impervious Areas		0	0
		Totals	1.756	130

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{130}{1.756} =$ 74

Ia (weighted) : $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 1.756}{1.756} =$ 5.00 mm

2. Time of Concentration

Channelisation Factor : C = 1 (from Table 4.2)

Catchment Length : L = 0.147 km (along drainage path)

Catchment Slope : Sc = 0.109 m/m (by equal area method)

Runoff Factor R : $\frac{CN}{200 - CN}$ = 0.59

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30}$ = 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c$ = 0.11 hrs

3. Soil Storage Parameter : S = ((1000/CN)-10)*25.4

Total = 89.2 mm

Pervious = 89.2 mm

Impervious = 5.2 mm

	Storm #1	Storm #2	Storm #3
4. Average Recurrence Interval, ARI (yr) :	2	10	100
5. 24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)	84	134	195
6. Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$	0.29	0.41	0.51
7. Specific Peak Flow Rate, q*, (from Figure 5.1)	0.082	0.108	0.126
8. Peak Flow Rate, q_p : $= q^* A P_{24}$ (m³/s)	0.121	0.254	0.431
9. Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm) Pervious	37.1	76.2	129.3
Impervious	79.1	129.0	190.0
10. Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m³) Pervious	651	1,339	2,270
Impervious	000	000	000
Total	651	1,339	2,270

TP108 - POND DESIGN (POST-DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: DMR Date: 05/09/06

Location: ## Checked: 0 Date:

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area	Product of CN x Area
	Pervious Areas (List)			
Waitemata clay, Class C	*Bush*	70	0	0
Waitemata clay, Class C	*Cut faces*	74	0.808	60
	Subtotal for Pervious Areas		0.808	60
	Impervious Areas (List)			
	Roads / paved	98	0.948	93
	Subtotal for Pervious Areas		0.948	93
		Totals	1.756	153

* from Table 3.3

CN (weighted) : $\frac{\text{total product}}{\text{total area}} = \frac{153}{1.756} =$ [illegible]

Ia (weighted) : $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 0.808}{1.756} =$ 2.3 mm

2. Time of Concentration

Channelisation Factor :	C	=	0.6	(from Table 4.2)
Catchment Length :	L	=	0.147	km (along drainage path)
Catchment Slope :	Sc	=	0.109	m/m (by equal area method)
Runoff Factor R :	$\frac{CN}{200 - CN}$	=	0.77	

Time of Concentration : $t_c = 0.14\ C\ L^{0.66}\ R^{-0.55}\ Sc^{-0.30}$ = 0.17 hrs

SCS Lag for HEC-HMS : $t_p = 2/3\ t_c$ = 0.11 hrs

3. Soil Storage Parameter : $S = ((1000/CN)-10)*25.4$

Total	=	38	mm
Pervious	=	89	mm
Impervious	=	5	mm

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
4. Average Recurrence Interval, ARI (yr) :	Erosion	1/3 *2	2	10	100
5. 24 hour Rainfall Depth, P_{24} (mm), (from Appendix A)	34.5	28.0	84	134	195
6. Runoff Index, c* : $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$	0.28	0.23	0.51	0.63	0.71
7. Specific Peak Flow Rate, q*, (from Figure 5.1)	0.061	0.054	0.114	0.133	0.145
8. Peak Flow Rate, q_p : $= q^* A P_{24}$ (m³/s)	0.04	0.03	0.17	0.31	0.50
9. Runoff Depth, Q_{24} : $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S}$ (mm)					
Pervious	7.3	4.7	37.1	76.2	129.3
Impervious	30.0	23.6	79.1	129.0	190.0
10. Runoff Volume, V_{24} : $= 1000 \times Q_{24} A$ (m³)					
Pervious	059	038	300	616	1,045
Impervious	284	224	750	1,223	1,801
Total	344	262	1,050	1,839	2,845

C A L C U L A T I O N S H E E T

Job No: 42656 By: DMR Checked: _____ Date: 5/9/06

Project: West Coast Road Page: _____ of: _____

Subject: HEC - HMS Basin Catchments.

Babbage CONSULTANTS

From Spreadsheets, detailed catchment area by WL.

Stage	Impervious ha	Impervious km^2	Pervious ha	Pervious km^2	Comments
1 - 1	0.7831	0.007831	1.3666	0.013666	
1 - 2	0.4678	0.004678	0.3258	0.003258	
2	0.6723	0.006723	6.8897	0.068897	
3	0.2916	0.002916	0.4954	0.004954	
Albion Vale	0.948	0.00948	0.8078	0.008078	Upstream Catchments taken from ex. pond maintence manual summary
E & J	0.0633 / 3.2261		0.3634 / 4.2484		7.4745ha

Stage 1 Percentage split of catchment

From TP108 spreadsheet, total catchment calculated (developed)

Imp = 1.2378ha Per = 1.7112ha Tot = 2.949ha

Stage 1 (see catchment plan & spreadsheet) = AREAS A - J

Stage 1 - 1 = Areas A, B, C, D & ½ F (note E not included in pond design)

= Imp 0.7831 ha Per. 1.3666.

Stage 1 - 2 = Areas ½ F, G, H, I (note, J not included in pond design)

= Imp. 0.5044 ha Per 0.6319 ha

PART OF STAGE 1 - 1 needs to be considered for diversion into the wetland pond.

Assume an over 33% of Imp / per area of Stage 1-1 to go directly into wetland via diversion. This should account for WQV volume i.e ⅓ 2 year in first flush

So Stage 1 - 1		Stage 1-1 PART		TOTAL	
0.5247 Imp	0.956 Per	0.2584 Imp	0.454 Per	0.7831 Imp	1.3666 Per.

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Job No. 42608
Project West Coast Road
Date 17-May-06
By Wayne Lam

STAGE 1A

		Impermeable	Permeable
Total Area A : (Berms)	7141 m²	0	7043
Total Area B :	4888 m²		
Residential (roofs) :	979 m²		
Driveways (Paved) :	574 m²		
Berms	3335 m²	1553	3335
Total Area C : (Road/Footpath)	4338 m²	4338	0
Total Area D :	3047 m²		
Residential (roofs) :	606 m²		
Driveways (Paved) :	524 m²		
Berms	1917 m²	1130	1917
Total area for Stage 1A :	**19316 m²**		
Impermeable area :	**7021 m²**		
Permeable area :	**12295 m²**		

STAGE 1B

Total Area E :	3427 m²		
Footpath :	366 m²		
Berms	3061 m²	366	3061
Total Area F :	4360 m²		
Residential (roofs) :	945 m²	½ 472.5	
Driveways (Paved) :	674 m²	337	
Berms	2741 m²	1371	
		1619	2741
Total Area G : (Road/Footpath)	2810 m²	2810	0
Total Area H :	1143 m²		
Residential (roofs) :	194 m²		
Driveways (Paved) :	137 m²		
Berms	812 m²	331	812

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Project West Coast Road
Date 17-May-06
By Wayne Lam

		Impermeable	Permeable
Total Area I :	1803 m²		
Residential (roofs) :	390 m²		
Driveways (Paved) :	337 m²		
Berms	1076 m²	727	1076
Total Area J :	840 m²		
Residential (roofs) :	145 m²		
Driveways (Paved) :	122 m²		
Berms	573 m²	267	573
Total area for Stage 1B :	**14383 m²**		
Impermeable area :	**6120 m²**		
Permeable area :	**8263 m²**		
STAGE 2			
Total Area K :	1467 m²		
Residential (roofs) :	166 m²		
Driveways (Paved) :	315 m²		
Berms	986 m²	481	986
Total Area L :	2795 m²		
Footpath	402 m²		
Berms	2393 m²	402	2393
Total Area M : (Road/Footpath)	2539 m²	2539	0
Total Area N :	5095 m²		
Residential (roofs) :	1022 m²		
Driveways (Paved) :	875 m²		
Berms	3198 m²	1897	3198
Total Area O :	3724 m²		
Residential (roofs) :	890 m²		
Driveways (Paved) :	514 m²		
Berms	2320 m²	1404	2320

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Date 17-May-06
By Wayne Lam

Total area for Stage 2 : 15620 m²
Impermeable area : 6723 m²
Permeable area : 8897 m²

STAGE 3

		Impermeable	Permeable
Total Area P : (Berms)	3064 m²	0	3064
Total Area Q :	1252 m²		
Residential (roofs) :	320 m²		
Driveways (Paved) :	109 m²		
Berms	823 m²	429	823
Total Area R : (Road/Footpath)	1479 m²	1479	0
Total Area S :	2075 m²		
Residential (roofs) :	627 m²		
Driveways (Paved) :	381 m²		
Berms	1067 m²	1008	1067

Total area for Stage 3 : 7870 m²
Impermeable area : 2916 m²
Permeable area : 4954 m²

Total area 57189

CATCHMENT SCHEDULE

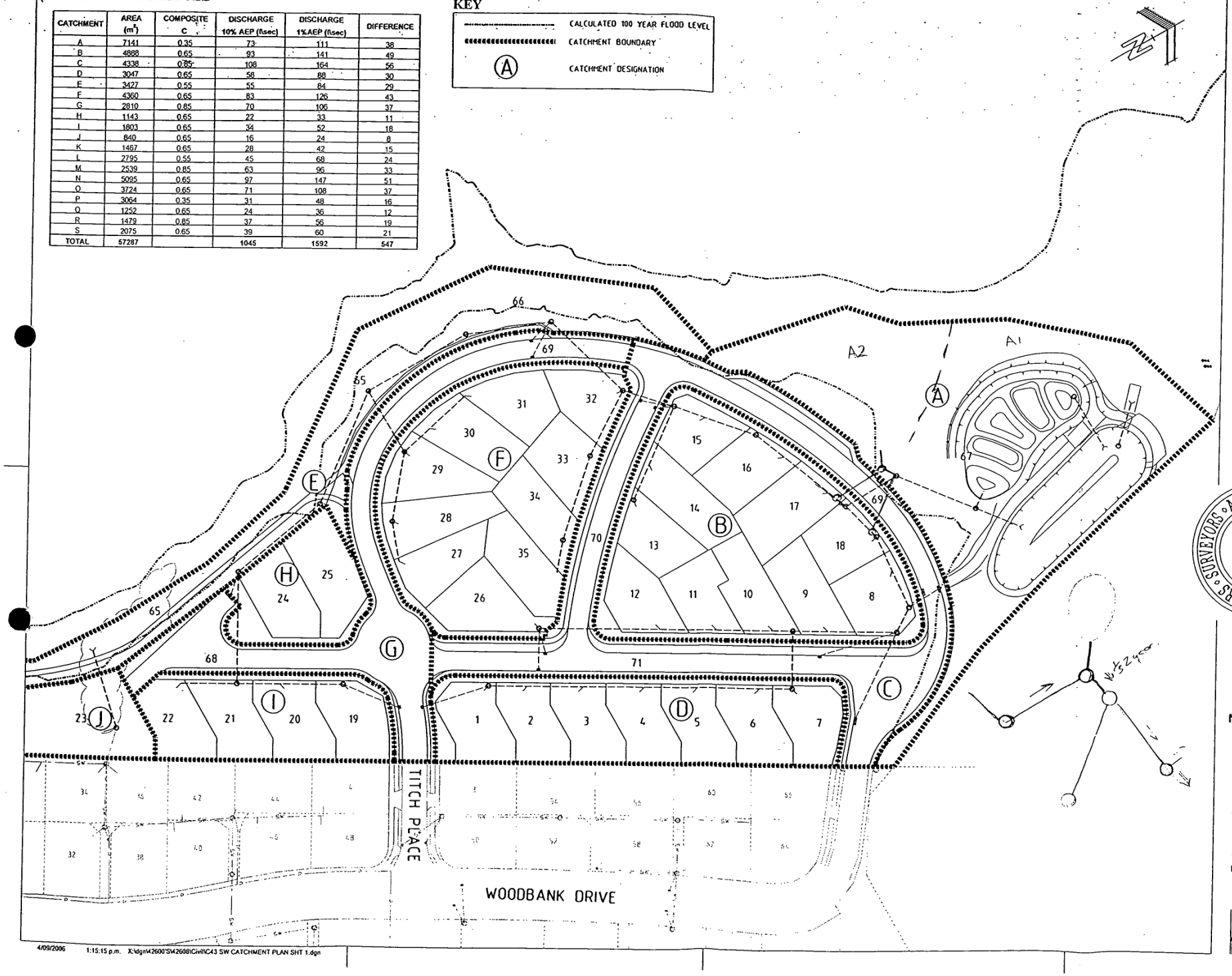
CATCHMENT	AREA (m^2)	COMPOSITE C	DISCHARGE 10% AEP (l/sec)	DISCHARGE 1%AEP (l/sec)	DIFFERENCE
A	7141	0.35	73	111	38
B	4868	0.65	93	141	49
C	4338	0.85	108	164	56
D	3047	0.65	58	88	30
E	3427	0.55	55	84	29
F	4360	0.65	83	126	43
G	2810	0.85	70	106	37
H	1143	0.65	22	33	11
I	1803	0.65	34	52	18
J	840	0.65	16	24	8
K	1467	0.65	28	42	15
L	2795	0.55	45	68	24
M	2539	0.85	63	96	33
N	5095	0.65	97	147	51
O	3724	0.65	71	108	37
P	3064	0.35	31	48	16
Q	1252	0.65	24	36	12
R	1479	0.85	37	56	19
S	2075	0.65	39	60	21
TOTAL	57287		1045	1592	547

KEY

CALCULATED 100 YEAR FLOOD LEVEL

CATCHMENT BOUNDARY

(A) CATCHMENT DESIGNATION



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

STORMWATER CATCHMENT PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C43	-

KEY

- CALCULATED 100 YEAR FLOOD LEVEL
- CATCHMENT BOUNDARY
- (A) CATCHMENT DESIGNATION

CATCHMENT SCHEDULE

CATCHMENT	AREA (m^2)	COMPOSITE C	DISCHARGE 10% AEP (l/sec)	DISCHARGE 1%AEP (l/sec)	DIFFERENCE
A	7141	0.35	73	111	38
B	4888	0.65	93	141	49
C	4338	0.85	108	164	56
D	3047	0.65	58	88	30
E	3427	0.55	55	84	29
F	4360	0.65	83	126	43
G	2810	0.85	70	106	37
H	1143	0.65	22	33	11
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J	840	0.65	16	24	8
K	1467	0.65	28	42	15
L	2795	0.55	45	68	24
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N	5095	0.65	97	147	51
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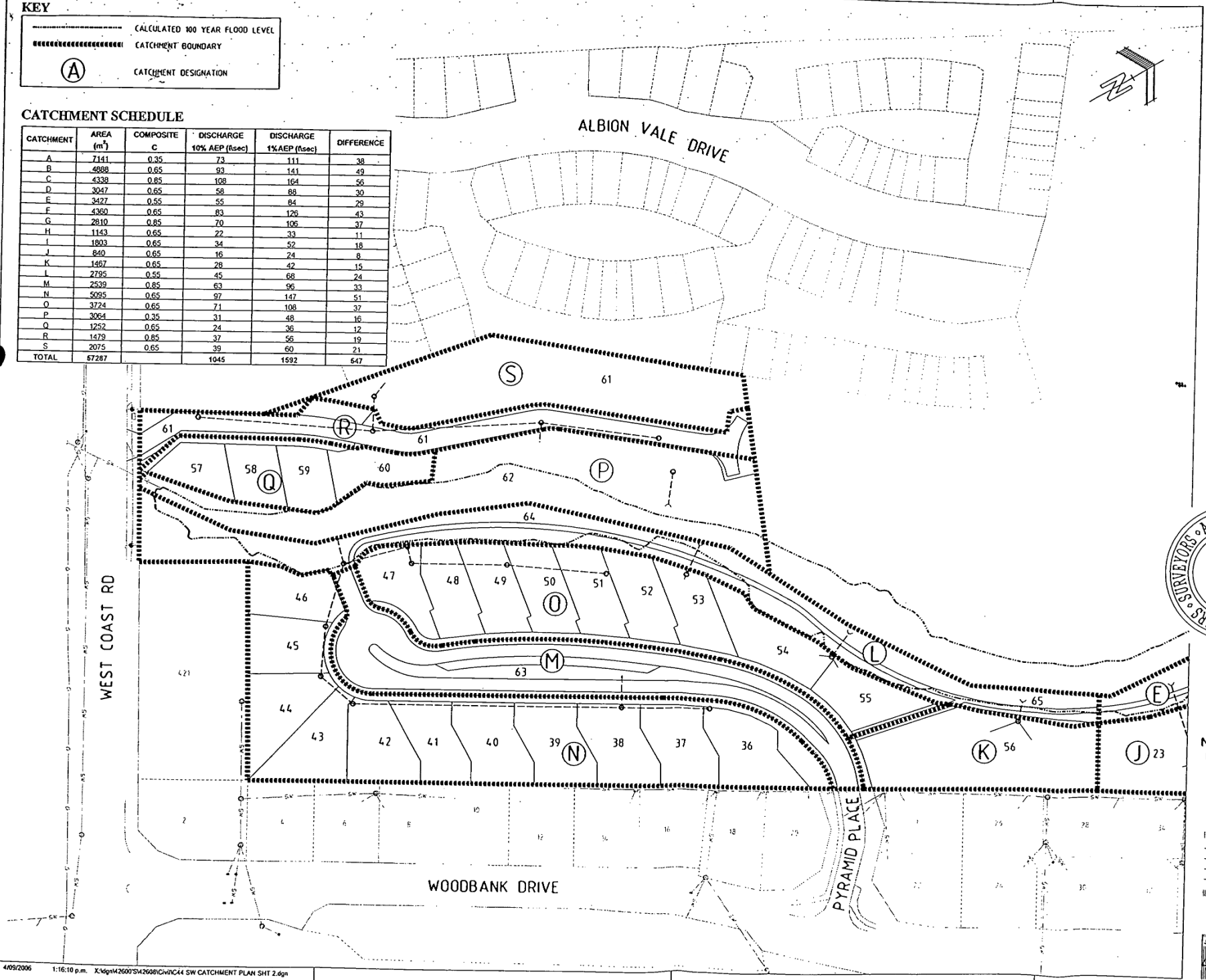
P	3064	0.35	31	48	16
Q	1252	0.65	24	36	12
R	1479	0.85	37	56	19
S	2075	0.65	39	60	21
TOTAL	57287		1045	1592	547



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FOR

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DRAWING TITLE

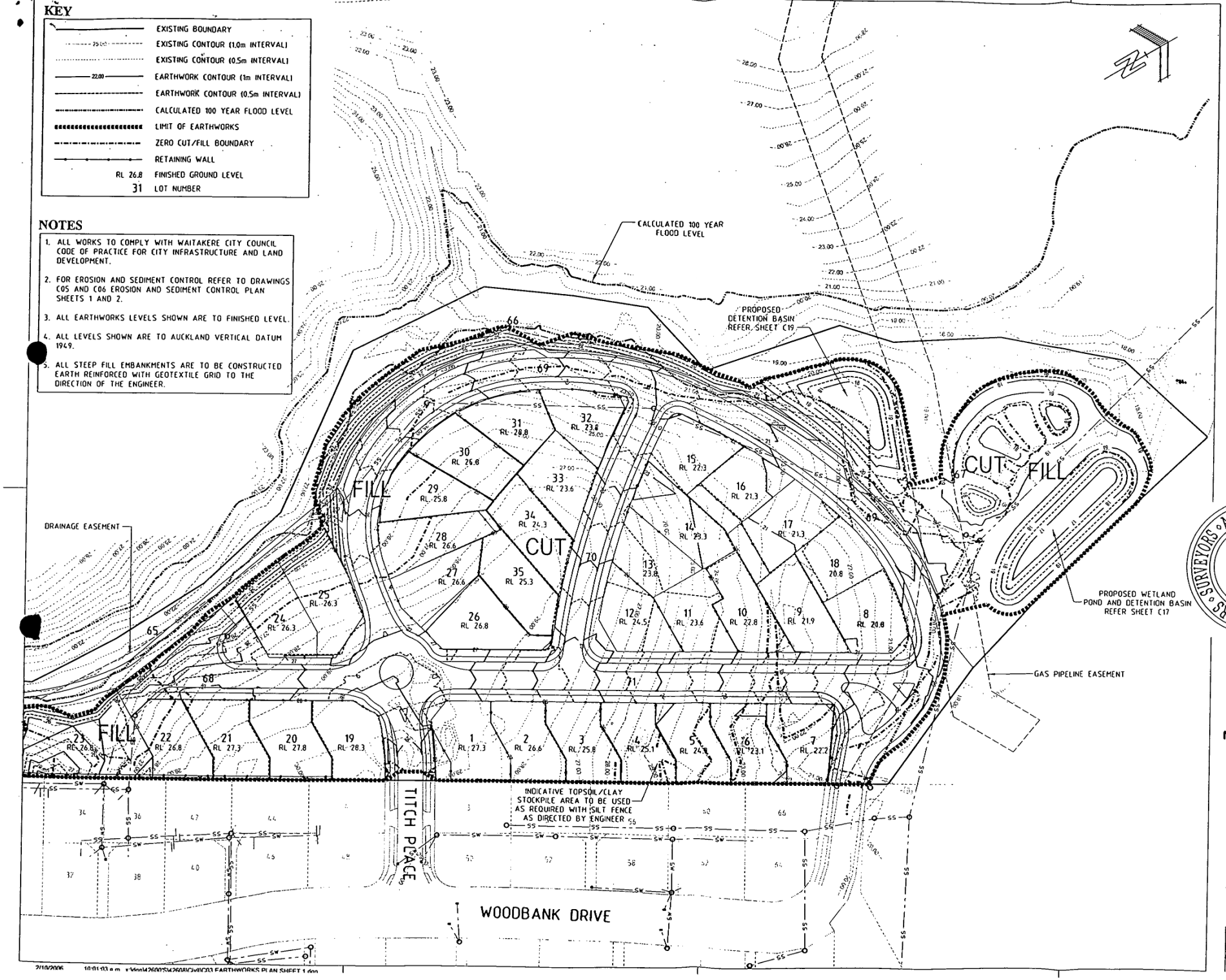
STORMWATER CATCHMENT PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C44	-



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHEC
B	07.09.06	POND AND WALLS AMENDED	FK	DR
A	150806	VARIOUS AMENDMENTS	FK	DR

DRAWING REVISIONS

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WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

EARTHWORKS PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C03	B

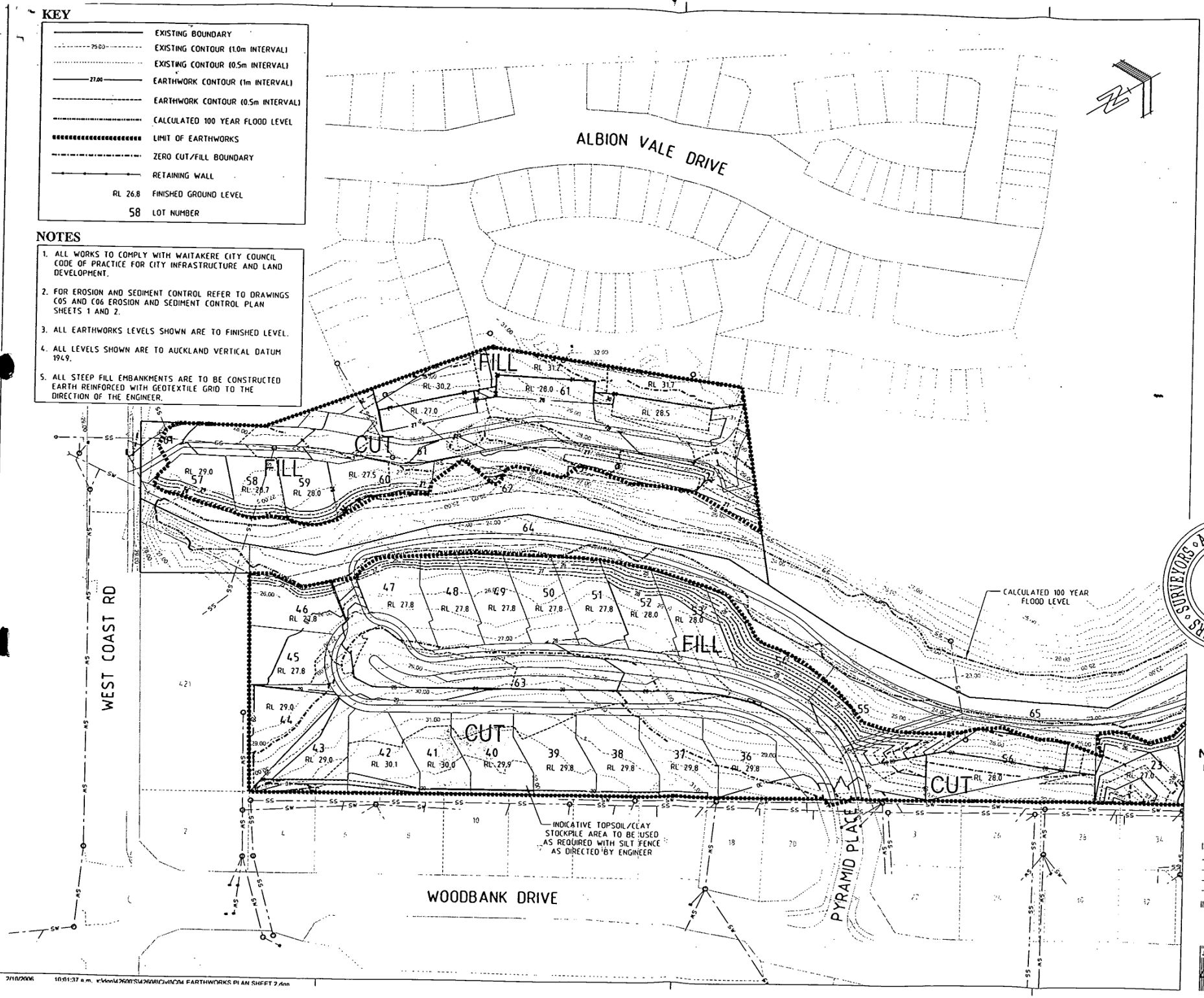
2/10/2006 10:01:03 a.m. x:\dgn\42600\s\42608\c\dwg\C03 EARTHWORKS PLAN SHEET 1.dgn

KEY

———	EXISTING BOUNDARY
---75.00---	EXISTING CONTOUR (1.0m INTERVAL)
·····	EXISTING CONTOUR (0.5m INTERVAL)
——27.00——	EARTHWORK CONTOUR (1m INTERVAL)
----------	EARTHWORK CONTOUR (0.5m INTERVAL)
·-·-·-·-·-	CALCULATED 100 YEAR FLOOD LEVEL
■■■■■■■■■■	LIMIT OF EARTHWORKS
·-·-·-·-·-	ZERO CUT/FILL BOUNDARY
——•——•——	RETAINING WALL
RL 26.8	FINISHED GROUND LEVEL
58	LOT NUMBER

NOTES

1. ALL WORKS TO COMPLY WITH WAITAKERE CITY COUNCIL CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. FOR EROSION AND SEDIMENT CONTROL REFER TO DRAWINGS C05 AND C06 EROSION AND SEDIMENT CONTROL PLAN SHEETS 1 AND 2.
3. ALL EARTHWORKS LEVELS SHOWN ARE TO FINISHED LEVEL.
4. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949.
5. ALL STEEP FILL EMBANKMENTS ARE TO BE CONSTRUCTED EARTH REINFORCED WITH GEOTEXTILE GRID TO THE DIRECTION OF THE ENGINEER.



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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

EARTHWORKS PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
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APPROVED		

SCALE (A1)

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JOB NUMBER	DRAWING NUMBER	REVISION
42608	C04	B

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West Coast Road (No.423-429), Housing Development Stage 1

2006-1078

for

New Zealand Housing Foundation

Earthworks Completion Report

Ref: 42608/GE
October 2007

Architects ▫ Consulting Engineers ▫ Surveyors ▫ Project Managers

Client: New Zealand Housing Foundation

Project: West Coast Road

Job Number: 42608

Report Title: Earthworks Completion Report

Document Reference: BDOC03675709

Report Date: October 2007

Issue	Date	Status	Prepared By	Reviewed By
-	15/10/07	First Issue	W E Campton / R Allison	N.S. Luxford

CONTENTS

1.0 INTRODUCTION 1

2.0 CONSTRUCTION SEQUENCE SUMMARY 2

3.0 CONSTRUCTION MONITORING AND TESTING 2
- 3.1 General 2
- 3.2 Road Subgrades 3
- 3.3 Building Foundations 4
- 3.4 Stormwater Pond 4
- 3.5 Retaining Walls 4

4.0 SUMMARY AND RECOMMENDATIONS 5
- 4.1 General 5
- 4.2 Suitability of Earthfill 5
- 4.3 Retaining Walls 6
- 4.4 Road Subgrades 6
- 4.5 Stormwater Ponds 6

5.0 LIMITATIONS 7
- 5.1 Restriction of Intended Purpose 7
- 5.2 Legal Interpretation 7
- 5.3 Reliability of Information 7

Appendix A : Drawings

Site Location Plan	Drawing No. 42608 G01
Cut and Fill Isopac As Built Plan	Drawing No. 42608 AB05
Fill Test Location Plan	Drawing No. 42608 G06
Wetland & Detention Basin 1	Drawing No 42608 C17
Retaining Wall Plan	Drawing No. 42608 C50
Retaining Wall Detail	Drawing No. 42608 C52

Appendix B : In Situ Test Results

Fill Test Result Summary Table

Appendix B : In Situ Test Results

Statement of Professional Opinion

1.0 INTRODUCTION

Babbage Consultants Ltd (Babbage) were engaged by New Zealand Housing Foundation to monitor the construction of earthworks and retaining walls for the West Coast Road Subdivision carried out in the 2006/2007 earthworks season.

The development covers Lots 2 & 3 DP 339810, 423 – 429 West Coast Road, Henderson, as shown on the Site Location Plan in Appendix A. The site is bound to the south by West Coast Road and to the east by Woodbank Drive and associated residential development. Most of the western boundary is generally marked by Parrs Stream that flows northwards into the Waikumete Stream that flows approximately parallel to the northern boundary. However, in the south west the boundary extends westward of Parrs Stream to the existing residential development off Albionvale Road.

A walkover survey of the site was undertaken as part of our geotechnical investigation prior to development. No apparent signs of previous slope instability were observed.

The site covers an area of approximately 5.7ha and the subdivision will result in the creation of 61 residential lots to be developed in three stages. Lots 1 to 61 inclusive are building platforms, and Lots 62 to 71 are drainage and road reserves. The majority of the proposed residential dwellings are understood to comprise two-storey structures. In addition a new stormwater pond and a footbridge link to the neighbouring subdivision to the west were developed.

This report presents the results of the work carried out by Babbage to verify the Stage 1 earthworks and construction of the associated ponds and retaining walls. Stage 1 comprises Lots 1 to 35 and Lots 65 to 71, as shown on Drawing 42608 AB05 in Appendix A. However, Lots 19 to 22 will be subject to a supplementary report since they were occupied by the contractors site offices and a topsoil stockpile.

2.0 CONSTRUCTION SEQUENCE SUMMARY

The contractor, Earthco Civil, was engaged to commence earthworks on site in December 2006 and began with the construction of the permanent stormwater pond on the northern portion of the site. An earth crossing was needed over the main gas line that bisects the site to allow heavy machinery to access the stormwater pond area without damaging the pipeline. This had been completed by early January 2007, and topsoil was stripped from the mid and northern slopes (Stage 1). Material was then cut off the higher ridge and placed along the northeastern edge of Parrs Creek to build up land along this boundary. The road carriageways on Stage 1 were cut down at this time, and building platforms along the eastern boundary were formed with minor cut to fill operations.

Access to the site was formed from Titch Place, and the lower portion of Woodbank Drive.

A localised area of the site at the southern end of Lot 23 where the topsoil was found to be contaminated with pesticides from previous land use and zinc from neighbouring buildings was remediated during the earthworks. Pesticide affected soils were removed from site and samples taken to confirm that all materials had been removed. This work is reported separately by Babbage in the Site Validation Report dated March 2007 (BDOC03434211).

3.0 CONSTRUCTION MONITORING AND TESTING

3.1 GENERAL

The stripped gullies in all fill areas were inspected by Babbage during earthworks construction. Underfill drainage was placed and observed during these regular inspections. Approval was given to commence filling once we were satisfied that all deleterious material had been removed from the fill areas, and vegetation had been removed.

The specification for placement of earthworks fill material was prepared by Babbage. The specification required that the fill be placed in layers up to

200mm thick and compacted by at least 6 passes of a 10 ton self-propelled or a towed tamping type steel wheeled roller. We understand that a total of approximately 10,000m^3 of material was placed in all fill areas in the 2006/2007 earthworks season, with approximately 5,600m^3 in Stage 1.

The relative compaction, determined by comparing the in-situ density with that of a sample compacted in the laboratory accordance with Test 4.1.1 of NZS4402:1986, was to be greater than 95%. The specification also required that the maximum in situ air voids of the fill was to be 8%. The minimum average in situ shear strength of the fill was required to be greater than 120kPa with no individual value less than 100kPa.

The in situ density of the fill material has been determined using a nuclear densometer. The nuclear densometer has been calibrated in accordance with NZS4407:1991, Test 4.2.3 by using three density blocks in an accredited testing workshop. The in situ moisture content has been determined by testing a sample recovered from the test site in our laboratory in accordance with NZS4402:1986, Test 2.1. The in situ dry density and air voids have been calculated using the laboratory moisture content. The in situ shear strength of the fill was measured using a hand held Pilcon Shear Vane. Areas of fill that failed to meet the specified criteria were reworked and retested or observed by a Babbage representative and identified as being satisfactorily compacted.

The site was visited by Babbage to undertake fill testing on 9 days during the 2007 construction season. A total of 31 in situ density tests were completed during these visits, of which 8 were carried out on the fill in Stage 1.

The location of in situ density tests are shown on Drawing No. 42608 G06 in Appendix A. The dates that the fill testing has been undertaken and results of the fill testing are presented on the Fill Test Result Summary included in Appendix B.

3.2 ROAD SUBGRADES

The specifications for pavement design under roads called for 250mm of basecourse on top of lime stabilised subgrade. An alternative design of 200mm sub-basecourse and 150mm basecourse was considered if lime stabilisation did not improve the subgrade. Scala penetrometer readings were taken on all road

subgrades after lime stabilisation and these confirmed that substantial improvement had occurred.

3.3 BUILDING FOUNDATIONS

The near surface materials exposed in the cut areas are typically stiff to very stiff and support the passage of construction plant when dry.

Lots 4, 5, 6 and 7 along the eastern boundary were developed early on and had minor cut to fill operations to create level building platforms. These fill areas were tested once platforms were completed. Most other platforms were either entirely in cut, or controlled fill areas. We understand that most units will be two-storey buildings, with waffle-slab floors. It is recommended that footings for these units should extend at least 600mm below finished level to accommodate the potential affects of shrinkage and swelling.

3.4 STORMWATER POND

The stormwater pond was constructed in accordance with the details as shown on Drawing 42608 C17 in Appendix A. An initial request was made by Watercare Services Ltd for the placement of a 1m thick clay liner on the base of the pond to prevent stormwater from leaking into the adjacent underground utility trenches. However, since the natural soils encountered in the base of the pond were already fully saturated, it was agreed with Merv Popham of Watercare that such a liner was not required and therefore not installed.

3.5 RETAINING WALLS

A number of site visits were made to inspect the post holes for the timber pole retaining walls. The hole diameters, spacing and embedment depths confirmed to be all in accordance with the minimum requirements for the specified wall types.

Hand shear vane tests were carried out within selected post holes and the results generally indicated the natural in situ soils to have a minimum undrained shear strength of 80kPa.

4.0 SUMMARY AND RECOMMENDATIONS

4.1 GENERAL

In our opinion, based on our site observations and testing, the fill materials on Stage 1 of West Coast Road (Nos. 423 – 429) as shown on Drawing 42608 AB05, including those associated with stormwater pond construction have generally been placed in accordance with the Specification and NZS4431:1989 Code of Practice for Earthfill for Residential Development, except that the minimum requirement for the peak in situ shear strength of the fill materials are as detailed in Sections 3.1 of this report. In our opinion there is no evidence to indicate that land formed on this part of the subdivision will be subject to any instability unless future earthworks create such instability.

Any dwellings created under the normal items of NZS3604:1999 within the normal building envelope will in our opinion be within stable land in the lots.

Our geotechnical assessment of the subdivision classified most soils as Class M from AS2870:1996. We have not undertaken any testing to confirm this. However our fill testing and observations during earthworks lead us to recommend that strip footings be taken to 600mm depth to allow for shrinkage – swell movements. This will not restrict uplift of "waffle-slab" foundations constructed from polystyrene packed concrete. As such we recommend that any such proposed foundation be placed after thoroughly wetting up of the soil to minimise the risk of swelling and that the perimeter of each slab is extended to a minimum depth of 600mm below finished ground level or piled to minimise the affects of shrinkage and swell. Prior to construction it is recommended that the subgrade is inspected by a Geotechnical Engineer to confirm the shrinkage/swell potential.

4.2 SUITABILITY OF EARTHFILL

In our opinion, based on our site observations and testing, the fill materials as shown on Drawing 42608 AB05, are generally suitable for the development of light timber framed buildings designed in accordance with NZS3604:1999. We recommend that combined floor loads be less than 15kPa, including the weight of any proposed slab and fill.

We note that footings should be taken to at least 600mm below finished ground level to minimise the effects of shrinkage / swell movements. This includes the perimeter footings of waffle-slabs.

In the case of structures located on the fill adjacent to the 100 year flood level, shallow foundations at a minimum depth of 600mm are considered suitable for structures located no closer than 1.2m from the crest of the 1(v) to 2(h) batter slope. This is to ensure that the foundation is located no closer than a line at a gradient of 1(v) to 3(h) from the toe of the batter and therefore minimise the risk of loss of support should localised frittering / minor creep and movement of the batter slope occur.

Where structures are located closer than 1.2m to the crest of the 1(v) to 2(h) batter along the 100 year flood level, the use of piled foundations is recommended in order to minimise the risk of loss of support should localised frittering and slumping of the batter slope occur.

4.3 RETAINING WALLS

Retaining walls adjacent to vehicle accessways have been designed and constructed to support a 5kPa surcharge. All other walls have not been designed and constructed to support a surcharge and therefore it is recommended that no additional fill or structure is located at the top of such walls within a minimum horizontal distance equal to the retained height of the wall.

4.4 ROAD SUBGRADES

Testing of road subgrades after lime stabilisation confirmed that the design CBR criteria was met in both cut and fill areas. Roads were constructed using basecourse at the specified metal depths.

4.5 STORMWATER PONDS

The stormwater pond was constructed in accordance with the details as shown on Drawing 42608 C17 in Appendix A.

5.0 LIMITATIONS

5.1 RESTRICTION OF INTENDED PURPOSE

This report has been prepared solely for the benefit of New Zealand Housing Foundation as our client with respect to the brief and the benefit of the Waitakere City Council. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such party's sole risk.

5.2 LEGAL INTERPRETATION

Opinions and judgements expressed herein are based on our understanding and interpretation of current regulatory standards, and should not be construed as legal opinions. Where opinions or judgements are to be relied on they should be independently verified with appropriate legal advice.

5.3 RELIABILITY OF INFORMATION

Recommendations and opinions in this report are based on data from our Investigation and control testing on this site. As we were not on site full time during earthworks, the nature and continuity of subsoil conditions could vary from the assumed model.

During excavation and construction the site should be examined by an Engineer or Engineering Geologist competent to judge whether the exposed subsoils are compatible with inferred conditions.

Babbage Consultants would be pleased to provide this service and believe that the development would benefit from this continuity. In any event it is essential that Babbage Consultants Ltd be contacted if there is any significant variation in subsoil conditions from those described in this report.

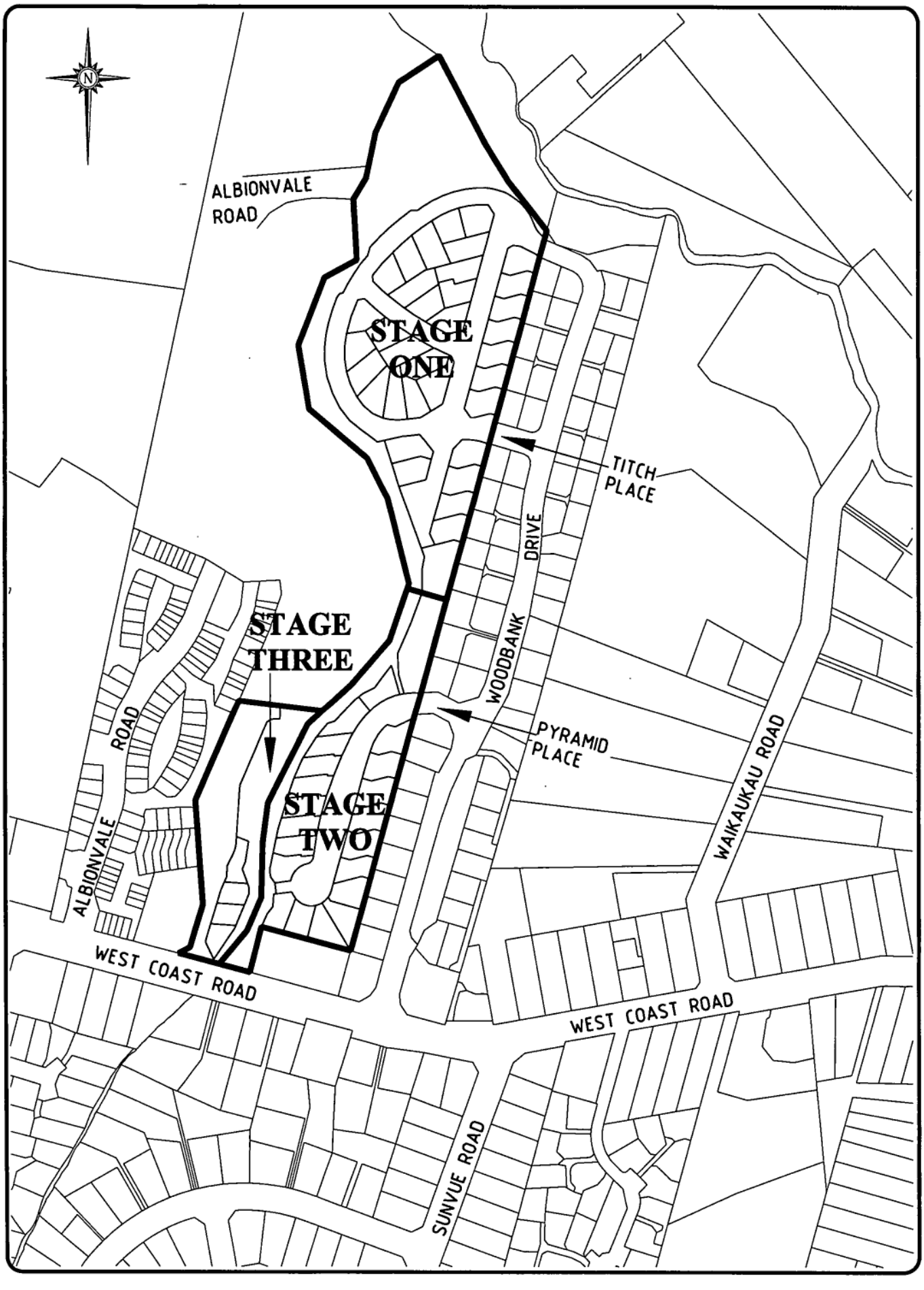
This report has been prepared by Wayne Campton and Russell Allison and reviewed by N.S. (Paddy) Luxford.

Respectfully submitted
Babbage Consultants Limited

Russell Allison
Senior Geotechnical Engineer

Appendix A

Drawings



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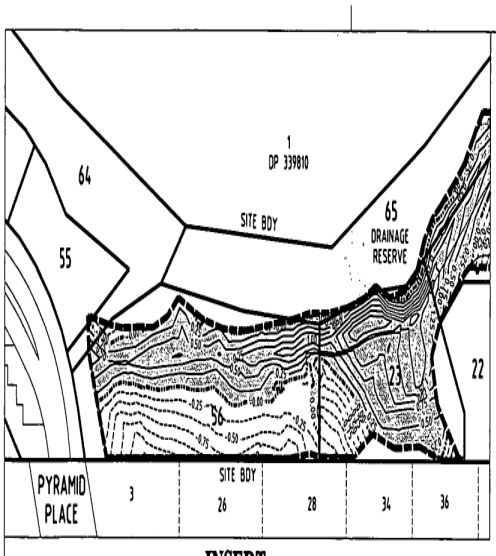
109 FANSHAWE STREET, AUCKLAND
PO BOX 2027, AUCKLAND 1, NEW ZEALAND
PHONE 09 379 9980, FAX 09 377 1170

WEST COAST ROAD HOUSING DEVELOPMENT FOR NZ HOUSING FOUNDATION

JOB NO:	42608
TITLE:	SITE LOCATION PLAN
SCALE:	NOT TO SCALE
DRAWING:	G01 (REV A)



INSERT
SCALE 1:500(A1)

KEY

-1.25- CUT CONTOURS
-1.25- FILL CONTOURS
-0.00- ZERO CUT/FILL
EXTENT OF EARTHWORKS

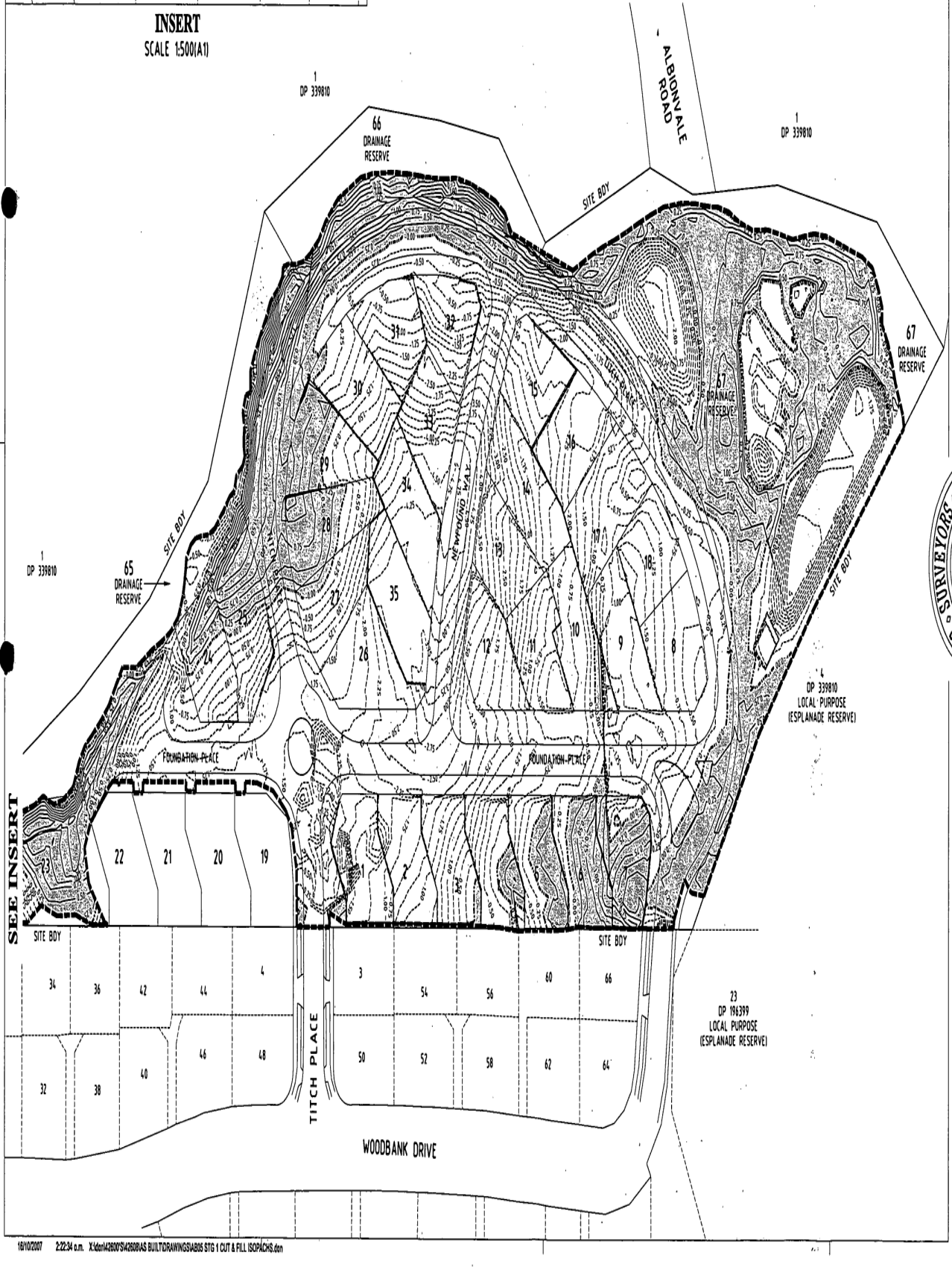
NOTES

1. FILL AREAS ARE SHOWN SHADED
2. CONTOURS SHOWN ARE AT 0.25m INTERVALS.
3. LEVEL DATUM - LANDS AND SURVEY LEVEL DATUM 1946.

I KEVIN RAYMOND MEIKLE, LICENSED SURVEYOR, HEREBY CERTIFY THAT ALL AS BUILT DATA SHOWN ON THIS PLAN IS ACCURATELY PLOTTED IN RELATION TO LOT BOUNDARIES, IS IN TERMS OF GEODETIC DATUM 2000 (MT. EDEN CIRCUIT) AND LANDS AND SURVEY LEVEL DATUM 1946.

DATE: 30/10/07

K.R. MEIKLE
LICENSED SURVEYOR



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS

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109 FANSHAWE STREET
PO BOX 205
AUCKLAND 1 - NEW ZEALAND
PHONE 09 - 379 9880 - FAX 09 - 377 11
admin@babbage.co.n

CLIENT / PROJECT

423 - 429 WEST COAST ROAD
HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE

STAGE ONE
CUT AND FILL
ISOPACH AS BUILT

	DATE	INITIAL
DESIGNED		
DRAWN	OCT 2007	MJD
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
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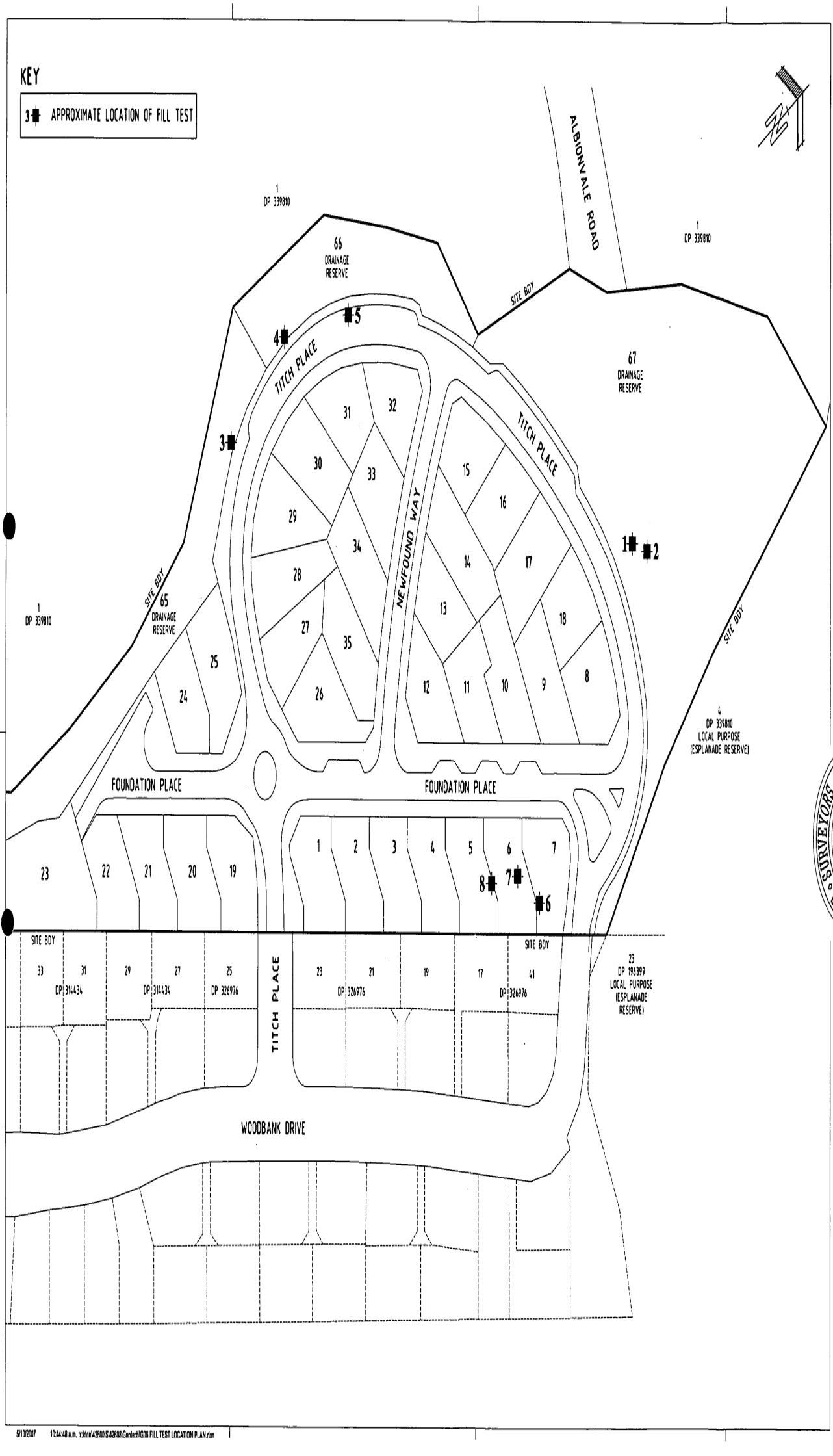

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHED

DRAWING REVISIONS

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ENGINEERS • SURVEYORS • ARCHITECTS
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AUCKLAND 1 · NEW ZEALAND
PHONE 09 - 379 9880 · FAX 09 - 377 117
admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

FILL TEST LOCATION PLAN

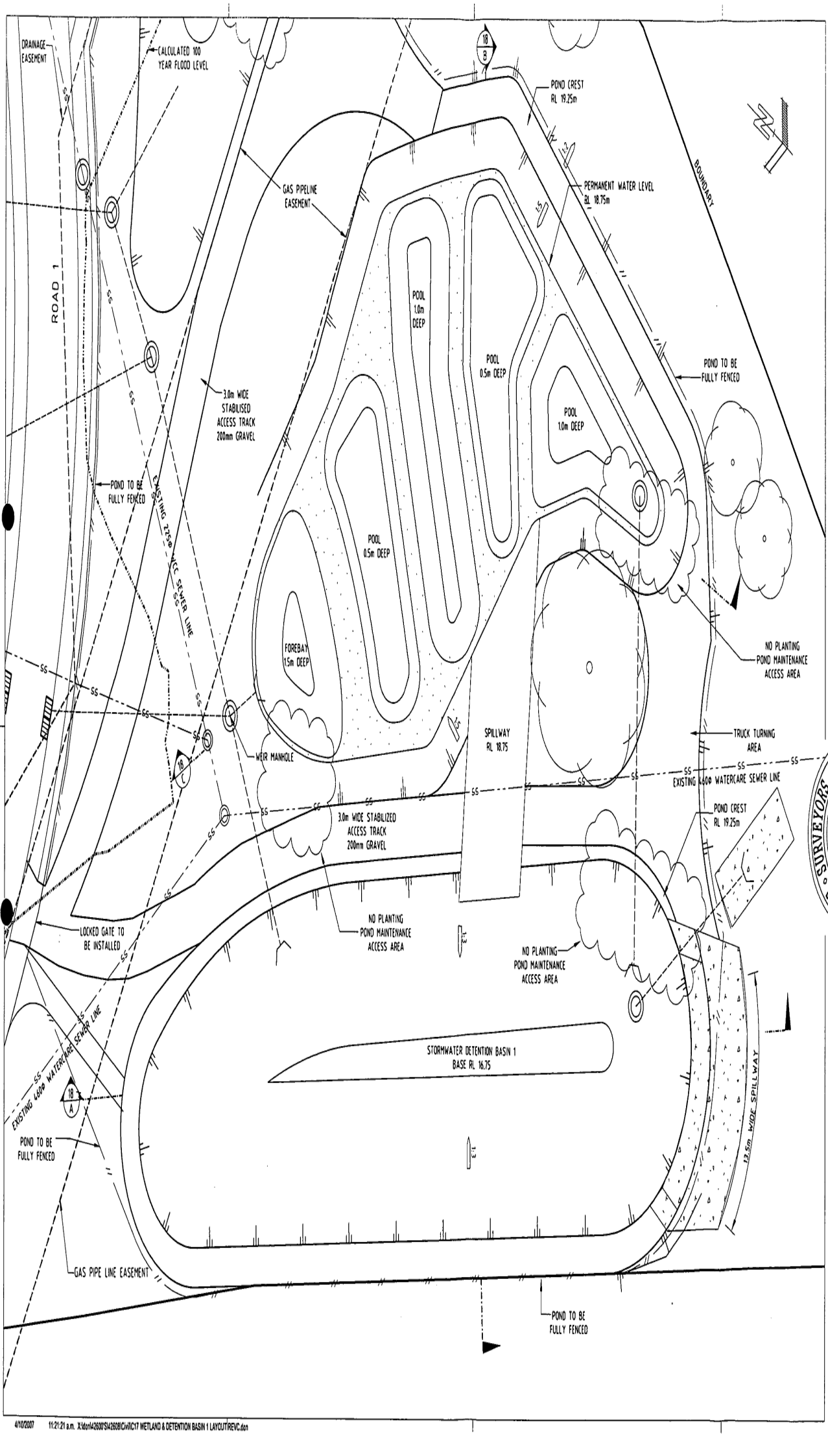
	DATE	INITIAL
DESIGNED		
DRAWN	AUGUST 2007	MSO
CHECKED	AUGUST 2007	RA
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	G06	-

5/10/2007 10:44:58 a.m. x:\dm\42608\SI\42608RGeotechG06 FILL TEST LOCATION PLAN.dgn



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DRAWING NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S (WCC) CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. SAFETY SIGNS TO BE ERECTED AS WCC STANDARD DRAWING SD 4.22.

REV	DATE	DESCRIPTION	DRAWN	CHECK
C	220607	WETLAND AMENDED	FK	
B	070407	VARIOUS AMENDMENTS	FK	
A	0806	VARIOUS AMENDMENTS	FK	

DRAWING REVISIONS

ENGINEERS • SURVEYORS • ARCHITECTS
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admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

WETLAND & DETENTION BASIN 1 LAYOUT

	DATE	INITIAL
DESIGNED	JUNE 2006	DMR
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

SCALE (A1)

1:125

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C17	C

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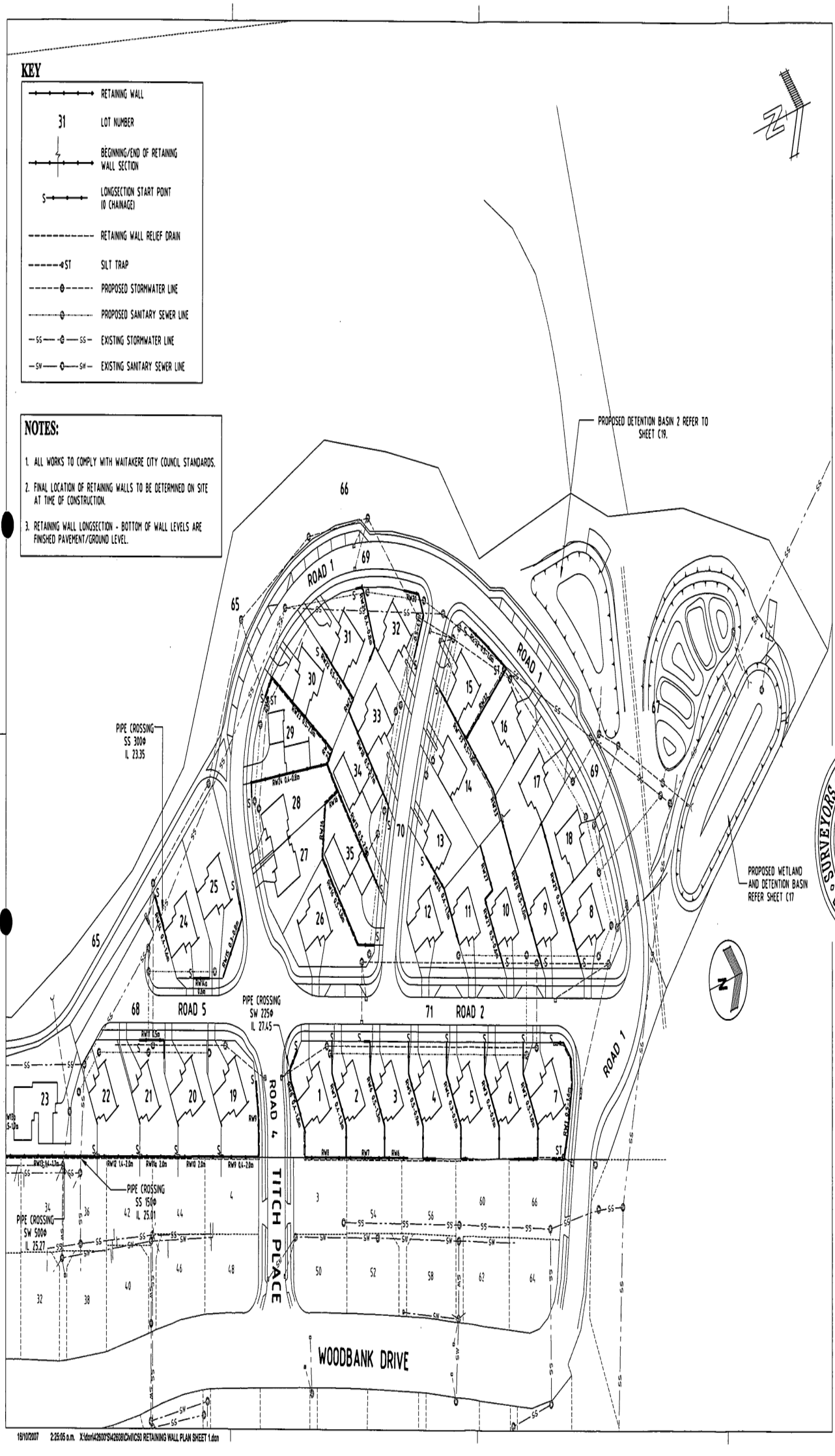
DRAWING NOTES

KEY

- RETAINING WALL
- 31 — LOT NUMBER
- BEGINNING/END OF RETAINING WALL SECTION
- S — LONGSECTION START POINT (0 CHAINAGE)
- RETAINING WALL RELIEF DRAIN
- ST — SILT TRAP
- PROPOSED STORMWATER LINE
- PROPOSED SANITARY SEWER LINE
- SS — EXISTING STORMWATER LINE
- SW — EXISTING SANITARY SEWER LINE

NOTES:

1. ALL WORKS TO COMPLY WITH WAITAKERE CITY COUNCIL STANDARDS.
2. FINAL LOCATION OF RETAINING WALLS TO BE DETERMINED ON SITE AT TIME OF CONSTRUCTION.
3. RETAINING WALL LONGSECTION - BOTTOM OF WALL LEVELS ARE FINISHED PAVEMENT/GROUND LEVEL.



REV	DATE	DESCRIPTION	DRAWN	CHECK
D	29/0407	RW18 AMENDED	FK	
C	31/0107	RELIEF DRAINS AND SILT TRAPS ADDED	FK	
B	15/01/07	HOUSE PLATFORMS SHOWN	FK	
A	01/07	RW AMENDMENTS	FK	

DRAWING REVISIONS

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CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

RETAINING WALL PLAN (SHEET 1)

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C50	D

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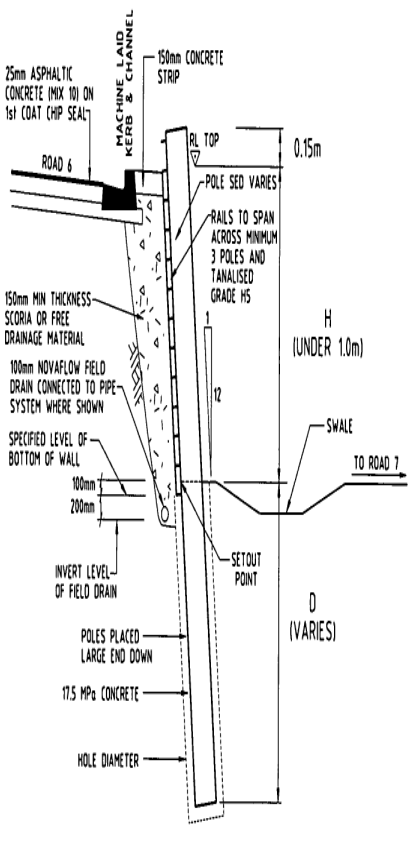
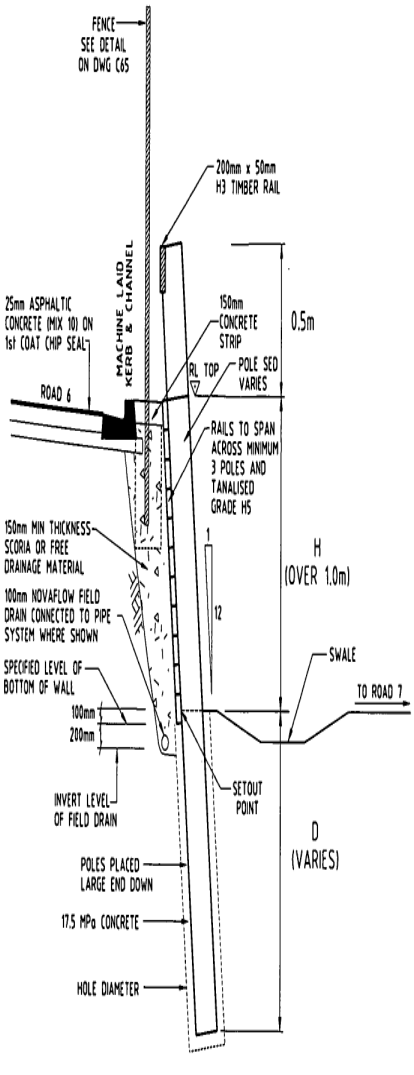


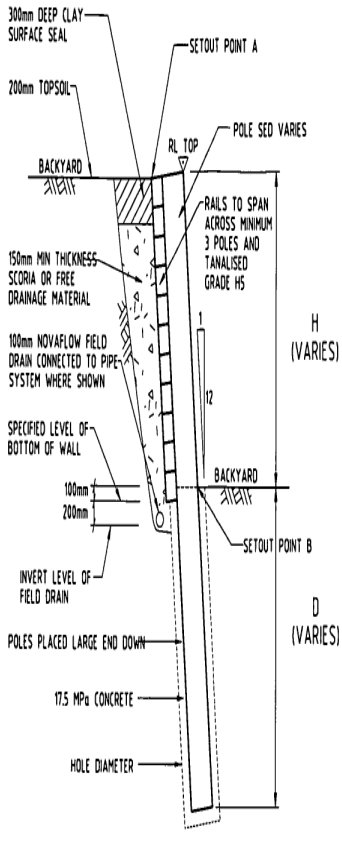
TYPICAL SECTION OF POLE RETAINING WALL UNDER 1.0m HIGH BETWEEN ROAD 6 AND SWALE

(NOT TO SCALE)



TYPICAL SECTION OF POLE RETAINING WALL OVER 1.0m HIGH BETWEEN ROAD 6 AND SWALE

(NOT TO SCALE)



TYPICAL SECTION OF POLE RETAINING WALL BETWEEN BACKYARDS

(NOT TO SCALE)

REV	DATE	DESCRIPTION	DRAWN	CHECK
G	300807	TYPICAL CRASH BARRIER SECTION ADDED	MSO	FK
F	270707	TYPE B TABLE AMENDED	FK	
E	250607	TYPE B TABLE AMENDED	FK	
D	050607	PIPE CLEARANCE FROM PILES DETAIL ADDED	FK	
C	150107	VARIES AMENDMENTS	FK	
B	050107	VARIES AMENDMENTS	FK	
A	210868	TABLES ADDED	FK	DMR

DRAWING REVISIONS

NOTES:

1. ALL WORKS TO COMPLY WITH WAITAKERE CITY COUNCIL STANDARDS.
2. ALL RETAINING WALL POLES TO BE HIGH DENSITY.
3. FINAL LOCATION OF RETAINING WALLS TO BE DETERMINED ON SITE AT TIME OF CONSTRUCTION.
4. RETAINING WALL LONGSECTION - BOTTOM OF WALL LEVELS ARE FINISHED PAVEMENT/GROUND LEVEL.
5. ALL TIMBER POLE RETAINING WALLS ARE TYPE A EXCEPT RETAINING WALL 50, WHICH IS TYPE B.
6. ALL PILE HOLES ARE TO BE PREDRILLED.

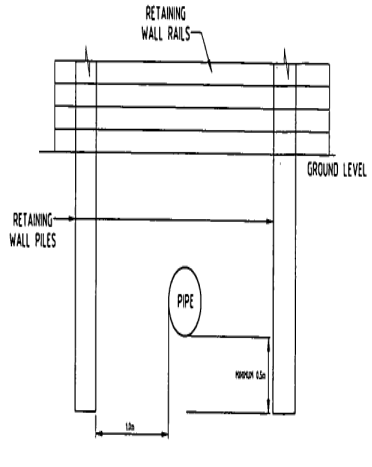
TYPE A (NO SURCHARGE)

(ALL POLE RETAINING WALLS EXCEPT RETAINING WALL 50)

MAXIMUM RETAINED HEIGHT (m)	POLE SIZE SED (mm)	HOLE DIAMETER (mm)	POLE SPACING (m)	EMBEDMENT DEPTH (m)	RAIL THICKNESS (mm)
0.00-1.00	100	300	1.0	1.0	45
1.00-1.50	150	350	1.0	1.5	45
1.50-2.00	200	400	1.0	2.0	45
2.00-2.50	250	450	1.0	2.5	90
2.50-3.00	300	600	1.0	3.0	90
3.00-3.50	350	600	1.0	3.5	90

TYPE B (5kPa SURCHARGE) (POLE RETAINING WALL 50)

MAXIMUM RETAINED HEIGHT (m)	POLE SIZE SED (mm)	HOLE DIAMETER (mm)	POLE SPACING (m)	EMBEDMENT DEPTH (m)	RAIL THICKNESS (mm)
0.00-0.80	100	300	1.0	1.0	45
0.80-1.30	150	350	1.0	1.3	45
1.30-1.80	200	450	1.0	1.8	45
1.80-2.30	250	450	1.0	2.3	50
2.30-2.70	300	500	1.0	2.7	50



TYPICAL CROSS SECTION DETAIL FOR PIPE CLEARANCE FROM PILES

(NOT TO SCALE)

NOTE:

SETOUT POINT A - SET OUT POINT BETWEEN HOUSE LOT BOUNDARIES
SETOUT POINT B - SET OUT POINT BETWEEN HOUSE LOT BOUNDARY AND ROAD RESERVE

ENGINEERS · SURVEYORS · ARCHITECTS
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admin@babbage.co.

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT

FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

RETAINING WALL DETAILS

	DATE	INITIAL
DESIGNED		
DRAWN	19.07.06	GNB
CHECKED		
APPROVED		

SCALE (A1)

NTS

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C52	G

Appendix B

In Situ Test Results

Job Number: 42608/GE	Project: 423 – 429 West Coast Road, Henderson	FILL TEST RESULT SUMMARY

Test No.	Test Date (Report No.)	Bulk Density (t/m^3)	Dry Density (t/m^3)	Moisture Content (%)	Air Voids (%)	Field Shear Strength (kPa)	Relative Compaction (%)	Pass / Fail	Comments
1	11/12/06 (DFT1)	1.892	1.52	24.0	6.2	4 X UTP	-	pass	Testing of crossing over gas pipeline easement.
2		1.886	1.52	23.6	6.8	4 X UTP	-	pass	
3	15/1/07 (DFT2)	1.826	1.42	28.4	6.3	124, 134, 163, >225	-	pass	
4		1.785	1.32	35.1	4.1	121, 124, 141, 173	-	pass	
5		1.845	1.46	26.7	6.6	134, 140, 146, 148	-	pass	
6		1.819	1.26	44.7	0	111, 114, 121, 124	-	pass	
7	17/1/07 (DFT3)	1.772	1.32	35.0	4.9	124, 139, 194, UTP	-	pass	
8		1.853	1.46	26.9	6.0	226, 3 X UTP	-	pass	

Appendix C

Statement of Professional Opinion

To:	Waitakere City Council Private Bag 93 109 Henderson Waitakere City 1231

STATEMENT OF PROFESSIONAL OPINION AS TO SUITABILITY OF LAND FOR RESIDENTIAL DEVELOPMENT

Subdivision: **423-429 West Coast Road, Stage 1**
Lots 2 & 3 DP.339810

Owner/Developer: **New Zealand Housing Foundation**

Location: **Henderson**

I, **N S Luxford** of **Babbage Consultants Ltd**, hereby confirm that:

1. I am a Chartered Professional Engineer experienced in the field of geotechnical engineering and was retained by **New Zealand Housing Foundation** as the Geotechnical Engineer on the above subdivision.

2. The extent of my inspections, and the results of all tests carried out during construction, are described in my report entitled **"West Coast Road (No.423-429), Housing Development Stage 1 Earthworks Completion Report", Ref. 42608/GE, October 2007**.

3. In my professional opinion, not to be construed as a guarantee, I consider that:

   (a) The earth fills shown on **Drawing 42608/AB05** attached to the above referenced Earthworks Completion Report, except for Lots 19 to 22, have generally been placed in compliance with **NZS4431:1989 Code of Practice for Earthfill for Residential Developments**.

   (b) The completed works give due regard to land slope and foundation stability considerations.

   (c) The filled ground, except the fill on Lot 121, is suitable for the development of residential buildings, designed in accordance with NZS3604:1999, provided combined floor loads are less than 15kPa, including the weight of the slab and fill.

   (d) The original ground not affected by filling is suitable for the development of residential structures designed in accordance with NZS3604:1999, provided combined floor loads are less than 15kPa, including the weight of the slab and fill.

   (e) The earthworks associated with the roads and reserves have been carried out in a manner appropriate for their intended purpose.

   (f) The following special limitations should be observed:

      (i) The cut and fill platforms for Lots 19 to 22 have not been subject to specific inspection or density testing. Future development in these lots will require inspection by a suitably qualified geotechnical engineer and the fill to be certified.

      (ii) Any building foundation constructed above a gradient line of 1v to 3h from the toe of the fill slope should be the subject to specific design by a suitably qualified geotechnical engineer.

(iii) The excavations for foundations in natural materials should be inspected by a suitably qualified engineer to confirm the ground conditions and design parameters are as assumed in the Babbage supplementary geotechnical assessment report, dated November 2006.

(iv) The minimum depth of all perimeter foundations for future buildings, are to be 600mm below finished ground level to minimise the effects of shrinkage swell movements on the structure.

4. This professional opinion is furnished to the **Waitakere City Council and New Zealand Housing Foundation** for their purposes alone on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any dwelling.

Signed: ..... Date: **16 October 2007**

N S Luxford
Chartered Professional Engineer (CPEng No 41147)

PARKS SUBDIVISIONAL REQUIREMENTS FOR ENGINEERING PLAN APPROVAL

Waitakere Eco City

To: Fiona Keir

Subdivision: 423-429 West Coast Road

Owner/Contact: NZ Housing Foundation
Telephone No: **Facsimile No:**

Consultant: Babbage Consultants Ltd
Address:
Telephone No: **Facsimile No:**

Parks Planner: Maylene Barrett

The following requirements relate to the park development within the above subdivision and shall be included in the engineering plan approval for this project as the Park requirements. These requirements are supplementary and are to be read in conjunction with the Waitakere City Infrastructure Code of Practice. All works are to comply with both these requirements and standards unless written approval is obtained from the Parks Management team.

Specific Conditions:

1. The plans C60-C64 Revision C are approved with the following conditions:
2. Install geogrid material on the surface of the bridge
3. The bridge handrail shall be constructed from galvanised steel painted colour N43 'Pipeline grey'.
4. The footpath shall be constructed as per parks standard 7.09A.

Signed: Maylene Barrett **Date:** 1 June 07

Parks Consent Planner

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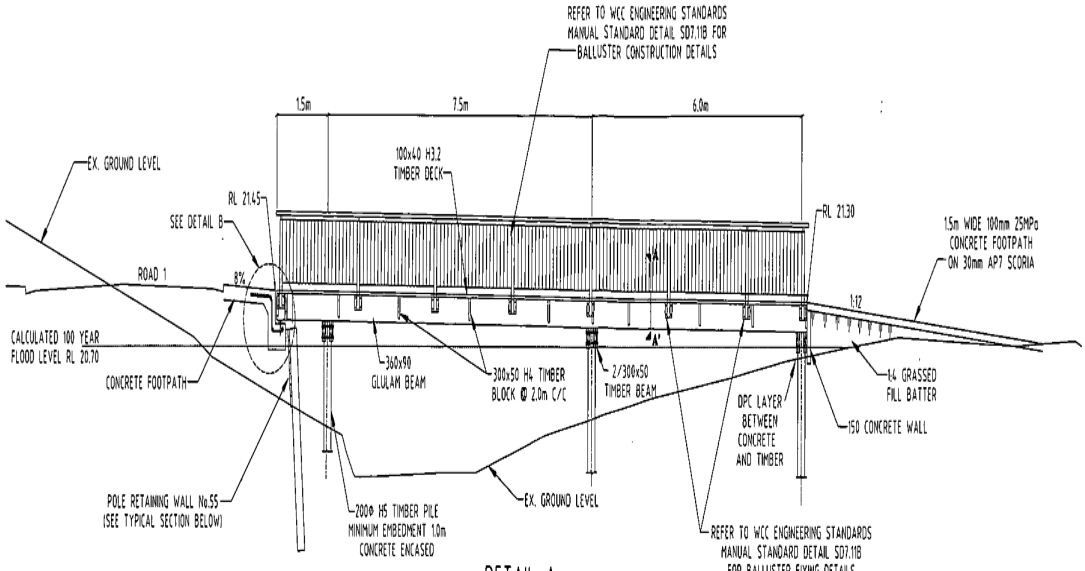
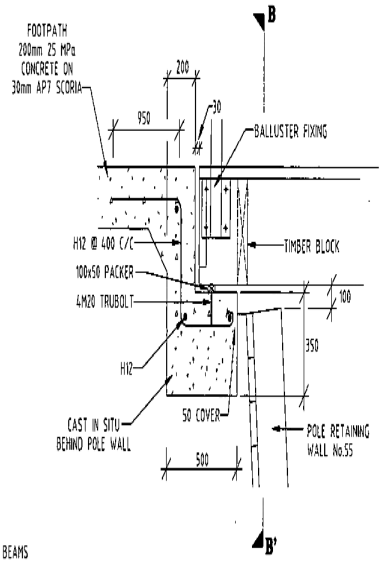


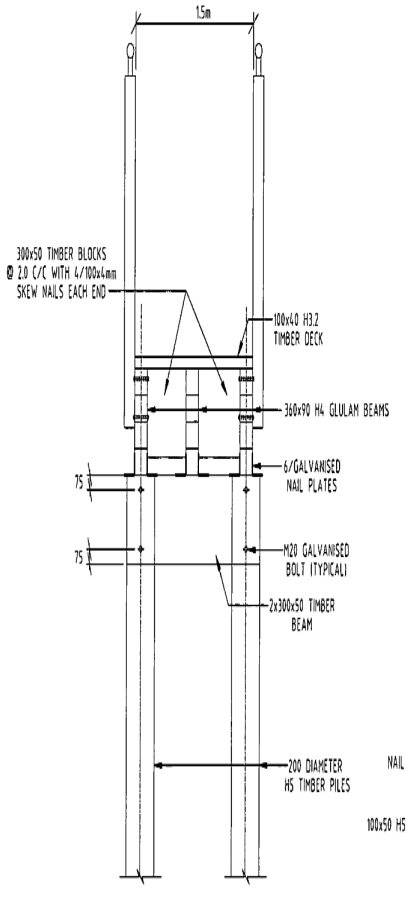
DETAIL A
SCALE 1:50



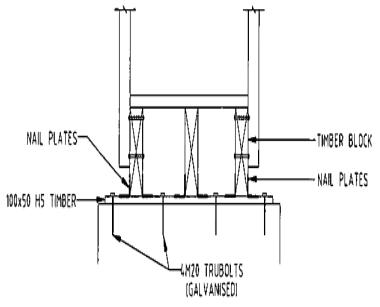
DETAIL B
NOT TO SCALE

RETAINING WALL NOTES:

1. ALL WORKS TO COMPLY WITH WAITAKERE CITY COUNCIL STANDARDS.
2. ALL RETAINING WALL POLES TO BE HIGH DENSITY.
3. FINAL LOCATION OF RETAINING WALL TO BE DETERMINED ON SITE AT TIME OF CONSTRUCTION.
4. ALL PILE HOLES ARE TO BE PREDRILLED.

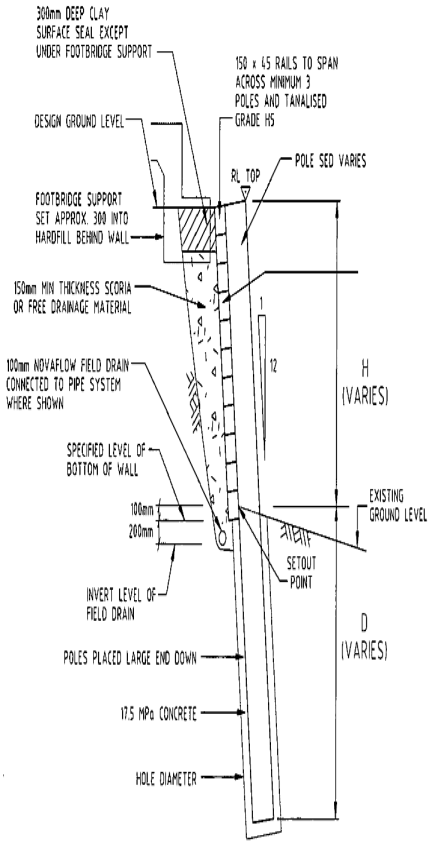


SECTION A-A'



SECTION B-B'

TYPICAL CROSS SECTIONS OF FOOTBRIDGE
NOT TO SCALE



TYPICAL SECTION OF POLE RETAINING WALL No.55
(NOT TO SCALE)

REV	DATE	DESCRIPTION	DRAWN	CHECK
C	08.03.07	CRIB WALL AMENDED TO POLE WALL AND DETAILS AMENDED	MJD	NSL
B	08.03.07	VARIOUS AMENDMENTS	FK	
A	13.02.07	STREAM BED ADDED	DH	DNR

DRAWING REVISIONS

SURVEYORS • ARCHITECTS • ENGINEERS
Babbage CONSULTANTS
129 FANSHAWE ST
PO BOX
AUCKLAND 1 - NEW ZEALAND
PHONE 09 - 379 9560 - FAX 09 - 377 1170
admin@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD HOUSING DEVELOPMENT
FOR
NZ HOUSING FOUNDATION

DRAWING TITLE

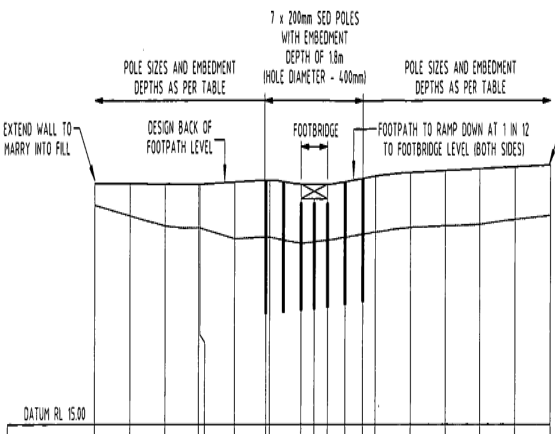
FOOTBRIDGE DETAILS

	DATE	INITIAL
DESIGNED	AUGUST 2006	VL
DRAWN	AUGUST 2006	GNB
CHECKED		
APPROVED		

SCALE (A1)
AS SHOWN

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C60	C

3/03/2007 11:59:27 a.m. X:\dgn\42600'S\42608\CM\C60 BRIDGE DETAILS.dgn


7 x 200mm SED POLES WITH EMBEDMENT DEPTH OF 1.8m (HOLE DIAMETER - 400mm)
POLE SIZES AND EMBEDMENT DEPTHS AS PER TABLE
POLE SIZES AND EMBEDMENT DEPTHS AS PER TABLE
EXTEND WALL TO MARRY INTO FILL
DESIGN BACK OF FOOTPATH LEVEL
FOOTBRIDGE
FOOTPATH TO RAMP DOWN AT 1 IN 12 TO FOOTBRIDGE LEVEL (BOTH SIDES)
EXTEND WALL TO MARRY INTO FILL
DATUM RL 15.00

| | | |

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
6 Henderson Valley Road
Henderson

Private Bag 93109
Henderson
Waitakere City 0612

Telephone
09 836 8000

24Hr Call Centre
09 839 0400

Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

21 February 2007

Babbage Consultants Ltd
P O Box 2027
Shortland Street
AUCKLAND 1140

Dear Sir/Madam

RE: **Engineering Plan Approval – SUB 2006-1078**

ADDRESS: **423-429 West Coast Road, GLEN EDEN**

Thank you for your Engineering Plan Approval Application. A partial approval is now ready to be issued. Further approvals are to come from Parks and Ecowater. All processing fees will be invoiced before final Engineering Plan approval is given.

Yours faithfully

Kristin Spyve
Planning Technical Assistant

Kristin Spyve

From: Glenn Pope
Sent: Tuesday, 19 December 2006 10:11 a.m.
To: Kristin Spyve
Cc: Felicitas Dhliwayo
Subject: FW: Attention: FIONA KEIR

These are my comments that I sent to Babbage Consultants for Earthworks approval. Please file. Looks like I will be doing most of the Engineering Approvals in the mean time (because of my leg), so I'll endeavour to make sure my process is up to scratch.

Cheers
Glenn

From: Glenn Pope
Sent: Tuesday, 19 December 2006 9:25 a.m.
To: 'admin@babbage.co.nz'
Subject: Attention: FIONA KEIR

Dear Fiona,

Regarding your request for engineering approval for 423-429 West Coast Road, Glen Eden (SUB 20061078). I have been asked by Kristin Spyve to assess the plans from an earthworks perspective. I have reviewed the plans submitted and found no major changes from those originally asessed with the Resource Consent (LUC 20061077) in relation to earthworks volumes or sediment and erosion control. Additionally, I would be happy to approve these plans although it should be noted that only earthworks have been assessed on my behalf. Please also note that any future engineering changes may require a variation to conditions of consent or a new consent depending on the change involved.

If you have any questions regarding these comments, please do not hesitate to contact me as below.

Glenn Pope
Environmental Monitoring Officer
Resource Management
Waitakere City Council
Telephone: (09) 836 8000 extn 8568
Cell: (021) 379 126
Email: Glenn.Pope@waitakere.govt.nz

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
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09 839 0400

Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

7 December 2006

NEW ZEALAND HOUSING FOUNDATION
C/- Fiona Keir
Babbage Consultants Limited
PO Box 2027
Shortland Street
AUCKLAND 1020

Attn: Fiona Keir
Your ref: 42608/C

Dear Sir / Madam

Resource Consent Application:	**SUB-2006-1078, LUC 2006-1077**
Proposal:	**61 LOT SUB**
	NOTE: COMBO REFER RMA 20061077 FOR LUC
Site Address:	**423-429 West Coast Road, GLEN EDEN**

You recently submitted plans for engineering approval for the above subdivision.

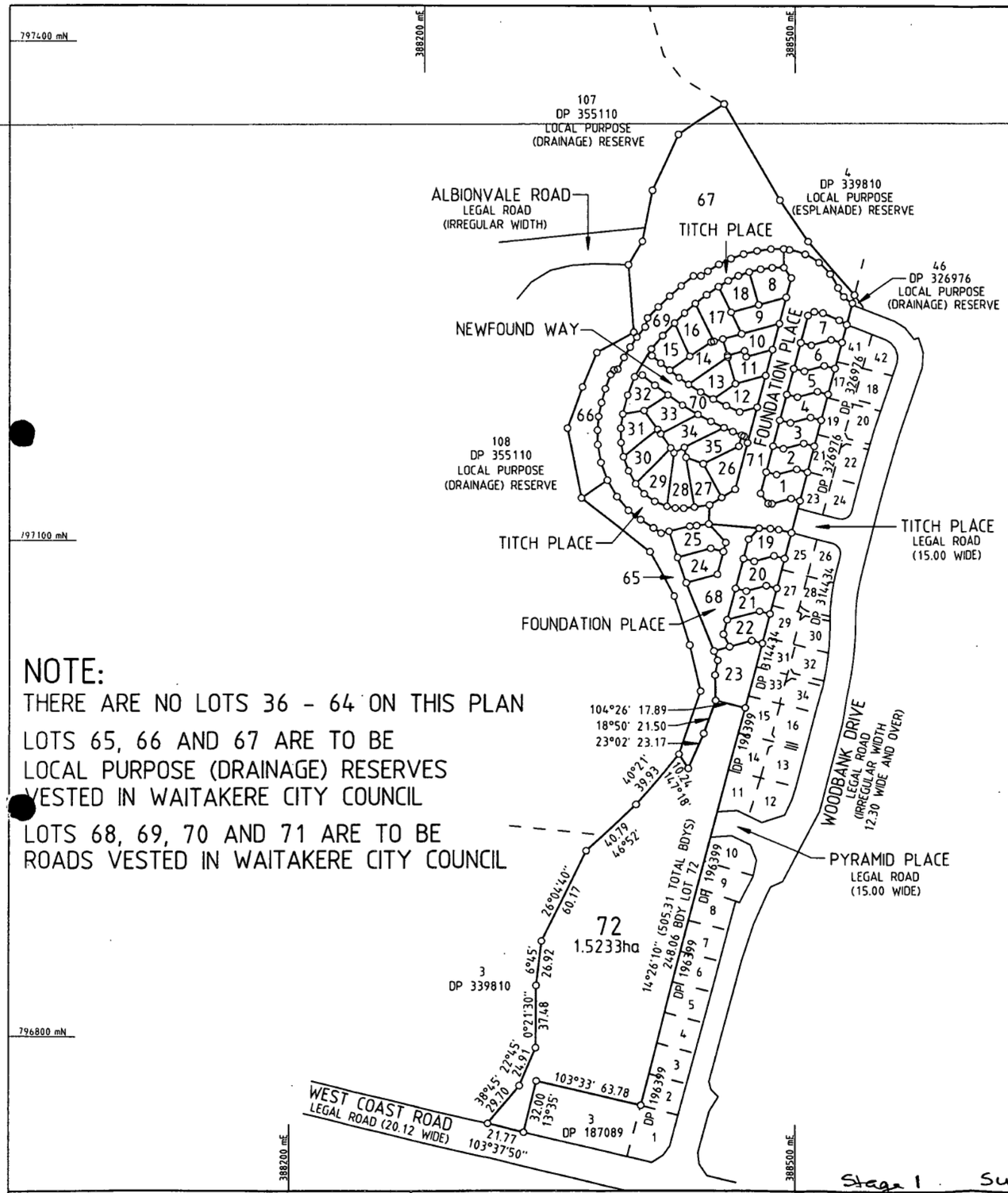
Your plans have been forwarded to the Resource Planner and Monitoring (for sediment & erosion control). . Each unit will contact you directly with any further correspondence.

Once the Subdivision consent SUB2006-1078 has been granted I will forward the plans to Ecowater and Transport Assets for engineering approval. In the interim Ecowater will undertake a preliminary view of the plans.

Please find attached an invoice for the engineering plan approval base fee.

Yours faithfully

Kristin Spyve
PLANNING TECHNICAL ASSISTANT



NOTE:

THERE ARE NO LOTS 36 - 64 ON THIS PLAN

LOTS 65, 66 AND 67 ARE TO BE LOCAL PURPOSE (DRAINAGE) RESERVES VESTED IN WAITAKERE CITY COUNCIL

LOTS 68, 69, 70 AND 71 ARE TO BE ROADS VESTED IN WAITAKERE CITY COUNCIL

24 Sept 2007

Stage 1 SUB2006-1078

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF SUPPORT	Ⓐ	LOT 1	LOT 2
	Ⓑ	LOT 2	LOT 3
	Ⓒ	LOT 3	LOT 4
	Ⓓ	LOT 4	LOT 5
	Ⓔ	LOT 5	LOT 6
	Ⓕ	LOT 6	LOT 7
	Ⓖ	LOT 8	LOT 18
	Ⓗ	LOT 9	LOT 8
	Ⓘ	LOT 10	LOT 9
	Ⓙ	LOT 11	LOT 10
	Ⓚ	LOT 12	LOT 11
	Ⓛ	LOT 12	LOT 13
	Ⓜ	LOT 13	LOT 14
	Ⓝ	LOT 14	LOT 15
RIGHT OF SUPPORT	Ⓞ	LOT 17	LOT 16
	Ⓟ	LOT 18	LOT 17
	Ⓠ	LOT 9	LOT 17
	Ⓡ	LOT 27	LOT 28
	Ⓢ	LOT 28	LOT 27
	Ⓣ	LOT 28	LOT 29
	Ⓤ	LOT 29	LOT 30
	Ⓥ	LOT 30	LOT 31
	Ⓦ	LOT 33	LOT 32
	Ⓧ	LOT 33	LOT 34
	Ⓨ	LOT 34	LOT 33
	Ⓩ	LOT 35	LOT 34
	Ⓐⓐ	LOT 20	LOT 19
	Ⓐⓑ	LOT 21	LOT 20
RIGHT OF SUPPORT	Ⓐⓒ	LOT 22	LOT 21
	Ⓐⓓ	LOT 23	LOT 22
	Ⓐⓔ	LOT 24	LOT 25

EXISTING EASEMENTS IN GROSS

PURPOSE	SHOWN	CREATED BY
OIL AND GAS SUPPLY	Ⓐⓕ Ⓐⓖ Ⓐⓗ	B344219.1

I HEREBY CERTIFY THAT THIS PLAN WAS APPROVED BY THE WAITAKERE CITY COUNCIL PURSUANT TO SECTION 223 OF THE RESOURCE MANAGEMENT ACT 1991

ON THE ____ DAY OF_____.2007
SUBJECT TO THE GRANTING OR RESERVING OF THE EASEMENTS SET OUT IN THE MEMORANDUM HEREON

_____
AUTHORISED OFFICER

NEW CT ALLOCATED

LOT 1 - 357044	LOT 19 - 357062
LOT 2 - 357045	LOT 20 - 357063
LOT 3 - 357046	LOT 21 - 357064
LOT 4 - 357047	LOT 22 - 357065
LOT 5 - 357048	LOT 23 - 357066
LOT 6 - 357049	LOT 24 - 357067
LOT 7 - 357050	LOT 25 - 357068
LOT 8 - 357051	LOT 26 - 357069
LOT 9 - 357052	LOT 27 - 357070
LOT 10 - 357053	LOT 28 - 357071
LOT 11 - 357054	LOT 29 - 357072
LOT 12 - 357055	LOT 30 - 357073
LOT 13 - 357056	LOT 31 - 357074
LOT 14 - 357057	LOT 32 - 357075
LOT 15 - 357058	LOT 33 - 357076
LOT 16 - 357059	LOT 34 - 357077
LOT 17 - 357060	LOT 35 - 357078
LOT 18 - 357061	LOT 72 - 357079

NOTES

1. FOR LOT AREAS AND BOUNDARY DIMENSIONS SEE SHEETS 2, 3 AND 4
2. FOR EASEMENT BOUNDARY DIMENSIONS SEE DIAGRAMS A AND B ON SHEET 2 AND DIAGRAMS C, D AND E ON SHEET 5.

SHEET 1 OF 5

CLASS OF SURVEY: I

Total Area 4.9334ha

Comprised in CT 163628

I KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2;
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed _____ *Date* _____

Field Book p. *Traverse Book* p.
Reference Plans
Examined *Correct*

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File
Received
Instructions

DP389289

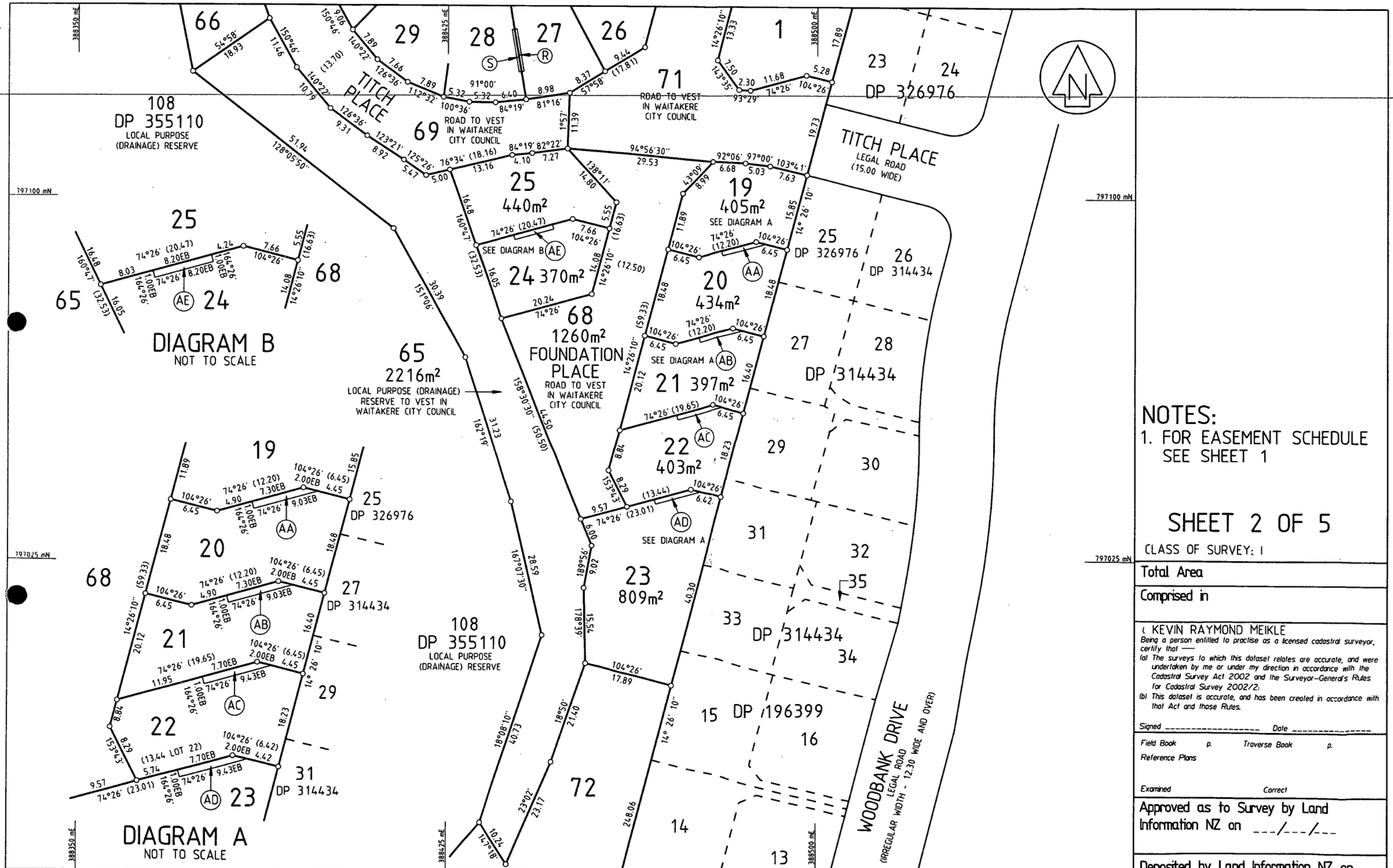
LAND DISTRICT NORTH AUCKLAND

LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY

Surveyed by BABBAGE CONSULTANTS LTD. 42608

Scale 1 : 2000 Date MAY 2007



NOTES:
1. FOR EASEMENT SCHEDULE SEE SHEET 1

SHEET 2 OF 5

CLASS OF SURVEY: 1

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE
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Signed _____ Date _____

Field Book p. Traverse Book p.
Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File
Received
Instructions

DP389289

LAND DISTRICT NORTH AUCKLAND

LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY
Surveyed by BABBAGE CONSULTANTS LTD. 42608
Scale 1 : 500 Date MAY 2007

J:\CCADS\DATA\42608\DWGS1TP2 FROM JOB LTBDYST1

APPROVED LM 99/11

ALBIONVALE ROAD
LEGAL ROAD
(IRREGULAR WIDTH)

67
LOCAL PURPOSE (DRAINAGE)
RESERVE TO VEST IN
WAITAKERE CITY COUNCIL

TITCH PLACE

18 353m²
8 404m²
17 475m²
9 402m²
16 395m²
10 389m²
15 363m²
14 433m²
11 353m²
13 351m²
69 3239m²
70 998m²
66 1451m²
32 350m²
33 383m²
12 374m²
71 3690m²
ROAD TO VEST IN WAITAKERE CITY COUNCIL
31 371m²
34 411m²
30 438m²
35 415m²
29 412m²
28 413m²
27 354m²
26 451m²
25
68
19

NEWFOUND WAY
(IRREGULAR WIDTH OVER 12.50)

FOUNDATION PLACE

7 380m²
6 379m²
5 379m²
4 379m²
3 379m²
2 379m²
1 414m²

41 42 DP 326976
17 18 DP 326976
19 20 37 DP 326976
21 22 DP 326976
23 24 DP 326976

4 DP 339810

46 DP 326976
LOCAL PURPOSE (DRAINAGE) RESERVE

WOODBANK DRIVE
(IRREGULAR WIDTH - LEGAL ROAD - 12.30 WIDE AND OVER)

LOCAL PURPOSE (DRAINAGE) RESERVE TO VEST IN WAITAKERE CITY COUNCIL

108 DP 355110
LOCAL PURPOSE (DRAINAGE) RESERVE

LOCAL PURPOSE (DRAINAGE) RESERVE TO VEST IN WAITAKERE CITY COUNCIL

ROAD TO VEST IN WAITAKERE CITY COUNCIL

TITCH PLACE
LEGAL ROAD
(15.00 WIDE)

797250 mN
797175 mN
797100 mN
388350 mE
388425 mE
388500 mE

NOTES:

1. FOR EASEMENT SCHEDULE SEE SHEET 1
2. FOR EASEMENT DIAGRAMS SEE SHEET 5

SHEET 3 OF 5

CLASS OF SURVEY: I

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE
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Signed _____ Date _____

Field Book p. Traverse Book p.
Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File
Received
Instructions

DP389289

LAND DISTRICT NORTH AUCKLAND

LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY
Surveyed by BABBAGE CONSULTANTS LTD. 42608
Scale 1 : 500 Date MAY 2007

J:\CCADS\DATA\42608\DWGS\TP3 FROM JOB LTBDYST1

APPROVED LM 99/11

388350 mE
388425 mE
388500 mE
797325 mN
797250 mN

107
DP 355110
LOCAL PURPOSE
(DRAINAGE) RESERVE

67
7011m²
LOCAL PURPOSE (DRAINAGE)
RESERVE TO VEST IN
WAITAKERE CITY COUNCIL

4
DP 339810
LOCAL PURPOSE
(ESPLANADE) RESERVE

ALBIONVALE ROAD
LEGAL ROAD
(IRREGULAR WIDTH)

108
DP 355110
LOCAL PURPOSE
(DRAINAGE) RESERVE

TITCH PLACE

ROAD TO VEST IN WAITAKERE CITY COUNCIL

69
18
353m²
8
404m²
17
475m²
9
402m²
16
14
15
10
66

71
ROAD TO VEST
IN WAITAKERE
CITY COUNCIL

FOUNDATION PLACE

WOODBANK DRIVE
LEGAL ROAD
(IRREGULAR WIDTH
12.30 WIDE AND OVER)

7
380m²
6
41
42
46
DP 326976
LOCAL PURPOSE
(DRAINAGE) RESERVE

NOTES:

1. FOR EASEMENT SCHEDULE SEE SHEET 1
2. FOR EASEMENT DIAGRAMS SEE SHEET 5

SHEET 4 OF 5

CLASS OF SURVEY: I

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE
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Signed _____ Date _____

Field Book p. Traverse Book p.
Reference Plans

Examined Correct

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File
Received
Instructions

DP389289

LAND DISTRICT NORTH AUCKLAND

LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY
Surveyed by BABBAGE CONSULTANTS LTD. 42608
Scale 1 : 500 Date MAY 2007

J:\CCAD5\DATA\42608\DWGS1TP4 FROM JOB LTBOYST1

APPROVED LM 99/11

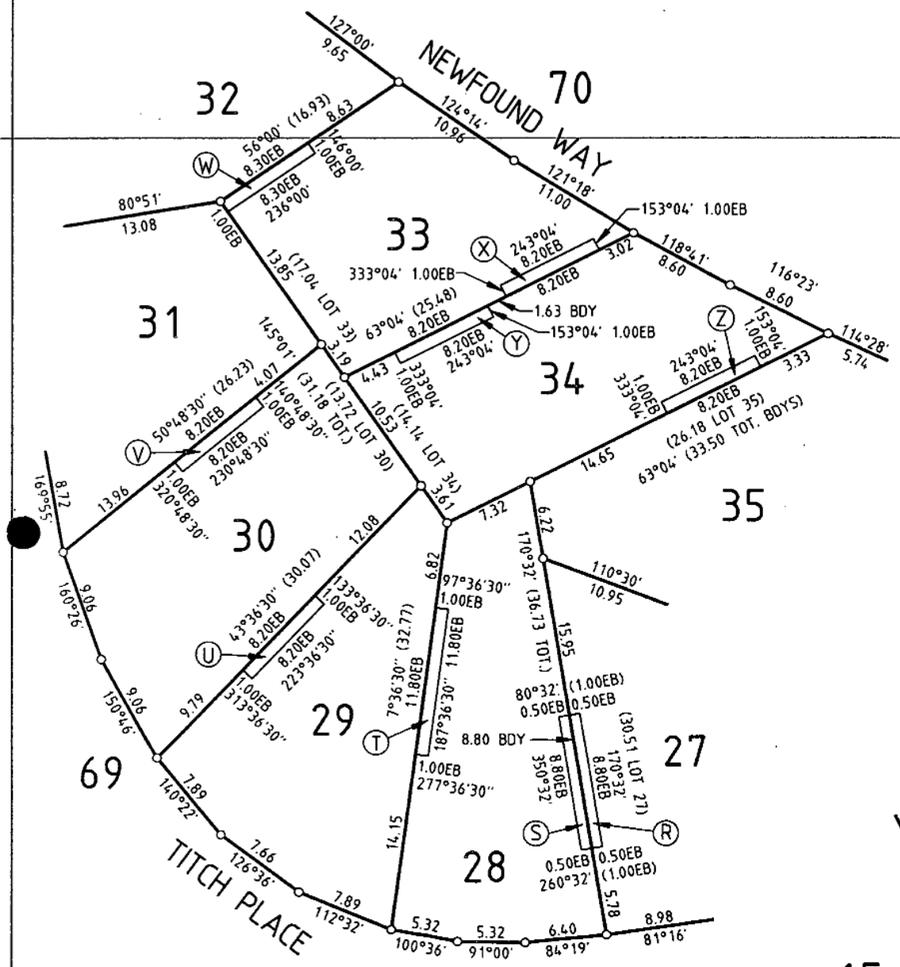

DIAGRAM C
NOT TO SCALE

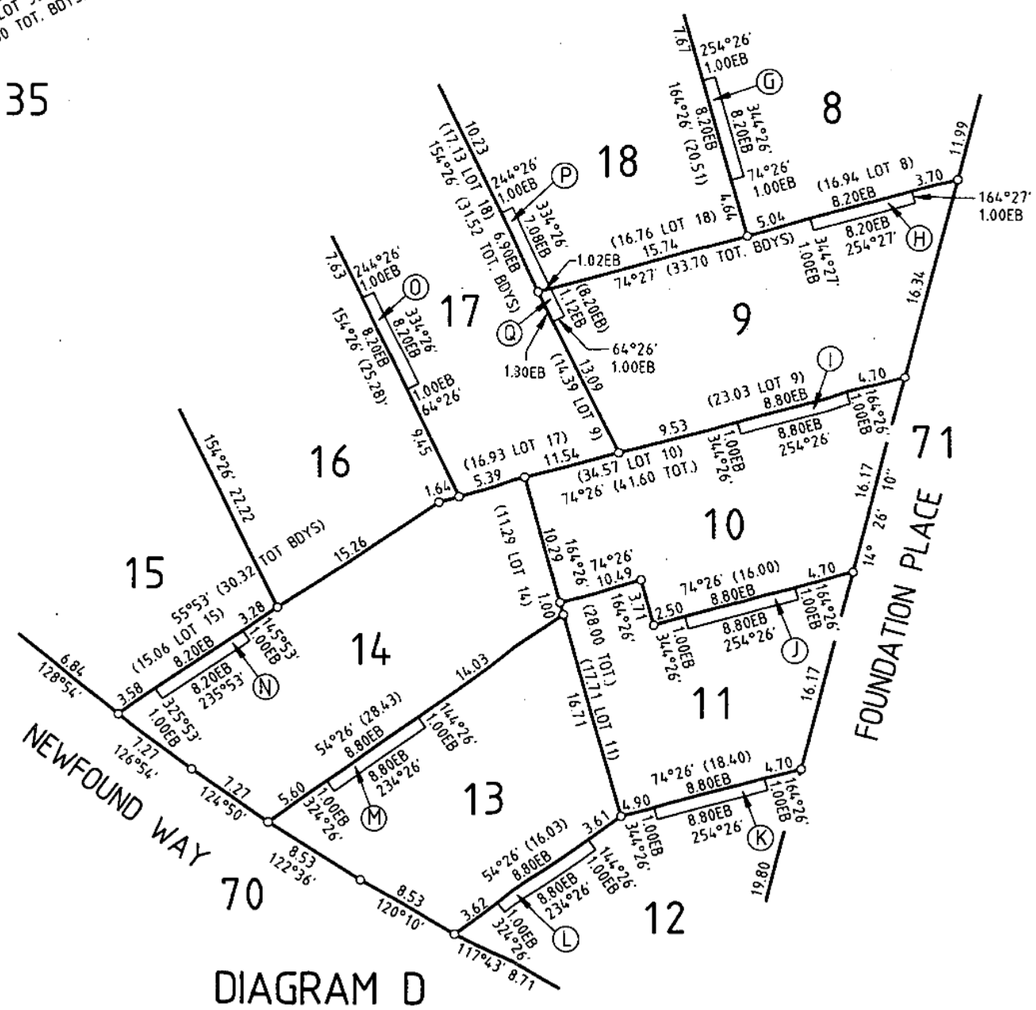

DIAGRAM D
NOT TO SCALE

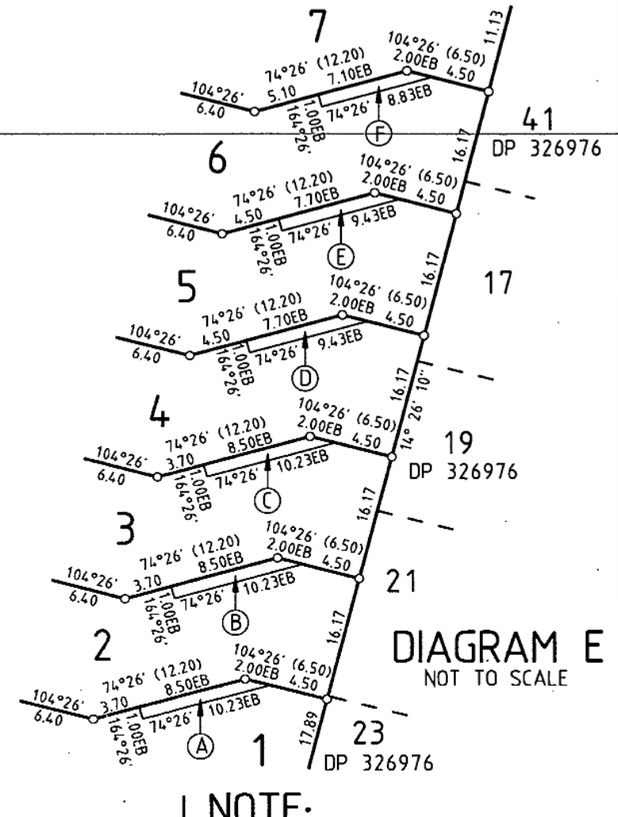

DIAGRAM E
NOT TO SCALE

NOTE:
FOR EASEMENT SCHEDULE
SEE SHEET 1

CLASS OF SURVEY: I

Total Area

Comprised in

I KEVIN RAYMOND MEIKLE
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Field Book p. *Traverse Book* p.
Reference Plans

Examined *Correct*

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File
Received
Instructions

DP389289

SHEET 5 OF 5

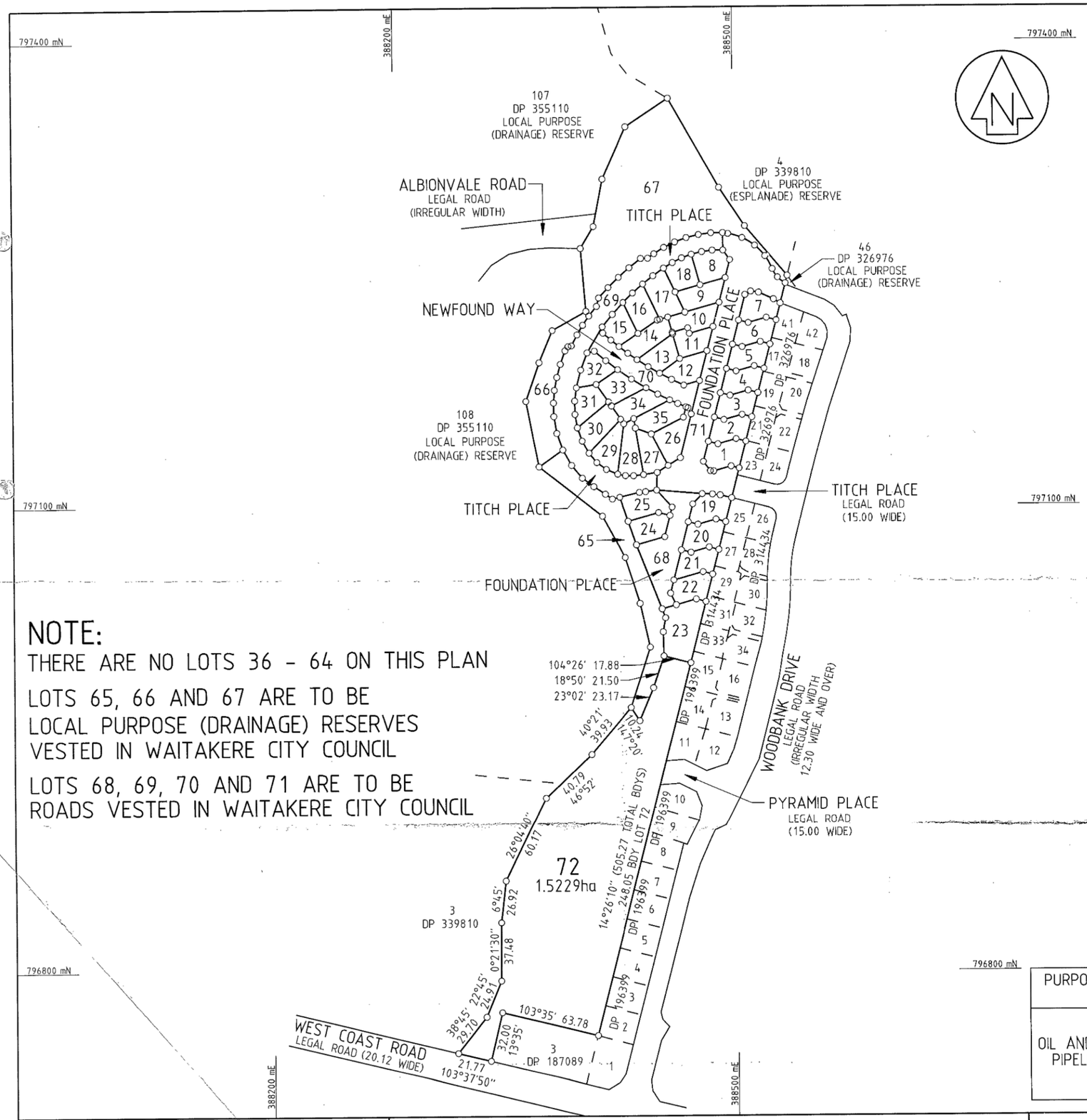
LAND DISTRICT NORTH AUCKLAND

LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY
Surveyed by BABBAGE CONSULTANTS LTD. 42608
Scale 1 : 500 Date MAY 2007

J:\CCAD5\DATA\42608\DWGS1TP3 FROM JOB LTBDYST1

APPROVED LM 99/11



NOTE:

THERE ARE NO LOTS 36 - 64 ON THIS PLAN

LOTS 65, 66 AND 67 ARE TO BE LOCAL PURPOSE (DRAINAGE) RESERVES VESTED IN WAITAKERE CITY COUNCIL

LOTS 68, 69, 70 AND 71 ARE TO BE ROADS VESTED IN WAITAKERE CITY COUNCIL

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF SUPPORT	(A)	LOT 1	LOT 2
	(B)	LOT 2	LOT 3
	(C)	LOT 3	LOT 4
	(D)	LOT 4	LOT 5
	(E)	LOT 5	LOT 6
	(F)	LOT 6	LOT 7
	(G)	LOT 8	LOT 18
	(H)	LOT 9	LOT 8
	(I)	LOT 10	LOT 9
	(J)	LOT 11	LOT 10
	(K)	LOT 12	LOT 11
	(L)	LOT 12	LOT 13
	(M)	LOT 13	LOT 14
	(N)	LOT 14	LOT 15
RIGHT OF SUPPORT	(O)	LOT 17	LOT 16
	(P)	LOT 18	LOT 17
	(Q)	LOT 9	LOT 17
	(R)	LOT 27	LOT 28
	(S)	LOT 28	LOT 27
	(T)	LOT 28	LOT 29
	(U)	LOT 29	LOT 30
	(V)	LOT 30	LOT 31
	(W)	LOT 33	LOT 32
	(X)	LOT 33	LOT 34
	(Y)	LOT 34	LOT 33
	(Z)	LOT 34	LOT 35
	(AA)	LOT 20	LOT 19
RIGHT OF SUPPORT	(AB)	LOT 21	LOT 20
	(AC)	LOT 22	LOT 21
	(AD)	LOT 23	LOT 22
	(AE)	LOT 24	LOT 25

EXISTING EASEMENTS IN GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
OIL AND GAS PIPELINES	(AF)	LOT 67	B344219.1
	(AG)	LOT 69	
	(AH)	LOT 71	

I HEREBY CERTIFY THAT THIS PLAN WAS APPROVED BY THE WAITAKERE CITY COUNCIL PURSUANT TO SECTION 223 OF THE RESOURCE MANAGEMENT ACT 1991

ON THE ____ DAY OF_____.2007
SUBJECT TO THE GRANTING OR RESERVING OF THE EASEMENTS SET OUT IN THE MEMORANDUM HEREON

_____
AUTHORISED OFFICER

NEW CT ALLOCATED

LOT 1 - 357044	LOT 19 - 357062
LOT 2 - 357045	LOT 20 - 357063
LOT 3 - 357046	LOT 21 - 357064
LOT 4 - 357047	LOT 22 - 357065
LOT 5 - 357048	LOT 23 - 357066
LOT 6 - 357049	LOT 24 - 357067
LOT 7 - 357050	LOT 25 - 357068
LOT 8 - 357051	LOT 26 - 357069
LOT 9 - 357052	LOT 27 - 357070
LOT 10 - 357053	LOT 28 - 357071
LOT 11 - 357054	LOT 29 - 357072
LOT 12 - 357055	LOT 30 - 357073
LOT 13 - 357056	LOT 31 - 357074
LOT 14 - 357057	LOT 32 - 357075
LOT 15 - 357058	LOT 33 - 357076
LOT 16 - 357059	LOT 34 - 357077
LOT 17 - 357060	LOT 35 - 357078
LOT 18 - 357061	LOT 72 - 357079

NOTES

1. FOR LOT AREAS AND BOUNDARY DIMENSIONS SEE SHEETS 2, 3 AND 4
2. FOR EASEMENT BOUNDARY DIMENSIONS SEE DIAGRAMS A AND B ON SHEET 2 AND DIAGRAMS C, D AND E ON SHEET 5.

SHEET 1 OF 5

CLASS OF SURVEY: I

Total Area 4.9331ha

Comprised in CT 163628

I, KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2:
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed _____ *Date* _____

Field Book *p.* *Traverse Book* *p.*
Reference Plans

Examined *Correct*

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File
Received
Instructions

DP389289

LAND DISTRICT NORTH AUCKLAND

LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY
Surveyed by BABBAGE CONSULTANTS LTD. 42608
Scale 1 : 2000 Date MAY 2007

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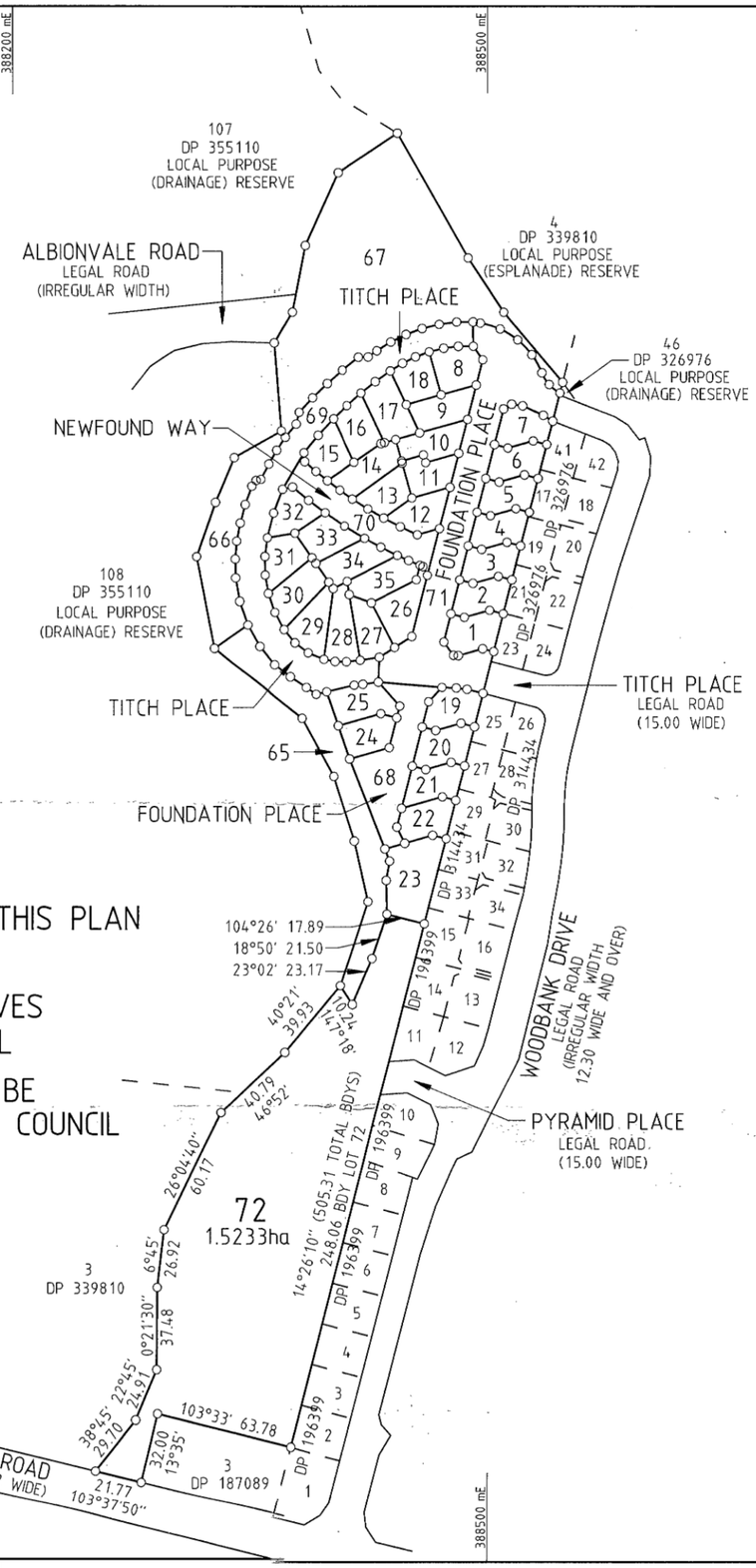
APPROVED LM 98/11



NOTE:

THERE ARE NO LOTS 36 - 64 ON THIS PLAN

LOTS 65, 66 AND 67 ARE TO BE LOCAL PURPOSE (DRAINAGE) RESERVES VESTED IN WAITAKERE CITY COUNCIL

LOTS 68, 69, 70 AND 71 ARE TO BE ROADS VESTED IN WAITAKERE CITY COUNCIL

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF SUPPORT	(A)	LOT 1	LOT 2
	(B)	LOT 2	LOT 3
	(C)	LOT 3	LOT 4
	(D)	LOT 4	LOT 5
	(E)	LOT 5	LOT 6
	(F)	LOT 6	LOT 7
	(G)	LOT 8	LOT 18
	(H)	LOT 9	LOT 8
	(I)	LOT 10	LOT 9
	(J)	LOT 11	LOT 10
	(K)	LOT 12	LOT 11
	(L)	LOT 12	LOT 13
	(M)	LOT 13	LOT 14
	(N)	LOT 14	LOT 15
RIGHT OF SUPPORT	(O)	LOT 17	LOT 16
	(P)	LOT 18	LOT 17
	(Q)	LOT 9	LOT 17
	(R)	LOT 27	LOT 28
	(S)	LOT 28	LOT 27
	(T)	LOT 28	LOT 29
	(U)	LOT 29	LOT 30
	(V)	LOT 30	LOT 31
	(W)	LOT 33	LOT 32
	(X)	LOT 33	LOT 34
	(Y)	LOT 34	LOT 33
	(Z)	LOT 35	LOT 34
RIGHT OF SUPPORT	(AA)	LOT 20	LOT 19
	(AB)	LOT 21	LOT 20
	(AC)	LOT 22	LOT 21
	(AD)	LOT 23	LOT 22
	(AE)	LOT 24	LOT 25

EXISTING EASEMENTS IN GROSS

PURPOSE	SHOWN	CREATED BY
OIL AND GAS SUPPLY	(AF) (AG) (AH)	B344219.1

I HEREBY CERTIFY THAT THIS PLAN WAS APPROVED BY THE WAITAKERE CITY COUNCIL PURSUANT TO SECTION 223 OF THE RESOURCE MANAGEMENT ACT 1991

ON THE _____ DAY OF_____.2007
SUBJECT TO THE GRANTING OR RESERVING OF THE EASEMENTS SET OUT IN THE MEMORANDUM HEREON

_____
AUTHORISED OFFICER

NEW CT ALLOCATED

LOT 1 - 357044	LOT 19 - 357062
LOT 2 - 357045	LOT 20 - 357063
LOT 3 - 357046	LOT 21 - 357064
LOT 4 - 357047	LOT 22 - 357065
LOT 5 - 357048	LOT 23 - 357066
LOT 6 - 357049	LOT 24 - 357067
LOT 7 - 357050	LOT 25 - 357068
LOT 8 - 357051	LOT 26 - 357069
LOT 9 - 357052	LOT 27 - 357070
LOT 10 - 357053	LOT 28 - 357071
LOT 11 - 357054	LOT 29 - 357072
LOT 12 - 357055	LOT 30 - 357073
LOT 13 - 357056	LOT 31 - 357074
LOT 14 - 357057	LOT 32 - 357075
LOT 15 - 357058	LOT 33 - 357076
LOT 16 - 357059	LOT 34 - 357077
LOT 17 - 357060	LOT 35 - 357078
LOT 18 - 357061	LOT 72 - 357079

NOTES

1. FOR LOT AREAS AND BOUNDARY DIMENSIONS SEE SHEETS 2, 3 AND 4
2. FOR EASEMENT BOUNDARY DIMENSIONS SEE DIAGRAMS A AND B ON SHEET 2 AND DIAGRAMS C, D AND E ON SHEET 5.

SHEET 1 OF 5

CLASS OF SURVEY: I

Total Area 4.9334ha

Comprised in CT 163628

I, KEVIN RAYMOND MEIKLE
Being a person entitled to practise as a licensed cadastral surveyor, certify that —
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2;
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.

Signed _____ *Date* _____

Field Book *p.* *Traverse Book* *p.*
Reference Plans
Examined *Correct*

Approved as to Survey by Land Information NZ on ___/___/___

Deposited by Land Information NZ on ___/___/___

File
Received
Instructions

DP389289

LAND DISTRICT NORTH AUCKLAND

LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY
Surveyed by BABBAGE CONSULTANTS LTD. 42608
Scale 1 : 2000 Date MAY 2007

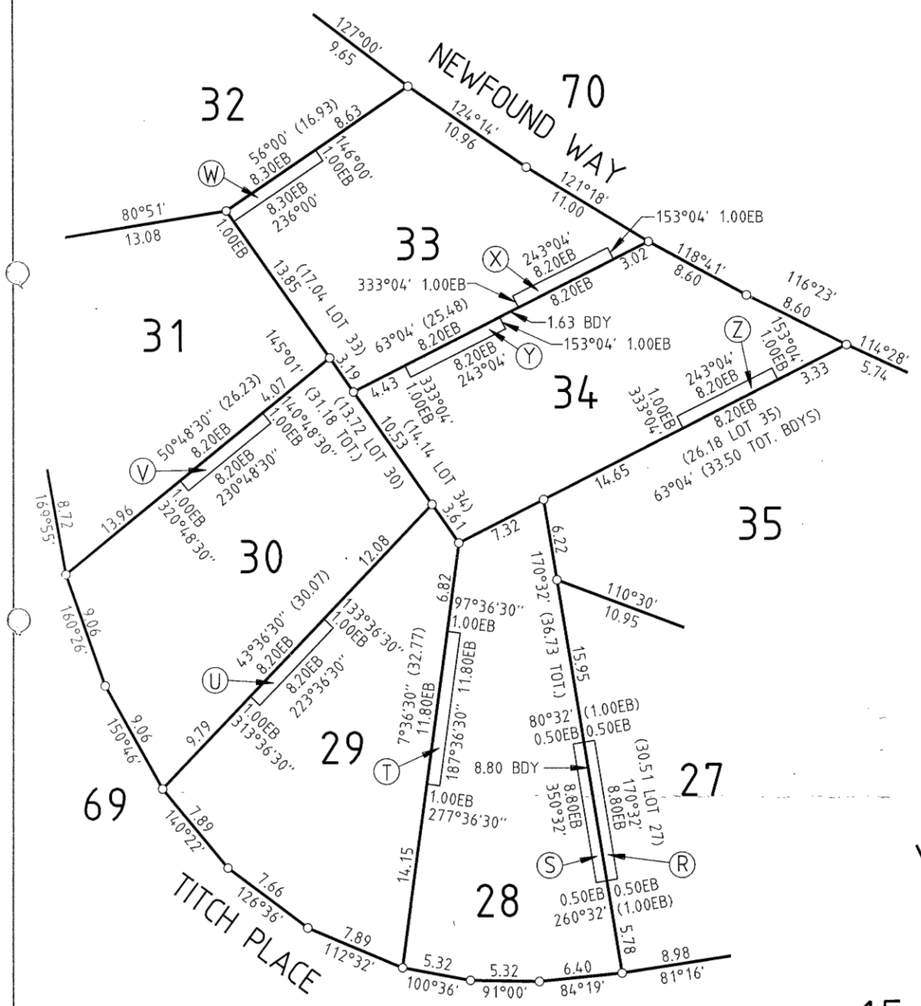


DIAGRAM C
NOT TO SCALE

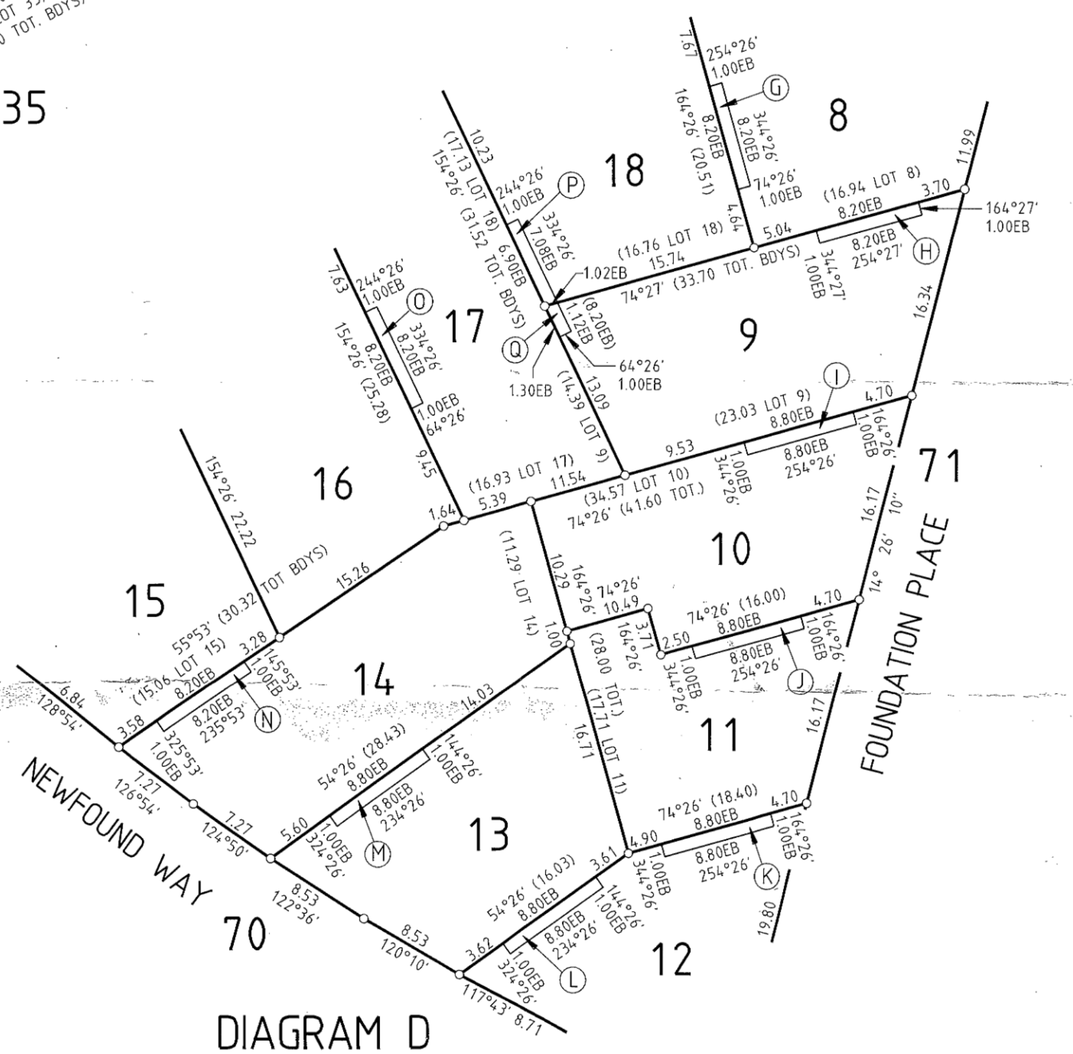


DIAGRAM D
NOT TO SCALE

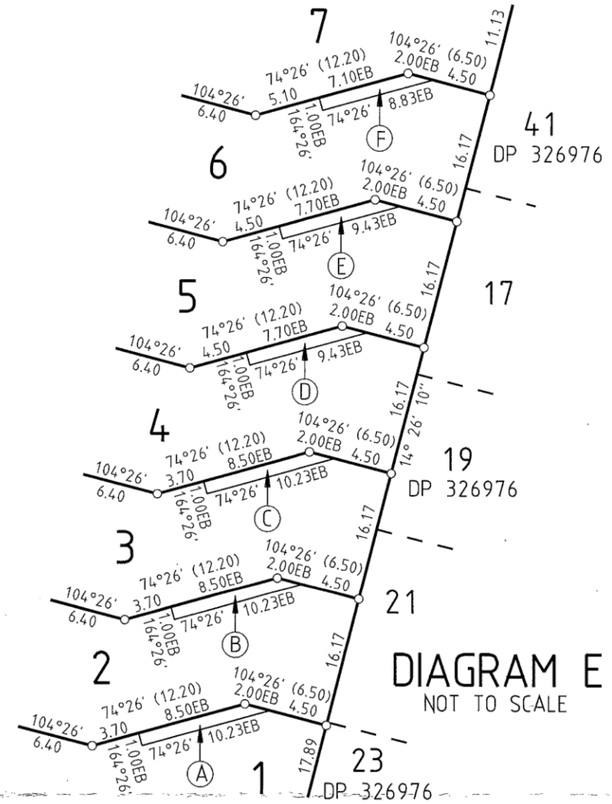


DIAGRAM E
NOT TO SCALE

SHEET 5 OF 5

NOTE:
FOR EASEMENT SCHEDULE SEE SHEET 1

CLASS OF SURVEY: I

Total Area

Comprised in

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Signed _____ Date _____

Field Book p. *Traverse Book* p.

Reference Plans

Examined *Correct*

Approved as to Survey by Land Information NZ on ___/___/___

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Received
Instructions

DP389289

LAND DISTRICT NORTH AUCKLAND

LOTS 1 - 35 AND 65 - 72 BEING A SUBDIVISION OF LOT 2 DP 339810

TERRITORIAL AUTHORITY WAITAKERE CITY

Surveyed by BABBAGE CONSULTANTS LTD. 42608

Scale 1 : 500 Date MAY 2007

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APPROVED LM 99/11

388350 mE
388425 mE
388500 mE
797325 mN
797250 mN

107
DP 355110
LOCAL PURPOSE
(DRAINAGE) RESERVE

67
7011m²
LOCAL PURPOSE (DRAINAGE)
RESERVE TO VEST IN
WAITAKERE CITY COUNCIL

4
DP 339810
LOCAL PURPOSE
(ESPLANADE) RESERVE

ALBIONVALE ROAD
LEGAL ROAD
(IRREGULAR WIDTH)

108
DP 355110
LOCAL PURPOSE
(DRAINAGE) RESERVE

TITCH PLACE

69
ROAD TO VEST IN WAITAKERE CITY COUNCIL
(13.70)

18
353m²

8
404m²

71
ROAD TO VEST IN WAITAKERE CITY COUNCIL

17
475m²

9
402m²

16

15

14

10

66

FOUNDATION PLACE

7
380m²

6

41
DP 326976 42

46
DP 326976
LOCAL PURPOSE
(DRAINAGE) RESERVE

WOODBANK DRIVE
LEGAL ROAD
(IRREGULAR WIDTH
12.30 WIDE AND OVER)

56°34' 33.06
24°31' 36.88
150°21' 66.20
146°34' 29.94
11°09' 31.20
30°50' 16.53
175°22' 40.69
147°22' 3.43
99°04' 3.39
106°28' CH 9.56 ARC
121°16' CH 9.56 ARC
82°27' 8.18
89°32' 7.62
139°40'10" 42.21
136°05' CH 9.56 ARC
150°54' CH
148°10' CH
127°53' CH
98°09' 5.16
6.37 ARC (12.74 ARC) 18.00 RAD.
114°31' 10.55
121°09' 5.10
14°26'10" 13.31
14°26'10" 16.91
104°26' 6.51
74°26' (12.20)
104°26' 6.40
(38.24 ARC) 27.00 RAD.
145°03' 7.59
11.99
16.34
14°26'10" 16.17
(16.94)
16.76
74°27' (33.70 TOT.)
(14.39)
(23.03)
(16.93 LOT 17) 11.54
(34.57 LOT 10) 74°26' (41.60 TOT.)
(31.52 TOT.)
154°26' (25.28)
154°26' 22.22
154°26' (17.13)
164°26' (20.51)
1.64
5.39
5.08
11.20
39°35' 10.43
43°02' 10.43
39°35' (11.20)
43°02' 14°26' 5.58
46°11' 8.73
49°03' 8.73
51°52' 8.50
54°40' 8.50
58°03' 6.72
63°55' 6.69
70°00' 6.73
76°12' 6.92
82°27' 6.88
89°32' 6.92
7.24
33°52' 7.94
9.07
46°11' 9.45
49°03' 9.41
51°52' 9.60
54°40' 8.80
58°03' 7.63
63°55' (11.20) 7.86
70°00' 7.93
76°12' 8.14
4.55 4.95
88°20'
11120
11992

NOTES:

1. FOR EASEMENT SCHEDULE SEE SHEET 1
2. FOR EASEMENT DIAGRAMS SEE SHEET 5

SHEET 4 OF 5

CLASS OF SURVEY: 1

Total Area

Comprised in

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Signed _____ *Date* _____

Field Book *p.* *Traverse Book* *p.*

Reference Plans

Examined *Correct*

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File *Received* *Instructions* DP389289

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TERRITORIAL AUTHORITY WAITAKERE CITY
42608
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Scale 1 : 500 Date MAY 2007

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APPROVED LM 99/11

ALBIONVALE ROAD
LEGAL ROAD
(IRREGULAR WIDTH)

67
LOCAL PURPOSE (DRAINAGE)
RESERVE TO VEST IN
WAITAKERE CITY COUNCIL

TITCH PLACE

18
353m²

8
404m²

17
475m²

9
402m²

16
395m²

15
363m²

14
433m²

10
389m²

11
353m²

13
351m²

12
374m²

69
3239m²

70
998m²

66
1451m²

32
350m²

33
383m²

31
371m²

34
411m²

30
438m²

35
415m²

29
412m²

28
413m²

27
354m²

26
451m²

71
3690m²
ROAD TO VEST
IN WAITAKERE
CITY COUNCIL

ROAD TO VEST
IN WAITAKERE
CITY COUNCIL

NEWFOUND
WAY
(IRREGULAR
WIDTH
OVER 12.50')

LOCAL PURPOSE (DRAINAGE)
RESERVE TO VEST IN
WAITAKERE CITY COUNCIL

108
DP 355110
LOCAL PURPOSE
(DRAINAGE) RESERVE

LOCAL PURPOSE (DRAINAGE)
RESERVE TO VEST IN
WAITAKERE CITY COUNCIL

65

TITCH PLACE

25

68

19

4
DP 339810

46
DP 326976
LOCAL PURPOSE
(DRAINAGE) RESERVE

7
380m²

6
379m²

5
379m²

4
379m²

3
379m²

2
379m²

1
414m²

41
42
DP 326976

17
18
19
20
37
21
22
23
24
DP 326976

FOUNDATION PLACE

WOODBANK DRIVE
LEGAL ROAD
(IRREGULAR WIDTH - 12.30 WIDE AND OVER)

TITCH PLACE
LEGAL ROAD
(15.00 WIDE)

797250 mN
797175 mN
797100 mN
388350 mE
388425 mE
388500 mE

NOTES:

1. FOR EASEMENT SCHEDULE SEE SHEET 1
2. FOR EASEMENT DIAGRAMS SEE SHEET 5

SHEET 3 OF 5

CLASS OF SURVEY: 1

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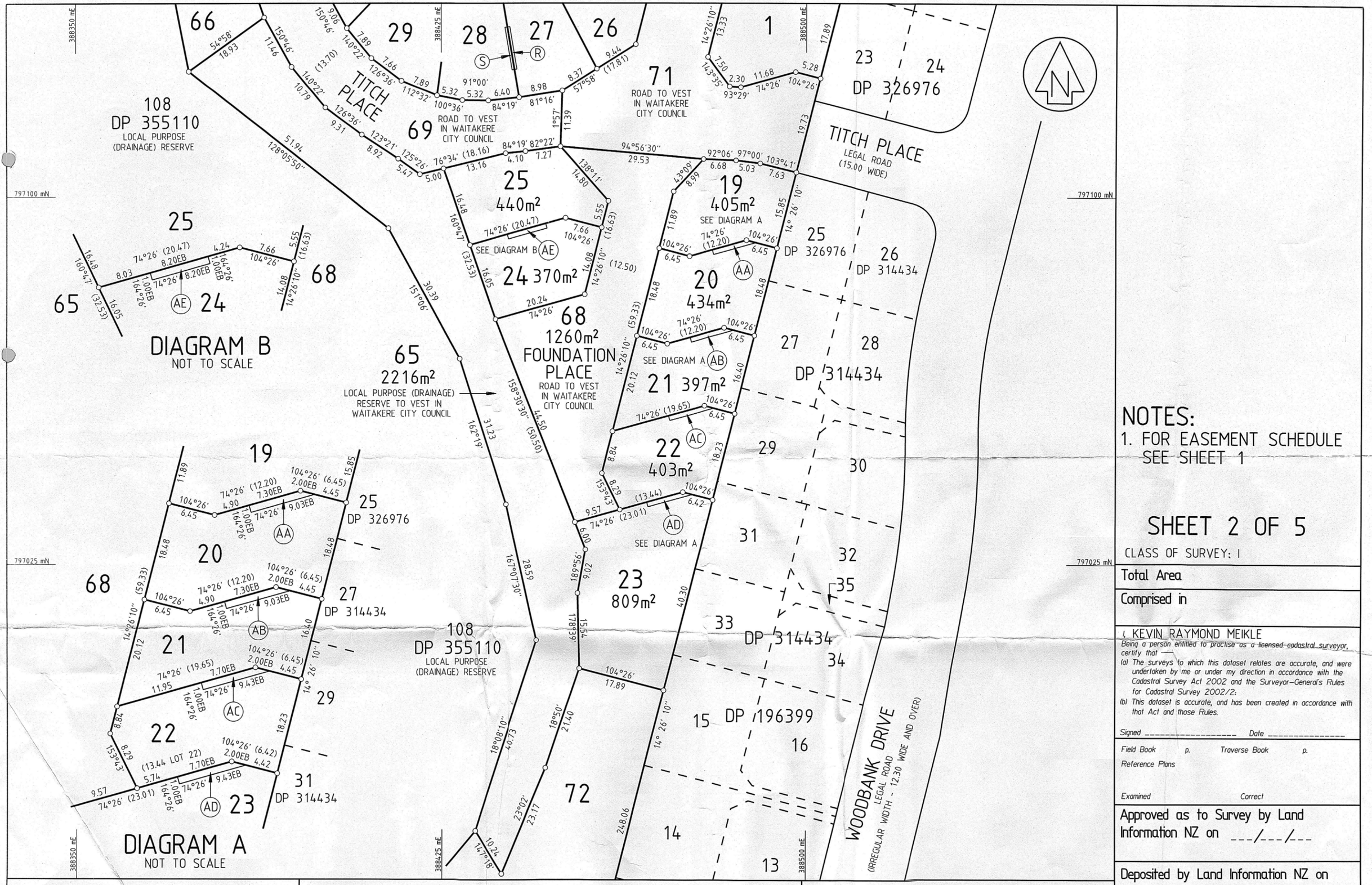

NOTES:
1. FOR EASEMENT SCHEDULE SEE SHEET 1

SHEET 2 OF 5

CLASS OF SURVEY: I

Total Area

Comprised in

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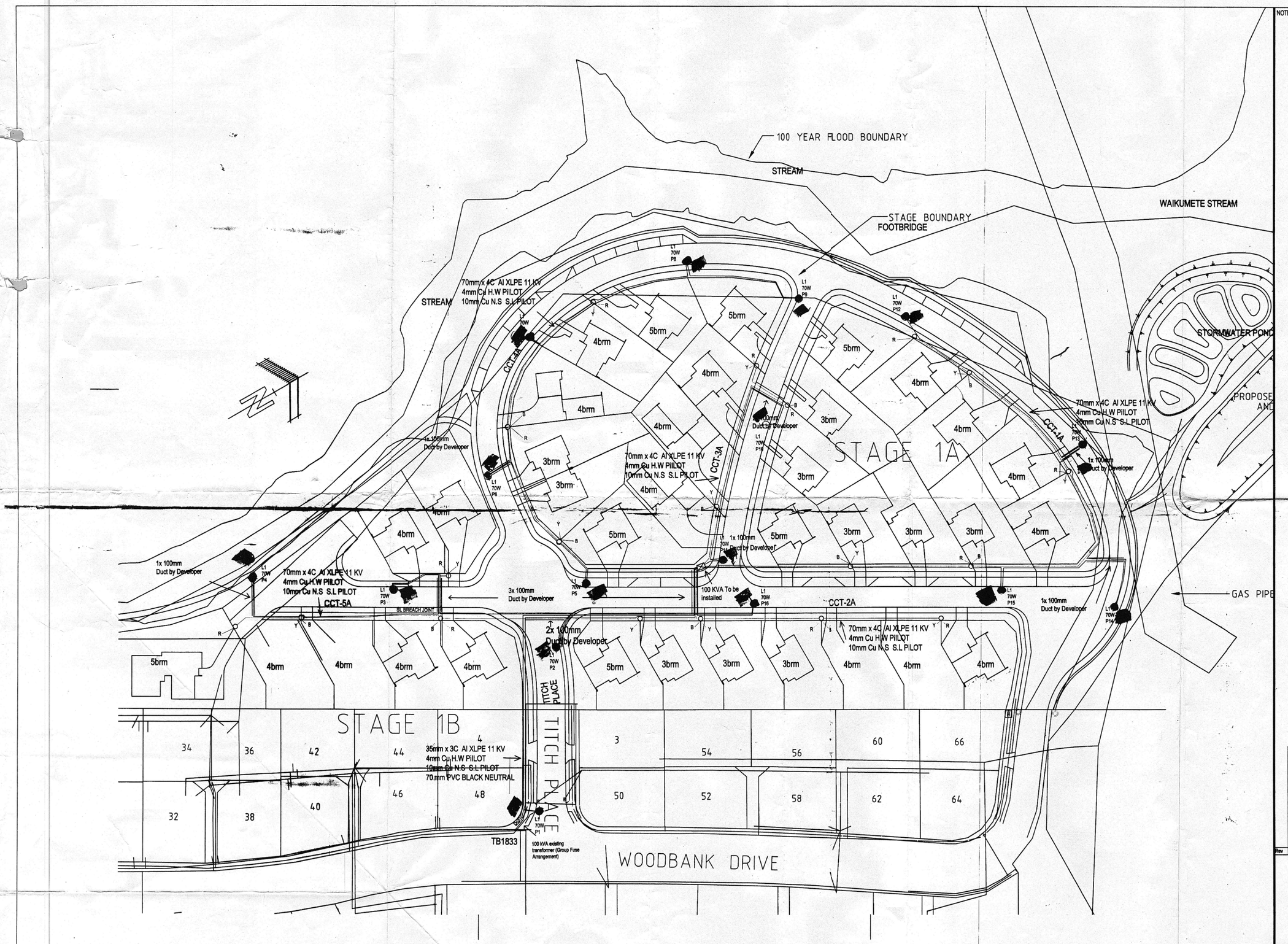

NOTES

Rev	Revision Description	By	Date

SIEMENS

SIEMENS ENERGY SERVICES LTD.
169 Bush Road, Albany.
PO Box 101-694 NSMC
Ph. (09)919 5000
Fax. (09)919 5011
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Drawing Title

West Coast Rd

Babbage Consultants

Scale	Cad File Number
1:500 (A1)	P:\Cad\Draft\????
Date	Drawn / Approved
18/05/07	C.WANG

Drawing Number	Sheet	Next	Revision
109995	1		?

Waitakere City Council
Te Taiao o Waitakere

Waitakere City Council
Waitakere Central
6 Henderson Valley Road
Henderson

Private Bag 93109
Henderson
Waitakere City 0612

Telephone
09 836 8000

24Hr Call Centre
09 839 0400

Facsimile
09 836 8001

DX CX 10250 Auckland Mail Centre
Email: info@waitakere.govt.nz

Website: www.waitakere.govt.nz

30 October 2006

New Zealand Housing Foundation
C/- Matthew Paetz
Babbage Consultants
PO Box 2027
Auckland 1140

Dear Sir/Madam

Resource Consent Application Number RMA20061077
Location: 423-429 West Coast Road, & 4 Pyramid Place, Glen Eden, WAITAKERE CITY

I am pleased to advise that your Resource Consent (Planning) application has been considered and consent has been granted pursuant to sections 93, 94, 104, and 108 of the Resource Management Act 1991.

The full report considering your application and the decision which has been made is attached. The following contains the decision on your application and the conditions which must be met for your consent to be valid:

DECISION

Pursuant to Sections 104, 104B and 108 of the Resource Management Act 1991, being satisfied that no body or person is adversely affected, it is recommended that **consent be granted** to the application by New Zealand Housing Foundation to undertake a medium density residential housing development, that under the Rules of the District Plan (as more accurately defined in Sections 3 and 4 of this report) requires resource consent for;

- Earthworks
- Vegetation Alteration
- Height in relation to Boundary
- Building Height
- Medium Density Housing
- Shared driveway
- Building, earthworks & vegetation alteration on land known by Council to be subject to inundation.

At 4 Pyramid Place & 423-429 West Coast Road, Glen Eden, being Lots 2 & 3 DP 339810 for the following reasons pursuant to Section 113:

(i) It is considered that the proposal would have no more than a de minimis adverse effect on the environment as the proposed development is in keeping with the existing neighbourhood character and amenity (as described in more detail in Section 10 above). Although the proposed development exceeds the maximum height, the level of infringement is minor and due to the topography of the site and the design of the buildings, the infringement will not be clearly distinguished when viewed from neighbouring sites. The Height in Relation to boundary infringements is considered minor and is on the internal boundaries. The amount of earthworks proposed is considered to be consistent with the scale of the development and will be adequately managed through sediment and erosion control measures, in conjunction with the site Management Plan. The proposed landscape treatment will improve the overall amenity of the site.

(ii) The proposal is considered to be consistent with the relevant assessment criteria for Discretionary Activities for earthworks, vegetation clearance and medium density housing as demonstrated in Sections 5.2 and 10.2 above.

(iii) The proposal is generally consistent with the objectives and policies of the District Plan and Part II of the Resource Management Act 1991.

Conditions imposed on the consent are as follows:

General Conditions

1. The development shall proceed in accordance with the plans titled;
   - Site Plan- West Coast Road Housing Development- Bulk and Location Study, prepared by Babbage Consultants, dated 23 June 2006 (being 1 sheet).
   - Site Plan- West Coast Road Housing Development (Bulk & Location Study)- Stage 1A & 1B- Rev A002, Stage 1C & 1D- Rev A003, Stage 2A & 2B- Rev A004, Stage 3- Rev A005, all dated June 2006.
   - Floor Plans- Type 1 House- (Sheet A101), Type 2A House- 2 Bedroom Apartment (Sheets A102-1 & A102-2), Type 2B House (Sheets A103-1 & A103-2), Type 2C House (Sheets A104-1 & A104-2), Type 3 House (Sheet A105), Type 4A House (Sheet 106), Type 4B House (Sheet A107), Type 4C (Sheet A108), Type 5A House (Sheet A109), Type 5B House (Sheet A110), Type 5C House (Sheet A111).
   - Elevation Plans- Type 1 House- (Sheet A201), Type 2A House- (Sheets A202-1 & A202-2), Type 2B House (Sheets A203-1, A203-2 & A203-3), Type 2C House (Sheets A204-1 & A204-2), Type 3 House (Sheet A205), Type 4A House (Sheet 206), Type 4B House (Sheet A207), Type 4C (Sheet A208), Type 5A House (Sheet A209), Type 5B House (Sheet A210-1 & A210-2), Type 5C House (Sheet A211-1).
   - Elevation Plans showing HIRB- Sections 1A (Rev A304), Sections 1B (Rev A305 & A306), Sections 1C (Rev A307 & A308), Sections Stage 1D (Rev A309), Sections Stage 2A (Rev A 310), Sections Stage 2A & 2B (Rev A311 & Rev A 312), Section stage 3 (Rev A313)
   - Area Summary, Rev A401, being 1 Sheet, dated 30 May 2006

   Prepared by Babbage consultants dated June 2006.

   - Roading Plan for NZ Housing Foundation, Sheet 1 (C20- Rev A) & Sheet 2 (C21- Rev A).
   - Road Longitudinal Sections, sheet 1 (C22), Sheet 2 (C23), Sheet 3 (C24).
   - Road Cross Sections, Sheet 1 (C25-A), Sheet 2 (C26-A).
   - Topographical Plan, Sheet 1 (C01- Rev A), Sheet 2 (C02- Rev A).
   - Earthworks Plan, Sheet 1 (C03- Rev B), Sheet 2 (C04- Rev B).
   - Erosion and Sediment Control Plan, Sheet 1 (C05- Rev B), Sheet 2 (C06- Rev B).
   - Sediment Control Details, (C07- Rev A)
   - Drainage Plan, Sheet 1 (C10- Rev C), Sheet 2 (C11- Rev A)
   - Stage 2 Swale Layout (C15), Stage 3 Swale Layout (C16- Rev A)
   - Wetland & detention Basin 1 Layout (C17- Rev A)
   - Pond Details Plan (C18- Rev B)
   - Detention Basin 2 Layout (C19)
   - Services Plan, Sheet 1 (C35- Rev A), Sheet 2 (C36- Rev A)
   - Stormwater Catchment Plan, Sheet 1 (C45), Sheet 2 (C46)
   - Retaining Wall Plan, Sheet 1 (C50), Sheet 2 (C51).

   prepared by Babbage Consultants and dated June 2006.

   - Typical Planting Plan House Type 4A, reference LSP-07, dated 07/08/06
   - Typical Garden Layout House type 4A, reference LSP-08 dated 15/08/06
   - Landscape Master Plan and Typical Garden Layout reference LSP-01 Rev C, dated 16/06/06
   - Landscape Master Plan, reference LSP-02 Rev C, dated 16/06/06
   - Street Tree Planting Plan 1 of 2, reference LSP-05 Rev B, dated 15/08/06
   - Street tree Planting Plan 2 of 2, reference LSP-06 Rev B, dated 15/08/06

   prepared by Soul Environments

and all of the information submitted with the application (including further information), all referenced by Council as **RMA20061077** .

2. Pursuant to Section 125 of the Resource Management Act 1991, if not given effect to earlier, this consent shall lapse five (5) years after the grant date of the consent.

3. A consent compliance monitoring fee of $1, 035 has been paid to the Council. This fee is to recover the actual and reasonable costs incurred ensuring compliance with the conditions of this consent. If, on inspection all conditions have not been satisfactorily met, a reinspection shall be required at the relevant hourly rate applicable at the time the re-inspection is carried out. The resource consent holder shall be advised of any further monitoring fees if they are required.

4. All reticulated services, including power and telephone, shall be provided underground.

5. A copy of this Resource Consent and the approved Site Management Plan to which the consent relates shall be held on site at all times that the works are being carried out. All personnel working on the site shall be made aware of, and have access to this consent and accompanying documentation.

6. The carparks for the apartments on Lot 61 shall be clearly marked prior to occupation. At least one carpark shall be allocated for each unit.

Surveyors Certificates

7. A Licensed Cadastral Surveyor shall certify to Council in writing prior to work progressing beyond the pre-lining stage that the buildings are located exactly as proposed in the application and will not exceed the degree of infringement applied for in relation to the overall height and height in relation to boundary controls of the District Plan and elsewhere complies with the height in relation to boundary and overall height rules of the District Plan. No work shall proceed beyond this stage until receipt of such certification, to the satisfaction of the Manager Resource Consents.

Earthworks Conditions

8. **Before commencement of any works and until completion of exposed earth siteworks**, adequate sediment and erosion control measures shall be constructed and maintained by the consent holder. The control measures must be maintained until the site has been adequately stabilised against erosion. The construction and maintenance shall be in accordance with Appendix 3, Erosion and Sediment Control Measures Appendix to the Natural Area Rules of the Waitakere City Council District Plan (attached as appendix A to this consent).

   Please **advise Council's Environmental Monitoring Officer when the controls are in place and await the approval of the monitoring officer** before commencing work. **The applicant should book an inspection at least 48 hours prior to the required inspection.**

9. In the event of archaeological evidence being uncovered (e.g shell, middens, hängï or ovens, pit depressions, defensive ditches, artifactual material or human bones) work shall cease in the vicinity of the discovery, the area secured, and the Council (Planning Help Desk , 839 0400) contacted. Activity on the site will remain halted until the Manager Resource Consents gives approval for operation to recommence.

10. All sediment laden runoff from the site shall be treated in accordance with the approved silt and sediment control management plan attached as appendix A to this consent. These measures are to be operational before earthworks commence, and shall be maintained until the site has been secured against erosion (whether by vegetative means, paving or otherwise). The consent holder shall notify Council's Monitoring Officer when silt and sediment control measures are in place. Work shall not commence until approval has been gained in writing from the Manager Resource Consents.

11. If the bulk earthworks are not completed within the earthworks season (1 November till April 30th) then the necessary measures shall be implemented to ensure that the erosion and sediment controls are appropriate for the winter. A written report on the progress of the earthworks and the above erosion and sediment controls from the registered engineer supervising the work shall be submitted for the approval of the Manager: Resource Consents within one month of the cessation of work.

12. All areas of exposed earth shall be top-soiled and grassed or otherwise stabilised against erosion as soon as practicable and in a progressive manner as works are complete but no later than one week following the completion of works.

13. All topsoil excavated during the course of works shall be retained on site and re-spread following the completion of earthworks.

14. All earthworks, stockpiles of earth and the storage of other construction materials/ works shall be excluded from the drip-line of all vegetation to be retained on site and from the riparian margins of streams / the coast. A protective fence shall be erected around the affected area prior to the commencement of any work on the site and shall remain in place until the completion of all works on site.

15. Stockpiles of earth shall be located as far as practicable from the stream and existing residences, to the satisfaction of the Manager Resource Consents. Approval to the landfill to be used shall be obtained from the Manager, Resource Consents prior to any work commencing.

16. All excess or unsuitable excavated material shall be removed from the site before or immediately following the completion of earthworks, to an approved disposal location and disposed of to the satisfaction of the Manager Resource Consents. Written evidence demonstrating that the excavated fill has been deposited in the approved location, should be submitted to the Manager Resource Consents in the form of producer statement, certification or similar.

17. All dirt tracked onto the surrounding roads as a result of the development covered by this consent shall be cleaned by sweeping on a daily basis at the expense of the applicant. In case of repeated non-compliance with this condition, Council may engage the road cleaning contractor nominated by the applicant to carry out the road cleaning. Council's Environmental Monitoring Officer (EMO) may engage the road sweeping contractor to carry out road cleaning if it is the EMO' opinion that the dirt on roads and/or footpath is creating an adverse effect on the environment. The road cleaning contractor shall be engaged at the cost of the applicant.

18. A full copy of the Resource Consent Conditions, Approved Plans, including site management and Erosion and Sediment Control Plans shall be kept on the site at all times. All personnel working on the site shall be made aware of and have access to the contents of this consent document and the associated Site Management and Erosion and Sediment Control Plans.

19. All necessary action shall be taken to prevent a dust nuisance to neighbouring properties; including, but not limited to, the staging of areas of works, the retention of existing shelter belts and hedgerows, the installation and maintenance of wind fences and vegetated strips, watering of all haul roads and manoeuvring areas during dry periods, spraying of load dumping operations, and suspension of all operations if necessitated by the prevailing conditions to the satisfaction of the Manager Resource Consents. The site, or parts thereof as appropriate, shall be re-grassed or otherwise protected from wind erosion immediately on the completion of bulk earthworks whether or not other works are completed.

20. A stabilised entranceway to the site shall be provided prior to the commencement of works and maintained for the duration of works. Additional measures such as wheel wash facilities shall be implemented (as) if deemed necessary by Council's Environmental Monitoring Officer to prevent the deposition of earth or other debris on the surrounding street network by vehicles entering and exiting the site. Roads, footpaths, berms and kerbs including entry and exit points to the site shall be kept free from damage and clear of mud and debris at all times Any material deposited on the street shall be immediately removed by sweeping and any damage caused shall be immediately repaired at the expense of the consent holder. The consent holder shall notify Council's Monitoring Officer when entranceway controls are in place. Work shall not commence until approval has been gained in writing from the Manager Resource Consents.

21. **The development works associated with the subdivision are to be carried out in accordance with NZS 6803P:1984 "The Measurement and Assessment of Noise from construction, Maintenance and Demolition Work" with the exception of the hours of work, which are to be limited as follows:**

Monday to Friday:	**7.30 am to 7.00 pm**
Saturday	**8.00 am to 5:30 pm**
Sunday and Public Holidays:	**No work**

Vegetation Conditions

22. Landscape development on private lots including framework planting shall be in general accordance with the Landscape Master Plan and Typical Garden Layout, Drawing LSP-01 Rev C and LSP-02 Rev C, both dated 16.06.06 and in accordance with the Street Tree Planting Plan 1 of 2 Drawing LSP-05 Rev B, and Street Tree Planting Plan 2 of 2 Drawing LSP-06 Rev B both dated 15.08.06 by SOUL Environments and the 'Additional information on proposed planting' Rev C, received at Council 16 October 2006, and shall be established to the satisfaction of Council's Environmental Monitoring Officer, Resource consents.

23. On site planting for each private lot shall have the framework tree planting and fencing as per the afore-cited plans and shall have lawn areas, gardens, paving and other site features, in general accordance with the 'Typical Planting Plan House Type 4A, dated 7.08.06 and 'Typical Garden Layout House Type 4B' dated 16.08.06 plans and associated planting schedule by Soul submitted with the application, and shall be to the satisfaction of Council's Environmental Monitoring Officer, Resource Consents.

24. Grassed areas shall be manually graded to be flush with adjacent paved or retained areas and, in association with garden areas, shall be prepared prior to occupation of units and establishment of any proposed fencing. Fences and gates shall be set in place following final forming of ground levels including grassed areas. Garden areas and grassed areas shall be good quality topsoil or garden mix (50:50 topsoil and compost), weed and debris free with garden areas to 300mm minimum depth and grassed areas to 200mm minimum depth and shall be to the satisfaction of Council's Environmental Monitoring Officer Resource Consents.

25. Planting shall be set in place in the first planting season (May till 7th September) following use of each dwelling unit to the satisfaction of Council's Environmental Monitoring Officer, Resource Consents. If the development is staged then the landscape development including planting shall be staged accordingly.

26. Any tree planted within a grass area shall be within a 600mm diameter weed and debris-free garden area with a woodchip mulch to 60mm depth, and with two marker stakes 50mm x 50mm x 1.2m per tree (ties not required).

27. Lawn areas and gardens shall be watered as necessary to facilitate establishment, and with gardens kept weed free on an ongoing basis for the first two years following initial planting, to the satisfaction of the Environmental Monitoring Officer, Resource Consents. Any tree or plant that dies, is removed or otherwise fails to establish shall be replaced the following planting season and shall be maintained for a further two years to the satisfaction of the Environmental Monitoring Officer, Resource Consents.

28. All vegetation works shall be undertaken in accordance with Subdivision Conditions (PK 1) – (PK 10).

Transport Assets

29. All transport assets conditions shall be completed to the satisfaction of the Manager, Transport Assets and shall be in accordance with the conditions outlined in the subdivision consent (See the subdivision consent RMA 20061078 for exact requirements and detail).

Geotechnical Conditions

30. A geotechnical investigation shall be completed by an experienced geotechnical engineer for the detailed design of earthworks at the site. This shall include recommendations for the batter slopes and an assessment of overall stability off site slopes (supported by limit equilibrium analysis), consolidation characteristics of the soils, fill quality and compaction requirements. All the requirements for constructing and controlling engineered fill shall be detailed. The report on this work shall accompany the earthworks construction management report.

31. Groundwater drainage measures for the development shall be designed by an experienced geotechnical engineer, taking into account existing information on shallow groundwater levels, anticipated maximum winter high and summer low groundwater levels, and potential effects on adjacent developed properties or roadways.

32. Building consents shall be required for the retaining walls which shall be no higher that 2.0 metres on all boundaries.

33. Pavement designs shall be confirmed by an experienced geotechnical engineer following the completion of earthworks.

34. A producer statement must be provided on completion of earthworks together with an earthworks completion report stating what requirements if any are necessary for the individual lots.

35. Unless there is clear evidence in the earthworks completion report to be provided by an engineer that NZS 3604 requirements have been fully met, all foundations shall require specific design.

36. Foundations of all lots shall be verified by an experienced geotechnical engineer familiar with the geotechnical report and shall take into account the potential for shrink/swell behaviour.

37. Stormwater pond construction shall be supervised by an experienced engineer familiar with the geotechnical report.

38. The proposed stormwater management systems to be used during construction shall be reviewed by an experienced engineer familiar with the geotechnical report.

39. The proposed stormwater management systems to be used during construction shall be reviewed by an experienced engineer familiar with the geotechnical report.

PARKS CONDITIONS

Please contact the Parks Assets Planning Co-ordinator on 836-8000 (extension 8768) to book an inspection.

(PK 1) Carry out the removal of environmentally damaging plants from all lots including the proposed esplanade reserve, as listed in the Waitakere City Council Proposed District Plan. Submit a Weed Control Programme to the satisfaction of the Manager, Resource Consents within 2 months of the issue of this consent. This Weed Control Programme shall be implemented on the site within 6 months of the date of issue of this resource consent to the satisfaction of the Manager, Resource Consents. The programme needs to include:

a) an inventory of the weed species to be removed;
b) removal techniques to be utilised; weed disposal methods;
c) time frames for work and whether the weed removal needs to be staged (particularly relevant for sensitive areas such as coastal edges or riparian margins);
d) any re-vegetation programme required to prevent re infestation of weeds;
e) an assessment of any ecological issues around the removal of vegetation;
f) methods for addressing stability and erosion and sediment control methods.

(PK 2) Enter into a registerable fencing agreement with Council in regards to Lots 23, 24, 25, and 46 – 60 to the effect that the Council will not be liable to contribute towards the cost of creating or maintaining any dividing fence between any reserve or other land vested in or administered by the Council. Also, that any fences facing the reserve shall be of visually permeable construction such as swimming pool fencing and 1.2metres maximum height in order to ensure good surveillance of the reserve, and to reduce the likelihood of graffiti.

(PK 3) Prior to work commencing on the site, protective fencing shall be placed around the dripline of the Totara (#4), Kahikatea (#7), Cabbage (#13), Pear (#10) and groups of native revegetation (references #4 and #6) as shown on the plan titled "Housing Foundation HZ, West Coast Road Development (Part of 423-429 West Coast Road) vegetation and major features, Sheets 1 & 2", dated 12 June 2006 prepared by Willy Coenradi. The fencing shall remain in place throughout the vegetation alteration, earthworks and construction stages.

(PK 4) Monitoring of the health of the vegetation referenced in (2) above shall be undertaken prior to the commencement of, and during the vegetation alteration, earthworks and construction stages. This monitoring shall be undertaken by an appropriately qualified arborist engaged by the applicant in conjunction with a WCC arborist to provide progressive on-site assessment of the effects of the work on the health of the Riparian vegetation.

(PK 5) That a silt fence and dirty water diversion run-off bund as depicted on the Erosion and Sediment Control Plan prepared by Babbage Consultants dated 23/06/06 contained in Appendix 10 of the application shall

be implemented along the full length of the western side of the stream to the satisfaction of prior to Parks Consent Planner prior to earthworks or vegetation alteration commencing on the site.

(PK 6) Landscaping and street tree planting is to be established within the development to the satisfaction of the Parks Consent Planner. The landscaping and street tree plans prepared by SOUL Environments specifically:

- Landscape Master Plan dated 16/06/06 Revision C Reference LSP-01
- Street Tree Planting Plan, Plan 1 of 2 and 2 of 2, dated 15/08/06 Revision B
- Accompanying information titled "NZ Housing Foundation Babbage Consultants 423 -429 West Coast Road, Henderson. Additional information on proposed planting 13-October-06, Revision C".

are to be implemented in accordance with WCC parks guidelines and subject to the following:

(i) That the bollards along the road frontage of the drainage reserve at the northern end shall be implemented in accordance with the WCC Code of Practice Standard Detail 7.17 and 7.71. That a 3 metre chain entry for maintenance access to the stormwater pond and wetland area shall be located in an appropriate location to the satisfaction of the Parks Consents Planner.

(ii) Street Lighting shall be implemented in accordance with the WCC Code of Practice Section 3.3.14 and Standard Detail 7.91 attached and located so as to not conflict with street tree planting.

(iii) In accordance with Section 7.3.7.3 of the WCC Code of Practice all footpath concrete paving in the reserve shall be 1.5 metres wide and exposed aggregate.

(iv) That the plants along the footpath adjacent to the Stream shall be low level and set back a suitable distance so as to not restrict access or visibility along the pathway.

(v) That the parking areas provided on the streets adjacent to footpaths shall be curbed or wheel stops implemented to the satisfaction of the Parks Consent Planner.

(vi) All plants shall be best nursery stock, healthy vigorous and eco-sourced.

(PK 7) The street tree planting shall be implemented to the satisfaction of the Parks Consent Planner. All plantings are to be in accordance with the WCC parks guidelines, Code of Practice and the landscape specification submitted with the Landscape Plan. An option exists for the applicant to pay Council the cost of supplying, planting and staking of street trees per plan, to carry out the planting of street trees following the completion of the building works. The cost for this would be $153 plus GST per tree (the current contract price for supply, planting, and staking of a PB95 tree as at April 2003).

(PK 8) The details of the pedestrian footpath, footbridge and boardwalk shall be finalised at the Engineering Plan stage to the satisfaction of the Parks Consent Planner. Engineering plans for the footpath, footbridge and boardwalk shall be submitted within 3 months of the issue of this consent. All works shall comply with the Waitakere City Council Code of Practice for City Infrastructure and Land Development. The developer must advise the Parks Consent Planner of when work will commence and prior to any works being carried out. Engineering plan details shall be provided at Engineering Plan stages for the following:

(i) The exposed aggregate footpath alignment details shall be to a width of 1.5m and constructed in accordance with the Waitakere City Council Code of Practice for City Infrastructure and Land Development Standard Detail 7.102 for Parks Walkway Types attached.

(ii) That the footbridge shall be constructed in accordance with the Waitakere City Council Code of Practice City Infrastructure and Land Development Standard Detail 7.106 for Typical Foot Bridge attached.

(iii) The boardwalk along the stream shall be constructed in accordance with the WCC Code of Practice Standard detail 7.105 for Typical Boardwalk attached.

(PK 9) Ensure that the reserves are left in a condition suitable for maintenance and mowing in accordance with section 7.3 of the WCC Code of Practice and to the satisfaction of the Parks Asset Planner.

Ecowater Conditions

(Eco 1) All infrastructure relating to stormwater treatment and disposal, wastewater disposal, and water supply shall be designed and completed to the satisfaction of Councils Drainage Engineer. (Compliance with the Waitakere City Council Code of Practice for City Infrastructure and Land Development is deemed to be in accordance with the above condition). (See the subdivision consent RMA 20061078 for exact requirements and detail).

Advice Notes:

1. Where indicated in the conditions it is the consent holders' responsibility to inform the Environmental Monitoring Officer when inspection is required. Inspections can be requested through the Call Centre on 839 0400.

2. Prior to the commencement of works the resource consent holder shall obtain all consents, permits and authorisations for the work as may be required by the Auckland Regional Council.

3. A condition of consent relating to the payment of a maintenance bond for landscaping has not been included under this Land Use consent but will be a condition of subdivision. It is the applicant's responsibility to ensure that this condition is complied with before issue of 224c under the subdivision consent (RMA20061078).

End of Conditions

Compliance with the above conditions will be monitored by Councils Environmental Monitoring Officer in accordance with section 35(d) of the Resource Management Act. This will typically include site visits to verify compliance (or non compliance) and documentation (site notes and photographs) of the activity established under the Resource Consent. Only after all conditions of the Resource Consent have been met, will Council issue a letter of compliance on request of the applicant.

Please note also that you must complete the activity that is consented to within five (5) years including compliance with the conditions of consent. If that does not happen the consent lapses and you may need to apply for an extension or a new consent. **Note: Your consent lapses on 1st November 2011.**

Please contact Felicitas Dhliwayo (extn 8352) of the Resource Consents Section if you have any general queries about the enclosed report or decision.

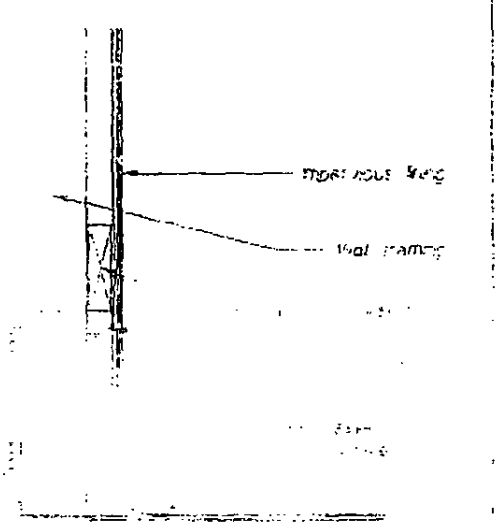
Yours faithfully

Michael Campbell
MANAGER RESOURCE CONSENTS

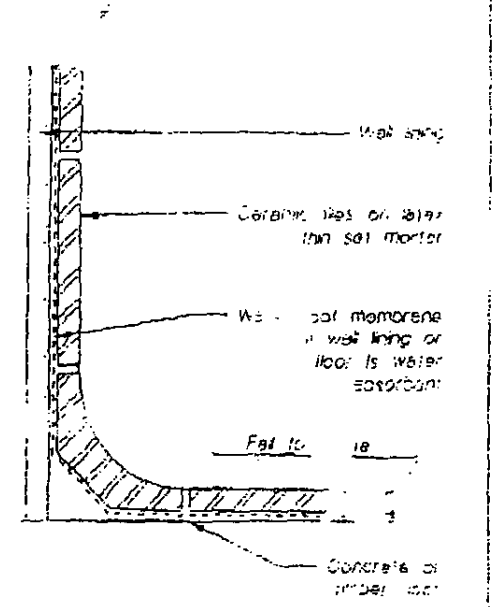
3.2.5 Shower trays

Shower trays and bases shall have upstands for the full perimeter (see Figure 7) except that shower trays and bases for *people with disabilities* shall have level thresholds.

Figure 7. Shower trays
Paragraph 3.2.5



Stainless steel shower tray



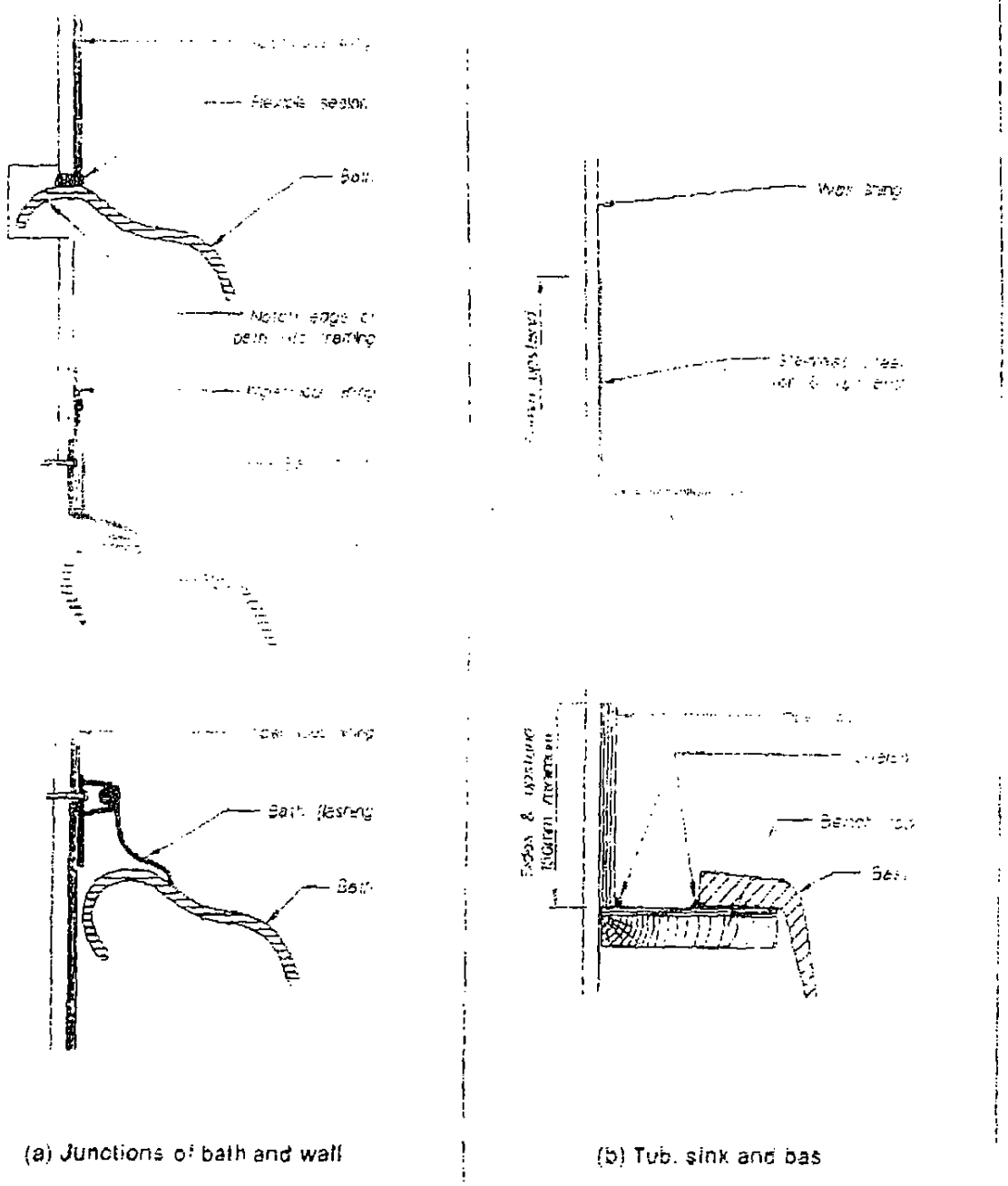
Tiled shower tray

3.2.6 Joints between baths, basins, tubs or sinks, and wall linings

Where baths, basins, tubs or sinks abut *impervious* linings, the joint between *fixture* and lining shall be sealed to prevent water penetration to *concealed spaces* or behind linings. (See Figures 8(a) and (b)).

Figure 8 Baths, basins, tubs and sinks, joints against wall linings

Paragraph 3.2.6



(a) Junctions of bath and wall

(b) Tub, sink and bas

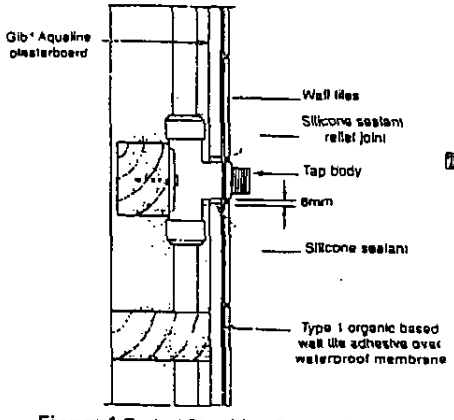


Figure 1 Typical Plumbing Penetration
(Where impact noise from pipes is an issue surface fix all pipes on resilient brackets)

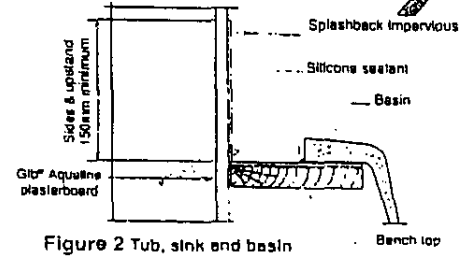
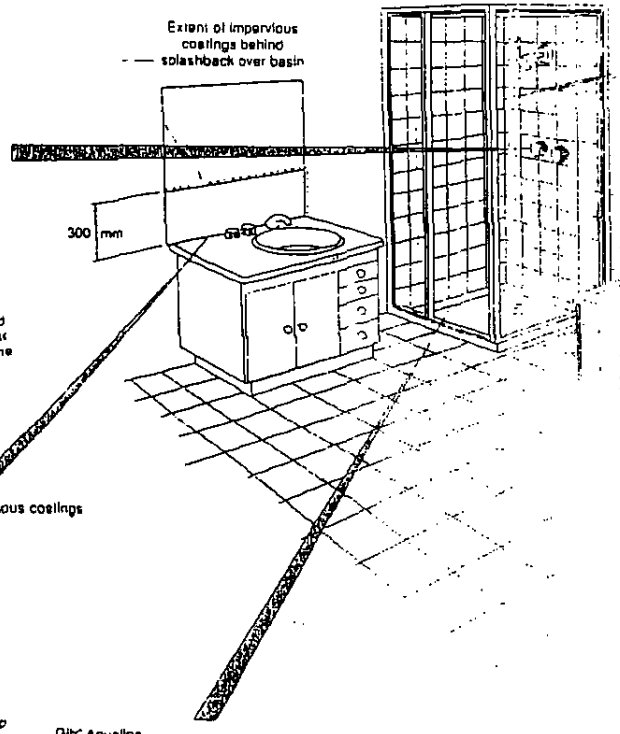


Figure 2 Tub, sink and basin



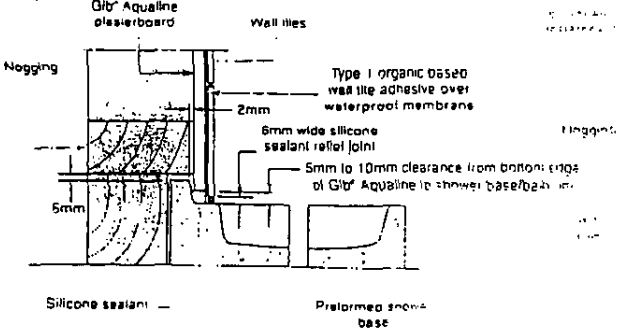
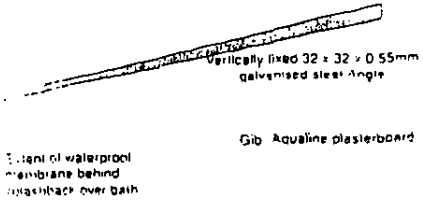


Figure 3 Preformed Shower Base Wall Junction
(Suitable where fire and sound ratings are not critical)

Notes:
- Silicone sealants shall be of the mould inhibited type.
- For details on Fire Rated and/or Noise Control systems, refer pages 16, 17.



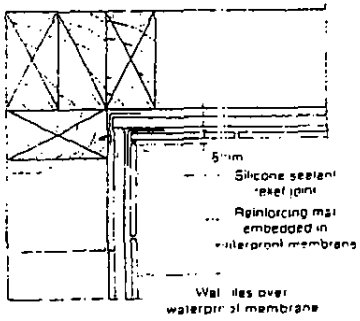
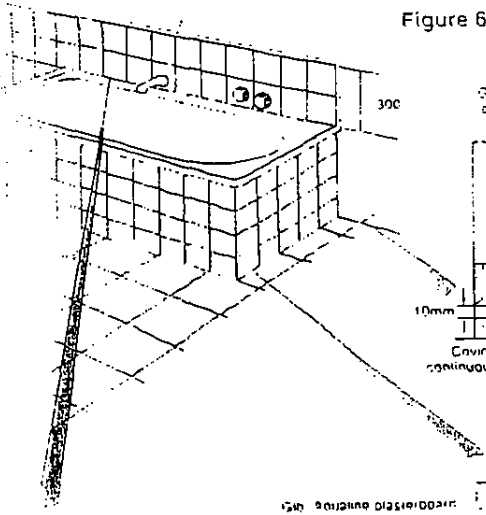
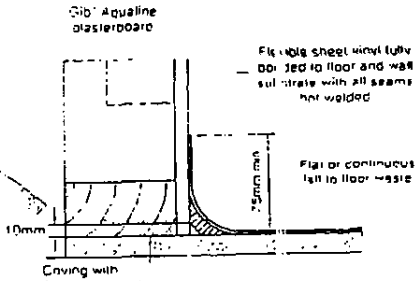
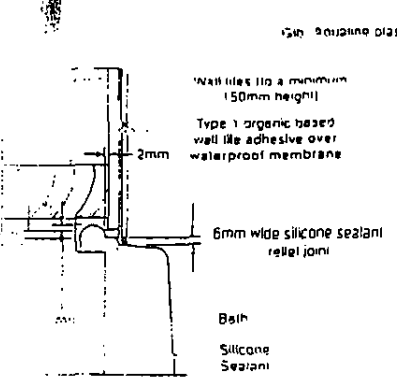


Figure 6 Tiled Shower – Internal Corner Detail

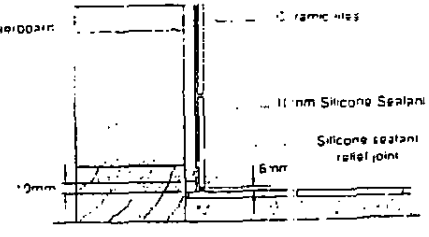




(a) Vinyl floor covering



(b) Bath Wall Junction Detail
(Suitable where fire and sound ratings are not critical)



(b) Ceramic tile covering

Figure 5 Wall to Floor Junctions
Bathrooms, Kitchens and Laundries

Premixed & 2 part Bathroom & Balcony

Product Description

Superflex Premixed Bathroom & Balcony is a tough, ready to use waterproofing membrane specifically designed for use under tiles. Superflex Two Part Bathroom & Balcony is a fast drying two component waterproofing membrane specifically designed for use under tiles. The products have been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. Superflex Premixed & Two Part Bathroom & Balcony are based on the most advanced acrylic polymer technology, and are totally resistant to re-emulsification. Both products are flexible, safe to use, low in odour, and is fully compatible with polymer modified tile adhesives. Superflex Premixed Bathroom & Balcony is one of the fastest drying one part acrylic membranes on the market - normally ready to tile in 48 hours @ 23°C

Features/Benefits

Features	Benefits
Fast drying	Superflex Premixed Bathroom & Balcony can be tiled over in 48 hours @ 23°C/50%R.H. Superflex Two Part Bathroom & Balcony can be tiled over in 4 hours @ 23°C/50%R.H. in non critical areas*
Liquid reinforced	Excellent strength, eliminates need for reinforcing mat
Flexible	Accommodates normal building movement
Advanced acrylic polymers	Will not re-emulsify
Designed for tiling system	Fully compatible with ABA tile adhesives
Water based	Safe to use, low odour & easy cleaning
[illegible] Appraisal	Approved for underslab waterproofing in the recessed bathroom [illegible] independent building authority

Superflex Premixed Bathroom & Balcony - Appraisal #91
Superflex Two Part Bathroom & Balcony - Appraisal #208
* Critical areas include areas where the membrane is applied at greater than [illegible] over impermeable substrates such as over bond breakers or incorporating other reinforcement. Longer drying times are necessary in these areas.

Application Range

Performance Levels
Commercial and residential

Location
Internal wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic.

Surfaces
Walls & floors

Substrates

Concrete	Cured for min. 28 days or sealed when set with one coat of Abaseal at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet concrete should be allowed to dry thoroughly or sealed with one coat of Abaseal as above
Renders and screeds	Cured for min. 7 days or sealed when set with one coat of Abaseal at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet render should be allowed to dry thoroughly or sealed with one coat of Abaseal as above.
Fibre cement sheets	Suitable for wet area grade fibre cement.
Plasterboard	Wet area grade only
Plywood	Structural plywood (PAA branded) or marine grade
Particleboard	Wet area grade, internal use only (special preparation is required - contact Ardex)
Permanently immersed	In conditions of permanent immersion it is recommended that Superflex Two Part Bathroom & Balcony is used.

Contact Ardex Australia for use over existing membranes, covering materials, and any other substrates not listed.

Specification clause

Superflex Premixed Bathroom & Balcony
The waterproofing membrane shall be Superflex Premixed Bathroom & Balcony a one part acrylic modified fibre reinforced membrane formulated to provide a tough, long lasting water barrier under tiling systems.

The waterproofing membrane shall be Superflex Two Part Bathroom & Balcony: a two component cementitious acrylic modified fibre reinforced membrane formulated to provide a tough, long lasting water barrier under tiling systems.

Packaging

Superflex Premixed Bathroom & Balcony
Single component: 20 kg (approx 15 litres) or 6.5kg (approx 5 litres)
Superflex Two Part Bathroom & Balcony
Two component: 20 kg liquid pail / 2 x 10 kg bags powder

Shelf life

12 months when stored in the original unopened packaging, in a dry place at 23°C. Do not store in direct sunlight. Replace lid tightly after use. Use remaining contents from part used containers within 3 months.

Coverage

Two coats are recommended as an effective waterproof membrane
Coverage will vary depending on the porosity of the surface.
Superflex Premixed Bathroom & Balcony
One 20kg (15 litre) unit will cover approximately 9-11m² (based on two coats) depending on area requirements between wall and floor surfaces to be treated.
Superflex Two Part Bathroom & Balcony
One 40kg unit will cover approximately 18-20m² (based on [illegible] depending on area requirements between wall and floor surfaces to be treated.

	Product	Thickness per Coat		Total Dry Film Thickness (2 coats)	Theoretical Coverage			Unit
		Dry Film	Wet Film		Per coat	For 2 coats		
FLOORS	Superflex Premixed	0.5mm	1.0mm	1.0mm	15 m²	5m²	Per	20kg(15L) unit
FLOORS	Superflex Two Part	0.6mm	0.9mm	1.2mm	32 m²	16m²	Per	40 kg unit
WALLS	Superflex Premixed	0.25mm	0.5mm	0.5mm	30 m²	15m²	Per	20kg(15L) unit
WALLS	Superflex Two Part	0.4mm	0.6mm	0.8mm	48 m²	24 m²	Per	40 kg unit

Drying times

Recoat time
1-2 hours (at 23°C/50% RH) between first and second coats. Alternatively, if a polyester mat is used between coats then the second coat can be applied whilst the first coat is still wet

Dry through
The slowest drying areas are those where the membrane has been applied over a silicone bond breaker, eg. wall and floor junctions. The membrane cannot be tiled over until these critical areas are completely dry. The Superflex Premixed Bathroom & Balcony membrane is totally dry in 48 hours at 23°C / 50% RH, but can take up to 72 hours at 10°C / 50% R.H. The Superflex Two Part Bathroom & Balcony membrane is totally dry in 24 hours at 23°C/50% RH but can take up to 48 hours at 10°C/50%RH
In areas where bond breakers or additional reinforcement are not used the Superflex two part bathroom and balcony can be tiled over after 4 hours at 23°C/50% R.H.

Fully cured
The shower should not be used until the membrane has reached its full strength The Superflex Premixed and Two Part Bathroom & Balcony membranes are fully cured 3 days after they have been applied at 23°C, or after 5 days at 10°C. Drying times will vary depending on humidity, surface temperature and surface porosity. Do not apply on substrates where the surface temperature is below 10°C or above 35°C.

wash hands, brushes, rollers, etc, with water while the membrane is still fresh. Remove cured material with mineral turpentine.

Precautions

Do not use the product in the following situations:

- areas subject to negative hydrostatic pressure or rising damp
- [illegible] coverage rate of 3.0 square metres per litre and allowed to cure overnight
- where rain is imminent
- where the membrane will be left exposed and subjected to regular foot traffic.
- on glazed, glass or other totally impervious surfaces (e.g.areas pre-treated with water repellants)
- where the surface temperature is below 10°C or greater then 35°C
- All floor areas must have adequate falls either built into the substrate or achieved with a sand/cement screed prior to application of the Superflex Premixed or Two Part Bathroom & Balcony. For substrates or situations other than those listed contact Ardex.

Safety data

Superflex Premixed and Two Part Bathroom & Balcony is non-toxic. However, the contents should not be swallowed or inhaled. In case of eye contamination, rinse thoroughly with clean water. If irritation continues seek medical advice. Material Safety Data sheets are available from Ardex upon request.

Quality Endorsed Company

Manufactured under a quality system certified as complying with ISO 9001 by an accredited certification body. Material Safety Data Sheets are available upon request.

User notes

[illegible] data sheet [illegible] good faith and based on the best of our knowledge and experience at the date of printing. It is the responsibility of the user to ensure the product is used in accordance with Ardex instructions and in applications for which they are intended.

Application tools

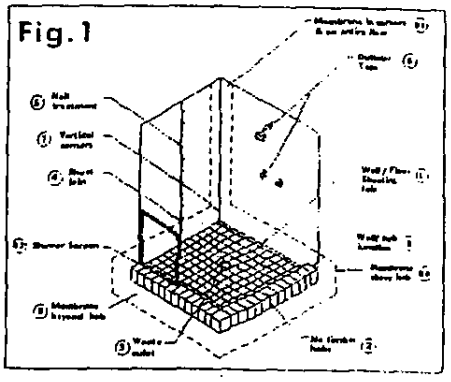
Apply Superflex by brush or roller. A medium nap (8-12mm pile) paint roller is recommended. New rollers should be dampened with water before being used for the first time. For best result with a paint brush use a good quality, 50 mm long bristle variety.

Critical Areas

1. construction should be in accordance with Australian/New Zealand Standard 3740
2. all render and tile bed requirements should be completed before application of the membrane. Tiles or other floor coverings should be direct bonded to the membrane.
3. ensure wall & floor sheets are installed as per sheet manufacturers recommendations.
4. ensure suitable brick/concrete hobs are used (do not use timber), and that the top of the hob does not slope outwards
5. ensure that falls to the waste are min 1:60 (i.e. approx. 30mm in 2mtr) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor
6. avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at the bottom edge, and sheet joints are treated with neutral cure silicone sealant or PVC duct tape
7. treat nail and screw holes with neutral cure silicone sealant
8. seal the perimeters of taps, shower outlets and waste outlets with neutral cure silicone sealant
9. apply a bead of neutral cure silicone sealant to all horizontal and vertical corners
10. apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls
11. apply the membrane to the entire shower recess floor and down into waste or drainage flange. Apply the membrane over the hob and at least 100mm beyond the outside edge of the hob (ideally to entire wet area floor)

Shower Recess - Critical Areas

Fig.1

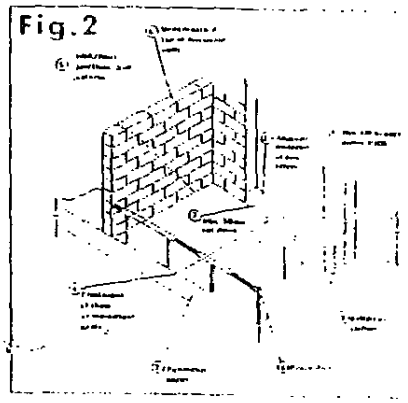


the shower recess
13. install the shower screen to inside edge of the hob

Balconies and decks

1. ensure that the deck is constructed with falls to edge /drains on min 1:100 (i.e. 20mm in 2mtr) or else achieve the fall with a sand/cement screed
2. [illegible] floor level (i.e. top of tiles)
3. ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/sliding door
4. treat any sheet joints with a neutral cure silicone prior to waterproofing
5. prepare and seal all wall/floor junctions with a bead of neutral cure silicone
6. apply the membrane up the step down and as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door)
7. where possible, apply the membrane prior to building divisional walls
8. apply the membrane to the entire balcony floor and at least 50mm up the wall (or to the first course of bricks)
9. apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping
10. apply the membrane down over the front edge of the balcony onto the drip rail
11. carefully seal any gaps around the balcony penetrations prior to applying the membrane
12. apply the membrane [illegible] removed
13. ensure all weep holes [illegible] membrane application

Balcony - Critical Areas



Application Notes

Surface preparation:

- Ensure all surfaces are structurally sound and dry. All sheet substrates must be securely fixed in accordance with the manufacturers instructions.
- Falls to the outlets of at least 1:60 (25mm in 1.5m) in internal wet areas or 1:100 (20mm in 2m) for external decks should be created prior to tiling. If the falls have not been built into the substrate they must be achieved with a suitable sand/cement screed.
- The surface to be coated should be free from dust, oil, paint, curing compounds and any other contaminating materials.
- Damaged concrete should be repaired (levelled) and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.
- Remove laitance on concrete or screeds by mechanical means.
- Highly dense (>40Mpa) or steel trowelled concrete should be roughened by mechanical means (shot blasting, grinding, etc).

Priming:

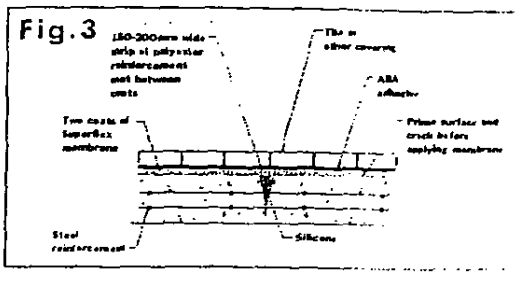
The primer is a critical part of the waterproofing system. Apply one coat of Superflex water based primer by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to be completely dry prior to the application of the Superflex membrane. This will take around 20-30 minutes depending upon the weather conditions and porosity of the substrate. Coverage is approximately 6m² per litre. Plastic (e.g. PVC) pipes should be primed with a solvent based plumbers pink primer. Prime metal surfaces with a suitable metal primer such as epoxy polyamide primer.

General Application

Crack preparation:

Cracks < 2mm: clean and remove any loose particles in the crack. Prime the area carefully with Superflex water based primer and allow to dry before applying two coats of Superflex membrane, in a 200mm wide band, along the length of the crack.

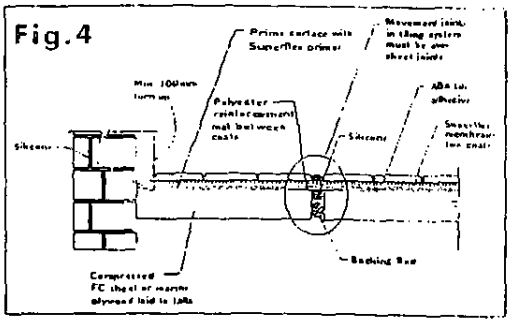
Crack Treatment



or neutral cure silicone into the crack and extend it 5mm either side.
Apply a 300mm wide band of Superflex Premixed or Two part Bathroom & Balcony along the entire length of the crack.
Place a 190 mm wide band of "Deckweb" polyester woven cloth reinforcement removing all creases or air pockets in the mat. Immediately apply a second coat to completely fill the mat. Cracks > 6mm: contact your local Ardex representative.

Movement joints (<6mm): clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 5mm each side of joint. Apply a 300mm wide band of Superflex Premixed or Two part Bathroom & Balcony along the entire length of the joint and whilst still wet install a 190 mm wide strip of reinforcing mat into the membrane.
Whilst still wet apply a second coat of the membrane removing any air pockets in the mat.

Movement Joints



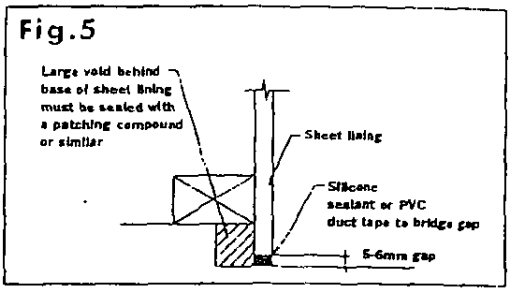
Construction joints (>6mm): use the same procedure as above, but replace the reinforcing mat with Superflex Joint Bridging Band.
Note: If tiling, movement joints should be taken to the surface of the tiles. Fill the joints between the tiles immediately above the movement joints with an appropriate joint sealant.Whilst still wet apply a second coat of the membrane removing any air pockets in the mat.

Corners and Covering Areas:
After priming with Superflex water based primer and allowing to dry, apply a generous bead (10mm) of neutral cured silicone sealant in corners and covering areas and trowel. Spread on the silicone bead extends 50mm [illegible] and 50mm over the floor and allow to touch dry. Apply a first coat of Superflex Premixed or Two part Bathroom & Balcony to the area and also the membrane to the wall. Apply a second coat ensuring that excess product is removed from the junction (the final dry film thickness should be around 1.0 mm)
Alternatively, if a polyester reinforcement mat is used between coats then the second coat can be applied as soon as the mat is fully bedded into the first coat.

Wall/Floor Junction

Walls:
After priming with Superflex primer and allowing to dry, apply two coats of Superflex Premixed or Two part Bathroom & Balcony (to achieve a minimum dry film thickness of 0.5 mm) in two opposite directions.
Wall sheets joints should be treated with a neutral cure silicone, PVC duct tape or base jointing compound. In balcony situations take the membrane up underneath any existing cover flashing or install appropriate flashing. Allow the first coat to dry before applying the second coat.

Wall/Floor Junction



Floors:
Two coats of Superflex Premixed or Two part Bathroom & Balcony are required to achieve the correct dry film thickness of 1.2 -1.5mm a minimum dry film thickness of 1.0 mm. Prime the surface with Superflex primer and allow to dry. Apply the first coat over the primed surface and allow it to dry (1-2 hours at 23°C, 50%RH) before applying a second coat in an opposite direction. In shower recesses a drainage flange must be installed on all timber / sheeted floors, and are strongly recommended on all other substrates. Where possible rebate the flange into the floor. Seal the perimeter of the flange with neutral cure silicone treatment If a flange is not installed the membrane must be applied down into the pipe.
Allow the membrane to dry completely before tiling. Refer to drying times above.

CSIRO
BUILDING PRODUCTS & SYSTEMS
Appraisals

Technical Assessment 91

'Superflex Premixed Bathroom & Balcony' Liquid Waterproofing Membrane System

Assessment

The 'Superflex Premixed Bathroom & Balcony' Liquid Waterproofing Membrane System as manufactured by Ardex Australia Pty Ltd, Seven Hills, New South Wales, is suitable for use as a waterproofing membrane for shower recesses, walls and floors which are to be tiled if the conditions listed in CSIRO Appraisals Technical Assessment 91 are fulfilled.

Applicant

Ardex Australia Pty Limited (ABN 82 000 550 005), 26 Prince William Drive, Seven Hills, New South Wales 2147 (manufacturer).

Term of Validity

Until August 2007.

P. Bailey
Project Leader
CSIRO Appraisals

BRANZ APPRAISED

SPECIFY WITH CONFIDENCE

BRANZ Appraisals

Technical assessments of products, construction and systems

BRANZ APPRAISAL CERTIFICATE No. 472 (2005)

SUPERFLEX™ WET AREA MEMBRANES

BRANZ

WFTAO

1.1 Superflex™ Wet Area Membranes are premixed and two-part, liquid applied waterproofing membranes for use under ceramic tiles in internal wet areas.

Scope

2.1 Superflex™ Wet Area Membranes have been appraised for use as waterproofing membranes for internal wet areas of buildings, within the following scope:

- on floor substrates of concrete, flooring grade particleboard, plywood, and fibre cement sheet tile underlay, and on wall substrates of wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
- when protected from physical damage by ceramic tiles; and,
- where floors are designed and constructed such that deflections do not exceed 1/360[a] of the span.

2.2 The use of Superflex™ Wet Area Membranes on concrete slabs where hydrostatic or vapour pressure is present is outside the scope of this Certificate.

2.3 Movement and control joints in the substrate must be carried through to the tile finish. The design and construction of the substrate and movement and control joints is specific to each building and therefore the responsibility of the building designer and building contractor and is outside the scope of this Certificate.

2.4 Ceramic tile finishes are outside the scope of this Certificate.

2.5 The products must be installed in accordance with the Ardex New Zealand Ltd Technical Literature referred to in Paragraph 6.1 and by Ardex trained and approved applicators.

Use GIB Aqualine® on walls and ceilings in bathrooms, kitchens and laundries

[illegible]

- Special plaster core containing water resistant wax polymers
- Resists moisture travelling up the core
- Helps protect against damage to linings and framing caused by moisture ingress

As steam rises use on ceilings as well as walls

Ideal tiling substrate

- Contains fibreglass for added strength, making it a solid, stable backing for ceramic tiles
- Dimensionally stable, reducing risk of tile popping
- Recommended tile weights:

  10mm GIB Aqualine® up to 12.5 kg/m²
  13mm GIB Aqualine® up to 32.0 kg/m²

- In shower and "splash" areas the GIB Aqualine® Wet Area System, like most tile substrate systems, needs to be coated with a waterproof membrane prior to tiling

[illegible]

- No packing out required to match thicknesses of other linings in room
- Easy to score and snap
- Easy to get a good paint finish
- Fire, noise and bracing properties

[illegible]

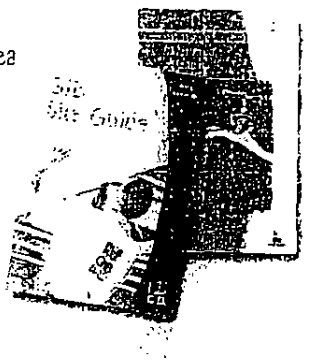
Helps protect yourself from [illegible]

Helps [illegible] damage [illegible]

Customers like to know you're using a [illegible] for wet area walls and ceilings

[illegible]

See the GIB® Site Guide and/or GIB Aqualine® Wet Area Systems book for detailed fastening and installation instructions. These books can be requested by calling the GIB® Helpline on 0800 100 442



Winstone Wallboards Limited
37 Felix Street, PO Box 12 256, Penrose,
Auckland, New Zealand
Website: www.gib.co.nz E-mail: info@gib.co.nz
GIB® HELPLINE - CALL FREE: 0800 100 442
GIB® FREE FAX: 0800 229 222

GIB®

2. General

2.1 Gib® Aqualine plasterboard is used as the primary component in Gib® Dry Zone Solutions to minimise damage caused by moisture build-up in wet areas within a building.

2.2 The Gib® Dry Zone Solution incorporates various elements such as waterproof membranes, tiles, coved and fully bonded flexible sheet vinyl, floor mounted waste overflows, and condensation drains in windows. These elements have not been assessed and are therefore outside the scope of this Certificate. Combined with the correct levels of heating and ventilation, a total solution can be provided to minimise moisture build up in wet areas.

2.3 Gib® Aqualine is a paper-faced lining material with a modified water-resistant gypsum-plaster core. The plasterboard sheets are either 10 or 13 mm thick, 1200 mm wide and with a joint taper on the long edges. See Table 1 for product range.

Table 1. Gib® Aqualine Product Range

Thickness (mm)	Sheet Lengths (m)	Weight (kg/m²) (max)
10	2.4, 2.7, 3.0, and 3.6	7.8
13		10.2

2.4 Gib® Aqualine sheet fixings are Gib® Grabber Screws [illegible] for 10 mm sheets, 32 mm long for 13 mm sheets and Gib® Fi[illegible]. Note: Gib® [illegible] are used for [illegible] such as [illegible] systems.

[illegible] combination [illegible] the Gib® Products [illegible] Wet Dry Profile [illegible] finishing compound [illegible] finishing.

3. Handling and Storage

The best results are achieved when Gib® Aqualine is treated as a finishing material and protected from damage. Sheets must be stacked flat and kept dry at all times. Sheets must be carried on edge and not dragged.

4. General

4.1 Gib® Aqualine provides a water-resistant base for finishing systems in wet areas such as ceramic tiles, flexible sheet vinyl to walls and for paint and wallpaper finish to walls and ceilings.

4.2 Gib® Aqualine must not be used in the following situations:

- Over a vapour barrier wall construction.
- In areas where it may be continually wet, such as group shower rooms or steam rooms.
- In external situations, or applied directly to masonry, concrete or solid plaster.
- Over other sheet lining materials.
- For bracing applications in showers.

4.3 When Gib® Aqualine is used as a tiling substrate, the tile weight must not exceed 32 kg/m².

4.4 Gib® Aqualine may be used as an alternative to other Gib® linings for fire-rated, sound-rated and bracing-rated wall and ceiling elements. Specific details for alternative applications are set out in the following Gib® literature:

- Gib® Fire Rated Systems.
- Gib® Noise Control Systems.

be followed for use, design, installation and maintenance.

5. Wet Areas

5.1 Wet areas are those areas within buildings, such as bathrooms, kitchens, or laundries, which are subject to frequent wetting e.g. showers, or splashback areas around baths, hand basins, sinks and laundry fitments.

5.2 The appropriate finishing system must be used according to the level of water exposure.

- Showers and Splashbacks - areas subject to frequent wetting must be covered by a water proof membrane which is tiled or covered by a flexible sheet vinyl.
- General Applications - paint or wallpaper finishes can be used beyond shower and splashback areas.

5.3 The BRANZ Good Tiling Practice and the BRANZ Good Internal Lining Practice provide recommendations on the extent of protection for wet areas.

6. Framing

6.1 The moisture content of timber framing must be between 12 and 16% at the time of installing interior linings.

6.2 Timber framing must be designed and constructed in accordance with NZS 3604, or to a specific design using NZS 3603 and NZS 4203. The use of kiln dried machine stress graded timber is recommended.

6.3 Steel framing must be designed to withstand loads in accordance with NZS 4203.

6.4 For both timber and steel framing, maximum [illegible] must be 600 mm. Framing must be provided to [illegible] the manufacturer's literature.

6.5 For ceiling [illegible] joists or battens provided at maximum 450 mm centres for 10 mm and [illegible] maximum centres for 13 mm Gib® Aqualine.

7. Structure

Bracing

7.1 10 mm Gib® Aqualine may be used as an alternative to 10 mm Gib® Standard plasterboard in bracing applications.

7.2 13 mm Gib® Aqualine may be used as an alternative to 13 mm Gib® Fyreline in specific design bracing applications.

7.3 Gib® Aqualine must not be used for bracing in showers.

Impact Resistance

7.4 Gib® Aqualine provides adequate resistance to soft body impact for domestic and light commercial applications.

8. Durability

Serviceable Life

8.1 Gib® Aqualine has a serviceable life of at least 15 years as a fully protected shower or splashback lining. As a general wall and ceiling lining Gib® Aqualine will have a serviceable life in excess of 50 years. The ability of Gib® Aqualine to remain durable is dependent on the linings and fixings being protected and remaining dry in service, and being maintained in accordance with this Certificate.

Maintenance

8.2 The building must be maintained weathertight and all lining systems protected from internal and external moisture.

8.3 Splashback and shower areas, including tiles, grout, waterproof membranes, sealants and flexible sheet vinyl must be checked to ensure the integrity of the system is maintained, and repaired or replaced if necessary. When replacing tiles, membrane or sheet vinyl, the Gib® Aqualine substrate must be checked for defects and repaired or replaced, if required.

8.4 For flexible sheet vinyl, particular attention must be pa[illegible]

9.3 Impact damage to Gib® Aqualine plasterboard, resulting in small holes and cracks, may be patched, stopped and finished. For larger areas of damage, expert advice on repair must be sought from Winstone Wallboards Ltd.

9. Outbreak of Fire

Fixed appliances using the controlled combustion of solid, liquid or gaseous fuel must be installed in a way, which reduces the likelihood of fire. Acceptable Solution C/AS1 sets out the separation distances and protection measures which satisfy this requirement.

10. Spread of Fire

10.1 Gib® Aqualine may be used as an alternative to Gib® Fyreline of the same thickness in Gib® Fire Rated Systems.

10.2 All Gib® linings in fire rated systems must be mechanically fixed. Adhesive fixing is not permitted.

Flame Barrier

10.3 Where flame barriers are required by Acceptable Solution C/AS1 Table 6.3, Gib® Aqualine will provide a 10 minute flame barrier, provided all sheet joints are formed over framing or back-blocked with Gib® plasterboard.

11. Internal Moisture

11.1 When installed in accordance with this Certificate, Gib® Aqualine Wet Area Systems will provide wall surfaces adjacent to sanitary fixtures that are impervious and easily cleaned.

[illegible] method [illegible] this Certificate [illegible] the internal moisture [illegible] NZS 4251 Part 2: 2003 Durable Enclosures [illegible] adequate levels of [illegible] and thermal resistance [illegible] provided in all spaces where moisture may be generated.

12. Airborne and Impact Sound

When Gib® Aqualine is used as an alternative to Gib® Fyreline of the same thickness in Gib® Noise Control Systems, the Sound Transmission Class (STC) will be maintained.

13. General

Gib® Aqualine Wet Area Systems must be installed in accordance with this Certificate and the 'manufacturer's literature'.

14. Cutting Sheets

Gib® Aqualine is easily cut by scoring the face paper with a sharp short-bladed trimming knife, and then snapping the plasterboard away from the cut face and cutting the back paper, or by sawing.

15. Health and Safety

Dust resulting from the sanding of stopping and finishing compounds may be a respiratory irritant and the use of a suitable face mask is recommended.

16. Fixing Sheets

Non-Tiled Areas

16.1 Gib® Aqualine sheets must be fixed with Gib® Grabber screws at 300 mm centres around the perimeter of the sheet, and with adhesive on all intermediate studs and dwangs. Horizontal

Tiled Areas

16.2 Control joints must be provided at maximum 4 m centres.

16.3 Internal corners must be reinforced with a minimum 32 x 32 x 0.55 mm galvanised metal angle prior to lining the walls.

16.4 13 mm Gib® Aqualine is recommended for the tiling substrate. A 10 mm gap between the bottom of the sheet and the floor and a 5-10 mm gap between the bottom edge of the sheet and any bath rim, preformed shower base or upstand must be provided.

16.5 Sheets must be fixed with Gib® Grabber Screws at 100 mm maximum centres around sheet perimeter and to intermediate studs and dwangs. Adhesive fixing must not be used.

Flexible Sheet Vinyl Areas

16.6 Gib® Aqualine is fixed as for non-tiled areas. The gap at the sheet bottom may be reduced to 5mm for pencil coving.

16.7 Internal shower corners must be reinforced with a 32 x 32 x 0.55 mm galvanised metal angle prior to lining.

16.8 Gib® Aqualine must be sealed with a oil-based sealer.

17. Ceilings

Gib® Aqualine must be fixed to Gib® Rondo Steel battens or kiln dried machine stress graded timber battens in accordance with the 'Gib® Living Solutions Site Guide'.

18. Penetrations and Sealants

18.1 All cut-outs for pipe penetrations must be [illegible] using a hole saw. [illegible] diameter greater than [illegible] head of an [illegible] the full thickness of the [illegible] Aqualine sheet around all [illegible] penetrations at bath rim, the preformed shower base [illegible] where an impervious junction is required at the floor to all [illegible]

18.3 In tiled areas, a bead of silicone sealant 6 mm wide must also be placed to the full thickness of the tiles where the above situation occurs. The sealant manufacturer's technical literature must be followed for installation.

19. Jointing and Finishing

19.1 Recommendations for stopping, paint finishes and waterproof membrane systems are given in 'Gib® Living Solutions Technical Guide' and 'Gib® Living Solutions Site Guide'.

Non-Tiled Areas

19.2 All joints in non-tiled areas must be stopped using two coats of Gib® Tradeset setting compound and reinforced with Gib® Paper Jointing Tape. A final coat of Gib® Promix air drying compound must be applied over all joints. All screw and nail heads must also be stopped.

Tiled Wet Areas

19.3 All joints in tiled areas for showers and splashbacks must be stopped using two coats of Gib® Tradeset setting compound and reinforced with Gib® Paper jointing Tape. All screw and nail heads must also be stopped.

19.4 Gib® Aqualine must be completely covered with a waterproof membrane prior to tiling. Only waterproof membrane systems that have been BRANZ or CSIRO Appraised, and are suitable for use behind tiles should be used. The instructions of the waterproofing membranes manufacturer must be followed especially at wall/floor junctions, corners and penetrations. Waterproof membranes are outside the scope of this Certificate.

19.5 For showers over baths, the waterproof membrane must be continued at least 1800 mm up the walls from the base of the

[illegible] basins, urinals and sinks, the waterproofing membrane is required behind tiles for a distance of 300 mm above the unit.

20. Tiling

Tiling must be carried out in accordance with the requirements of AS 3958. The adhesive must be organic based, complying with AS 2358 and must be applied by combing horizontally.

21. Flexible Sheet Vinyl

An approved proprietary system must be used and Winstone Wallboards Ltd must be consulted. All joints in showers and splash backs must be heat welded. Flexible sheet vinyl is outside the scope of this Certificate.

The following is a summary of the technical investigations carried out.

22. Tests

Three month weathering and testing of 10 mm Gib® Aqualine was carried out by BRANZ to determine MOR, MOE, paper tensile strength, paper shear strength, nail pull resistance, Hunter hardness, and inspection of fungal resistance.

23. Other Investigations

23.1 The 'Gib® Aqualine Wet Area Systems' literature, dated February 2002, has been examined by BRANZ and found to be satisfactory.

23.2 Site visits were carried out to assess the practicability of the installation of the Gib® Aqualine Wet Area System.

23.3 Assessments were made of the durability [illegible]

[illegible]

24. Quality

24.1 The Winstone Wallboards Ltd manufacturing process and details of the quality and composition of the materials have been examined by BRANZ and found to be satisfactory, and compliant with AS/NZS 2588 and ISO 6308.

24.2 The quality control systems of Winstone Wallboards Ltd have been assessed and registered as meeting the requirements of ISO 9002 by TELARC, Registration Certificate No. 252.

24.3 Winstone Wallboards Ltd is responsible for the quality of the Gib® products supplied.

24.4 The quality of the application and finish on site is the responsibility of the installation and stopping contractors.

25. References

AS 2358:1990 Adhesives for ceramic wall tiles and mosaics. Part 1 - 1.3(a) Type I

- AS/NZS 2588: 1998 Gypsum plasterboard.
- AS 3958.1:1991 Guide to the installation of ceramic tiles.
- Gib® Bracing Systems 1999. Winstone Wallboards Ltd, August 1999
- Gib® Fire Rated Systems, Winstone Wallboards Ltd, August 2001.
- Gib® Living Solutions Technical Guide, Winstone Wallboards Ltd, August 2000.
- Gib® Living Solutions Site Guide, Winstone Wallboards Ltd, June 2000.
- Gib® Noise Control Systems, Winstone Wallboards Ltd, February 2000.
- ISO 6308: 1980 Gypsum Plasterboard-Specification.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- NZS 3603: 1993 Timber structures.
- NZS 3604:1999 Timber framed buildings.
- NZS 4203: 1992 Code of practice for general structural design and design loadings for buildings.

The Building Regulations 1992, as at, and including January 2002 Amendment

This certificate replaces BRANZ Appraisal Certificate No. 332 (1997)

BUILDING KNOWLEDGE

In the opinion of BRANZ, Gib® Aqualine Wet Area Systems are fit for purpose and will comply with the Building Code to the extent specified in this Certificate provided they are used, designed, installed and maintained as set out in this Certificate.

The Appraisal Certificate is issued only to the Certificate Holder, Winstone Wallboards Ltd, and is valid until further notice, subject to the Conditions of Certification.

Conditions of Certification

1. This Certificate:
   a) relates only to the product as described herein;
   b) must be read, considered and used in full together with the technical literature;
   c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
   d) is copyright of BRANZ.
2. The Certificate Holder:
   a) continues to have the product reviewed by BRANZ;
   b) shall notify BRANZ of any changes [illegible] product specifications or [illegible] assurance measures prior to product being marketed;
   c) abides by the BRANZ Appraisal Services Terms and Conditions.
3. The product and the manufacture are maintained at or above the standards levels and quality assessed and found satisfactory by BRANZ.
4. BRANZ makes no representation as to:
   a) the nature of individual examples or batches of, or individual installations of the product, including methods and workmanship;
   b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
   c) any guarantee or warranty offered by the Certificate Holder.
5. Any reference in this Certificate to any other publication shall be read as a reference to the version of the publication specified in this Certificate.

For BRANZ

S J Dickinson

M E Reed

Date of issue: 29th July 2002

PRELIMINARY AND GENERAL (ALL TRADES)

1. Building Consents

The Contractors shall arrange to obtain all permit to build, etc., arrange all inspections and pay all fees as required by the local authorities.

2. Protection of work.

All parts of the work liable to injury and all adjoining property, existing work, footways, trees, etc. are to be protected until completion of the contract.

3. P.C. Sums (Net sums).

The P.C. Sums quoted in this specification are net and the contractor or sub—contractor concerned must add any cartage, fixing charges and profit he requires to all such items.

4. Site.

The site of the works will be pointed out to Tender's who are advised to visit same and check the slope of the ground, quality of the soil, etc., as no extras will be paid for foundation work, site drainage and leveling not detailed or specified.

5. Building Codes

The whole of the work in this contract is to be carried out in strict accordance with the N.Z. BUILDING CODE AND TO COMPLY WITH N.Z.S 3604 .

6. Extent of work.

This contract comprises the erection and completion in the soundest and. most workmanlike manner of all the work shown or reasonably implied on the accompanying drawings and in accordance with this specification and the supply of all plant, tools, labour, materials, fixtures and fittings required for the due completion of the work.

7. Insurance.

The Contractor shall at all times, keep the whole of the works fully covered by insurance, fire. Public liability. Workers' Compensation, etc.

8. Temporary Services.

The Contractor shall arrange for all temporary services, pay all fees in connection therewith and remove same on completion of the contract. Sheds, toilet, power, water, access to the building site, scaffolding.

9. Maintenance.

The Contractors shall maintain the property for a period of 30 days after completion, and any damage done, arising during that time through faulty workmanship or materials shall be made good at the Contractor's expense.

EXCAVATOR

1. General.

ALL GROUND IS ASSUMED TO BE " GOOD GROUND " AS SPECIFIED IN NZS 3604.
THE CONTRACTOR MUST ENSURE ALL GROUND COMPLIES OR CONSULT A GEOTECH ENGINEER IMMEDIATELY.

Remove all turf or other vegetation, including trees, Stumps, etc., from the area to be built on.

Bulldoze the site to the levels shown on the drawings. (Check original conditions).

Excavate as required for all wall footings, pile footings, steps etc., as shown on the drawings.

Footing excavations are to be taken down to a solid bearing arid to be not less than 450mm deep.

Excavations are to be stepped to suit the slope of the ground, and kept level at the bottom, maintained free from water or fallen material and shall be firm before placing reinforcing or concrete.

Backfill and ram the earth around the foundations after concrete work has firmly set.

Deposit the surplus spoil on the site as directed by the Owners.

CONCRETOR

1. Materials.

Concrete to be pre—mixed with a test of 20 Mpa after 28 days.(25 MPA in Sea Spray Zone). Reinforcement to be round mild steel rods or reinforcing mesh, as detailed, free from scale, loose rust, paint, grease, dirt, etc. Formwork shall be erected and braced in such a manner that the concrete shall finish to the dimensions shown or specified. The formwork is to be hosed out and kept wet before and while the concrete is being placed.

2. Concrete Work

Construct the various footings as detailed on the drawings and reinforced as shown.

Hard filling to be 75mm down scoria or 'run of the pit' metal compacted in layers of l50rnn depth maximum. Blind with 25mm of sand and overlay with black polythene damp proof course with taped joints.

All floor slabs to be laid to true and straight surfaces, screeded, wood floated and finished with a steel float or power float to a fine finish. Thickness and reinforcing as detailed on the drawings.

Allow to build in all holding down bolts, pipes, wires etc., as required, prior to the pouring of the concrete. Holding down bolts to be 300mm maximum from corners and at 900MM centers maximum.

BLOCKLAYER

1. Materials.

Blocks are to be of the sizes as shown on the drawings, delivered to the site on pallets and to be free from cracks and chipped edges.

Mortar is to consist of sand, cement and a liquid lime based plasticiser, mixed according to the lime manufacturer's directions.

2. Laying

Construct the various block walls as shown on the drawings.

Corners to be plumbed both ways, courses to be level and straight.

The blocks are to be kept dry before and during laying and while the mortar is setting.

Sills are to be purpose made masonry unit sill blocks; Jamb blocks are to be rebated.

Ventilators are to be matching in colour and size, spaced 600 mm from the corners and at 1.8m intervals.

Joints are to be 10 mm thick max, rounded on exposed faces.

Build in holding down bolts 300 mm from the corners and at 1.2m centers.

Reinforce and concrete fill the various bond beam courses and vertical cavities as shown on the drawings.

On completion clean down all exposed faces of the block work and leave free from all defects and mortar stains.

BRICKLAYER

1. Materials.

Bricks to be hard square, well burnt .....bricks, delivered to the site in packets and free from chipped edges. The bricks are to be wetted before laying.

Mortar to consist of sand, cement and a liquid lime based plasticiser, mixed according to the lime manufacturer's directions.

2. Laying.

Construct the various brick and brick veneer walls, chimney, flower boxes, etc., as shown on the drawings.

All corners are to be plumbed both ways and the courses are to be level and straight. Perpends are to be in alignment. Joints to be 10mm thick maximum weatherstruck on exposed faces.

Sills are to be bricks on edge, or purpose made sill bricks as directed protruding 25 *mm* beyond the face of the wall.

Build in vermin proofing at bottom plate level and galvanised ties spaced at not more than 500 mm horizontally and every third course vertically.

Maintain a 40mm min cavity to be kept clear of all mortar droppings and to be drained and ventilated.

Co-operate with the Carpenter in the building in of all exterior joinery.

On completion clean down the exposed faces of all brickwork and leave free from all defects, mortar stains.

Construction.

All materials are to be the best of their respective kinds and grades, laid true to their various lines and levels and constructed in a proper tradesmanlike manner, to make the whole of the works a sound construction in accordance with the **N.Z. BUILDING CODE AND NZS 3604 .**
All framing must comply with the B.I.A. acceptable solutions in B2 / ASI .
It is recommended that all framing be treated to H1.2 MINIMUM. Bottom plates should be H3.1 minimum.

All timberwork abutting or resting on masonry units, concrete or brickwork is to be protected with bitumen—fabric damp proof course.

Plates to be in long straight lengths. Bottom plates and wall plates to be butt joined over continuous support, top plates to be halve jointed or butt jointed and fastened with 4n nail plates.

Studs are to be set out to accommodate 2.4m high wall lining sheets. Bowed studs are to be straightened with saw cuts, wedges and 100 x 25 mm or 75 x 25 strapping.

Lintels are to be supported on 100x50 understuds with a full-length stud beside both ends.
Additional fixings to lintels are to comply with NZS 3604 1999.

Nogging (Dwangs) shall be wall thickness x 50 mm spaced in rows at 800 mm centers maximum (or as manufacturers requirements), set out to accommodate the wall lining sheets and drilled or notched for ventilation. To be nailed with two 65mm nails at each end.

Ceiling nogging (dwangs) to be set out to accommodate the ceiling lining sheets and cornices, around the perimeter of each room and in rows at l.8m centers maximum.

Metal angle bracing to be let in flush with the face of the wall frames and raked as nearly as practicable to 45 degree's. Refer bracing element plan and BRANZ, Sheet A and B.

The wall frames are to be assembled, squared, braced and erected, The bottom plates are to be straightened and fastened down, the corners are to be plumbed both ways using a plumb bob and line and the top plates are to be held straight with temporary bracing until the ceiling and roof framing and bracing has been complete

Ceiling joists to be on edge and spiked to the wall plates with one 100mm and one 75mm nail at each end. Where practicable, the ceiling joists are to come alongside rafters and to be spiked thereto.

Ceiling joists spanning more than 2.4m are to be stiffened with ceiling runners well spiked at every crossing.
150 x 50 runners will span up to 3.6 m.
200 x 50 runners will span up to 4.8 m

Ceiling bracing is required at all gable ends. Refer bracing element plan.

Rafters to be plumb cut to ridges and hip rafters and to be birdsmouthed to plates and fastened with one 100 mm and one 75mm nail to the plates.

Supply and fix the necessary ridge boards, hip rafters/valley rafters, valley boards, underpurlins and roof struts and collar/ties as required to complete the roof framing and as detailed on the drawings.

Alternatively, where detailed, the roof framing is to be constructed with Engineer designed 'Gangnail / Mitek" roof trusses fixed plumb, fastened to the plates with framing anchors, stiffened with runners and braced at each end of the building. The trusses are to be positioned directly over studs or supporting nogging is to be fixed between the studs directly under the top plate.(or 150 x 40 over as per NZS 3604 1999).

Ceiling battens are to be 75x40 " Dry " at 400 max. cts **OR as specified by ceiling material manufacturer.**

Purlins (iron roof) to be spaced to accommodate the roof covering and ridging and fastened to the rafters.

Eaves runner to be nailed to the outside of the wall frames. Eaves bearers to be nailed securely to each rafter overhang.

DRAINAGE

1. General.

Before commencing the Drainlayer should read the General conditions of the Contract.
All work is to be carried out by a Registered Drainlayer to comply with the NZ Building Code.

2. Extent of Work.

Excavate for supply and lay all drains, fittings etc. as required to complete the Drainage Works for this Project including sanitary sewer and stormwater systems. All Excavation to comply with The NZ Building Code.

3. Materials.

To be good quality lines.

1) Pipes to be First Quality 100mm PVC in accordance with NZS 764: 1981 and NZS 4452: 1986.

2) Fittings and Gullies to be PVC to NZS 7604: 1981.

3) Install inspection fittings to both Sanitary Sewer and Stormwater Drains as required in The NZ Building Code.

4. Laying.

Excavate for and Lay pipes to even falls with all necessary bends and junctions, cleaning eyes and inspections.

Fit Rubber Ring joins and clean out pipes as work proceeds.
Connect up to connections as per plans.

5. Completion.

The Sanitary Sewer and Stormwater lines must be tested to the satisfaction of the local authority inspector and any defects made good before backfilling.

All Backfilling to be as Original Ground Level.

PLUMBING

1. General.

Before commencing the plumber must read the General conditions of the contract in the specification.

All Plumbing work must comply with all requirements of The NZ Building Code and The Standards Association of NZ

On Completion the Building must be watertight with all installations in working order.

The Plumber shall clean all the fittings and taps that are installed and protect all installations from Damage.

2. Insurance.

The Plumbing Contractor shall have an Adequate Public Risk Policy to cover any damage by Himself or his Employees.

3. Piping.

Piping throughout shall be copper to both hot and cold water lines with Appropriate Fittings. Piping shall be to NZS 4606

4. Cold Water Supply.

Tap off from mains service pipe in 15mm copper.

All pipework to W.C., Bath, H.W.C, Showers Basins, Sink and Tubs to be in copper.

Provide one brass hose tap where directed by owner.

All piping outside the Building shall be buried to a minimum depth of 450mm to grassed areas and 600mm in sealed areas .

5. Hot Water Cylinder.

Supply and Fix a 180-litre capacity Rheems mains pressure electric hot water cylinder with element and thermostat.

Provide an Apex Mains pressure valve pack to suit

Thermostat to H W C set at 60 deg C with a tempering valve (installed alongside H W C) to set temperature to bath, shower and vanity at 55 deg. C.

Provide Seismic Restraint to the H.W.C as per attached details.

Equipotential Bonding is to be provided alongside the H.W.C.

6. Hot Water Supply.

Run hot water lines from cylinder to bathroom in 12mm copper in accordance with NZS 4606:

7. Sanitary Ware.

Supply and Fix all items detailed on the plans.

Toilets to be Porcelain W.C. Pan, Dual Flush Cisterns, Plastic toilet seats and flush pipe in accordance with NZS 3331, NZS 2028 and NZS 4616.

8. Taps.

All Taps to be as directed by owner

9. Wastes.

Fix 32 mm & 40mm PVC wastes with PVC traps from the sink, tub, baths, basins and showers to discharge into gullies. Backvent as Directed.

Traps to be as per the Relevant sections of the National Building Code.

10. Vent Pipes.

Carry up all vent pipes from drains and fittings as required by the NZ Building Code.

ELECTRICIAN

1. Generally.

This contract includes the supply and installation of the electric wiring system complete. The whole of the work shall be carried out strictly in accordance with the local authorities' by—laws and the electrical contractor is to obtain all permits from the supply authority, pay all fees in connection therewith and arrange for all inspection required.

2. Supply.

Arrange for a mains supply to the building. Check the conditions before tendering.

3. Boards.

Provide and set up as required one-meter board and case with all necessary equipment thereon neatly labeled.

Provide and set up where directed a switchboard panel with all necessary fuses, switches and main switches property mounted and labeled, and hinged on one side. This panel can be combined with the meter board if convenient to the Owners.

4. Lights

Provide and fix the lights, switches and power outlets as listed hereunder, all to be positioned by the Owners after the floor has been laid.

Passage and stairwell lights to have two way switches.

.....Interior lights.

..... Exterior lights.

.....Power outlets with switch gear.

5. Fittings

Allow the P.C. Sum of.....for the purchase of an electric range and allow to order, take delivery of and install same.

Allow to wire up the thermostatically controlled hot water cylinder element, supplied under "Plumber".

Allow the P.C. Sum of ..... for the supply of an electric wall heater and allow to order, take delivery of and install same.

Allow the P.C. Sum of.....for the purchase of special light fittings and allow to order, take delivery of and fit same.

Allow to supply and install an exhaust hood or fan to manufacturers details.

Allow to wire up for the waste disposal unit supplied under "Plumber".

Allow to provide and install a selected razor outlet positioned as directed by the Owners.

Earth all metal waste pipes, and metal fittings as required by the regulations. Aerial, earth and TV aerial sockets as directed by the Owners.

PAINTER AND PAPERHANGER

1. Generally.

Allow to submit the plan to a colour service for a colour scheme and, to the Owners for approval.

All paint and varnish is to be delivered to the job in new tins, unopened and currently usable.

2. Exterior.

Woodwork — Prime, stop and paint in one undercoat and one finish coat with a high gloss finish.

Stained work — One coat of stain prior to fixing, the nail holes, etc., are to be stopped with coloured stopping followed by one further coat of the stain.

Metalwork, including spoutings, downpipes, wrought iron work, etc. —Approved primer for galvanised iron, one undercoat and one finish coat.

Allow to paint exposed surfaces as required. Primer, undercoats and finish coats as required.

3. Interior

Interiors of all service rooms to be primed or sealed, stopped, undercoated and finished with high gloss enamel.

All other ceilings to be given two coats of flat ceiling paint. All other wall areas to be lined with wallpaper, hung in single lengths, plumb, and with butt joints.

P.C. value.....per roll.

Flush doors only to be sealed, and given two coats of satin finish varnish. To be rubbed down between coats.

All other interior finishing woodwork to be primed, stopped, undercoated and finished with a semi—gloss paint.

4. Completion.

On completion the residence is to be left clean and tidy, window and other glasswork is to be cleaned. All trade debris is to be removed from the site and the building left clean and ready for occupancy.

INSULATION

1. Floor.

A timber floor shall have perforated foil dropped between floor joists of 100 mm with perforation so placed to be at the bottom of the trough.

2. Walls.

Shall have min. R1.6 rating to all exterior walls.

3. Ceilings.

Provide and fix selected insulation with min. R2.2 rating to ceiling.

JOINER

1. Timber Grades

Exterior Joinery — Heart Rimu or Rad. P.P.T. Huttloc.

Door Sills — Heart Matai.

Sashes — Redwood or Rad. P.P.T. Huttloc

Interior Joinery D.A. Rimu.

All to be dry seasoned timber run to standard profiles.

2. Windows.

Aluminium windows where detailed shall be delivered to the site, stored on edge and protected from breakages, damage, plaster splashes, etc. To be installed as per the manufacturer's direction.

Timber windows to be of the sizes and types as indicated on the drawings with all members run to standard or J.M.F. 'Sundyne' profile, of standard construction and high class workmanship. Opening awning type sashes to be fitted with 'Interlock' stays of approved sizes.

The windows are to be glazed with standard quality glass, with selected obscured glass to bathroom and W.C. windows and as directed.

All windows (& exterior doors) are to have expandable foam filler to the trim cavity.

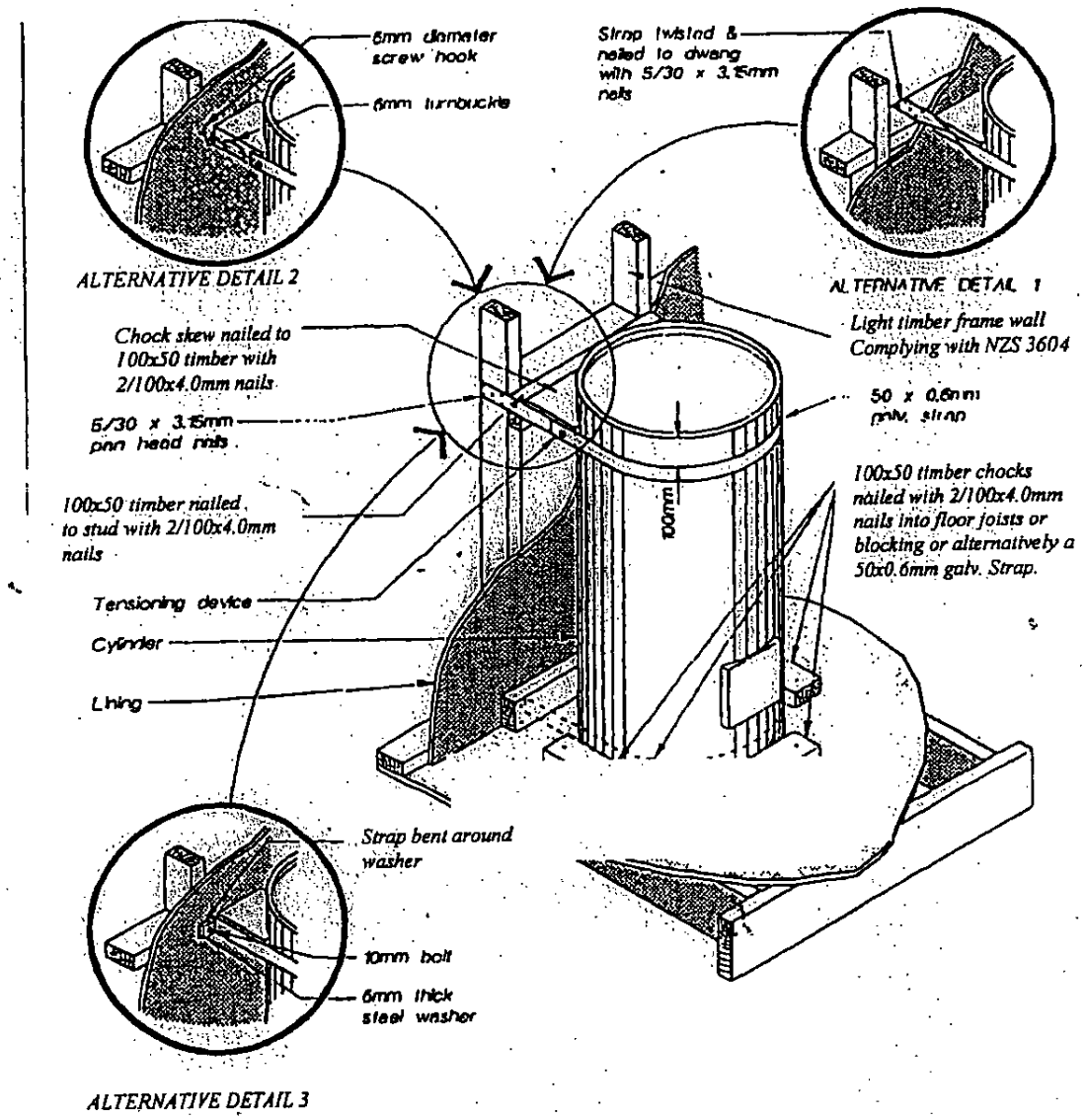
All Glazing to NZS 4223

3. Doors.

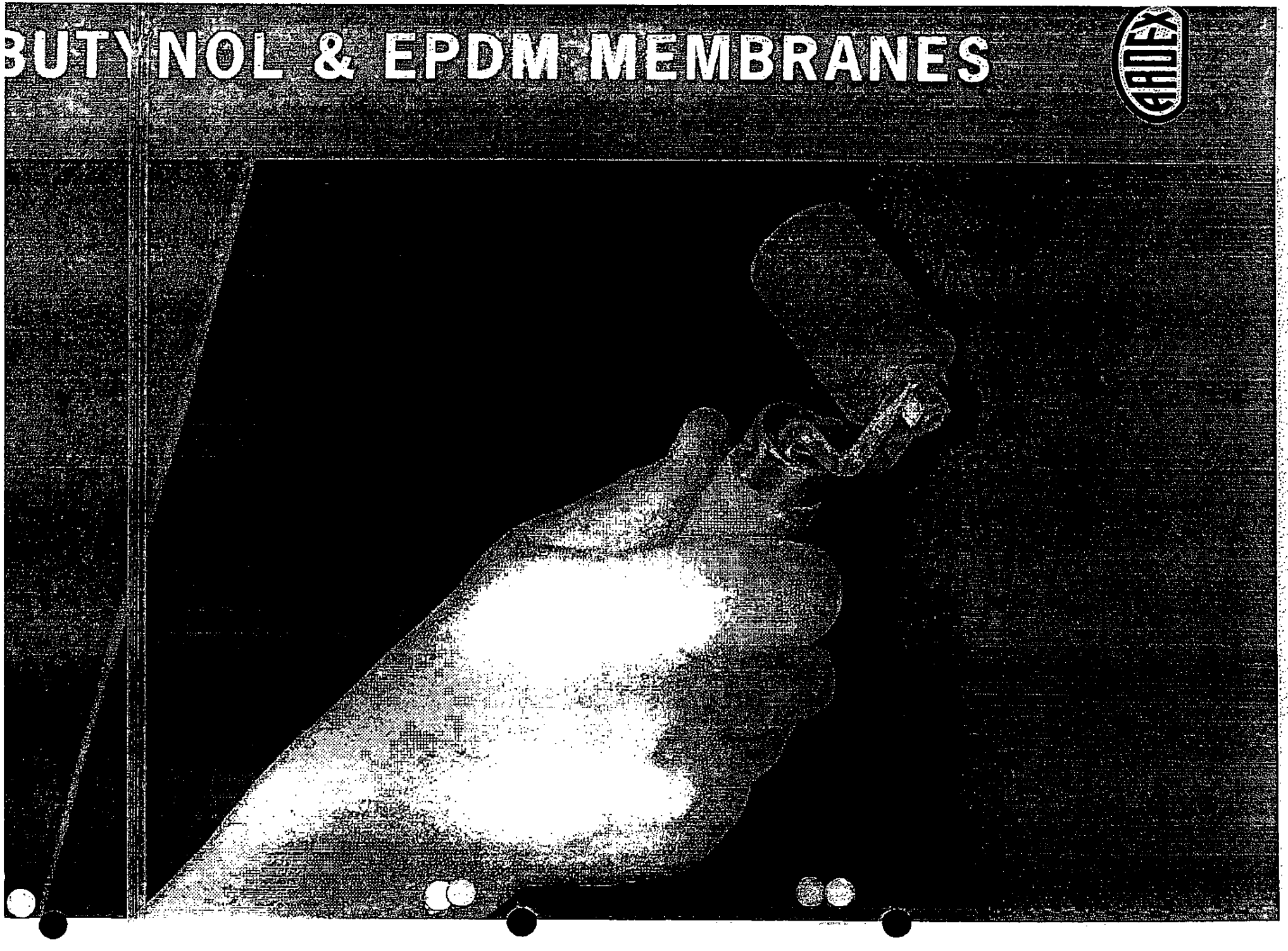
Exterior door frames and doors are to be of standard sizes and of the types as shown on the drawings.
Interior doors are to be flush type,.....facing sheets and clashing strip to the closing edge.

FIGURE 16: Seismic restraint of storage water heaters – less than 350 litres

Paragraph 4.10.3(b)



BUTYNOL & EPDM MEMBRANES



About ARDEX

ARDEX specialises in high-quality construction materials for substrate preparation, levelling floors, waterproofing, the fixing of natural stones & ceramic tiles and other surfacing materials. ARDEX offers innovative products of outstanding quality and optimal environmental friendliness, as well as providing training and support services for their application. The ARDEX Group comprises of 28 subsidiaries and some 1,400 employees active in offices and branches in more than 50 countries.

The history of ARDEX can be traced back over 50 years to Witten, Germany where ARDEX Chemie Gmbh was founded by Herr and Frau Fortmann and Dr. Kraft. Products such as **Ardurit Z8** and **Ardur K15** are firmly established as benchmarks for flooring products worldwide.

In December 2001 ARDEX acquired Norcros Building Products (NBP). The latter has a similar heritage in the Australasian market with **Butynol waterproofing membranes**, **ABA tile adhesives** – renowned for their quality and technical excellence, a reputation built over 30 years. Innovations such as Abaflex are unique in the market until this day. Other brands offered by NBP include **Superflex** under-tile waterproofing systems, **Shelter (previously Dunlop)** sheet membrane systems and **HydrEpoxy** coatings. In 2002 **Vibro Products Pty Ltd**, manufacturer under licence of ARDEX floor levelling and adhesives, was acquired and integrated into ARDEX.

These brands, leaders in their respective fields, come together under the ARDEX umbrella, offering you expert solutions. In addition, sharing of resources and technology within our extensive network enables us to provide you with a broader range of world benchmarked products and services.

Make ARDEX your single point of contact for all your waterproofing, flooring and tiling needs.

The Ardex Vision

Ardex New Zealand aims to become New Zealand's leading supplier of high quality specialised construction material.

THIS PRODUCT MANUAL TAKES EFFECT FROM 1ST APRIL 2005 AND REPLACES ALL PREVIOUS PRODUCT MANUALS ISSUED BY ARDEX NEW ZEALAND LTD

® Butynol, Shelterbit, Shelterseal, Sheltercoat, Episeal and Fibrepol are registered tradenames.

ARDEX Butyl

BRANZ Appraised,
E2/AS1 Acceptable Solution

BRANZ APPRAISED

SPECIFY WITH CONFIDENCE

BRANZ Appraisals

Technical Assessments of products for building and construction

BRANZ APPRAISAL CERTIFICATE No. 436 (2005)

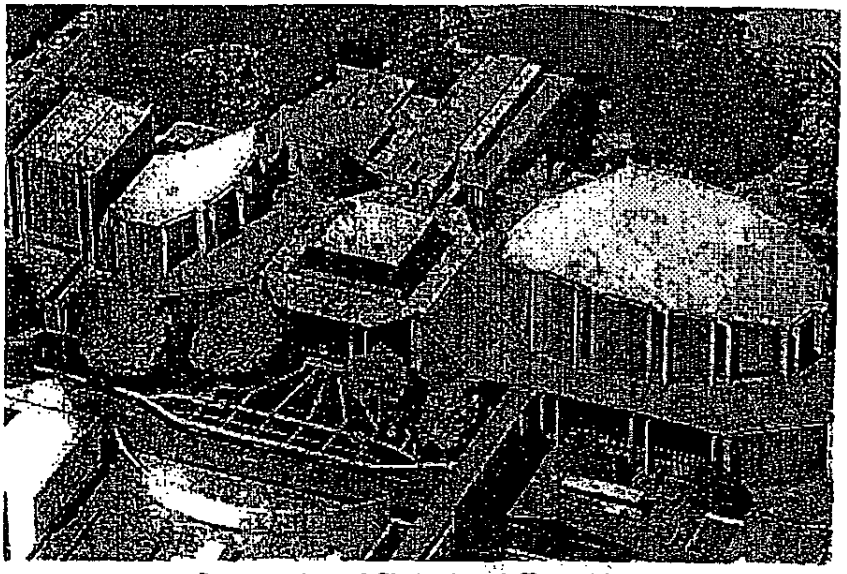
BUTYNOL® ROOFING MEMBRANE

BRANZ

WFTAO

1.1 Butynol® Roofing Membrane is a synthetic rubber waterproofing membrane designed to be used on roofs and decks.

1.2 The product is supplied as single-ply, flexible synthetic rubber sheet in roll form. The product is installed as a single layer system.



Current view of Christchurch Town Hall. 1 mm Butynol® Roof Membrane laid 1972.

2.1 Butynol® Roofing Membrane has been appraised for use as waterproofing membrane for buildings within the following scope:

- scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, and
- with timber supporting structures designed and constructed in accordance with the NZBC; and,
- with nominally flat or pitched roofs constructed to drain water to gutters and drain outlets complying with NZBC; and,
- with substrates of plywood sheet; and,
- with decks that have a maximum size of 40m².

2.2 Butynol® Roofing Membrane has also been appraised for use as waterproofing membrane for external reinforced concrete and plywood roofs, pedestrian decks and balconies for buildings within the following scope:

- up to 3 storeys with a maximum height from ground to eaves of 10m and with a floor plan area limited only by seismic and structural control joints; and,
- with the reinforced concrete structure designed and constructed in accordance with the NZBC; and,
- with timber supporting structures designed and constructed in accordance with the NZBC; and,
- with nominally flat, curved or pitched roofs constructed to drain water to gutters and drain outlets complying with NZBC.

2.3 This Appraisal is limited to roofs, decks and balconies within the following scope:

- constructed to suitable falls (Refer Paragraph 13.1 – 13.9); and,
- with no steps within the deck level, no integral roof gardens and no down pipe discharging directly onto the deck.

2.4 The design and construction of the substrate and movement and control joints is specific to each building, and therefore the responsibility of the building designer and building contractor and is outside the scope of this Certificate.

3.1 In the opinion of BRANZ, Butynol® Roof Membrane, if designed, used, installed and maintained in accordance with the statements and conditions of this Certificate, will meet or contribute to meeting the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years. Butynol® Roof Membrane meets this requirement. See Paragraph 9.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.1 and E2.3.2. Roofs, Decks and balconies incorporating Butynol® Roof Membrane meets these requirements. See Paragraphs 12.1 – 12.9.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Butynol® Roof Membrane meets this requirement and will not present a health hazard to people.

3.2 This Certificate appraises an Acceptable Solution in terms of New Zealand Building Code compliance and the product complies with NZBC Acceptable Solution E2/AS1 Paragraph 8.5. This product is also appraised as an Alternative Solution as outlined in Paragraph 2.2

4.1 Materials supplied by Ardex NZ Ltd are as follow:

Butynol® Membranes

All membranes are single-ply. Butynol® membrane is supplied in rolls [illegible] wide by [illegible] long. Each roll is packed in polythene wrapper trademarked "Butynol®" with the [illegible] identified. Gauges available are 1.0, 1.5 and 2.25mm in black and 1.5mm in six colours.

Adhesive WA98

- A specially formulated solvent-based adhesive for all Butynol® applications. Supplied in 1, 4 and 20 litre containers.

Seam Primer

- A water resistant primer adhesive, used with seam tape for general lap bonding.

Seam Tape

- Uncured cold gum tape used for general lap bonding and laps likely to be subject to periodic ponding. Supplied in 50mm x 30.5 metre rolls.

Flashing Tape

- A malleable tape for moulding gussets, pipe flashings and awkward situations. Supplied in widths of 50-100mm x 5 metres long.

Butynol Sealant

- A specially designed and formulated sealant for sealing Butynol® flashings into chases. Supplied in 375mm tubes.

Handling and Storage

5.1 Handling and storage of all materials whether on or off site is under the control of the Ardex NZ Ltd trained installers. Dry storage must be provided for all products and the rolls of membrane must be stored in an upright position.

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Butynol® Roofing Membrane. The Technical Literature must be read in conjunction with this Certificate. All aspects of design, use installation and maintenance contained in the Technical Literature and within the scope of this Certificate must be followed.

General

7.1 Butynol® Roofing Membrane is for use on roofs, decks and balconies where an impervious waterproof membrane is required to prevent damage to building elements and adjoining areas.

7.2 The 1.0mm thickness product is designed for use on roofs and gutters, and will accommodate light traffic; the 1.5mm is for walk out decks and high maintenance areas; and the 2.25mm is a heavy duty product that is custom made on request.

7.3 The effective control of internal moisture must be considered at the design stage due to the impermeability of the membrane. Refer to BRANZ publication "Good Practice Guide to Membrane Roofing".

7.4 Timber framing systems must comply with [illegible] where [illegible] the engineering design [illegible] the framing shall be of adequate stiffness to [illegible] Steel framing systems shall comply with the serviceability criteria of [illegible] In all cases framing must be provided so that the maximum [illegible] the substrate as specified by the substrate manufacturer is met and that all sheet edges are fully supported.

Substrates

Plywood

8.1 Plywood must be treated to H3.2 (CCA treated) LOSP treated plywood must not be used. Plywood must comply with NZBC Acceptable Solution E2/AS1 Paragraph 8.5.3 and 8.5.5. Where specific design is used (i.e. outside the scope of E2/AS1), the plywood thickness and fixing size may increase and centres may decrease to meet specific wind loadings.

Concrete

8.2 Concrete substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101.

Durability

Serviceable Life

9.1 Butynol® Roofing Membrane when subjected to normal conditions of environment and with proper maintenance can expect to have a serviceable life of at least 20 years.

Maintenance

10.1 No maintenance of the membrane is normally required provided significant substrate movement does not occur.

10.2 In the event of damage to the membrane, the membrane

External Moisture

12.1 Roofs, decks and balconies must be designed and constructed to shed precipitated moisture. They must also take account of snowfalls in snow prone areas. A means of meeting code compliance with NZBC Clause E2.3.1 is given by the Technical Literature which matches details in NZBC Acceptable Solution E2/AS1.

12.2 When installed in accordance with this Certificate and the Technical Literature, Butynol® Roofing Membrane will prevent the penetration of water and will therefore meet code compliance with Clause E2.3.2. The membrane is impervious to water and will give a weathertight roof, roof deck or balcony.

12.3 The minimum fall to roofs is 1 in 40 and to decks, balconies and gutters are 1 in 60. All falls must slope to an outlet. Inadequate falls will allow moisture to collect and increase the risk of deterioration of the membrane.

12.4 Butynol® Roofing Membrane is impermeable; therefore a means of dissipating construction moisture must be provided in the building design and construction to meet code compliance with Clause E2.3.6.

12.5 Roof, deck and balcony falls must be built into the substrate and not created with mortar screeds applied over the membrane.

12.6 Allowance for deflection and settlement of the substrate must be made in the design of the deck or balcony to ensure fall is maintained and no ponding of water can occur.

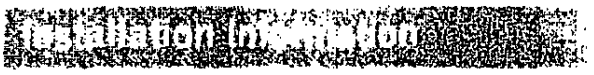
Drainage flanges are required for any outlet which is fitted with a grate or cage to reduce potential roof blockages. An overflow must be provided where the deck or balcony does not drain to an external gutter or spouting.

12.8 Penetrations and upstands of the membrane must be raised above the level of any possible flooding caused by blockage of deck and balcony drainage.

12.9 The design of details not covered by the Technical Literature is subject to specific weathertightness design and is outside the scope of this certificate.

Water Supplies

13.1 Butynol® Roofing Membrane is suitable for roofs used for the collection of water supplies in compliance with the provisions of NZBC G12.3.1. Water collection systems are the subject of specific design and are outside the scope of this Certificate.



Installation Skill Level Requirement

14.1 Installation of the membrane must be completed by trained applicators, approved by Ardex NZ Ltd.

14.2 Installation of substrates must be completed by tradespersons with an understanding of roof, deck and balcony construction, in accordance with instructions given within the Ardex NZ Ltd Technical Literature and this Certificate.

achieve an even and uniform surface.

15.2 Concrete substrates can be checked for dryness by using a hygrometer, as set out in BRANZ Bulletin No 424. The relative humidity of the concrete must be 75% or less before membrane application.

15.3 The moisture content of a timber substructure must be a maximum of 20% and plywood sheet must be dry at time of membrane application. This will generally require plywood sheets to be covered until just before the membrane is laid, to prevent rain wetting.

15.4 Substrates must be primed with a 50/50 solution of WA98 and adhesive solvent and left to dry before membrane is installed.

Membrane Installation

16.1 The membrane must be installed in accordance with the Technical Literature.

16.2 Plywood joints must be taped with 25mm wide PVC pressure sensitive tape.

16.3 The membrane must be unrolled without tension onto the prepared substrate and allowed to 'relax' for at least 20 minutes prior to installation.

16.4 Adhesive must be applied to both the membrane and the substrate, one half at a time. When the adhesive is tack dry, the sheet is rolled onto the substrate. The process is then repeated for the other half of the sheet. Joints in substrates with [illegible] all coloured membranes irrespective of pitch. Penetrations and areas subject to [illegible] pending require [illegible] Ardex seam tape. Joints on substrates with a pitch [illegible] sealed using WA98 adhesive. This applies to the Black Butynol only.

Inspections

17.1 The Technical Literature must be referred to during the inspection of membrane installations by Building Consent Authorities and Territorial Authorities.

17.2 Critical areas of inspection for waterproofing systems are:

- Construction of substrates, including crack control and installation of bond breakers and movement control joints
- Moisture content of the substrate prior to the application of the membrane.
- Acceptance of the substrate by the membrane installer prior to application of the membrane.
- Installation of the membrane to the manufacturer's instructions.

Health and Safety

18.1 Safe use and handling procedures for the membrane system is provided in the Technical Literature.

The products must be used in conjunction with the relevant Materials Safety Data Sheet for each membrane.

Tests

19.1 Tests have been carried out on the membrane by Materials and Quality Consultancy Ltd This testing covered specific gravity, shore hardness, tensile strength, modus of elongation, elongation at break, tensile and elongation retention after heat aging, tear strength, ozone resistance and water absorption as detailed in NZBC Acceptable Solution E2/AS1 Paragraph 8.5.4(b). Results and test methods have been reviewed by BRANZ and found to be satisfactory

19.2 Water vapour permeability tests have been undertaken by BRANZ in accordance with ASTM E96.

19.3 Tests have been carried out on the membrane to assess its suitability for use with potable water supplies. This testing showed the product was satisfactory.

19.4 The adhesives, primers and seam tapes used with Butynol® Roofing Membrane meet the intended performance requirements of NZBC Acceptable Solution E2/AS1 Paragraph 8.5.4(c). *Note: At the time of this Certificate's issue BRANZ EM5 as outlined on Paragraph 8.5.4(c)(i) was not published.*

Other Investigations

20.1 An assessment was made of the durability of the Butynol® Roofing Membrane by BRANZ technical experts using NZBC B2/VM1 History of Use

20.2 Site visits have been carried out by BRANZ to assess the practicability of installation and to examine completed installations.

(3) The Technical Manager, Ardex NZ Ltd, BRANZ, and Telarc Limited.

Quality

21.1 The manufacture of the Butynol® Roofing membrane has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. The membrane manufacturer is the subject of AS/NZS ISO 9001 Certificate by Telarc Limited, Registration No. 621.

21.2 The quality of manufacture of the product is the responsibility of Ardex NZ Ltd.

21.4 The quality of supply of the product to the market is the responsibility of Ardex NZ Ltd.

21.5 Quality on site is the responsibility of the Ardex NZ Ltd approved applicators.

21.6 Designers are responsible for the substrate design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, Ardex NZ Ltd and this Certificate.

Sources of Information

- AS/NZS 2269:1994 Plywood – Structural
- ASTM E 96-02 Water vapour transmission of materials in sheet form, American Society of Testing Materials, Philadelphia, 1992.
- NZS 3101: 1995 The design of concrete structures.
- NZS 3604: 1999 Timber framed buildings.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 Amendment.

In the opinion of BRANZ Butynol® Roofing Membrane is fit for purpose and will comply with the Building Code to the extent specified in this Certificate, provided it is used, designed, installed and maintained as set out in this Certificate.

The Appraisal Certificate is issued only to the Certificate Holder, Ardex NZ Ltd, and is valid until further notice, subject to the Conditions of Certification.

Conditions of Certification

For BRANZ

P J Robertson
Chief Executive

Date of Issue: 1st July 2006

BRANZ Appraised, E2/AS1 Acceptable Solution

BRANZ APPRAISED
BRANZ Appraisal Certificate No 436 (2005) Butynol Roofing Membrane has been issued. Copy available on request.

BRANZ APPRAISED SPECIFY WITH CONFIDENCE

BUTYNOL SYSTEM SPECIFICATION

A synthetic rubber with properties which resist ageing from heat, sunlight and ozone. It has excellent gas impermeability and toughness and remains flexible at low temperatures.

Butynol is manufactured by combining the petroleum gases isobutylene and isoprene at the extremely low temperature of –100°C. (Rubber Technology–Morton)

Butynol is marketed by Ardex as a warranted roofing and tanking product and fixed by their trained and experienced approved Applicators.

BUTYNOL MATERIAL SPECIFICATIONS

Our requirements for long term warranty necessitate that Butynol meets these typical technical requirements

Specific Gravity to ASTM D [illegible]	[illegible]
Hardness IRHD to ASTM D1415	[illegible]
Tensile Strength to ASTM D412	[illegible] MPa min
Modulus at 300% elongation to ASTM D412	4.15 MPa min
Elongation at break to ASTM D412	300% min
Heat Ageing (7 days at 115° C)	
Tensile Retention to ASTM D412	70% min
Elongation Retention to ASTM D412	70% min
Tear Strength to ASTM D624	26kN/m
Ozone Resistance to ASTM D1149 (7 days at 40°C in 50pphm ozone)	No visible cracks
Water Absorption to ASTM D471	1.65% (by mass) 0.72% (by volume)
Water Permeability to ASTM E96-92	
Vapour Flow Resistance (MNs/g)	12414
Vapour Flow Rate (g/m²d)	0.013

Note: Interesting comparable figures for water permeability are –
Polythene 156, Asphalt 1830, P.V.C. 4900.

K Values on 1mm Butynol sheeting

K Value (Thermal Conductivity) 7.4×10^3 Cal/cm/sec/deg C.

Conductivity Data on 1mm Butynol sheeting

Resistance/m² Ω /m² = 0.6816 on 9.3 volts.

SEAM TAPE PERFORMANCE

Tests on the seam tape bonding method, by an independent testing laboratory, have shown average values equivalent to 90% of unwelded material. It is considered impossible for the test methods used to be duplicated in normal service ie. 400% elongation.

BUTYNOL PROTECTION

Butynol protects against water, moisture vapour, gases, sun, ozone, frost, acids, chemicals and bacteria.

BUTYNOL RESISTANCE

Butynol resists tearing, flex cracking, bubbling and abrasion. It is extremely strong, has a long life and is versatile.

STAINING OF LIGHT COLOURED BUTYNOL

To avoid staining care must be taken during design stage to ensure that water running off unpainted treated timber and some metals (eg copper) do not run over light coloured Butynol.

BUTYNOL GAUGES

Standard 1.0mm–For roofs, gutters and decks with protection.

1.2mm–For roofs

1.5mm–For roofs and walk out decks.

2.25mm Heavy Duty

Factory welded panels in all gauges [illegible] made

BUTYNOL IS PACKAGED

In rolls of nominal 1.4m width and 17.86m long. Each roll is packed in polythene wrapper trademarked Butynol with thickness identified. Coverage 25m² except 2.25mm gauge which is 12m².

Gauges available are:

1.0mm black.	Weight: nominal 30kg
1.5mm black.	Weight: nominal 45kg
2.25mm black.	Weight: nominal 32kg
1.2mm dove grey.	Weight: nominal 32kg
1.5mm all colours.	Weight: nominal 47kg

ADHESIVES AND SOLVENTS

Specially formulated for all Butynol applications. Supplied in 20L steel/plastic pails (approx. 20kg). 4 and 1 litre cans.

BUTYNOL SEALANT

Available in tubes for caulking guns.

SEAM TAPE

Supplied by Ardex in 50mm x 30.5m rolls (6 to a carton). Roofs with a pitch of less than 5°, all coloured membranes and all guttering and areas subjected to periodic ponding require special lap bonding. All coloured membranes, irrespective of pitch require special lap bonding.

DETAIL TAPE

A malleable exterior tape for flashing exterior corners etc. 150mm x 30.5m rolls.

FLASHING TAPE

A malleable tape for moulding in gussets, pipe flashings and awkward situations. Supplied in 100mm x 5m rolls. Flashing tape must not be left exposed. A cover strip of Butynol or detail tape must be applied over flashing tape to finish.

SUBSTRATE VENTILATION

Substrate ventilation should be used to release moisture trapped under the Butynol. Substrate ventilators are used in conjunction with vent tapes. Tapes should be laid in a grid pattern spaced at 900mm centres venting to the roof perimeter. One way substrate ventilators prevent moisture vapour build up and one should be installed every 90 square metres. Not designed to ventilate roof cavities. (Refer Diagram page 17)

PLYWOOD TREATMENT

To be in accordance with Acceptable Solution E2/AS1 plywood substrate must be treated to H3.2 with *Waterborne CCA treatment and kiln dried after* treatment.

Plywood must not be LOSP treated.

DURABILITY

Butynol when fixed according to Ardex instruction will meet the NZBC requirements of B2.3.1(b) 15 years. Refer BRANZ Appraisal Certificate No 436 (2005).

EXTERNAL MOISTURE

New Zealand Building Code Acceptable Solution E2/AS1 requirements recommend membrane clad roofs have a minimum pitch of 1.5°.

DAMP AND WEATHERPROOFING

The Building Code of Australia Deemed-to-Satisfy Provisions F1.9 and F1.10 are met by Butynol as an acceptable damp-proof course.

Butynol when used as described in ABSAC Technical Opinion 188 August 1994 complies with the Building Code of Australia Deemed-to-Satisfy Provision F1.7(b) and Acceptable Construction Manual Part 3.8.1.0, or AS 3740 for "Water Proofing of Wet Areas in Buildings"

FIRE RATING

The Butynol roofing system must be considered combustible but may be used on buildings for all purpose groups, subject to the requirements of NZBC Acceptable Solution C/AS1 Part 7, Paragraph 7.11.1

When used for roofs in Purpose Groups SC and SD a non-combustible substrate or timber 18mm thick is acceptable. Refer 7.11.1.

Building Code of Australia allows use in all building types under Specification C1.10, Clause 7(e), except in bush fire prone areas.

PRODUCT WARRANTY

When laid by an approved Applicator in accordance with Ardex's specifications, a material warranty for up to 5 years (covering the Membrane, adhesive and tapes) is available. Ardex is not responsible for any costs arising from installation of the Membrane and does not provide any warranty other than where a written Ardex material warranty has been issued.

WORKMANSHIP

A warranty for workmanship shall be provided directly by the approved Applicator. The period and terms of the workmanship warranty shall be determined by the conditions of contract or the approved Applicator.

ADHESIVES AND SOLVENTS FOR USE WITH BUTYNOL

WA98	The Standard contact brushing, spray grade and rolling adhesive for fixing to the substrate and for laps not subject to periodic ponding. (Pitch 5° and above)
Seam Primer	A water resistant primer, used with seam tape for general lap bonding.

Roofs with a pitch of less than 5°, all coloured membranes and all guttering and areas subjected to periodic ponding require special lap bonding. All coloured membranes, irrespective of pitch require special lap bonding.

Note: Temperature and Humidity

The evaporation of any solvent adhesive system causes a drop in temperature at the interface. At times of high humidity this can result in a micro molecular water layer at the interface which will result in a failure to bond, falsely attributed to Adhesive failure. Fixing should not proceed under these circumstances.

NOTES

1. In case of extreme absorbency, a thinning coat of 50/50 WA98 adhesive and solvent may assist water shielding and absorption. However, a follow up of full strength adhesive for full bonding should not be proceeded with under four hours, thus allowing full evaporation of solvents absorbed into the substrate. Primers must be time dried not touch dried.
2. As new substrate materials continually appear on the market, consult Ardex for approval of their use with Butynol.
3. Where periodic ponding is likely and on roofs with a slope of less than 5°, Ardex Seam Tape and Seam Primer must be used on all joints.
4. Black Butynol and roofs with pitch of 5° or greater and sufficient fall to prevent periodic ponding may be formed using the sheet bonding adhesive WA98. All laps must be wiped with WA98 solvent prior to bonding.

   Roofs with a pitch of less than 5°, all **coloured membranes** and all guttering and areas subjected to periodic ponding require special lap bonding.

   Refer Acceptable Solution E2/AS1 8.5.5.2a.

   All coloured membranes, irrespective of pitch require special lap bonding.
5. Do not use in temperatures less than 6°C.

   CAUTION

   All Adhesives and Solvents are

   HIGHLY FLAMMABLE

SUBSTRATE SPECIFICATION (Plywood)

To conform with Acceptable Solution E2/AS1 plywood *shall be:*

A minimum of 17mm complying with AS/NZS 2269, at least CD Structural Grade plywood with the sanded C face upwards, and H3.2 with Waterborne CCA treatment and kiln dried after treatment.

Substrates must be dry when Butynol is applied. The plywood and the timber substructure shall have a maximum moisture content of 20% when Butynol is adhered.

Plywood panels shall be laid with staggered joints (brick bond), the edge of sheets shall be supported with dwangs or framing, unless a structurally tested tongue-in-groove edge provides equivalent support. The maximum recommended span in E2/AS1 is 400mm in each direction. However specific design may allow 17.5mm plywood or greater to be laid on 400mm purlins with nogs or dwangs at 600mm or even 1200mm centres. Plywood shall be laid with the face grain at right angles to the supports. A 20mm triangular fillet shall be used at the base of any 90° upstand. External edges shall be finished with a minimum radius of 5mm.

Plywood shall be fixed with 10 gauge x 50mm stainless steel countersunk head screws eg Hylton Parker No. 24639, with 3mm gaps between all sheets, at 150mm centres on edges, and 200mm in the body of the sheets.

All joints in the plywood and junctions of plywood with other materials shall have 25mm polyethylene release tape applied before application of Butynol.

Closed-in construction spaces under Butynol roofs and decks shall have adequate ventilation to prevent the accumulation of moisture under Butynol. There should be a minimum gap of 20mm between the underside of the substrate and any insulation.

NOTE: The use of LOSP (Light Organic Solvent Preservative) treated plywood must NOT be used under Butynol in any circumstances or conditions.

SUBSTRATE SPECIFICATION (Concrete)

New concrete

Must be cured for a minimum of 28 days and all curing compounds removed prior to application.

A reduction in cure time can be achieved by utilising the Ardex HydrEpoxy System (consult Ardex Technical Department for details).

Old concrete

Must be clean from any contaminents prior to application.

For further substrate types please consult Ardex Technical Department.

TYPICAL ARCHITECTURAL BUTYNOL RUBBER ROOFING SPECIFICATION

1. *Preliminary*

Refer to the Preliminary and General Clauses of this specification and to the General Conditions of Contract which are equally binding on all trades. This section of the specification shall be read in conjunction with all other sections.

2. Scope

This section of the contract consists in general of the provision and laying of all the Butynol rubber, for the roofs, decks, gutters and flashings on the buildings. Refer to Clause 12 hereafter for Extent of Work.

3. Workmanship

The whole of the work shall be carried out by skilled tradesmen using adequate and proper equipment and methods in accordance with best trade practice, and following the specifications methods and recommendations as laid down by the manufacturers

4. *Sub-contractors*

The work included in this section of the contract shall be carried out by a firm of roofing experts conversant with and specialising in the supply and fixing of the material and shall be a firm approved by Ardex.

5. Warranty

When laid by an approved Applicator in accordance with Ardex's specifications, a written material warranty of up to 20 years is available. It is the responsibility of the approved Applicator to confirm proper installation and to request Ardex to issue a material warranty on behalf of the customer following completion of installation. Ardex is not responsible for any costs arising from installation and does not provide any warranty other than where a written Ardex material warranty has been issued.

6. Materials

6.1 Butynol Rubber

(a) Shall be 1.0mm thick standard Black Butynol rubber to all roof surfaces, gutters and fascias and walk out decks where membrane is to be overlaid with tiles.

(b) Shall be 1.5mm thick Butynol to all walk out decks.

6.2 Adhesives

Shall be as recommended by Ardex specially formulated for Butynol rubber and suitable for the particular application and the relevant temperature and conditions applicable.

Generally Ardex WA98 adhesive is used for substrate and lap bonding (5° and above).

Ardex seam primer shall be used in conjunction with Ardex seam tapes.

When conditions are experienced that are outside the temperature and/or moisture ranges recommended by the manufacturers for the above standard adhesives work will cease.

6.3 Seam Tapes

Shall be 50mm wide seam tape provided by Ardex

6.4 Substrate Joint Tape

All Plywood joints shall be taped with a 25mm wide pressure sensitive Ardex approved self adhesive tape.

7. *Roof Deckings*

Shall be 1.5mm Butynol or 1mm with a protective covering for all deck surfaces.

All decks to which Butynol is to be fixed shall be clean, smooth, dry and free from dirt, grit or sharp objects.

Deck substrates may be primed with 50/50 WA98 adhesive/solvent.

The Butynol roofer shall co-operate with the other trades laying the decking to ensure that the final surface is in first class condition for the laying of the Butynol rubber roofing.

The Butynol roofer shall check the deck before laying any Butynol to ensure that the surface is completely sound, screw fixed [illegible] screw heads [illegible] sheet [illegible] movement [illegible]

8. Laying of Butynol Roofing

It is the responsibility of the Applicator to ensure that the substrate surface to be covered by the Butynol is in fit and proper condition, suitable for the laying of the material.

Tape all joins in substrate sheets with 25mm wide pressure sensitive tape approved by Ardex.

All Butynol sheeting shall be laid out on the roof to "relax" the sheeting before fixing. A period of at least 20 minutes is usually required. Do not finally position sheeting with a tension exceeding 2%.

Apply adhesive to the substrate and the underside of the Butynol rubber sheeting by brush, spray or an approved type roller at a spreading rate of generally not less than 2.5 square metres per litre. Leave to tack dry *before bonding the two surfaces together.*

Lay sheeting by drawing back halfway either longitudinally or transversely. Thoroughly roll or work over the surface of the sheet to exclude all air and to obtain a full bond

All Butynol shall be "lap bonded" as detailed below

Bonding Laps with Ardex Seam Tape and Seam Primer

Following laying of the Butynol the laps must be sealed. Roofs with a pitch of less than 5°, all coloured membranes irrespective of pitch and all guttering and areas subjected to periodic ponding require special lap bonding using Ardex seam primer and Ardex seam tape. Laps with pitch 5° and above (on black Butynol only) can be sealed using WA98 adhesive. (Lap area must be wiped using WA98 solvent prior to applying adhesive.)

1. The top lap is positioned and the bottom sheet marked to indicate the edge of the top sheet.
2. The top sheet is folded back.
3. The Ardex Seam Primer is then applied to the Butynol in the area marked on the bottom sheet and 50mm in from the edge on the top sheet. The Ardex Seam Primer is applied to the mating surfaces using a synthetic scrubbing pad. Scrubbing pads should be replaced as they become dirty. Allow the primer to become 'dry to the touch'.
4. Position and unroll the 50mm Ardex Seam Tape along the seam. The edge of the release paper should be aligned to the mark on the bottom membrane sheet.
5. Roll the length of the seam with the release paper still in place.
6. Remove the release paper from the Ardex Seam Tape by pulling at a 45° angle away from the seam. Keep the release paper low to the roof surface as it is removed.
7. Fold into place the primed edge of the top sheet.
8. Roll the completed seam.

9. Tiling Over Butynol

To direct fix tiles to Butynol, ABA Optima two part adhesive should be used. Ensure the Butynol surface is clean and dry before applying the adhesive. All laps must have seam tape.

(Refer Optima page 41)

10. Protection of Laid Butynol Sheeting

The Butynol roofing contractor shall ensure that his fixers only work on the Butynol roofing with soft sole shoes

The Butynol roofer shall co-ordinate with the main contractor who shall ensure that any other trades who work over the completed roof wear soft sole shoes

Upon completion of each area the roofer shall get the main contractor to inspect the area and the main contractor will sign off that the area was free from any defects or damage. It is then the responsibility of the main contractor to ensure the Butynol roofing is in no way damaged by other trades.

11. Completion

On completion carefully and thoroughly clean off and remove all scraps and other rubbish from finished [illegible] and leave in tidy order.

12. Extent of Work

Observe the foregoing specifications and supply and lay Butynol rubber sheeting to all roofs, decks, gutter and flashings as shown and detailed in the Ardex specification

Failure to comply with the above specifications will result in all warranties being null and void.

BRANZ Appraised, E2/AS1 Acceptable Solution

LAYING SPECIFICATION

The Sub contractor for the work called for in this trade will be a Company or Person approved by Ardex.

The approved Applicator (hereafter called the Applicator) shall examine all drawings and provide for the flashing, caulking and sealing of all vents, stacks and pipes penetrating the roofing membrane. Also all flashings at walls, parapets, verges, gutters etc., unless otherwise instructed in the specifications.

The surface to which Butynol is to be fixed shall be clean, smooth, dry and free from sawdust, grit or sharp objects. Membrane laying shall not start until defects have been corrected.

To avoid staining care should be taken to avoid water runoff from copper downpipes or guttering on to light coloured Butynol.

When CCA plywood is used in conjunction with a light coloured membrane it is advisable to prime any plywood that will not be covered the same day.

It is the responsibility of the Applicator to ensure that the surface to be covered by the Butynol is in fit and proper condition suitable in all respects for the laying of the material.

On completion the Applicator will provide the owner with a Workmanship Warranty and obtain from Ardex a Materials Warranty.

Failure to comply with the above specifications will result in all warranties being null and void.

LAYING THE BUTYNOL

Before applying the Butynol, it shall be unrolled for twenty minutes to relieve stresses induced by manufacture and storage. The Butynol sheet shall be set out in the exact position in which it will be finally required and while it is held in place, it shall be folded back lengthwise to expose half the underside. To the now exposed underside and the area of roof also left exposed, apply an even coat of WA98 Adhesive. When the adhesive has become touch dry, work the sheet back into its original position avoiding wrinkles and the inclusion of air bubbles.

Repeat the process with the other half of the sheet and when completed, roll the whole sheet with hand press rollers or the like.

When applying the next sheet, it shall be lapped over the first sheet by 50mm. All turn ups and downs shall be neatly formed and cut to a straight line if required.

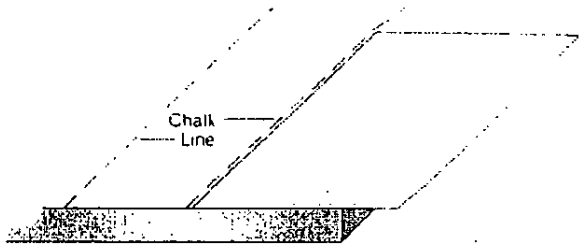
Butynol shall not be laid under tension.

When the whole area has been covered or as work progresses, the applicator has to seal the laps.

BUTYNOL LAYING METHOD

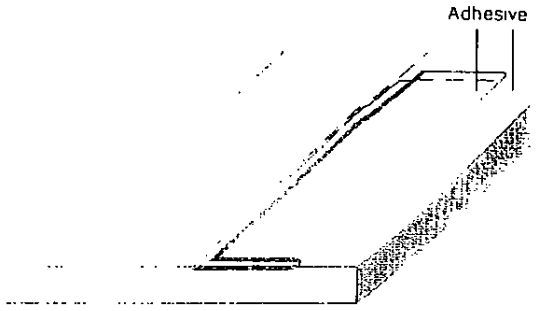
STEP 1

Accurately place sheet. Mark spacing with chalk line



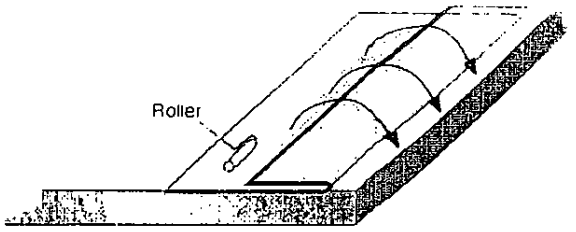
STEP 2

Fold back half sheet. Apply adhesive to both faces.



STEP 3

After flashings fold membrane into place. Roll thoroughly



STEP 4

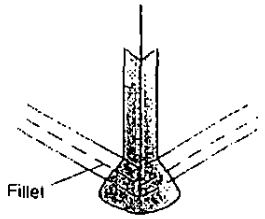
Treat 2nd half of Butynol similarly.

EXTERNAL CORNERS

To comply with Acceptable Solution E2/AS1 Figure 57.

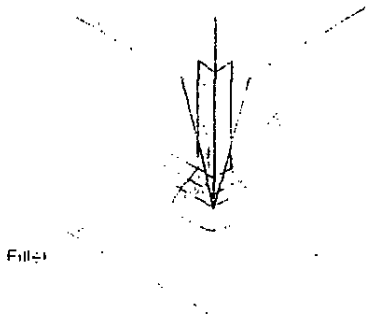
STEP 1

Bond 100mm flashing to corner as shown



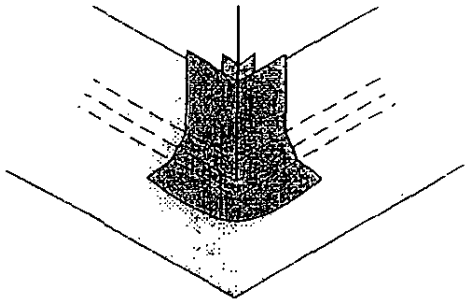
STEP 2

Bond Butynol to deck and up wall 150mm minimum. Cut sheet from corner at 45° as shown.



STEP 3

Cover corner point with layer of detail tape.

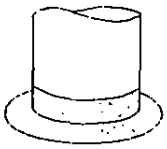


NOTE: Fillets must be used on all internal corners.

FLASHING - EXISTING PIPE

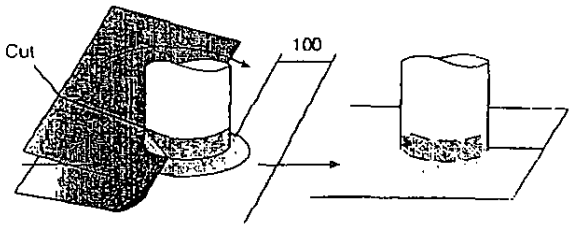
STEP 1

Under flash pipe with 100mm Butynol flashing tape.



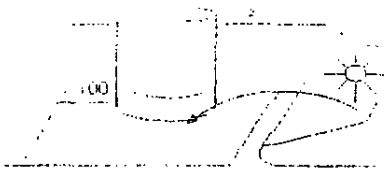
STEP 2

Bond Butynol to 100mm past pipe.
N.B. When flashing black Butynol use Butynol or detail tape.



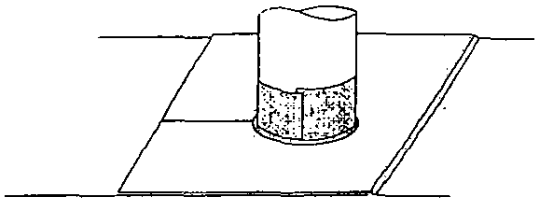
STEP 3

Bond continuation of Butynol to overlap base sheet and beyond pipe 100mm.



STEP 4

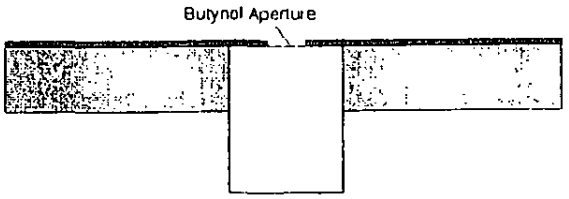
Apply collar of detail tape or Butynol cover strip DO NOT STRETCH STRIP.



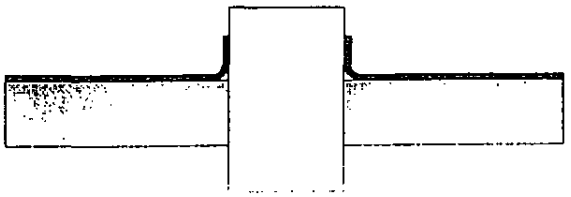
N.B. Flashing tape MUST NOT be left exposed. Cover strip must be Butynol. When detail tape is used a cover strip of Butynol is not required.

and areas where a pig's ear cannot be used

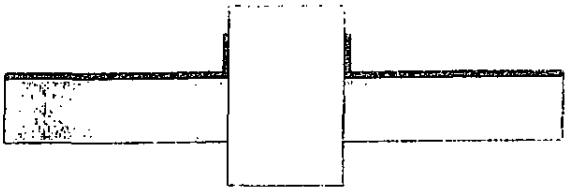
STEP 1
Cut smaller diameter hole than pipe.



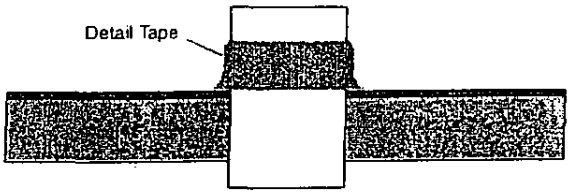
STEP 2
Pipe is raised through smaller diameter hole in Butynol, forcing edge upwards to create upstand.



STEP 3
Pull pipe down to eliminate [illegible]

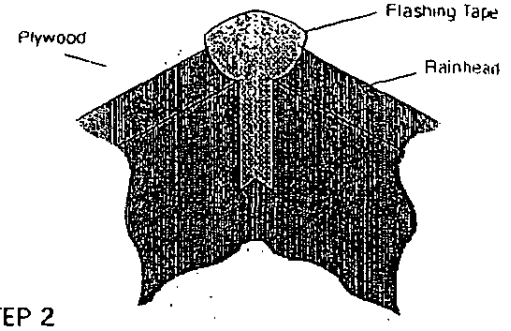


STEP 4
After pulling pipe down approximately 1cm to sharpen corner, tape upstanding Butynol to pipe using WA98 adhesive and detail tape.

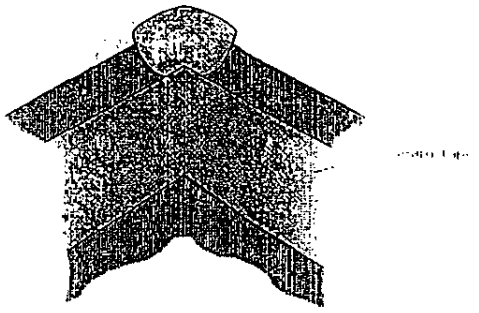


N.B. If flashing tape is used it MUST NOT be left exposed. A cover strip of Butynol must be applied over the flashing tape to finish.

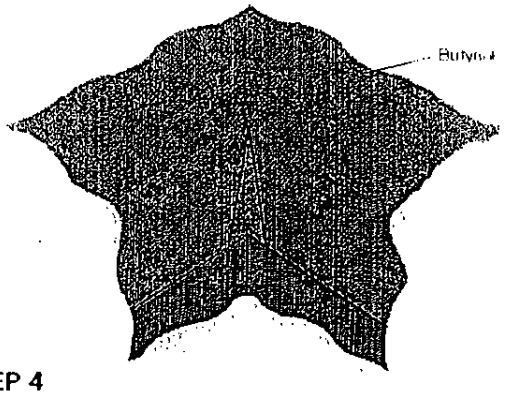
STEP 1
Apply Flashing Tape over Rainhead and Plywood



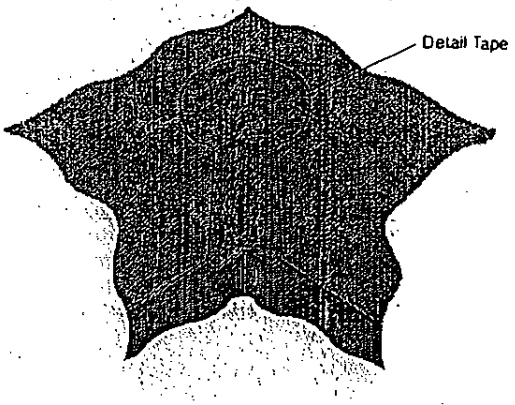
STEP 2
Run Seam Tape along all four vertical sides of Rainhead.



STEP 3
Cut Butynol sheet to fit into corners.



STEP 4
Cover corner point with layer of detail tape.

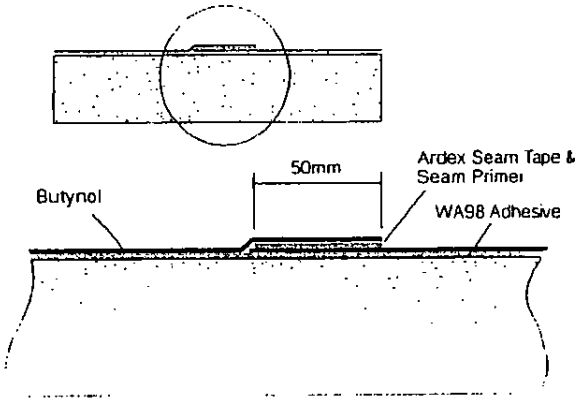


BONDING THE LAPS

Roofs with a pitch of less than 5°, all **coloured membranes** and all guttering and areas subjected to periodic ponding require special lap bonding.

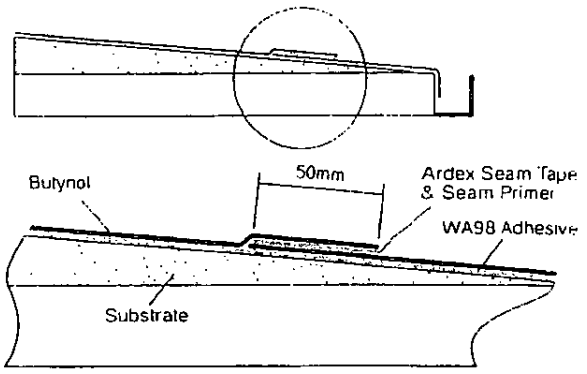
Refer Acceptable Solution E2/AS1 8.5.5.2a.

All **coloured membranes**, irrespective of pitch require special lap bonding.



The top sheet is folded back and the bottom sheet marked to indicate the edge of the top sheet.

2. The top sheet is folded back.
3. The Ardex Seam Primer is then applied to the Butynol in the area marked on the bottom sheet and 50mm in from the edge on the top sheet. The Ardex Seam Primer is applied to the mating surfaces using a synthetic scrubbing pad. Scrubbing pads should be replaced as they become dirty. Allow the primer to become 'touch dry'.
4. Position and unroll the 50mm Ardex Seam Tape along the seam. The edge of the seam tape should be aligned to the mark on the bottom membrane sheet. The see-through backing film makes this very simple.
5. Roll the length of the seam with backing film still in place.
6. Remove the backing film from the Ardex Seam Tape by pulling at a 45° angle away from the seam. Keep the backing film low to the roof surface as it is removed.
7. Fold into place the primed edge of the top sheet.
8. Roll the completed seam.

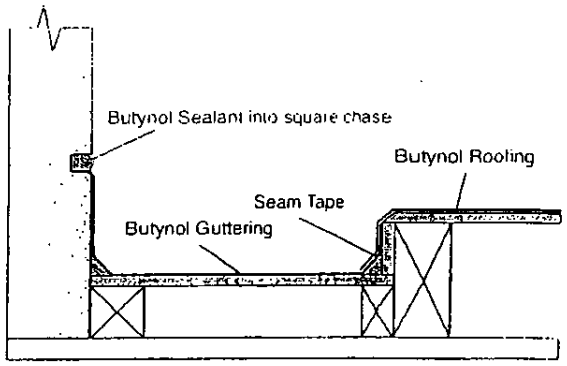


Black Butynol and roofs with minimum pitch of 5° and sufficient fall to prevent periodic ponding may be formed using the sheet bonding adhesive WA98. All laps must be wiped with WA98 solvent prior to bonding.

FORMING LAPS FOR GUTTERS

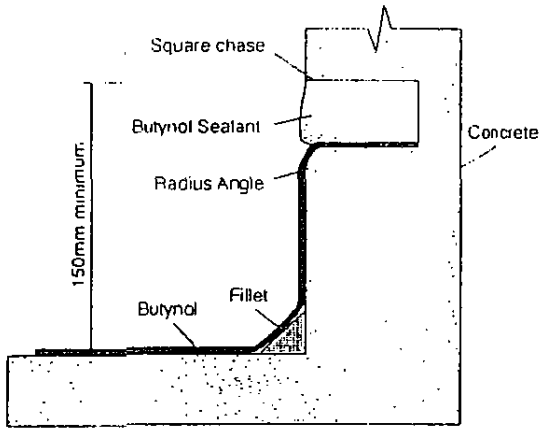
Laps are most important in gutter work and should be formed using Ardex seam tape and [illegible]

[illegible] internal boxed gutter, [illegible] and [illegible] any shape or size using Butynol over any specified substrate.



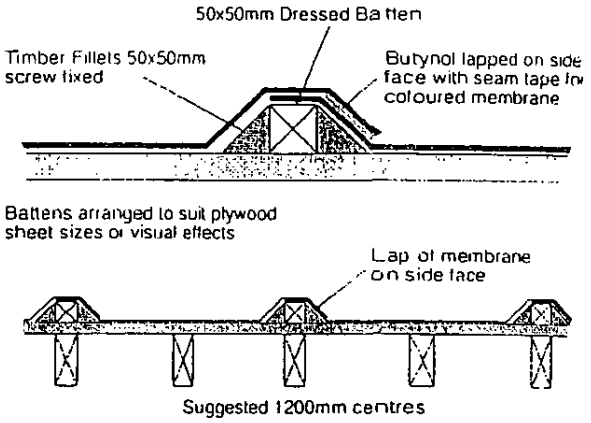
BRANZ Appraised, E2/AS1 Acceptable Solution

FLASHING INTO CONCRETE WALLS



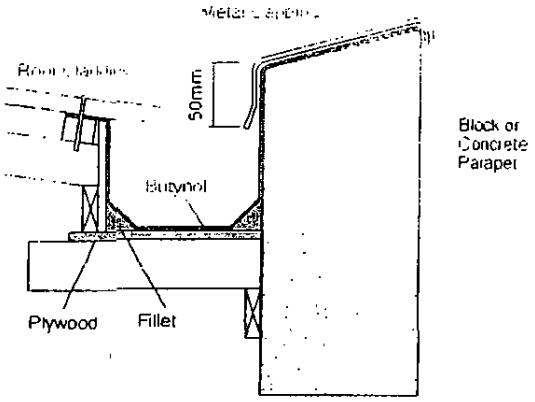
Butynol is glued into square chase and finished with Butynol Sealant

RECOMMENDED BATTEN PROFILE DETAIL

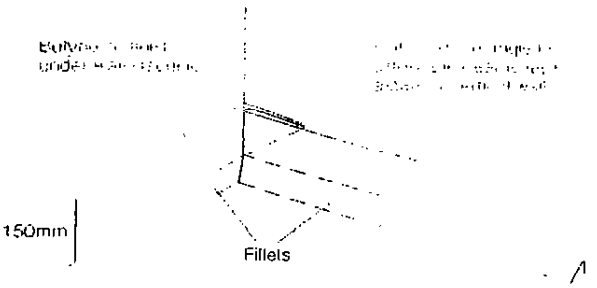


Example of a 1400mm sheet of Ardex Butynol dressed over battens at 1200mm centres

BOXED GUTTER AND PARAPET DOWNTURN



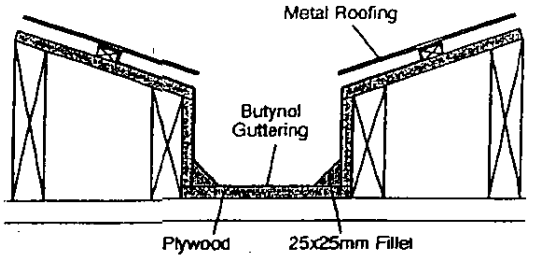
INTERNAL CORNERS



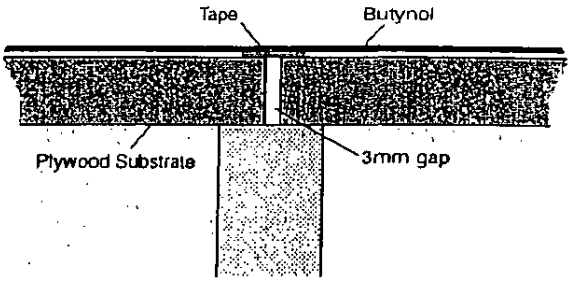
Without cutting Butynol simply fold a 'pig's ear' corner as shown. The angle fold should be behind the main sheet.

NOTE: Fillets must be used on all internal corners.

INTERNAL GUTTER



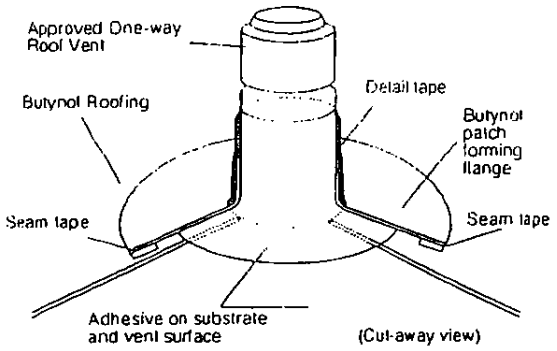
TAPING SUBSTRATE SHEETS



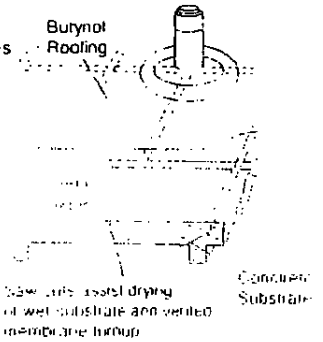
All joints between substrate sheets of Ply should be taped to prevent stressing of the Butynol in case of marked timber movement.

ONE WAY SUBSTRATE VENTILATOR

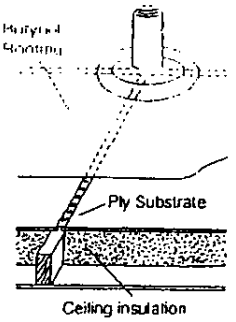
PVC or Aluminium



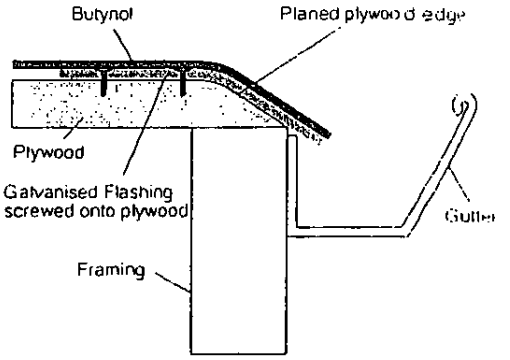
Vent installed over intersection of vent tapes on concrete substrate

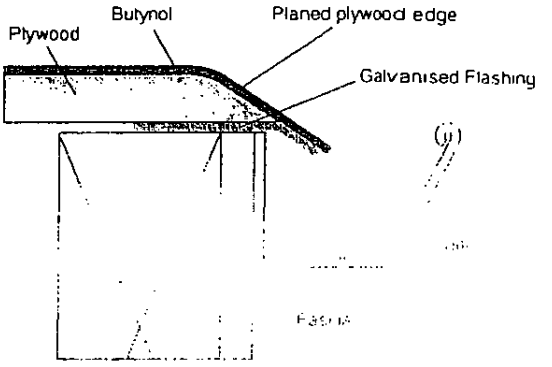


Vent installed over intersection of 3mm gap between Ply substrate sheets

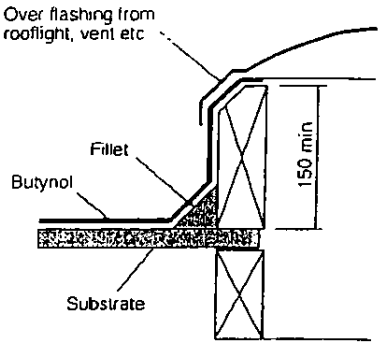


TWO METHODS FOR FINISHING OVER A GUTTER





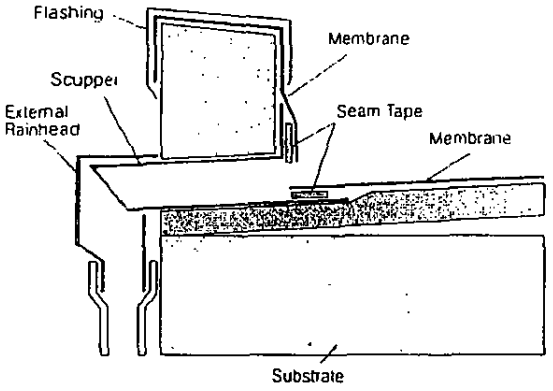
ROOFING PENETRATION IN MEMBRANE



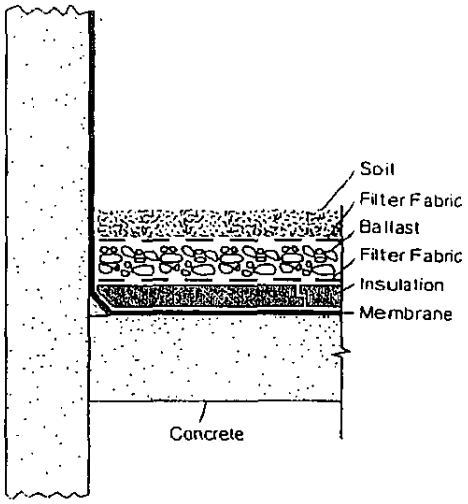
NOTE: 1 For maximum penetration size of 1200x1200mm
2 External corners to be formed as shown

BRANZ Appraised, E2/AS1 Acceptable Solution

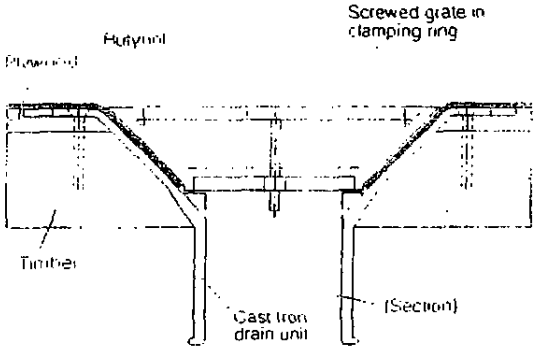
SCUPPER OUTLET

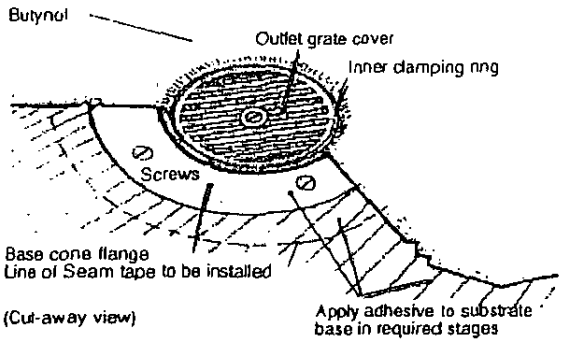


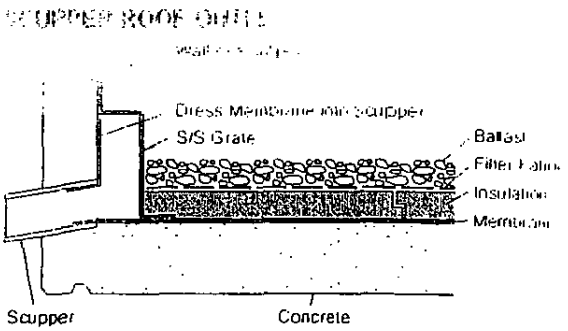
TYPICAL BALLASTED/GARDEN ROOF DETAIL



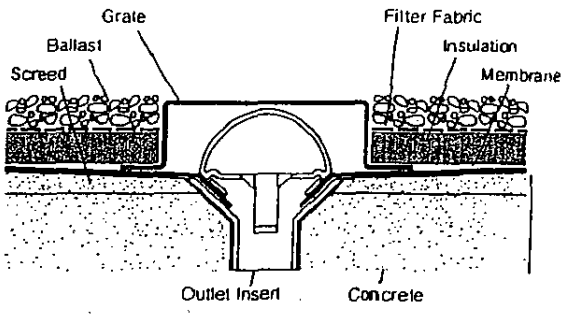
INTERNAL ROOF DRAIN (NZBC E2/AS1 Approved)





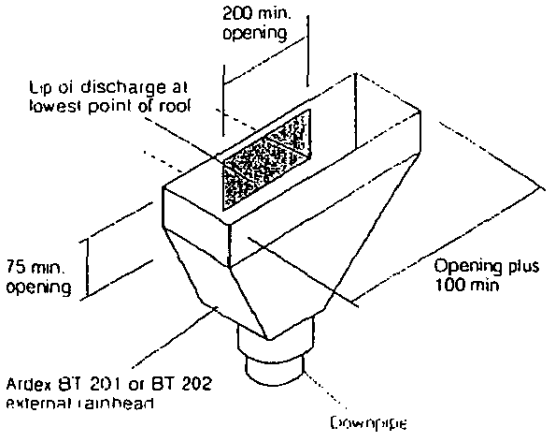


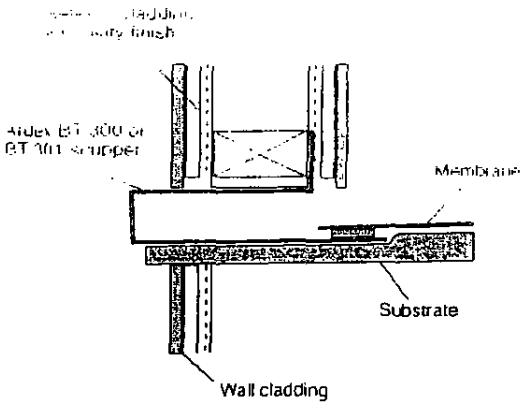
SCUPPER ROOF OUTLET & GRAVEL RETAINER



RAINWATER HEAD AND SCUPPER OPENING IN MEMBRANE USING ARDEX BT 300 OR BT 301 SCUPPER

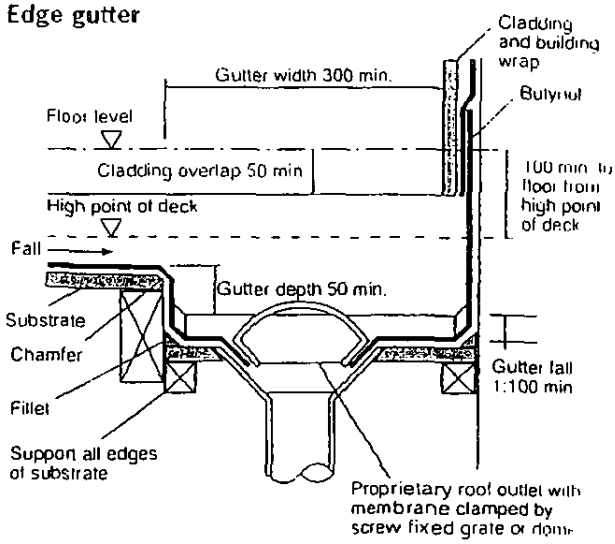
Deck outlet

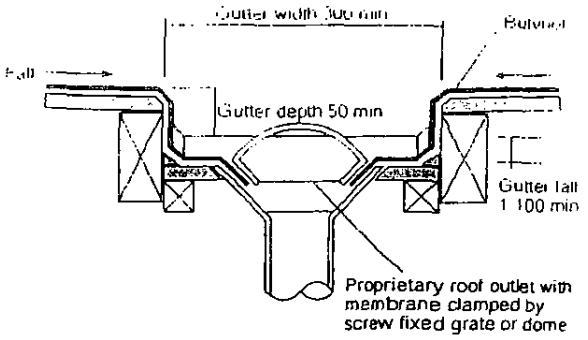




GUTTERS AND OUTLETS IN MEMBRANE

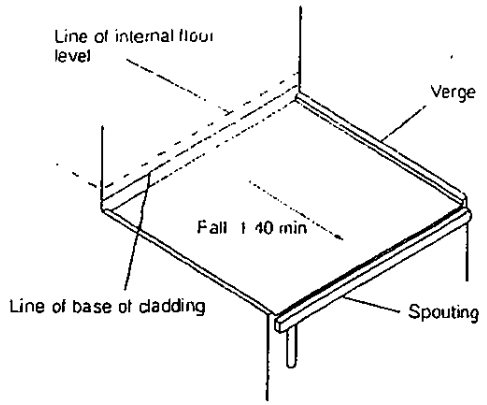
Edge gutter



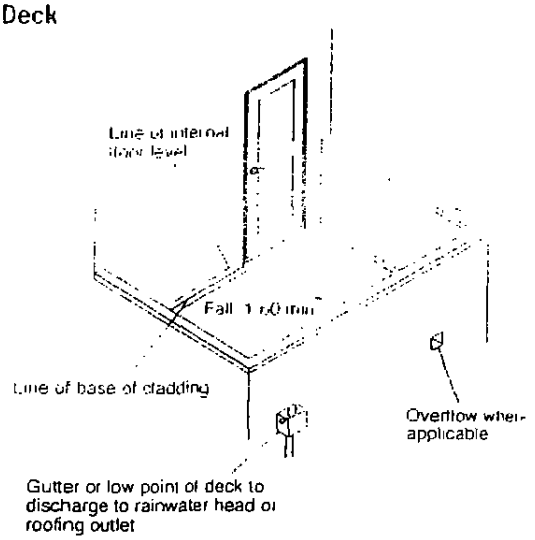


FALLS IN BUTYNOL ROOFS AND DECKS

Roof

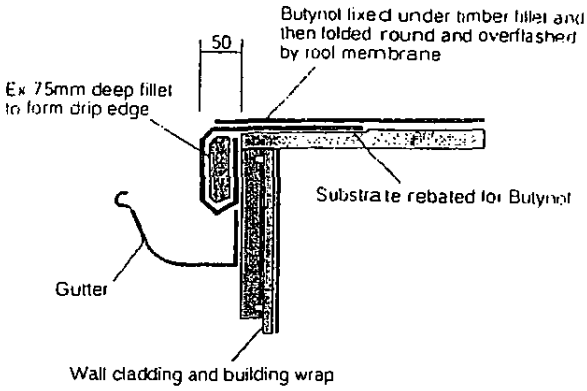


Deck

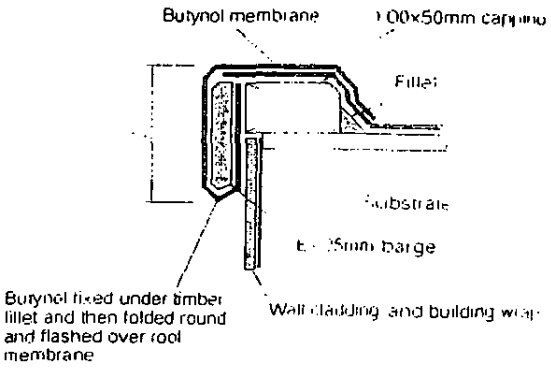


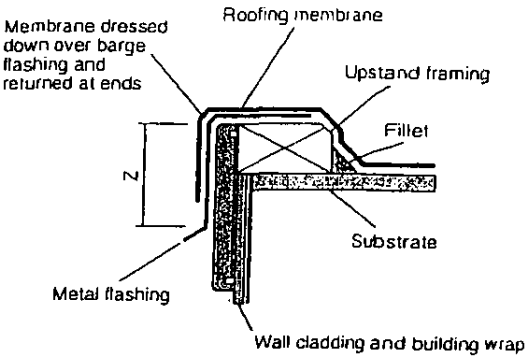
EAVE AND VERGES IN BUTYNOL

Eave



Verges





NOTE: Z = variable according to wind zone

LOOSE LAID APPLICATION OF BUTYNOL ROOFING

Materials used shall be as previously specified. When the surface is suitably prepared a large fully vulcanised Butynol sheet or sheets can be unrolled and spread over the prepared area and allowed to remain in this position for approximately one hour to relieve stresses induced by manufacture and storage. If necessary for ease of handling, these sheets can be supplied in varying sizes and vulcanised on site using an Ardex vulcanising machine or using seam tape with seam primer.

The Butynol sheet shall be set out in the exact position in which it will be finally required and whilst it is held firmly in place it shall be folded back at least one metre from the roof's surrounding parapet or wall to allow the application of adhesive to that area of the exposed substrate.

WA98 adhesive may be applied to the substrate and the corresponding area of Butynol sheeting which may then, when the adhesive is touch dry, be worked back into its required position avoiding wrinkles and the inclusion of air bubbles.

Upon completion of the detail work [illegible] drain and ballast to a layer of rounded gravel 30-40mm should be spread up to 50mm deep over a layer of Geo Textile Fabric for protection of the Butynol sheet

Care must be taken at outlets to ensure the ballast cannot enter or cause a blockage that prevents rainwater from leaving the roof area. Maintenance paths should be created to air-conditioning or roof plant with concrete tiles

Effects on the membrane in areas of high wind can be eliminated by stabilising the ballast with cement. Dry cement should be broadcast over the 30-40mm gravel with a broad mouth shovel and left to hydrate or lightly sprayed with water to set off.

If possible a water test should be carried out prior to the application of ballast.

Note: Minimum pitch 1.5° to comply.

Refer NZBC Clause E@/AS1 External Moisture 8.5.1 (a).

4.1 PROFILE METAL LONG RUN ROOFING

The following is a full copy (excluding guidance notes) of the MasterSpec® specification for Dimond Roofing Systems.

4311D DIMOND PROFILED ROOFING

1. GENERAL

Related work

1.1 RELATED SECTIONS
Refer to 4312D DIMOND PROFILED GRP NATURAL LIGHTING for natural lighting sheeting
Refer to 7413 RAINWATER SYSTEMS for rainwater disposal

Documents

1.2 DOCUMENTS REFERRED TO
Documents referred to in this section are:

AS/NZS 1170	Structural design actions Part 2: Wind actions
AS/NZS 2728	Prefinished/pre-painted sheet metal products for interior/exterior building applications – performance requirements
NZS 3604	Timber framed buildings
AS 3566	Self-drilling screws for the building and construction industries
NZS 4203	General structural design and design loadings for buildings
AS/NZS 4534	Zinc and zinc/aluminium-alloy coatings on steel wire

NZ Metal Roofing Manufacturers Inc: NZ metal roofing & wall cladding code of practice

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.3 MANUFACTURER'S DOCUMENTS
Manufacturer's and supplier's documents relating to work in this section are:

Dimond Roofing and Cladding Systems Manual, September 2001

Copies of the above literature are available on the **Dimond** website www.dimond.co.nz or by phoning **Dimond** on 0800 DIMOND (0800 346 663).

Requirements

1.4 QUALIFICATIONS
Roofers to be Dimond Certified Commercial Installer, or experienced, competent roofers familiar with **Dimond** products.

1.5 MAINTENANCE DATA
Provide two bound copies of all relevant **Dimond** maintenance information on completion of the roofing work.

1.6 WARRANTY

Warrant this work under normal environmental and use conditions against:

Coating:	15 year failure of coating adhesion (manufacturer's standard warranty)
Penetration:	15 year weatherproofing by material penetration (manufacturer's standard warranty)
Execution:	5 year weatherproofing by substandard workmanship
From:	Date of completion of installation

Refer to the PRELIMINARIES AND GENERAL section for details of when completed warranty must be submitted.

Performance

1.7 FIXINGS, WIND

Design and use the fixings appropriate for the wind zone (R) and topographical classification (T) of this site and building height; as required by NZS 3604, or by wind loads given by NZS 4203 or AS/NZS 1170 Part 2. Allow for specific loadings at corners and the periphery of the roof, where localised pressure factors apply.

1.8 CO-ORDINATE

Co-ordinate to ensure substrate and preparatory work is complete and other work programmed in the order required for access and completion of the roof.

1.9 PERFORMANCE

Accept responsibility for the weather-tight performance of the completed roofing system, including all penetrations through the roof and junctions with walls and parapets.

2. PRODUCTS

Materials – General

2.1 WIRE NETTING

Galvanized hexagonal 75 mm mesh from 1 mm diameter steel wire to AS/NZS 4534.

2.2 SAFETY MESH

Aus Mesh galvanized wire mesh.

2.3 UNDERLAY

Breather type kraft paper laminates.

2.4 DIMOND ROOFING

Refer to 4. SELECTIONS / drawings.

2.5 FLASHINGS GENERALLY

Formable grade 0.55 mm BMT for galvanized, Zincalume® and pre-coated steel, and 0.90 mm BMT for aluminium to the same standards as the profiled sheets, notched where across profile or provided with a soft edge.

2.6 FLASHINGS TO VERGE, RIDGE AND HIP

Supplied by **Dimond** to match or to suit the roofing.

2.7 FASTENERS GENERALLY
Durability of all fasteners not less than the roofing material being fixed.

2.8 FIXING CLIPS TO TROUGH SECTION ROOFING
Galvanized steel (powder coated for aluminium) to suit the material and profile of the rigid sheet and location as required by **Dimond** for **Dimondek 300** and **Dimondek 400**. Fix to steel with 16 mm x 10 gauge galvanized wafer head self-drilling screws and to timber with 50 mm long galvanized spiral rolled flat head nails.

Fix **Dimondek 630** clips to steel with 12 gauge x 20 mm tek screws and to timber with 10 gauge x 25 mm long wafer head timbertite screws – Class 4.

2.9 FIXING SCREWS
To AS 3566. Screws appropriate to the roofing material and the supporting structure, and wind load as required by **Dimond**, and with a durability not less than the material fixed.

2.10 RIVETS
Sealed aluminium, minimum diameter 4.8 mm.

Accessories

2.11 SEALANT
Neutral curing silicone or polymer sealant as required by **Dimond** and used as directed.

2.12 CLOSURE STRIPS
Non-bituminous compressible, profiled closed cell foam strips to fit the sheet profile.
Brand: Ecofoam
Profile: To suit selected cladding profile

3. EXECUTION

Conditions

3.1 INSPECTION
Inspect the roof framing and supporting structure to ensure that it is complete and fully braced ready for roofing and free from any misalignments or protrusions that could damage the roofing.

3.2 STORAGE
Take delivery of and accept packs of roofing dry and undamaged on delivery. Reject all damaged material. Store on a level firm base clear of the ground, with packs well ventilated and completely protected from weather and damage. Do not allow moisture to build up between sheets.

3.3 HANDLING
Avoid distortion and contact with damaging substances, including cement. Do not drag sheets across each other or other materials. Protect edges and surface finishes from damage. Use soft, flat sole shoes when fixing and for all other work on the roof.

3.4 SEPARATION

Isolate dissimilar materials in close proximity as necessary by painting the surfaces or fitting separator strips of compatible materials. Place isolators between metals and treated timber and cement based materials. Do not use unpainted lead sheet in contact with or allow water run-off onto galvanized steel or Zincalume®.

Application

3.5 SET-OUT & LAYING

Carefully set out to allow cover flashings of equal width at the ends of the building. Lay sheets with side laps away from the line of sight ensuring ends of sheets are true to line. Check during fixing to eliminate creep or spread and use string lines along purlin centres to keep fastenings in line.

3.6 FORMING

Form stop-ends and downturns to **Dimond** recommendations.

3.7 SEAL CUT EDGES

Seal cut edges of pre-coated steel sheet with cut edge protection lacquer before fixing to **Dimond** requirements.

3.8 END LAPS

End laps are not permitted, except where specifically detailed to **Dimond** requirements.

3.9 THERMAL MOVEMENT

Roof fixing and jointing to conform with **Dimond** requirements for thermal movement.

3.10 FIXING GENERALLY

Install and fix in accordance with the Dimond Roofing and Cladding Systems Manual and the NZ Metal Roofing Manufacturers Inc: NZ metal roofing & wall cladding code of practice and to **Dimond** required fixing patterns and details for each area of the building roofing. Use only screws as required by **Dimond**. Paint colour matched fixings and accessories before installation.

3.11 FIX UNDERLAY

Fix wire netting where specified, drawn tight and nailed or screwed to purlins with edges butted and wired together to form a complete net. Fit and lap roofing underlay over the netting to suit roofing sheets, with 40 mm oversail into gutter, to the underlay manufacturer's requirements.

3.12 FIX INSULATION

Run and fix insulation blanket as detailed and to the insulation manufacturer's requirements.

3.13 MARKING AND CUTTING

Cut only by shearing tools. Do not use black lead pencils for marking Zincalume®, Colorsteel® or ColorCote® products.

3.14 FIX SHEETS

Fix sheets in place using the fastening system required by **Dimond** for specified profiles, making due allowance for dynamic local wind pressures on the building and thermal movement in the sheet.

3.15 FLASH

Flash roof to parapets, walls and penetrations to detail in the Dimond Roofing and Cladding Systems Manual and to the New Zealand Metal Roofing Manufacturer's Association Inc: NZ metal roofing & wall cladding code of practice and **Dimond** requirements. Cut accurately and fix using sealant and rivets to detail and to **Dimond** requirements to form a weatherproof cover. Ensure flashings are designed and installed to avoid water ponding.

3.16 FIX RIDGES AND HIPS

Cut accurately and fix using primary fasteners to the purlins. Join using sealant and rivets to detail and to the New Zealand Metal Roofing Manufacturers Inc: NZ metal roofing & wall cladding code of practice. Ensure flashings are designed and installed to avoid water ponding.

3.17 FIX VERGE AND CAP FLASHINGS

Cut accurately and fix using primary fasteners to the purlins. Join using sealant and rivets to detail and to the New Zealand Metal Roofing Manufacturers Inc: NZ metal roofing & wall cladding code of practice. Ensure flashings are designed and installed to avoid water ponding.

3.18 PENETRATIONS

Flash and overflash all penetrations through the roof.

3.19 PENETRATIONS AND JUNCTIONS

Check that adjoining walls and parapets are prepared ready for the installation of the roofing. Confirm that openings have been prepared ready for the installation of skylights and other penetrations through the roof. Required work includes the following:

- underlay turned up at wall and parapet lines
- underlay finished and dressed off to all openings, ready for the installation of skylights and other penetrations
- roofing installation neatly finished to all sides of openings and to all wall and parapet junctions
- installation of flashings (those required to be installed prior to installation of penetrating elements and/or wall linings)

Completion

3.20 REPLACE

Replace damaged or marked elements.

3.21 LEAVE

Leave this work complete with all necessary flashings, undercloaks, valleys, ridges and hips all properly installed as the work proceeds so the finished roof is completely weathertight.

3.22 REMOVE

Remove all trade rubbish, swarf and unused materials from the roof and surrounds daily during the work. Sweep down at the end of each day, and clean out spoutings, gutters and rainwater pipes on completion of the roof. Remove debris, unused materials and elements from the site.

3.23 PROTECTION

Protect the completed work from damage for the remainder of the construction period. If access is given to the roof for later work, provide properly constructed walkways or platforms to eliminate damage.

4. SELECTIONS

4.1 UNDERLAY

Brand/type. –

4.2 INSULATION

Brand: –

Type: –

Thickness: –

Facing: –

Materials - roofing products

4.3 DIMOND TROUGH SECTION ROOFING

Profile name: –

Metal: Steel

BMT: 0.55 mm

Coating system: –

Dimond colour: –

4.4 DIMOND SYMMETRICAL RIB PROFILE ROOFING

Profile name: –

Metal: –

BMT: 0.55 mm

Coating system. –

Dimond colour –

4.5 DIMOND ASYMMETRICAL RIB PROFILE ROOFING

Profile name: Styleline

Metal: Steel

BMT: 0.55 mm

Coating system: –

Dimond colour: –

4.6 DIMOND CORRUGATE

Metal: Steel

BMT: 0.55 mm

Coating system: Unpainted Zincalume

Dimond colour: –

4.7 DIMOND CURVED PROFILE ROOFING

Profile name: V-Rib

Metal: Steel

BMT: 0.55 mm

Coating system: –

Dimond colour: –

4.8 DURACLAD

Type:	Opaque, PVF film surfaced glass reinforced sheeting
Profile:	–
Colour:	White

4.9 DURACLAD GC

Type:	*Opaque glass fibre reinforced sheeting with a gel coat top surface.*
Profile:	–
Colour:	–

(a) Description:
Dimond long run roofing and wall cladding systems are available in a variety of sheeting materials together with the appropriate fasteners, underlay, supporting netting and perimeter and penetration flashings. Table 2.1A summarises the sheeting material options available.

Please also refer to the Habitats Colour Chart, Section 1.3 for the full range of available colours in each of the paint coating types. Other materials and thickness may be available upon enquiry.

Table 2.1A Sheeting Material Options

Material	Grade	Thickness (mm)	Metal Coating	Prepaint Finish Available	Relevant Standards
Steel	G550	0.40 or 0.55 BMT	Zinc[1] or Zinc/Aluminium[2]	Yes	AS 1397
	G250/300[3]	0.40 or 0.55 BMT		Yes	
Aluminium (plain or embossed)	5052	0.70 or 0.90 BMT	N/A	Yes	AS 1734
	5251	0.70 or 0.90 BMT	N/A	Yes	
Stainless Steel	304	0.70	N/A	No	AS 1449
	316	0.70	N/A	No	
Copper	110A	0.55	N/A	No	AS 2738
	122A	0.55	N/A	No	
GRP	Duraclad	1.7	N/A	Yes	–

1. Galvsteel™
2. Zincalume®
3. For some machine-curved products only

BMT Base Metal Thickness

(b) Scope Of Use:
Dimond long run metal roofing and wall cladding systems are intended for use in constructing the building envelope for commercial buildings and residential buildings subject to limitations listed below.

(c) Requirements:
Attention to the following details is required to ensure the expected system performance is achieved.

	Reference
• The selection of the type and grade of sheeting material and fasteners must be based on the life expectancy required and the severity of the external and internal environments.	2.1.1.2 2.1.1.3 2.1.1.4 2.2.3
• Correct choice of breather type or vapour barrier underlay to suit the building environment.	2.1.3.5
• Site storage that keeps product dry and protected from damage.	
• Sheeting handling that prevents surface damage.	
• Avoidance of excessive spans or insufficient fasteners for the expected loads.	2.1.3.1 2.1.4
• Correct placement and flashing of penetrations through the roof.	
• Correct layout and installation of the sheeting, underlay and netting.	
• Allowance for thermal expansion and contraction.	2.1.3.4
• Sufficient roof pitch to permit complete surface water drainage.	2.1.4
• Control of allowable contact with dissimilar materials.	2.1.3.3
• Awareness and implementation of maintenance requirements, particularly for surfaces not washed by natural rainfall.	2.1.1.3
• Correct choice of material for collection of drinking water from a Zincalume or colour finished roof is required.	2.2.1.4

Continued on next page ...

(d) NZBC Compliance:

Test information available from Pacific Coilcoaters and BHP NZ Steel, and past history of use of long run metal roofing and cladding products in New Zealand indicate that, provided the product use and maintenance is in line with the guidelines contained in the current literature referenced, Dimond long run metal roofing & wall cladding systems can be expected to meet the performance criteria in clause E2 of the New Zealand Building Code, for a period of not less than 15 years.

(e) Use Outside the Stated Guidelines:

If the need arises to use Dimond long run roofing & cladding outside the limitations and procedures given in this or other referenced literature, or if any doubt exists on product handling or use, written approval for use must be obtained from Dimond before the project commences.

AS/NZS 2728: 1997, (Australia/New Zealand Standard – Prefinished / Prepainted Sheet Metal Products For Interior / Exterior Building Applications – Performance Requirements), classifies the atmospheric environment into 7 categories and provides a guide to the selection of prefinished products in these categories.

In Table 2.1B and 2.1C overleaf we have created a guide showing which categories the more common roofing and cladding materials and coatings can be used in. Only 6 of the 7 categories defined by the standard are covered, as the 7th one, Tropical, is not relevant in New Zealand.

For further classification information please refer to AS/NZS 2728:1997

Table 2.1B Atmospheric Classification Definition

Mild	sheltered areas that are far inland (very few in NZ)
Moderate	areas that are protected from marine influence. Are inland areas other than those that are far inland
Industrial	industrial areas that are inland
Marine	large parts of NZ including areas 100m – 400m from the shoreline in sheltered areas (inner harbour and estuaries) and more than 1 km from breaking surf shoreline Can extend up to 30kms inland depending on topography and prevailing winds.
Severe Marine	areas that range from 100m to 1km from breaking surf shoreline. In high wind areas the distance inland will increase. It also includes areas that are less than 100m (but can extend up to 400m depending on prevailing winds) from the shoreline in sheltered areas.
Very Severe Marine	in areas up to and including 100m from breaking surf. Will extend inland 400m or more where strong prevailing winds exist.
Industrial & Geothermal	areas of high corrosion including chemical plants and geothermal areas.
Severe Chemical Environments (additional to AS/NZS 2728)	unusually harsh conditions due to moisture generation and/or chemical usage or storage (eg. cool stores, animal shelters, fertiliser storage). Will require specific material selection for sheeting, fasteners and netting. Contact Dimond.

Table 2.1C Environment Categories and Suitable Sheeting and Fastener Materials

Atmospheric Conditions	Substrates	Prefinished Paint Coating Types	Branded Sheeting Products	Recommended Screw Fastener Material	Washer Material
Mild Moderate Industrial Marine	Zinc Coated Steel	–	Galvsteel™	Climaseal 4®	Galvanised
	Zinc/Aluminium Coated Steel (150g/m²)	–	Zincalume®	Climaseal 4®	Zincalume®
		Polyester, Acrylic	ColorCote® ZR8™/Colorsteel® Endura™	Climaseal 4®	Colorcote ZR8™/CS Endura™
		PVF²	Colorcote® ZRX™	Climaseal 4®	Colorcote ZRX™
	Aluminium	–	Plain or embossed finish	304 Stainless Steel	Aluminium
		Polyester, Acrylic	ColorCote® AR8™	304 Stainless Steel	Colorcote AR8™
		PVF²	ColorCote® ARX™	304 Stainless Steel	Colorcote ARX™
	Stainless Steel	–	–	304 Stainless Steel	304 Stainless Steel
	Copper	–	–	304 Stainless Steel, Bronze	–
	Glass Reinforced Polyester (GRP)	Gel Coat	Duraclad®, Webglass	304 Stainless Steel	Weatherlok (UV Stabilised PEA)
Severe Marine	Zinc/Aluminium Coated Steel (200g/m²)	Polyester	Colorsteel® MAXX™	Climaseal 4®	Colorsteel MAXX™
	Zinc/Aluminium Coated Steel (150g/m²)	PVF²	ColorCote® ZRX™	Climaseal 4®	Colorcote ZRX™
	Aluminium	–	Plain or Embossed	304 Stainless Steel	Aluminium
		Polyester, Acrylic	ColorCote® AR8™	304 Stainless Steel	Colorcote AR8™
		PVF²	ColorCote® ARX™	304 Stainless Steel	Colorcote ARX™
	Stainless Steel	–	–	304 Stainless Steel	304 Stainless Steel
	Copper	–	–	304 Stainless Steel, Bronze	–
	Glass Reinforced Polyester (GRP)	Gel Coat	Duraclad®, Webglass	304 Stainless Steel	Weatherlok (UV Stabilised PEA)
Very Severe Marine Industrial Geothermal	Zinc/Aluminium Coated Steel (200g/m²)	Polyester	Colorsteel® MAXX™	Climaseal 4®	Colorsteel MAXX™
	Aluminium	–	Plain or embossed finish	304 Stainless Steel	Aluminium
		Polyester, Acrylic	ColorCote® AR8™	304 Stainless Steel	Colorcote AR8™
		PVF²	ColorCote® ARX™	304 Stainless Steel	Colorcote ARX™
	Stainless Steel	–	–	316 Stainless Steel	Stainless Steel
	Copper	–	–	316 Stainless Steel, Bronze	–
	Glass Reinforced Polyester (GRP)	Gel Coat	Duraclad®, Webglass	316 Stainless Steel	Weatherlok (UV Stabilised PEA)
Severe Chemical	Glass Reinforced Polyester (GRP)	Gel Coat	Duraclad®, Webglass (Consult Dimond)	Consult Dimond	Weatherlok (UV Stabilised PEA)

Warranties for commercial applications are issued on a job by job basis. It is imperative that care is taken during the planning process to choose the Roofing, Wall Cladding and Fastener system that will provide the life expectancy in the environment in which it will be installed, as incorrect selection could result in no warranty being available.

To assist you in determining the system that will best meet your warranty expectations Dimond have in place a Warranty Inquiry Service. Your design decisions on product type, material thickness, profile, paint coating type and colour, along with site details including address, distance from sea and degree of exposure will be required to enable us to provide a meaningful warranty. To access the service, please contact your Dimond Key Account person or phone 0800 DIMOND.

All warranties will carry a required maintenance clause, which must be complied with to ensure the warranty remains valid. Often aspects of design such as roof shape and roof pitch can influence the maintenance requirements. Due consideration of these factors during the design process is wise.

As a general guide, provided the materials are correctly selected from Table 2.1C for the environment, and building design does not impact on durability, it is reasonable to expect the following warranty periods will be available for your roofing and wall cladding. Please note that no warranty is available for Galvsteel material regardless of which environmental category it is used in.

Guideline Warranty Periods

Steel substrate with appropriate paint coating.

- Commercial roofs:
  15 years to perforation of substrate and fastener strength retention.
  15 years to paint coating peeling, flaking or excessive fade.
- Residential roofs (dependent on environment):
  Up to a maximum 30 years to perforation of substrate and fastener strength retention.
  Up to a maximum 20 years to paint coating peeling, flaking or excessive fade.

Aluminium (unpainted):

- Commercial and residential roofs:
  15 years to perforation of substrate.

Aluminium substrate with appropriate paint coating:

- Commercial roofs:
  15 years to perforation of substrate and fastener strength retention.
  15 years to paint coating peeling, flaking or excessive fade.
- Residential roofs:
  30 years up to and including Severe Marine, and 20 years in Very Severe Marine, to perforation of substrate and fastener strength retention.
  15 to 20 years dependent on environment to paint coating peeling, flaking or excessive fade.

Duraclad

- Commercial and residential roofs and walls:
  20 years to fibre show through or perforation of sheet.

Routine Maintenance

Washing

All metal surfaces must be kept clean for best warranty. Warranty conditions require routine washing either by natural rainwater or by manual washing and scrubbing with a soft bristle brush.

The frequency of washing must be sufficient to prevent build up of debris, dirt or salt deposits and will vary depending on location and degree of protection from rainfall.

As a general guide the following frequencies can be used as a starting point.

Environment	Washing Frequency
Moderate / Marine	Every 6 – 12 months
Severe Marine	Every 3 – 6 months
Very Severe Marine	Every 3 months

The need to wash can be reduced by building design that avoids the creation of metal roof or wall surfaces that are sheltered from natural rainfall.

Overpainting

Substrate in Good Condition

Clean the surface and overpaint with 2 coats of an acrylic roof paint system, following the paint manufacturer's instructions.

If the roof or wall cladding has had less than 2 years exposure to weathering, the acrylic paint manufacturer should be consulted for advice on pretreatment of surface to ensure adequate adhesion.

Substrate Requires Refurbishment

Clean the surface and coat any surface corrosion with a suitable conversion treatment and primer, then overpaint with 2 coats of an acrylic roof paint system, following the paint manufacturer's instructions. Check and replace any fasteners exhibiting advanced corrosion.

Rubbing

Hard rubbing on the unpainted Zincalume surface can cause black marks on the Zincalume surface if the clear coating is worn through. If rubbing is unavoidable we recommend it be kept to a minimum to avoid the wear through of the protective clear coating.

The selection of the most appropriate roofing and wall cladding material to meet cost-performance requirements within a chosen time period should be made with the assistance of Life Cycle Costing comparisons.

Input for these comparisons requires:

- Environment type
- Expected useful life for each material / maintenance option
- Type of regular maintenance (if any) and associated cost
- Material types of sheeting and fastener, and their durability
- Material and installation costs
- Discount rate (%) to convert costs to present value

The following Tables 2.1D, E, F, G provide a guideline comparison for general cases. The Tables are based on:

1. Environment descriptions as defined in Section 2.1.1.2. Specific chemical exposure has not been included in the Life Cycle Analysis.

2. Market rates for the sheeting and fastener materials detailed and for installation labour. These rates have been converted to relative costs based on the initial installed cost of unpainted Zincalume®.

3. A choice of three different maintenance options identified on the Tables by the following key:

   R: Replacement Option –
   No maintenance other than regular washing to keep surface clean. Sheeting and fasteners replaced once the sheeting has reached an advanced state of deterioration, but before perforation and leakage occurs.

   F: Refurbish Option –
   No maintenance other than regular washing to keep surface clean until surface deterioration is at a point where refurbishment will add to the life of the sheeting rather than leave for later replacement.

   A: Acceptable Appearance Option –
   Regular washing to keep surface clean, and repainting of the surface to maintain a good standard of acceptable appearance, where this is important (e.g. high visibility walls). Once painted, repainting is required every 8 years.

4. In some cases the F and A maintenance options will eventually include sheeting and fastener replacement. The number of replacements expected in any case is shown on the Tables with shading to the following key.

No replacement of sheeting and fasteners
One replacement of sheeting and fasteners
Two replacements of sheeting and fasteners

5. The relative costs are given as initial installed cost at 0 years (with lowest cost option assigned the relative value of 1.0) and then as the present value of future maintenance costs required to deliver a sheeting life of 20, 30, 40 or 50 years. Present value has been calculated at a discount rate of 10%.

Continued on next page...

6. The combination of steel and aluminium is based on material with similar load span capability. No account has been taken of extra maintenance that may be required to repair foot traffic damage (which in some case may be higher for aluminium than steel).

7. The costs used for Duraclad do not include the extra support framing that may be required for this material in comparison with steel or aluminium. Depending on use (e.g.: wall cladding versus roofing) this difference may not be significant.

Table 2.1D Relative Life Cycle Costs – Moderate Environment

Roofing / Cladding Options			Relative Life Cycle Cost for Period				
Material							
Sheeting	Fastener	Maintenance	0 Years	20 Years	30 Years	40 Years	50 Years
Zincalume®	Class 3	R	1.00	1.00	1.00	1.09	1.09
Post-painted Zincalume®	Class 3	F	1.32	1.32	1.39	1.43	1.46
		A	1.32	1.54	1.58	1.59	1.62
Colorsteel® ENDURA™ or ColorCote® ZR8™	Class 3	R	1.21	1.21	1.21	1.27	1.27
		F	1.21	1.21	1.21	1.24	1.25
		A	1.21	1.28	1.32	1.34	1.35
ColorCote® ZRX™	Class 4	R	1.46	1.46	1.46	1.46	1.50
		F	1.46	1.46	1.46	1.47	1.48
		A	1.46	1.46	1.50	1.53	1.54

Table 2.1E Relative Life Cycle Costs – Industrial / Marine

Roofing / Cladding Options			Relative Life Cycle Cost for Period				
Material							
Sheeting	Fastener	Maintenance	0 Years	20 Years	30 Years	40 Years	50 Years
Zincalume®	Class 3	R	1.00	1.00	1.24	1.24	1.24
Post-painted Zincalume®	Class 3	F	1.32	1.44	1.48	1.50	1.52
		A	1.32	1.54	1.58	1.60	1.62
Colorsteel® ENDURA™ or ColorCote® ZR8™	Class 3	R	1.21	1.21	1.21	1.31	1.31
		F	1.21	1.21	1.25	1.26	1.27
		A	1.21	1.28	1.32	1.34	1.35
ColorCote® ZRX™	Class 4	R	1.46	1.46	1.46	1.46	1.53
		F	1.46	1.46	1.46	1.48	1.49
		A	1.46	1.46	1.50	1.53	1.54
Colorsteel® MAXX™	Class 4	R	1.54	1.54	1.74	1.74	1.74
		F	1.54	1.79	1.90	1.95	1.99
Aluminium (unpainted)	304 S/S	R	1.56	1.56	1.56	1.56	1.56
Duraclad	304 S/S	R	1.52	1.52	1.52	1.59	1.59
		F	1.52	1.52	1.63	1.68	1.72

Table 2.1F Relative Life Cycle Costs – Severe Marine Environment

Roofing / Cladding Options			Relative Life Cycle Cost for Period				
Material Sheeting	Fastener	Maintenance	0 Years	20 Years	30 Years	40 Years	50 Years
Colorsteel® ENDURA™ or ColorCote® ZR8™	Class 4	R	1.23	1.67	1.67	1.67	1.67
		F	1.23	1.42	1.64	1.66	1.67
ColorCote® ZRX™	Class 4	R	1.46	1.46	1.76	1.76	1.76
		F	1.46	1.57	1.57	1.75	1.77
		A	1.46	1.58	1.64	1.83	1.84
Colorsteel® MAXX™	304 S/S	R	1.54	1.54	1.86	1.86	1.86
		F	1.54	1.91	2.17	2.22	2.26
Aluminium (unpainted)	304 S/S	R	1.56	1.56	1.56	1.75	1.75
ColorCote® ARX™	304 S/S	R	2.15	2.15	2.15	2.15	2.15
		F	2.15	2.15	2.15	2.18	2.21
		A	2.15	2.23	2.26	2.28	2.29
Duraclad	304 S/S	R	1.52	1.52	1.52	1.59	1.59
		F	1.52	1.52	1.63	1.68	1.72

Table 2.1G Relative Life Cycle Costs – Very Severe Marine Environment

Roofing / Cladding Options			Relative Life Cycle Cost for Period				
Material Sheeting	Fastener	Maintenance	0 Years	20 Years	30 Years	40 Years	50 Years
Colorsteel® MAXX™	Class 4	R	1.54	2.06	2.06	2.18	2.18
		F	1.54	1.91	2.23	2.29	2.34
Aluminium (unpainted)	304 S/S	R	1.56	1.56	1.87	1.87	2.01
ColorCote® ARX™	304 S/S	R	2.15	2.15	2.15	2.41	2.41
		F	2.15	2.27	2.30	2.46	2.47
Duraclad	304 S/S	R	1.52	1.52	1.52	1.59	1.59
		F	1.52	1.52	1.63	1.68	1.72

STUD TO TOP PLATE FIXING SCHEDULE

(ALTERNATIVE TO NZS 3604:1999 TABLE 8.18)

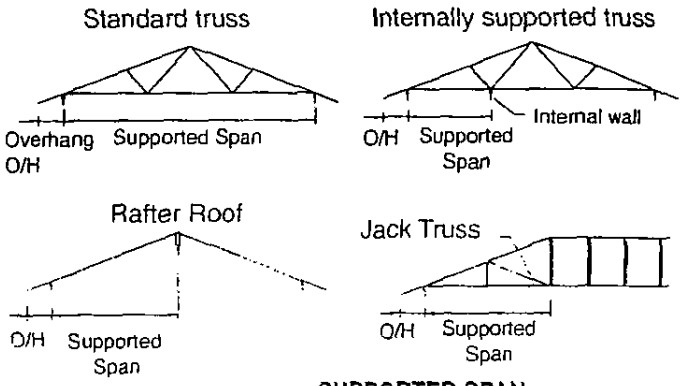
All fixings are designed for vertical loads only. Dead loads include the roof weight and standard ceiling weight of 0.20kPa. Refer to table 8.19, NZS3604:1999 for nailing schedule to resist horizontal loads.

These fixings assume the correct choice of rafter/truss to top plate connections have been made. Refer to the **LUMBERLOK®** Truss Fixing Chart.

Gable end wall top plate/stud connections require only 2x90x3.33 nails driven vertically into stud through top plate.

All Fixings assume top plate thickness of 45mm maximum.

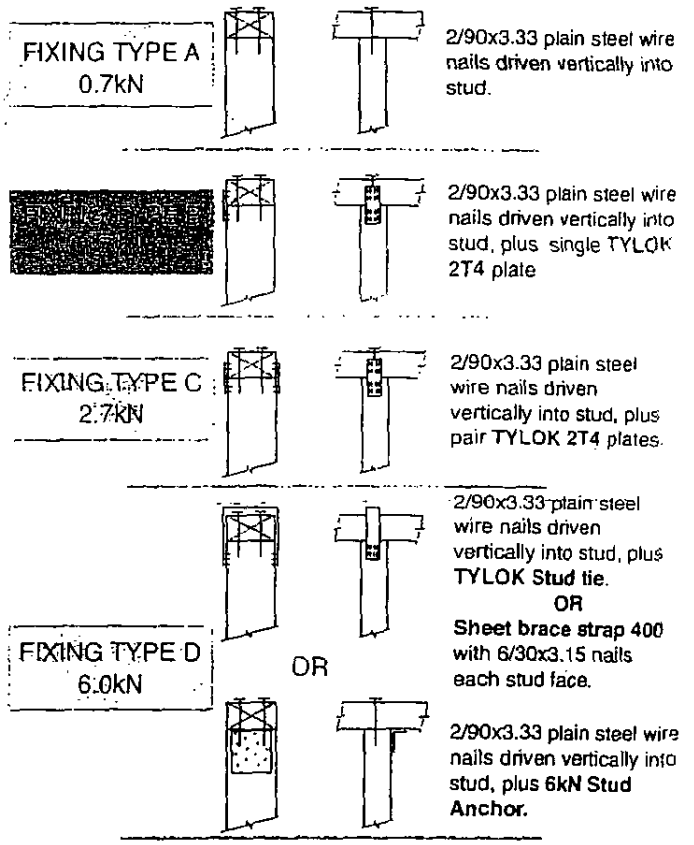
Wall framing arrangements under girder trusses are not covered in this schedule.

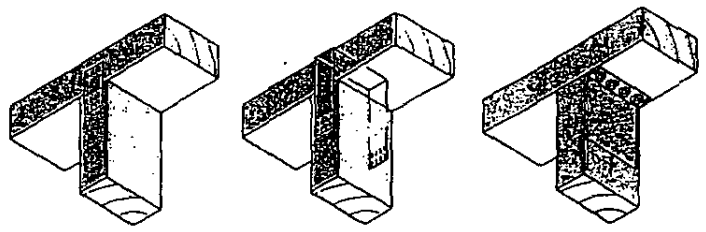


LOADED DIMENSION = $\frac{\text{SUPPORTED SPAN}}{2}$ + OVERHANG

Loaded Dimension	Light Roof Wind Zone				Heavy Roof Wind Zone			
	L	M	H	VH	L	M	H	VH
1.5	A	A	B	B	A	A	B	B
2.0	A	B	C	C	A	A	B	C
2.5	A	B	C	C	A	A	B	C
3.0	B	B	C	D	A	A	B	C
3.5	B	B	C	D	A	A	B	D
4.0	B	C	D	D	A	A	C	D
4.5	C	C	D	D	A	B	C	D
5.0	C	C	D	D	A	B	C	D
5.5	C	C	D	D	A	B	C	D
6.0	C	C	D	-	A	B	D	D

- All studs at 600 crs.
- For studs at 400 crs decrease loaded dimension by 33%.
- All trusses at 900 crs.
- For trusses at 1200 crs increase loaded dimension by 33%.





TYLOK 2T4 | **TYLOK STUD TIE OR SHEET BRACE STRAP 400** | **6kN STUD ANCHOR**

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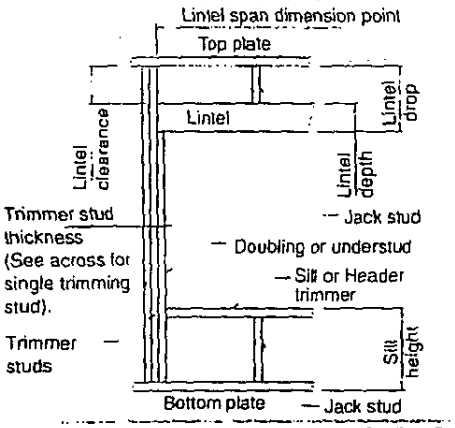
LINTEL FIXING SCHEDULE

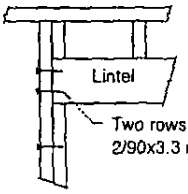
(ALTERNATIVE TO NZS 3604:1999 TABLE 8.14 & FIGURE 8.12)

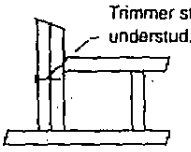


Lintel Span	Loaded Dimension *See reverse side	Light Roof Wind Zone L	M	H	VH	Heavy Roof Wind Zone L	M	H	VH
1.5	2.0	A	A			A	A		
	3.0	A		C	C	A	A		C
	4.0	A		C	C	A	A	C	C
	5.0			C	C	A	A	C	C
	6.0			C	D	A	A	C	C
2.0	2.0	A			C	A	A		
	3.0	A		C	C	A	A	C	C
	4.0			C	C	A	A	C	C
	5.0		C	C	D	A	A	C	C
	6.0		C	C	D	A		C	D
2.4	2.0	A			C	A	A		
	3.0			C	C	A	A	C	C
	4.0		C	C	D	A	A	C	C
	5.0		C	C	D	A		C	D
	6.0		C	D	D	A		C	D
3.0	2.0	A		C	C	A	A		C
	3.0			C	D	A	A	C	C
	4.0		C	C	D	A		C	D
	5.0		C	D	D	A		C	D
	6.0	C	C	D	-	A		D	D
3.6	2.0			C	C	A	A		C
	3.0		C	C	D	A		C	C
	4.0		C	D	D	A		C	D
	5.0	C	C	D	-	A		D	D
	6.0	C	D	D	-	A		D	-
4.2	2.0			C	C	A	A	C	C
	3.0		C	D	D	A		C	D
	4.0	C	C	D	-	A		D	D
	5.0	C	D	D	-	A		D	-
	6.0	C	D	-	-	A	C	D	-
4.8	2.0		C	C	D	A	A	C	C
	3.0		C	D	D	A		C	D
	4.0	C	C	D	-	A		D	D
	5.0	C	D	-	-	A		D	-
	6.0	C	D	-	-	A	C	D	-

Lintels accepting Girder trusses for ALL load cases use:
Fixing type C where contributary area = 10m²
Fixing type D where contributary area = 20m²
All cases outside this require specific design

TYPE A
1.4kN

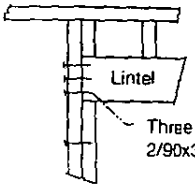


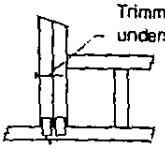


Fixing of jack stud to lintel & top plate, as per top plate schedule, see reverse side.

"All other nailing as Table 8.19"

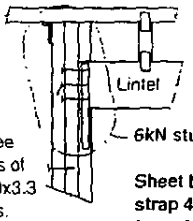
TYPE B
2.8kN



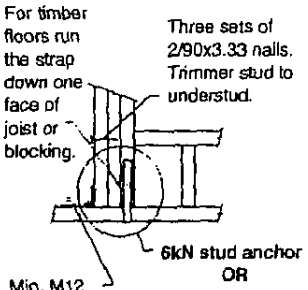


"All other nailing as Table 8.19"

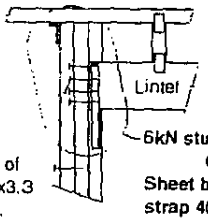
TYPE C
7.5kN



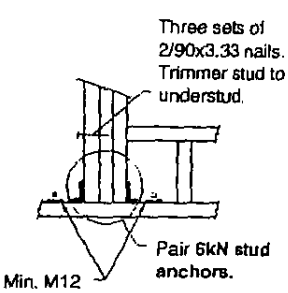
"All other nailing as Table 8.19"



TYPE D
13.5kN



"All other nailing as Table 8.19"



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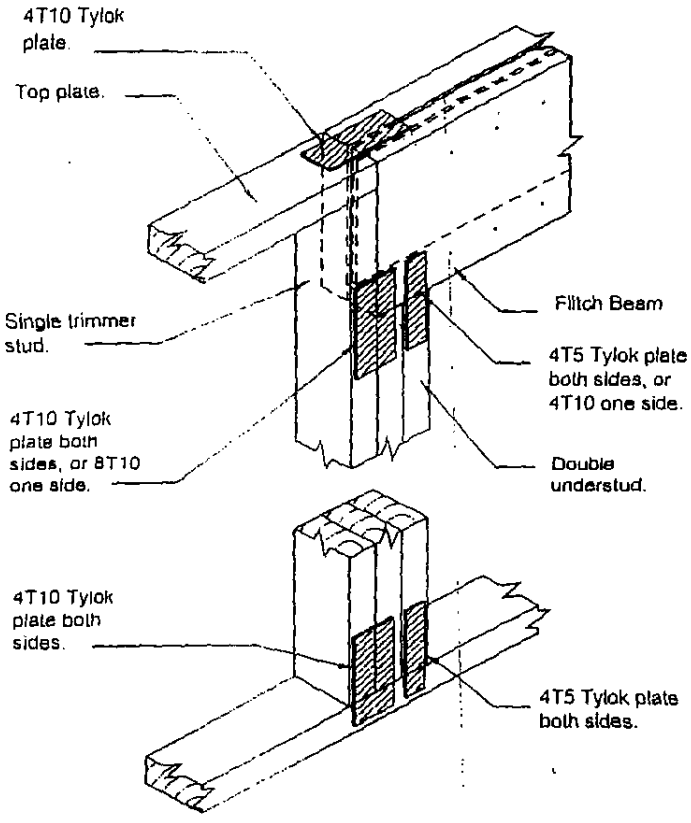
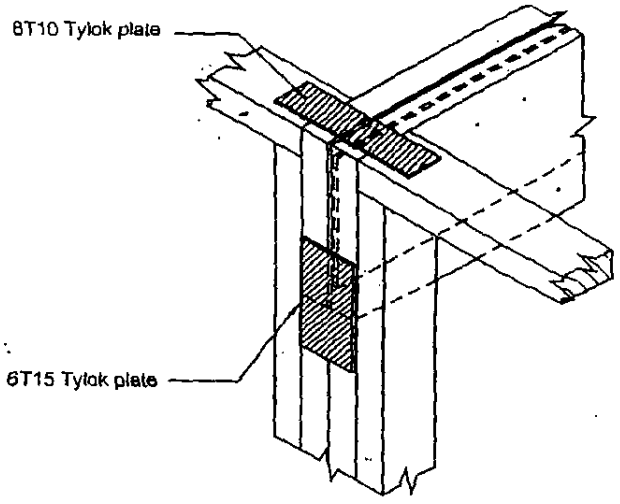
FLITCH BEAM

Fixing And Support Details



Simply Supported Beam



Beam Pocket

7.3 Level thresholds

Where provision for level access is required, this shall be provided as shown in Figure 17A and Figure 17B.

7.3.1 Enclosed decks

Where provision for level access is required for an *enclosed deck*, this shall be provided in Figure 17A. The underlying *membrane deck* surface shall be made *weathertight* as described in Paragraph 8.5.

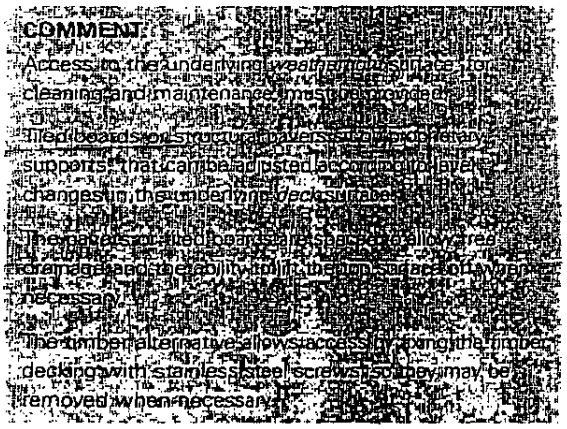
7.3.1.1 Removable surfaces

Raised removable surfaces of tiles or timber shall be provided over the underlying *weathertight enclosed deck* surface, as shown in Figure 17A. A minimum gap of 12 mm shall be provided against the wall or balustrade *cladding*.

7.3.1.2 Timber option

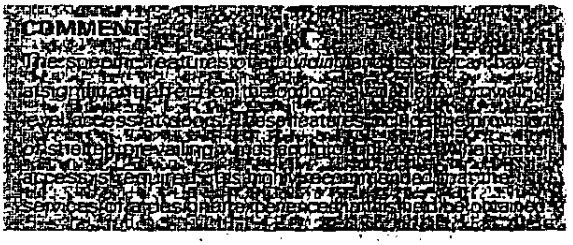
Timber decking shall be over 75 x 50 mm *framing* supported on blocks, with spacing in accordance with NZS 3604.

No fixings shall penetrate the underlying *deck membrane*.



7.3.2 Ground floor level access

Where provision for level access is required, this may be provided as shown in Figure 17B, with exterior paving or decking that complies with the *access route* requirements of D1/AS1.



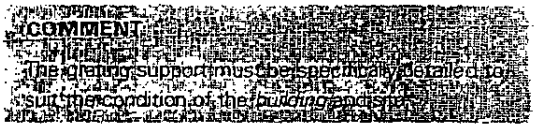
7.3.2.1 Concrete slab

Where provision for level access is required from a concrete floor slab to exterior paving, this shall be as shown in Figure 17B with:

a) A channel across the door opening, with:
   i) the width to suit capacity in accordance with E1/AS1,
   ii) a minimum depth of 150 mm,
   iii) a maximum length of 2000 mm, and
   iv) 1:200 minimum fall along length of channel.

b) Grating, in accordance with Table 20, over the channel, that:
   i) is supported independently of the door frame,
   ii) is removable to allow access for cleaning,
   iii) is specifically designed to accommodate imposed loads,
   iv) has gaps sized to prevent the wheels of wheel chairs or mobility aids entering or being trapped, and
   v) has a continuous gap of 12 mm minimum from door frame and wall *cladding*, and

c) Exterior paving that:
   i) has a minimum fall of 1:40 away from the channel,



   ii) together with the surrounding paving and ground levels, complies with drainage requirements of E1/AS1.

7.3.2.2 Timber floor

Where provision for level access is required from a timber floor to the exterior, this may be provided as shown in Figure 17B, with clearances in accordance with Paragraph 9.1.3.

7.0 Decks and Pergolas

Timber used to construct *decks*, *enclosed balustrades* and other attachments such as pergolas shall comply with NZS 3602.

7.1 Thresholds for decks

The vertical separation between the inside floor and the upper surface of the *deck* shall be as shown in Figure 14.

7.1.1 Slatted decks

For *decks* using spaced timber slats, a minimum gap of 12 mm shall be provided between the exterior wall and the adjacent timber slat.

The level of the upper surface of the timber decking:

a) Shall be a minimum of 50 mm below the interior floor level for *cantilevered decks* as shown in Figure 16, or

b) May be at the same level as the interior floor for non-cantilevered *decks* that are formed as shown in Figure 15.

7.1.2 Enclosed decks

This Acceptable Solution is limited to *enclosed decks* with a maximum area of 40 m².

For *enclosed decks*, the vertical separation between the inside floor level and the upper surface of the finished *deck* surface shall be a minimum of 100 mm.

7.2 Attachment to building structure

7.2.1 Slatted timber decks to walls

Junctions of slatted timber *decks* and pergola stringers with walls shall be made *weathertight* as shown in Figure 15.

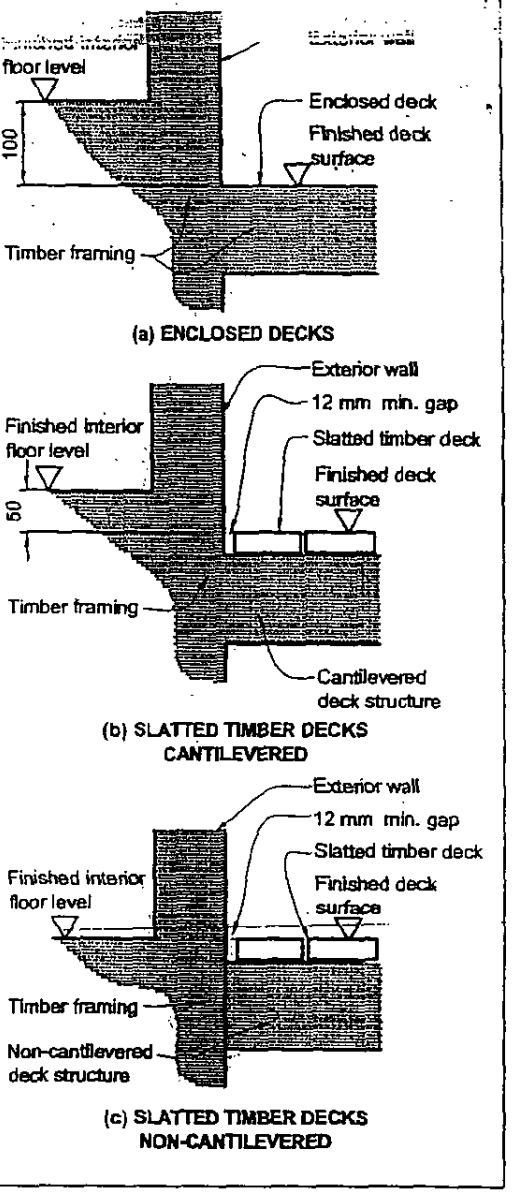
Fixings for stringers shall be in accordance with NZS 3604.

COMMENT:

Separation of decking and framing reduces the risk of water penetration into the framing.

Wall *cladding* that is absorbent, such as fibre cement, shall be sealed on surfaces and edges prior to fixing the stringers.

Figure 14: Threshold separations
Paragraph 7.1



7.2.1.1 Cantilevered decks

Cantilevered decks shall have the junction with the exterior wall made *weathertight* as shown in Figure 16. *Cladding* shall be sealed to the *saddle flashing*.

7.2.2 Pergolas

Connections of other structures, such as pergolas, shall have the junction with the exterior wall made *weathertight* by using the *deck framing* connections shown in Figure 15.

9.0 Wall Claddings

9.1 General

Wall *claddings* shall meet the requirements of NZBC E2.3.2 to E2.3.7, and comply with the provisions of Paragraph 9.1.1 to Paragraph 9.9.

9.1.1 Limitations

This Acceptable Solution is limited to the wall *cladding systems* listed in Paragraph 3.3. Table 3 lists wall *cladding systems* that shall be used for *buildings* with varying *risk scores*.

The method of establishing the level of risk associated with the use of a specific wall *cladding* is given in Paragraph 3.1. Based on this *risk score*, a wall *cladding* may require the inclusion of a *drained cavity* as described in Paragraph 9.1.8.

9.1.2 Maintenance

COMMENT

A deterioration in the appearance of the surface of the *cladding* does not necessarily relate to a deterioration in the weathertightness of the *cladding*.

Maintenance of wall *claddings* shall be carried out as necessary to achieve the expected *durability* of the material – refer Paragraph 2.5. The extent and nature of the necessary maintenance is dependent on the:

a) Type of *cladding* used,

b) Position of the *cladding* on the *building*,

c) Geographical location of the *building*, and

d) Specific site conditions.

COMMENT

Washing by rain removes most accumulated atmospheric contaminants. Sheltered areas, protected from the direct effects of rain and regular maintenance by washing with pressurised water should be used.

9.1.3 Bottom of cladding

Separations, clearances and overlaps shall be as shown in Figure 65 and Table 18.

Figure 65: Levels and garage openings
Paragraphs 9.1.3 and 9.1.3.4

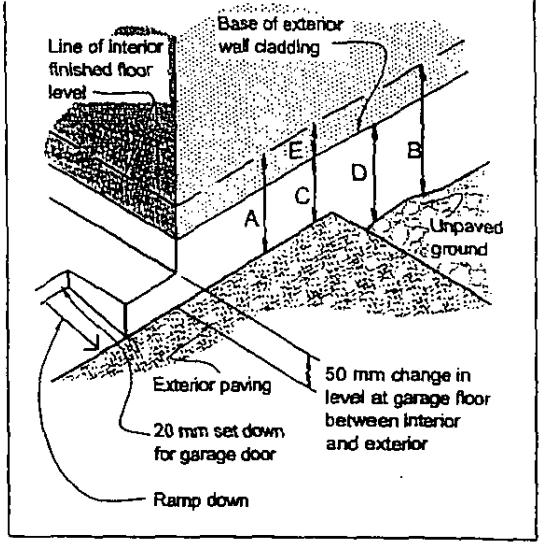


Table 18: Clearances
Paragraphs 9.1.3, 9.1.3.2, 9.1.3.3, 9.1.3.4 and 10.3.5

Minimum clearances (mm)	Masonry veneer		Other claddings				
	A	B	A	B	C	D	E
Concrete slab	200	150	150	225	100	75	50
Timber floor	Refer Note		Refer Note		100	75	50

NOTE: Refer to NZS 3604 for requirements.

9.1.3.1 Concrete slabs

Concrete slabs shall meet the requirements of Paragraph 10.3 as shown in Figure 132.

9.1.3.2 Masonry veneer clearances

The height of the floor slab above *finished ground level* shall be in accordance with Paragraph 10.3.5, as shown in Table 18.

Ground clearances for *masonry veneer* shall be as shown in the Brick Veneer Handbook SNZ HB 4236.

9.1.3.3 Bottom of other wall claddings

At concrete slab level, the base of the *cladding system* shall be as shown in Table 18, and:

a) Finish a minimum of:
   i) 100 mm above a paved surface, or
   ii) 175 mm above an unpaved surface,

b) Overlap the concrete slab by 50 mm, and

c) Be offset horizontally by a minimum of 6 mm to prevent capillary action.

9.1.3.4 Openings to garages

COMMENT:
This paragraph does not apply to garages that are detached outbuildings.

Garage spaces within, or attached to, the *building* envelope shall have:

a) Openings provided with a 50 mm minimum total level change between the interior and the exterior paving, and

b) Provision to drain water away from the threshold of the opening.

COMMENT:
Methods for achieving the required step may include:
- A 50 mm difference in *finished ground level* adjacent to the opening, or
- A raised threshold at the opening, or
- Concrete ramp at the opening.

Refer to Figure 65 and Table 18 for overall level change requirements.

COMMENT:
NZS 3604 may require greater separations depending on floor type and materials.
The likely final landscaped ground levels must be taken into account when planning foundations and earthworks to allow for reductions to the minimum ground clearances in the finished *building*.

9.1.3.5 Ground level timber framing

Suspended timber floors shall meet the requirements of Paragraph 10.0. Clearances from paved and unpaved surfaces to the wall *framing* shall be in accordance with NZS 3604, and Table 18. At ground floor level, the base of the *cladding system* shall:

a) Overlap the timber floor structure by 50 mm minimum, and

b) For walls with *direct fixed claddings*, be offset horizontally from a concrete foundation wall by a minimum of 6 mm.

COMMENT:
Where *cladding* requires *drained cavities*, care must be taken to ensure air from the subfloor space cannot enter the cavity. This is important as moisture levels in subfloor air can be high.

9.1.3.6 Balconies, decks and roofs

A minimum of 35 mm clearance shall be provided from the bottom edge of the wall *cladding* to:

a) The finished plane of any adjacent horizontal surface, or

b) The top surface of any adjacent sloped or horizontal *apron flashing*.

At any junction of a wall with a *deck* or roof, clearance shall be measured from the highest point of the adjacent *deck* or roof, and the highest point of any surface ridges or textures.

COMMENT:
This keeps the bottom edge of the *cladding* dry and allows cleaning and painting of the bottom surfaces.

9.1.4 Barriers to airflow

This Acceptable Solution requires that *buildings* have barriers to airflow, in the form of:

a) Interior *linings* with all joints stopped, or

b) Where walls are not lined, such as attic spaces at gable ends, a rigid sheathing or an air barrier, complying with Table 23, fixed to *framing* prior to fixing *cladding* or *cavity battens*.

COMMENT:
The primary function of airbarriers and airseals is to moderate airflow rates through the wall cavity. Airflows under certain weather conditions encourage moisture penetration of the cladding and allow moisture in the cavity to dry. Airbarriers and airseals are therefore important components in managing moisture in walls. Airbarriers and airseals are required to stop wind pressures and applications such as gable ends and internal garage spaces. Airbarriers are not required in all walls. Airbarriers are required in walls where the cavity is ventilated. Airbarriers are required in walls where the cavity is ventilated. Airbarriers are required in walls where the cavity is ventilated.

9.1.5 Building wrap to wall openings

Prior to window or door installation:

a) *Building wrap* shall be cut and dressed into all sides of openings as per Figure 72, and

b) *Flexible flashing tape* shall be applied to head and sill *framing* as shown in Figure 72. *Flexible flashing tape* shall:
   i) comply with Parts 3.2 and 4 of ICBO Acceptance Criteria AC148, and
   ii) be compatible with the *building wrap*.

COMMENT:

Dressing the *building wrap* around the *framing* timber and providing a flexible *air seal* limits airflows around the window reveal.

The *flexible flashing tape* keeps any water that does get past the *cladding*, or through the joinery, from direct contact with the timber.

9.1.6 Air seals

Window, door and other penetration openings shall be provided with flexible *air seals* to minimise the risk of airflows carrying water into the *building* wall. The *air seal* shall be:

a) Provided between the reveal or frame and the wrapped opening (for example of use, refer to Figure 81),

b) Installed over a closed cell polyethylene foam (PEF) backing rod, and

c) Made of:
   i) self-expanding polyurethane foam complying with ASTM C1330, or
   ii) sealant complying with:
      a. Type F, Class 20LM or 25LM of ISO 11600, or
      b. low modulus Type II Class A of Federal Specification TT-S-00230C.

COMMENT:

Care must be taken when using self-expanding polyurethane foams as there is a danger of over-filling due to the foam expanding up to twenty times its original volume. A backing rod should be used.

9.1.7 Building wrap

The *building wrap* shall be in accordance with Table 23, and shall:

a) Be run horizontally,

b) Have upper sheets lapped over lower sheets to ensure that direction of laps will allow water to be shed to outside of the *building wrap*,

c) Be lapped not less than 75 mm at horizontal joints,

d) Be lapped not less than 150 mm over *studs* at vertical joints, and

e) Be added as a second layer over head *flashings* as shown in Figure 71.

9.1.8 Drained cavities

Based on the *risk score* for an *external wall* calculated as per Paragraph 3.1, a wall *cladding* may require the inclusion of a *drained cavity*. Where a *drained cavity* is required, it shall meet the requirements of Paragraph 3.1

COMMENT:

Cavities manage occasional ingress of water past the *cladding*, but should not act as gutters or drains.

9.1.8.1 Limitations

This Acceptable Solution is limited to systems where:

a) *Cavity battens* are fixed, by the *cladding* fixings, to the wall *framing*,

b) *Claddings* are fixed through the *cavity battens* into the wall *framing*, and

c) The *drained cavity* behind *claddings*, except in *masonry veneer*, is not vented at the top.

Systems where the *cladding* is fixed into the *cavity batten* only are outside the scope of this Acceptable Solution.

9.1.8.2 Requirements

Where a *drained cavity* is required, it shall:

a) Be installed over *building wrap* or rigid sheathing that:
   i) complies with Table 23, and
   ii) is fixed to wall *framing*,

b) Be formed using vertical *cavity battens*,

c) Restrict air movement between the *drained cavity* and:
   i) floor, wall and roof *framing*,
   ii) attic roof space, and
   iii) subfloor space,

d) Be drained and open to the exterior at the bottom of cavities,

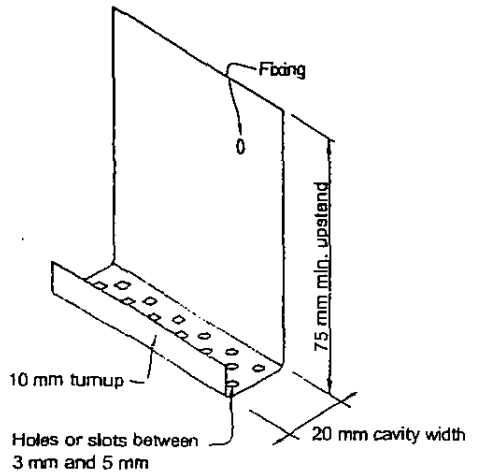
e) Use vermin-proofing at the cavity base as per Paragraph 9.1.8.3 and Figure 66,

f) Use *cavity spacers* as shown in Figure 67, where fixing is required between *cavity battens*, and

g) Not use horizontal *cavity battens*.

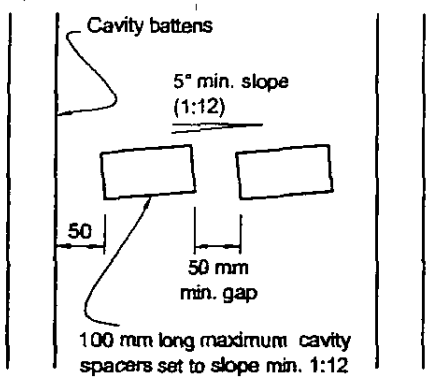
COMMENT:
Horizontal battens obstruct the flow of rain in cavities.

Figure 66: Cavity base closure
Paragraphs 9.1.8.2 e) and 9.1.8.3



NOTE: To be used in *drained cavities* at the base of walls and above window head and inter-storey *flashings*.

Figure 67: Cavity spacers
Paragraph 9.1.8.2 f)



NOTE: Spacing of cavity spacers will vary to suit individual cladding fixings.

9.1.8.3 Vermin-proofing

Vermin-proofing shall be provided above window heads and at the base of the *drained cavity*. Figure 66 provides one example of an appropriate cavity closure.

Aluminium, stainless steel or uPVC in accordance with Paragraph 4.1 shall be used where vermin-proofing material is not readily accessible or replaceable.

Vermin-proofing shall:

a) Provide holes or slots between 3 mm and 5 mm,

b) Provide a total area of opening of 1000 mm^2 per lineal metre of wall, and

c) Be positioned to allow a minimum *drip edge* to the wall *cladding* of:
   i) 10 mm at the base of walls, and
   ii) 15 mm above window head *flashings*.

COMMENT:
It is important the openings in vermin-proofing are kept clear and unobstructed in order to maintain draining and venting of the cavity. The closure shown is only one option for vermin-proofing. Providing openings are as specified, other dimensions can vary, so allowing the use of other shapes such as channels and right-angles.

9.1.8.4 Cavity battens

Cavity battens shall:

a) Be a minimum of 20 mm in thickness,

b) Be at least the same width as the *stud*,

c) Be fixed, by the *cladding* fixings, through the *building wrap* into the *framing*, and

COMMENT:
Battens will be fixed by the *cladding* fixings, which will penetrate the wall *framing*. Battens will therefore need only temporary fixing until the *cladding* is fixed. Polystyrene battens may be temporarily adhered to the *building wrap*.

d) Comply with the *durability* requirements of B2/AS1, and
   i) if timber, comply with NZS 3602, or
   ii) if polystyrene, comply with Paragraph 9.9.3.1, and be protected from any incompatible vapours from timber treatment.

COMMENT:
The solvents from fresh LOSP treated timber may melt polystyrene so these should not be used together.

9.1.8.5 Wall framing behind cavities

Where *stud* spacings are greater than 450 mm, an intermediate means of restraining the *building wrap* and insulation from bulging into the *drained cavity* shall be installed. Acceptable means of achieving this are by using:

a) 75 mm galvanized mesh,

b) Polypropylene tape at 300 mm centres,

c) Galvanized wire at 300 mm centres fixed to *dwangs* over the *building wrap*, or

d) Vertical *cavity battens* at 300 mm centres.

Wire or mesh shall be galvanized in accordance with AS/NZS 4534.

Dwangs shall be at a minimum of 800 mm centres, except when rigid sheathing is fixed to the *framing* prior to fixing *cavity battens*.

9.1.9 Penetrations

9.1.9.1 Penetrations through cavities

Window penetrations through cavities shall meet the requirements of Paragraph 9.2 to Paragraph 9.9.

9.1.9.2 Other cavity penetrations

Where penetrations of the wall *cladding* are wider than the *cavity batten* spacing, allowance shall be made for air flow between adjacent cavities by leaving a minimum gap of 10 mm between the bottom of the vertical *cavity batten* and the *flashing* to the opening.

9.1.9.3 Pipes and service penetrations

Pipes and service penetrations shall be made *weathertight* by using *flashings* and, where necessary, sealant complying with:

a) Type F, Class 20LM or 25LM of ISO 11600, or

b) low modulus Type II Class A of Federal Specification TT-S-00230C.

Details specific to particular *claddings* are given in Paragraph 9.2 to Paragraph 9.9.

Acceptable methods of *flashing* pipes and a meterbox are shown in Figure 68 and Figure 69.

COMMENT:
Where possible, meterboxes should be located in sheltered areas of the *building*, such as a porch, or be installed behind a weatherproof glazed panel.

Figure 68: General pipe penetration
Paragraph 9.1.9.3, Figure 126

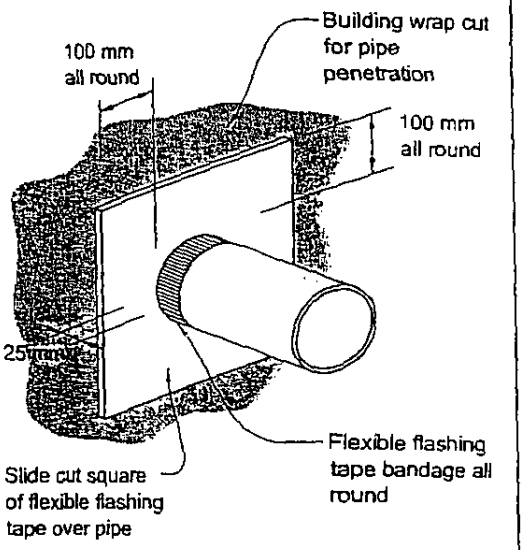
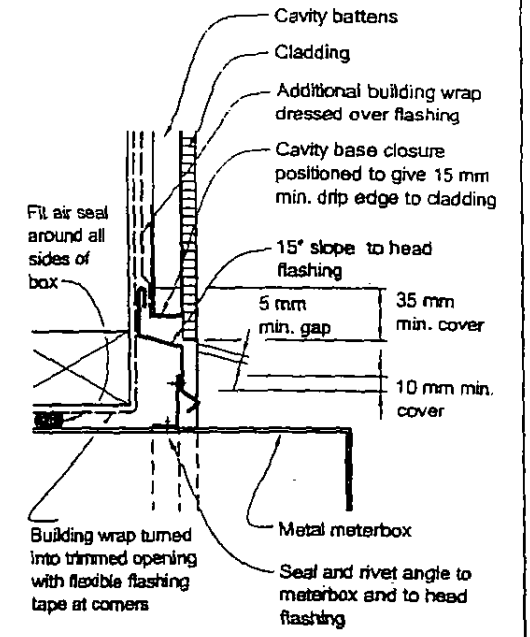


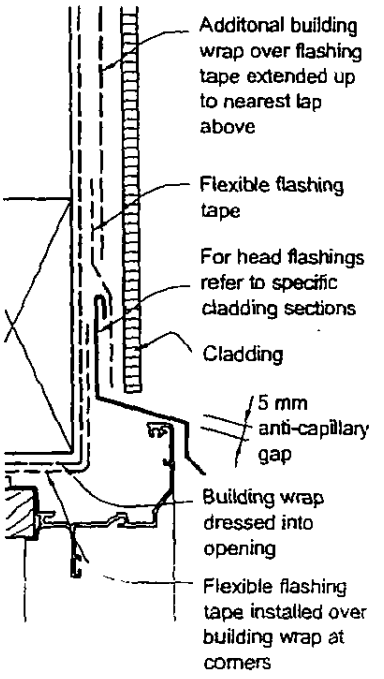
Figure 69: General meterbox
Paragraphs 9.1.9.3, 9.6.8.5 and 9.6.9.6



NOTE:
(1) Fix angle and seal to all sides of box. At sides and base, *claddings* shall overlap angle by 10 mm minimum. Continuously seal *cladding* against angle.
(2) Suitable for other similar penetrations.

Figure 71: General sealing of head flashing
Paragraphs 9.1.7 e), 9.1.10.3 and 9.1.10.4 c)

NOTE: May also use *building wrap* lapped over flashing upstand in lieu of *flexible flashing tape*. Refer cladding window details, for example Figure 115.



9.1.10.4 Head flashings

Head *flashings* shall be in accordance with Paragraph 4.6.1.6 and Table 7, and shall:

a) Direct water to the outside of the wall *cladding*, and

b) For *direct fixed cladding*, *stopends* shown on drawings are optional,

COMMENT:
Stopends are useful to prevent water moving past the ends of head *flashings*. However, additional problems of weatherproofing can occur where the *stopend* penetrates the *cladding*.

c) For wall *claddings* on cavity walls, incorporate 10 mm turn-ups as *stopends*,

d) Have the upstand of the *flashing* protected from moisture by lapping an additional layer of *building wrap* over the upstand, or by using *flexible flashing tape* as shown in Figure 71. The additional *building wrap* shall extend from the nearest lap above, and be lapped under the top layer.

9.1.10.5 Window sills

Sill tray *flashings* shall be in accordance with Paragraph 4.6.1.6 and Table 7.

a) *Direct fixed claddings* shall have sill tray *flashings* that direct moisture to the outside face of the *cladding system* as shown in the details included in Paragraph 9.2 to Paragraph 9.9. The sill *flashing* shall extend back past the condensation channel of the window. The 5 mm gap between the window facing and sill tray must not be sealed.

b) *Claddings* over a *drained cavity* shall have:
   i) face-fixed windows and doors, installed so the window frame flange facing is forward of the line of the *cavity battens*, and
   ii) no sill trays,
   iii) there is no requirement to maintain a 5 mm gap between the *cladding* and window facing at the sill with a cavity. Sealing this gap may reduce water entry during routine maintenance such as washing the *building*.

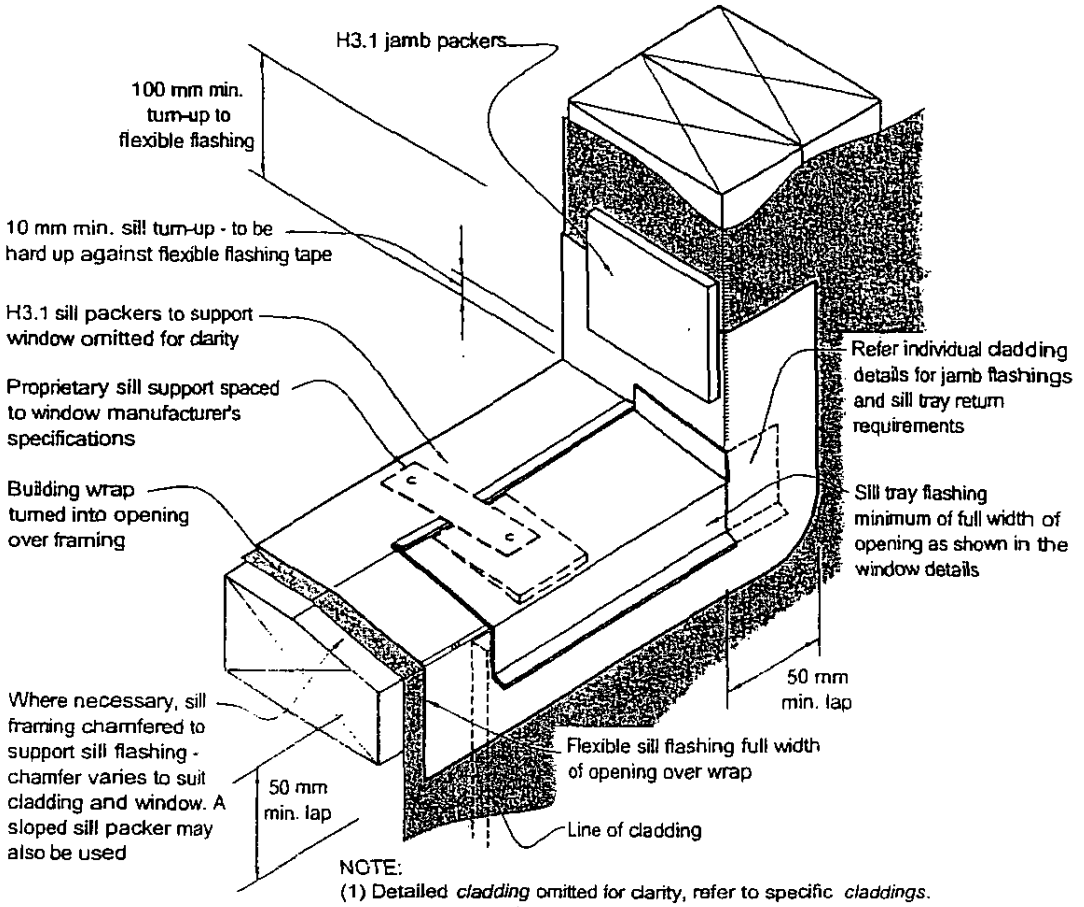
COMMENT:
If a *cladding* requires continuous horizontal support below the window sill, a sill tray will be needed to direct water from the back of the *drained cavity* out over the *cladding*. This will require *specific weathertightness design*.

c) Where sill supports are needed, these shall be to the manufacturer's recommendations, and shall be no closer than 200 mm from corners of the opening, and 100 mm from mullion to frame junction positions.

d) Certain aluminium joinery sections with a deep profile (such as bi-fold and sliding doors and windows) will not be able to use the sill details included in this Acceptable Solution and achieve the required window facing cover and sill support with a sloped sill tray. The sill details in these cases shall be specifically designed.

COMMENT:
Alternatives may include a flat extruded sill tray with a *stopend* on three sides. Manufacturers should be consulted for specific details and results of testing on these.

Figure 72: General window opening
Paragraphs 9.1.5 and 9.1.10.2, Figures 76, 81-86, 90, 91, 95, 99, 115, 116, 127 and 128



NOTE:
(1) Detailed *cladding* omitted for clarity, refer to specific *claddings*.
(2) Sill *flashing* shall extend back past the condensation channel of the window.
(3) Head to be treated similarly with continuous *building wrap* and *flexible flashing tape* at corners.
(4) Openings in *cavity walls* shall be treated similarly, except the sill *flashings* shall be omitted.

9.1.10.6 Jamb flashings

Jamb *flashings* shall be in accordance with Paragraph 4.6.1.6 and Table 7, and shall be installed where required in the figures included in Paragraph 9.2 to Paragraph 9.9.

Where required, jamb *flashings* shall overlap sill *flashings*, and direct moisture to the outside face of the *cladding system*.

9.1.10.7 Closed cell foam tape

Compressible foam tape shown behind window facings and *cladding* joints shall be closed cell PVC foam, with:

a) Hardness 55-60 to ASTM D2240 Scale OO,

b) Grade VE-43 to ASTM D1667,

c) Compression set of 20% maximum to ASTM D1667, and

d) UV weathering in UV Weatherometer for 1500 light hours to ASTM G154 or ASTM G155 with no visible deterioration in appearance.

9.2 Masonry Veneer

9.2.1 Limitations

This Acceptable Solution is limited to:

a) Clay brick veneer on timber *framing*, and

b) Concrete brick or block veneer on timber *framing*.

COMMENT:
Natural stone bricks or blocks may be suitable. However, these are not part of this Acceptable Solution. Refer to the manufacturer's recommendations for *specific weathertightness design* information.

9.2.2 General

Installation of *masonry veneer* shall be by trained installers, approved by the manufacturer or the NZ agent (in the case of imported *masonry veneer*).

COMMENT:
It is recommended that an installer has successfully completed, or demonstrated skill to the level of, an NZQA recognised course.

9.2.3 Installation

Masonry veneer on timber *framing* shall be an Acceptable Solution provided that:

a) The installation complies with SNZ HB 4236 and NZS 3604,

b) The *drained cavity* is sealed off from both the roof space and subfloor space,

c) A *building wrap* complying with Table 23 is applied to the face of timber *framing* in the cavity, and

d) *Control joints* are included as described in Paragraph 9.2.4.

9.2.4 Control joints

9.2.4.1 Clay bricks

Control joints shall be included at locations specified by the brick manufacturer.

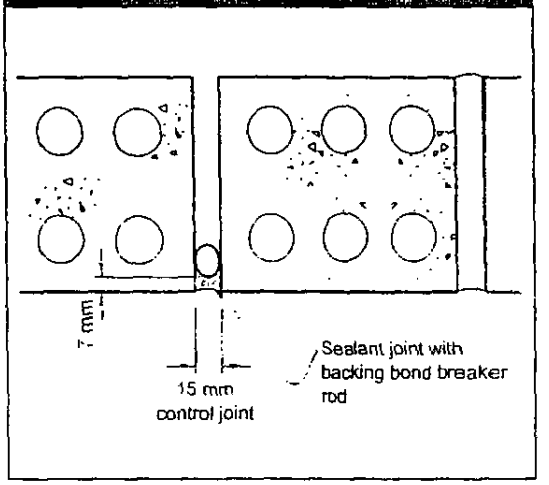
When *control joints* are used, they shall be formed as shown in Figure 73, and shall have:

a) A backer rod of compressible foam complying with ASTM C1330, and

b) Sealant in compliance with:
   i) Type F, Class 20LM or 25LM of ISO 11600, or
   ii) low modulus Type II Class A of Federal Specification TT-S-00230C.

COMMENT:
Control joints are not normally necessary for clay bricks except in long walls or at abutments. Cracks are cosmetic and not likely to cause a moisture problem because of the presence of the cavity. Manufacturers can provide additional information on *control joints*.

Figure 73: Vertical control joint
Paragraphs 9.2.4.1 and 9.2.5



9.2.5 Concrete bricks

Control joints shall be included as specified in the New Zealand Concrete Masonry Manual and in any other locations specified by the manufacturer. *Control joints* shall be formed as shown in Figure 73.

COMMENT:
Concrete bricks shrink over time and this must be allowed for in the design of the *masonry veneer*. Manufacturers can provide additional information on *control joints*.

9.2.6 Windows and doors

The openings in wall *framing* for windows and doors shall have *building wrap* and *flexible flashing tape* applied, in accordance with Paragraph 9.1.5.

Air seals shall be provided in accordance with Paragraph 9.1.6.

Window *flashings* shall be installed in accordance with SNZ HB 4236.

9.2.7 Bottom of masonry veneer

Clearances to ground levels at the bottom of *masonry veneer* shall be in accordance with Paragraph 9.1.3.2.

Vents at the top and drainholes at the base of the *masonry veneer* shall be installed in accordance with SNZ HB 4236 and NZS 3604.

9.2.8 Secondary cladding

Where a secondary *cladding* is used with the *masonry veneer*, and is *direct fixed* to *framing* above windows or at gable ends, this shall be fully sealed on:

a) The face of the *cladding*,

b) All edges of the *cladding*, and

c) A 75 mm minimum perimeter strip on the rear of the *cladding*.

Brick Maintenance

MonierBrick

Bricks are virtually maintenance free which is one of the benefits of choosing to build with brick.

To ensure the best performance, the following routine maintenance should be followed.

Information is also provided to assist with the cleaning of stains that may occur during or subsequent to construction.

Routine Maintenance

Weep holes should be checked annually to ensure they are clear of obstacles such as spider webs, dirt, etc.

For aesthetic purposes only bricks can be washed down with an acid free cleaning agent every two years or as necessary.

For Brick claddings that have been plastered, please refer to Plastering Suppliers maintenance recommendations.

Cleaning of Mortar Stains on Brickwork

The appearance of brickwork can be permanently spoiled by bad cleaning. If cleaning is left too long or if improper cleaning methods have been used, it may be impossible to rectify the situation. Here are some basic steps to follow to achieve best results.

Clean all stains as soon as possible.

If fresh mortar has splashed or spattered onto the brickwork, remove promptly with a clean wet paint-brush. Keep the brush handy in a glass of water containing a small amount of detergent. Do not allow the mortar smears to remain longer than one or two hours before cleaning off. **In particular, where mineral oxides are used as a colouring agent, clean off immediately.**

Use the right tools.

If acid cleaning is called for, remember that the acid attacks mortar and nothing else. This means the mortar in the joints as well as the smudged areas. To begin with remove as much mortar as possible with an old putty knife or wooden paddle, or scrape with a piece of the same colour brick .

Use a plastic bucket, fill with water, and pour the acid **into** the water. Wear rubber gloves and use a long handled fibre-brush (not metal). Scrub the bricks, and not the mortar.

Use the right cleaning agent.

Spirits of Salts (weak hydrochloric acid) is not the answer for anything other than old mortar stains. It will not cure efflorescence, nor will it remove stains caused by oil, timber leachings, iron' ruststains, paint, smoke or soot. Never use spirits of salts on green or yellow stains on a light coloured brick. Acid used on such stains may "fix" them on the brickwork permanently.

Lots of water is the story.

Cleaning with acid involves three steps. The work must be sopping wet before applying the acid; the area should be a smallish one of about 6 to 10 bricks at one time; the residue must be thoroughly hosed down with copious amounts of water.

Don't overdo acid treatment.

One part acid to 10 parts water is powerful enough - even 1:20 will do in some cases. Should the treatment not seem to work at first, do not increase the acid content. Instead, carry on and scrape down with a piece of wood to continue the process.

After the bubbling has stopped, try not to let the acid scum dry on the surface, but clean off immediately. It may prove impossible to shift once it has solidified.

Begin at the top.

Clean brickwork from the top down, and look out below!

On commercial work larger areas can be tackled at one time, say about a metre square. Channel dirty water away from untreated areas if an entire vertical section cannot be cleaned from top to bottom in one day.

Protect Metals

Protect any metal, particularly aluminium window frames, with vaseline or with masking tape.

When in doubt, proceed carefully.

If in doubt about any aspect of treating brickwork, try out small unobtrusive areas, and leave for a week or so to judge the effect before tackling the whole job.

Vanadium Staining

Light coloured clays often contain naturally occurring vanadium salts which may appear as a yellow, green or reddish-brown discolouration on the bricks.

Vanadium Staining is neither permanent nor harmful, and they do not indicate any defects in the bricks.

It will eventually break down in sunlight. We recommend leaving brickwork with vanadium to break down on its own, however should you want to speed up this process, you can use one of the methods below.

Note

See *General Advice on Removal of Stains* for important information .

The removal of vanadium staining from new brickwork would be the home owners responsibility.

Do not ever use hydrochloric acid on these stains as it may turn the stains black and make them more difficult to remove. Should your vanadium staining already have been affected by hydrochloric acid, the use of caustic soda or one of the proprietary cleaners may help remove these stains although in some cases the stains may be permanent.

It is essential that vanadium salt deposits be removed prior to using hydrochloric acid to remove mortar deposits.

After the initial removal of vanadium salt stains, more water on the masonry - even that used in the cleaning process - may induce further efflorescing of vanadium salt to the surface, depending on the amount within the brick.

These deposits must be removed by the same methods specified for the initial treatment.

Note

Do not apply anti graffiti coatings such as Cleanwall 2000 to bricks which have not been in place for at least 4 weeks or that have vanadium stains on them.

Potassium Hydroxide or Sodium Hydroxide (Caustic Soda)

This alkaline treatment is the preferred treatment.

Mix up 150g potassium or sodium hydroxide per litre of water and apply to the stained bricks. Leave on the wall until the stain disappears, then wash off. Usually several days. A white residue may appear after this treatment and this should also be hosed off.,

Proprietary Cleaners - Noskum

This is a general purpose cleaner used 1 part Noskum, 2 parts water: Neutralize with "Neutril" or bicarbonate of soda solution 1 part, 20 parts water. Apply to dry brick.

Proprietary Cleaners - Vango

A caustic soda based solution. Apply to stains and leave until stain disappears. Could be several days. Wash off. A white residue may appear this should also be washed off. Apply to dry brick. This can also be used on vanadium stains which have been darkened by the use of acid.

Oxalic Acid

This is probably the best known chemical removal of vanadium salt. **However, if used it must be followed by a neutralising wash. This action is commonly omitted and further staining of a serious nature can result**

Correct use of the oxalic treatment is:

1. Mix 20g to 40g of oxalic acid per litre of water (preferably hot water).
2. Apply to the stained bricks without pre-wetting.
3. Then neutralise the oxalic acid by applying a solution of 15g of washing soda per litre of water. Do not wash off.

Proprietary Cleaners - Oxcid

An oxalic acid based cleaner. Apply to stained areas leave until stain disappears. Neutralize with "Neutril" or bicarbonate of soda solution. (See under Noskum). Apply to dry bricks.

Do not use on vanadium stains which have darkened as a result of cleaning with hydrochloric acid (Spirits of Salts).

Smoke and soot

Scrub with a household detergent (JIF for example) or a scouring powder that contains bleach, followed by a good rinse. In difficult cases a 6 to 10mm thick poultice may be required, prepared from a filler such as talcum powder and trichloreythlene to form a stiff paste. Cover the poultice with a pan to prevent rapid evaporation. Handle this poultice with care and with adequate ventilation to avoid inhaling the fumes.

Bitumen or tar

Remove as much as possible by scraping off with a putty knife. Apply a poultice as for Smoke and Soot removal. A repeat application may be required. Remember the solvent is toxic, so handle with care. Scrub down with water and detergent after the poultice has been brushed off.

Lichens and mosses

These can be knocked back with an application of copper or ammonium sulphate or a proprietary weed killer. Vegetable growth is generally indicative of damp brickwork and will usually reappear if this basic cause is not cured. Green staining which does not respond to this treatment is possibly due to vanadium salts from within the bricks.

Efflorescence

(white crystals or white furry deposit)

This usually disappears from new brickwork due to the action of wind and rain. The process can be accelerated by repeated washings allowing the wall to dry out at intervals. Brushing down the wall at times of maximum efflorescence will help.

The salts brushed off should not be allowed to accumulate at the base of the wall, otherwise they may be carried back into the brickwork by subsequent rain.

Efflorescence on brickwork indoors:

Ensure that brickwork is as dry as possible. Dab the affected area with a damp (not wet) sponge, rinsing the sponge in clean water.

Allow bricks to dry and repeat as necessary.

The efflorescence should not reoccur if the brickwork remains dry.

Oiling brickwork

Oiled brickwork gives a darker shade to bricks, particularly red bricks, and is suitable as a cosmetic finish to improve the appearance of a job on which there may be light staining - for instance due to mortar droppings which have not been removed carefully.

Merely mix ordinary clean motor oil and kerosene in the proportion of 1:1 and paintbrush over bricks and mortar joints. This is all that is necessary. However, this treatment is for appearance only, and should not be used as a water-proofing technique.

Additional Remarks

Persistent efflorescence, extensive salt staining from within the bricks themselves and vegetable growth on the brickwork are due to excessively wet conditions, and unless the basic problem of water penetration is cured, the staining will repeatedly reappear.

In such cases, it is necessary to overhaul faulty flashings, repair leaking rainwater downpipes, renew copings, etc.

Where chemical treatments are recommended you should note that is is essential for brickwork to be cleaned down afterwards, using copious quantities of water to clear all traces of chemicals from the surface, adjacent areas and drains.

Industrial and manufacturing chemists as listed in the Yellow Pages may be contacted for the chemicals mentioned.

Please note:

We are unable to guarantee the effectiveness of the above treatments for each and every situation, in particular where staining may be due to a variety of causes.

FIG. 16 TYPICAL WALL SECTION

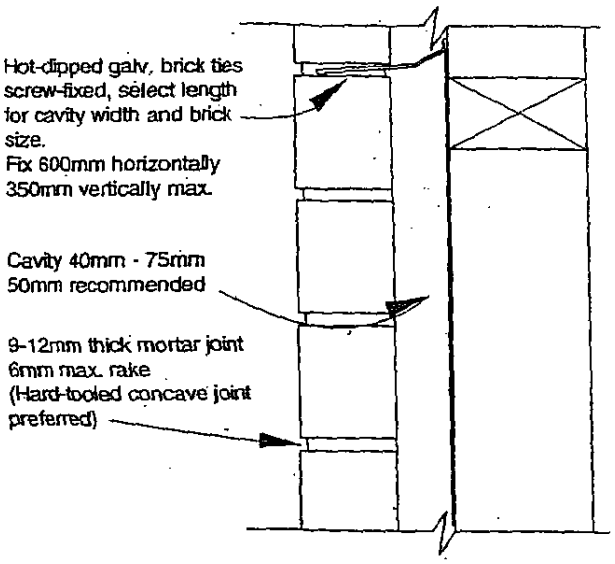


FIG. 28 WINDOW HEAD - Aluminium
Timber cladding above

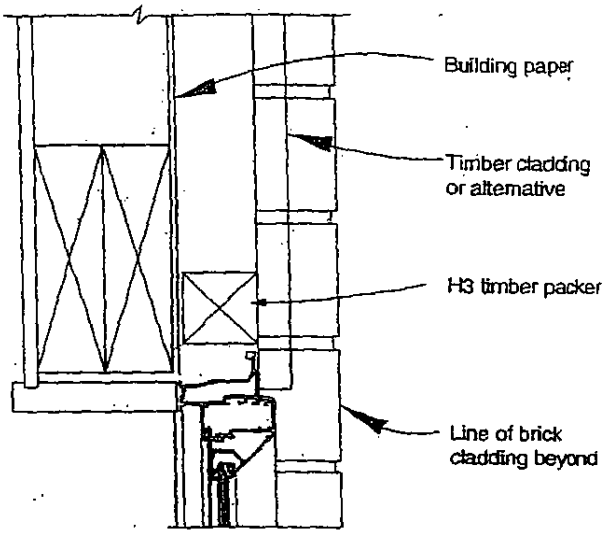


FIG. 41 DOOR JAMB - Aluminium

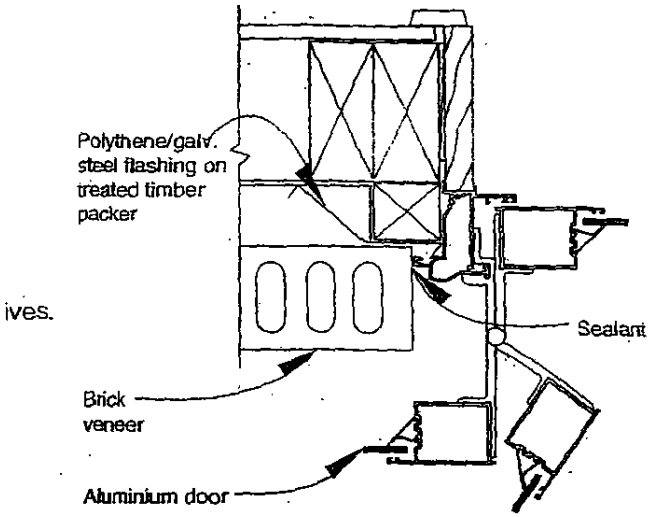


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FIG. 37 WINDOW JAMB - Aluminium

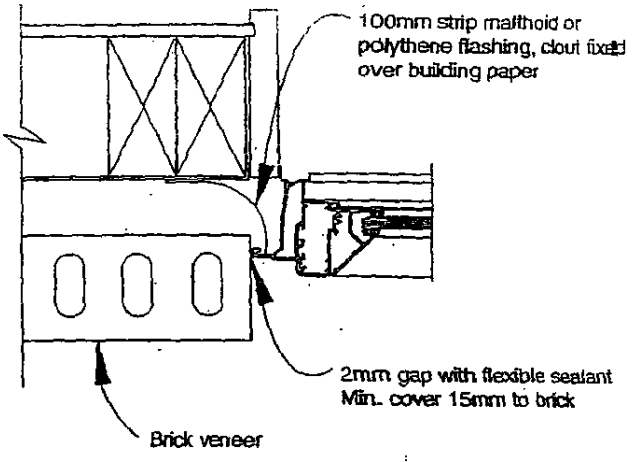
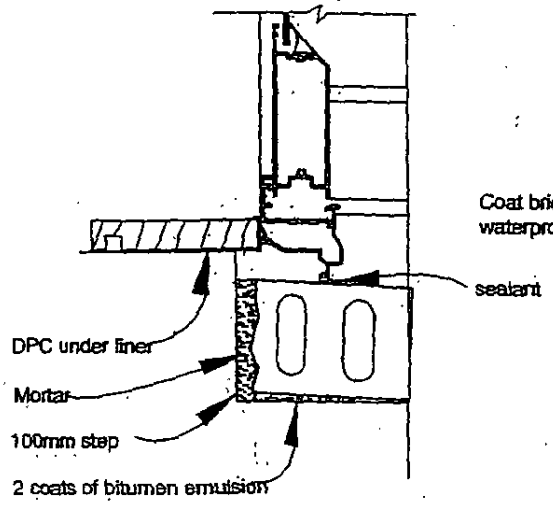


FIG. 42 BRICK DOOR SILL



Note: If brick is to be sloped further either increase the depth of the step or reduce the thickness of the brick

FIG. 39 WINDOW SILL - Aluminium

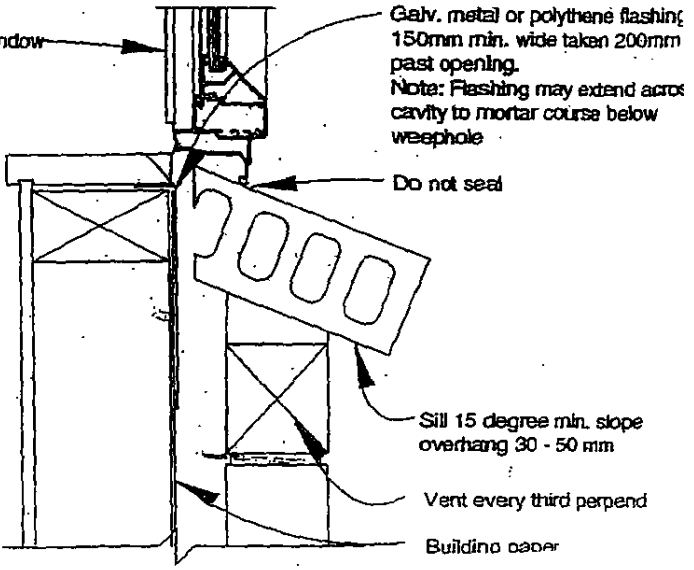


TABLE OF CONTENTS

1.0 INSTALLATION PREPARATION AND OVERVIEW

1.1 Storage and Handling

1.2 Temperature

1.3 Setting Out

1.4 Tools Required

1.5 Fixings

2.0 INSTALLATION PROCEDURE

2.1 Cavity Battens

2.2 Installation of Base Accessories

2.3 Corner Options

2.4 Jointing Options

2.5 Weatherboard Installation

2.6 Installation of Window Flashings & Joinery

2.7 Installation to Soffit

2.8 Finishing

2.9 Completion of Remaining Walls

3.0 COMPONENT SELECTION GUIDE

Design details, which support the information contained in this document, are available from the Palliside website www.palliside.co.nz or on CD from Dynex Extrusions Ltd.
A full list of the design details available can be found in the Palliside Technical Guide (paragraph 3.1).
Refer to the back of this document for contact details.

1.0 INSTALLATION PREPARATION AND OVERVIEW

1.1 Storage and Handling

Weatherboards must be laid flat in their original packaging (or otherwise covered) on bearers at 600mm centres. Do not lay other materials on top. Incorrect storage technique can result in buckling or distortion.

Weatherboards come in packs of four lengths. To remove weatherboards from the pack, cut through the full length of sleeve (outside boards in pack face inwards) and lift each weatherboard out.

Where possible it is recommended that two people carry out handling and fixing of Palliside.

1.2 Temperature

Additional care should be taken when fixing Palliside at temperature extremes. Where possible installation should be carried out in a temperature range of between 10°C and 25°C

In colder temperatures, care should also be taken when cutting and nailing the product. For example, it may be necessary to pre-drill the nail holes in each weatherboard.

1.3 Setting Out

The effective cover height of a Palliside weatherboard is 260mm nominal.[1]

To work out the actual cover height of each course of weatherboard, remove 2 lengths from the packet and place them together measuring from the bottom of the lower board to the base of the second and use this as a guide for board courses. Make up a storey rod using this cover height to use as a guide.

A *storey rod* can be a length of timber or other material with the cover height for each course of weatherboard marked out on the length. This can be used to work out where the weatherboard will finish at head flashing and soffit height, as well as helping ensure corner alignment is maintained throughout the installation.

1.4 Tools Required

Palliside requires no special tools and can be cut and nailed like timber using a wide variety of standard building equipment including circular saws, jig saws and other power tools.

1.4.1 Cutting

Palliside weatherboards and trims can be cut using any of the following methods:

- **A standard hand saw or tenon saw.**
- **An electric circular saw or drop saw, using a fine-toothed blade (minimum 20 teeth).**
- **An electric jigsaw or router (when cutting a straight horizontal line when the head flashing falls on part of the board profile, or for cutting utility holes, etc.**

1.4.2 Hole Forming

When cutting or drilling holes for utility pipes, standard hole-forming attachments can be used. Care should be taken not to force the jigsaw or drill too hard or quickly.

1.4.3 At the Base of Openings

Mark the board in place, remove and cut to suit using a jigsaw. An alternative to this is to cut down either side to the score line using a saw, use a utility knife to score along the length of the weatherboard and then snap the section out by hand.

[1]Weatherboard cover heights do not vary significantly from batch to batch

1.4.4 At the Head of Joinery

For best results a router (or jigsaw with a guide) can be used when cutting head flashing detail into the weatherboard.

Notes:

- **Surfaces of circular saws must be free from burrs prior to working with Palliside.**
- **Remember to always adopt standard safety precautions when using power tools to cut Palliside.**

1.5 Fixings

Fixings for Palliside (timber frame)

Type of Fixing	Installation Method Drained Cavity	
	Over Structurally Fixed Battens	Over Non-Structurally Fixed Battens
Manual Nailing	The HDG 40 x 2.5mm Palliside nail must be used (fixed at maximum 600mm centres). The Palliside nail has been specially designed with a smaller (5mm) head. 5 kg boxes of Palliside nails are available as part of the standard range of accessories.	Unless installing over structurally installed battens[2], a 60 x 2.8mm HDG flat head nail must be used (fixed at maximum 600mm centres). Such nails can be sourced from your preferred Building Merchant.
Impulse Driven Nails A nailing tool such as a Paslode finishing nailer can be used to fix Palliside weatherboards	Paslode ND50mm SS304 grade brads, or equivalent (2 per stud, skewed, at a maximum spacing of 600mm centres). *(ITW/Paslode product code B20054)*	Paslode ND60mm SS304 grade brads, or equivalent (2 per stud, skewed, at a maximum spacing of 600mm centres). *(ITW/Paslode product code B20055)*
Screws Palliside may be fixed using screws	8 gauge x 1¼" SS304 grade countersunk square drive wood screws or equivalent. *(MSL/Fortness Code SFQX 832)*	8 gauge x 2" SS304 grade countersunk square drive wood screws or equivalent *(MSL/Fortress Code SFQX850).*

1.5.1 Summary on Fixings

1.5.1.1 Use of Standard Palliside Nails Over a Drained Cavity

The standard 40x2.5mm Palliside nail can be used when nailing Palliside to a structural batten system. (Refer to Palliside Technical Guide)

1.5.1.2 Requirement for Stainless Steel in Sea Spray Zones

Due to the unique hidden nailing system and anti-capillary groove, there is no requirement to use stainless steel nails when fixing Palliside in sea spray zone locations as specified in NZS 3604.

The specification of Stainless brads and screws deals with the best option in absence of a HDG finish.

In these locations, any nail fixings that are to be exposed and not hidden by the weatherboard interlock; fixing should be of equivalent size, with a minimum SS316 treatment.

Accordingly, in these locations it would also be prudent to increase the specification of screws that are to be exposed, and not hidden by the weatherboard interlock, to SS316 grade.

1.5.1.3 Curved Walls

As covered in the Palliside Technical Guide (paragraph 2.10.2) when Palliside is to be installed to a curved wall, the weatherboard needs to be screwed in place using 8 x 1¼" SS304 grade countersunk square drive screw (MSL/ Fortress Code SFQX832) or equivalent.

1.5.1.4 Steel Frames

As steel framed construction is a specific design, the manufacturer of the steel frame should be consulted to ensure any fixing selected is suitable, however as a guide the minimum specification should be a self-drilling SS304 grade countersunk square drive screw or equivalent. The length of the fixing must cater for the thickness of the thermal break (minimum 10mm) and allow for a minimum 10mm penetration through the frame.

[2]Standard Palliside nails can be used when installing Palliside on a cavity meeting the parameters of Paragraph 2.12.4 of the Palliside Technical Guide for structurally installed battens.

2.0 PALLISIDE FIXING PROCEDURES (DRAINED CAVITY)

Pre-line Checklist

- Has the correct type of building paper/wrap been selected and installed correctly?
- Has flashing tape been applied to the base of the sill and to all corners of windows and door openings?
- Is the moisture content of the timber 18% or less?
- Is the timber frame straight and studs inline?

2.1 Installation of Cavity Battens

- **All Vertical battens must be installed at a maximum 600mm centres.**
- **A continuous horizontal batten is permissible at the soffit only.**
- **An additional run of vertical battens should be allowed for at the side of openings.**
- **Vertical Battens on external corners should be offset slightly by 10mm to allow a continuous air gap behind the Palliside corner base flashing.**
- **Horizontal spacers are required to allow Palliside horizontal starting trims to be fixed at the required 300mm centres providing they are:**

  a) A maximum 100mm in length

  b) Installed with a minimum slope of 5°

  c) Spaced at least 100mm away from any vertical batten or edge of window opening

2.1.1 WANZ Window Installation System

We recommend that the principles of the Window Association of New Zealand - Window Installation System are adopted when specifying Palliside to be installed over a drained cavity. These principles are covered in relevant Palliside design details for installation around windows. (Refer to the Palliside Technical Guide, paragraph 2.12, for an overview of scope for installing Palliside over a drained cavity).

In principle this means allowing for the use of joinery support bars at the base and cavity closer flashings at the head of all openings. These are available for purchase from your preferred aluminium joinery manufacturer.

2.1.1.1 WANZ Support Bar.

The WANZ Support bar is installed at the base of openings to help improve the support of aluminium joinery.

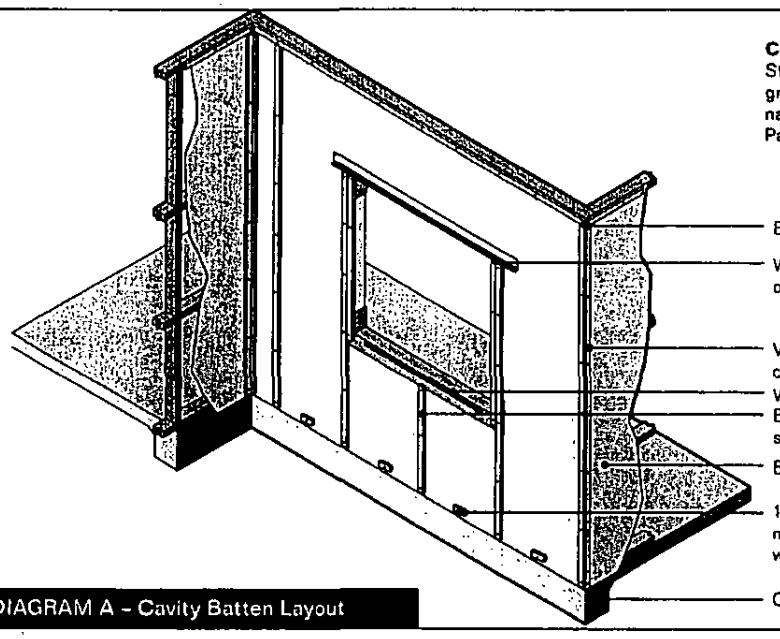
The support bar is installed ensuring that it is at least 100mm short of either side of the side of the opening.

2.1.1.2 Cavity Closer Flashing

The WANZ cavity closer flashing is installed at the head of all openings (allowing for the head flashing to be installed in front of the cavity batten rather than behind).

It needs to be cut and installed a minimum 50mm past the external face of the battens either side of the opening (the layout of battens should take this into consideration).

The back of the cavity closer flashing must be taped to the building paper/wrap and battens installed above the cavity closer. Packers at 300mm centres should be installed to enable the head flashing to be fixed correctly.



Comment
Structurally fixed batten equals No 1 framing grade H3.1 ex 50 x 25 Fixed with 60 x 2.8mm nails at 500mm centres. (This allows for standard Palliside nails to be used instead of 60 x 2.8)

DIAGRAM A – Cavity Batten Layout

2.2 Installation of Base Accessories (Starting Options)

Before the installation of weatherboards and joinery commences, all base accessories need to be fixed in place. This should occur after the straightening of frame and installation of building paper/wrap (and after the installation of cavity battens).

Base accessories include all starting pieces, all corner base pieces, and the two-part jointer base piece[1].

- **Fix all base accessories at 300mm centres.**
- **Use a chalk line and level to ensure that selected horizontal starting options are fixed level. This is particularly crucial with starter strip.**
- **Starting accessories should also be left slightly short of the selected corner option base pieces and vertical trims, not overlapped.**
- **Mitre trims where required.**

2.2.1 Starter Strip

Palliside starter strip should be installed so there is a minimum 50mm weatherboard overhang in accordance with the requirements of the New Zealand Building Code, (refer ground clearances in the Palliside Technical Guide).

If installed over a drained cavity the **Palliside cavity vermin tray** should be attached prior to the installation of the accessory to the battens

- **Starter strip can be used when installing Palliside above joinery between brick veneer (Refer design detail DC31)**
- **This accesory cannot be used when starting with a part board, or along raked areas**

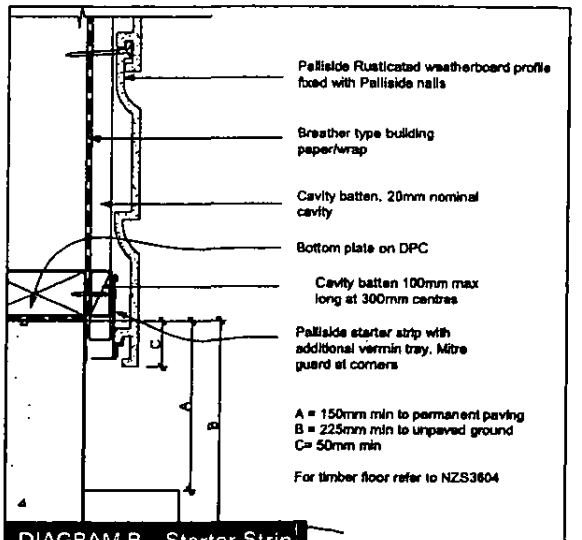


DIAGRAM B – Starter Strip

2.2.2 Cavity Vermin Tray

The cavity vermin tray clips into the base of the Starter Strip or can be glued to the back of the desired starting option.

The cavity vermin tray meets the requirement of E2/AS1 which requires a minimum opening area of 1000mm² per lineal metre of wall and must be installed at the base of the cladding, and in accordance with NZBC Acceptable Solution E2/AS1, where a gap is greater than 4mm wide.

[1] **If the 2-Part jointer option is selected.**

2.2.3 One Part Channel Trim

When can One Part Channel be used with the Rusticated Profile Weatherboard?

The One Part channel can be used as a universal starting option, around the apron of top storeys that contain raked/sloped rooflines and/or different starting heights or as a vertical trim abutting another cladding.

When can One Part Channel be used with the Traditional Profile Weatherboard?

The One Part channel can be used as a vertical trim abutting another cladding but is not ideally suited as a starting option for horizontal part board starts and raked/sloped rooflines[2].

When installed on a horizontal, 5mm drain holes must be drilled at maximum 600 centres.

2.2.4 2-Part Channel

When can 2-Part Channel be used with the Rusticated Profile Weatherboard?

The 2-Part channel trim can be used as a universal finishing option for both gable ends and horizontal finishes where the weatherboard does not finish on a scallop, around the apron of top storeys that contain raked/sloped rooflines and/or different starting heights or as a vertical trim abutting another cladding[3].

When can 2-Part Channel be used with the Traditional Profile Weatherboard?

The 2-Part channel trim can be used as a universal finishing option for both gable ends but not horizontal finishes, around the apron of top storeys that contain raked/sloped rooflines or as a vertical trim abutting another cladding.

2.3 Installation of Corner Options

All base pieces of corner options must be installed **prior** to the installation of the weatherboard and must be fixed at 300 centres.

It is permissible to join base pieces if required. (When joining a 2 piece option, stagger the base and cap join).

When installing over a drained cavity, vertical batten on corners should be offset slightly to allow airflow behind the base piece.

2.3.1 90° External Corner Soaker Option

When using the Palliside corner soaker option the correct shaped base piece must be installed prior to the installation of weatherboards. (Refer Diagram C.1)

Once the weatherboards have been installed to one wall, continue on the second wall clipping in place the corner soaker cap pieces (which match the shape of the Palliside profile). Ensure that the soakers line up tidily. If there is difficulty fitting these in place or gaps are prevalent to one side, check to ensure that weatherboards are aligned correctly.

No solvent or sealant is required to hold these in place.

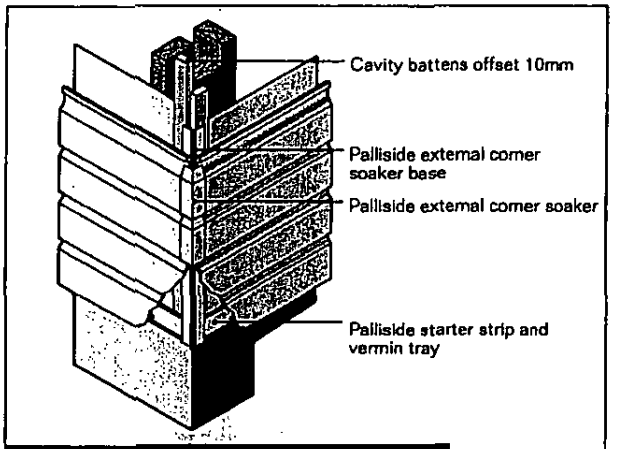


DIAGRAM C.1 – External Corner Soaker

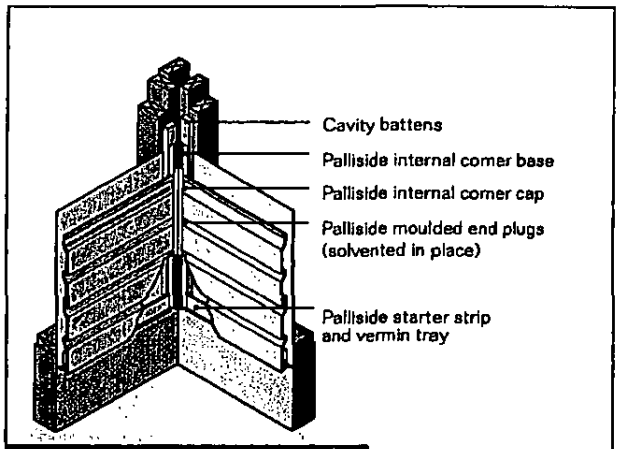


DIAGRAM C.2 – Internal Corner

[2]One Part channel is suitable for use as an alternative to the Palliside window scriber when installing over a drained cavity. This trim assists with the location of the moulded end plugs installed into the profile gaps.

[3]Providing that the spine of the flashing is not visible.

2.3.2 90° Boxed Internal Corner Option

This two-part option provides a boxed finish for 90° internal corners.

The base piece has specially designed location tabs (refer diagram C.2) that assist the location of the weatherboard. The weatherboards are then installed before the male cap piece is pushed in place. This cap features fins to aid the installation of the Palliside moulded end plugs that are inserted in to the gaps using solvent cement.

2.3.3 90° and 135° Boxed Corners

2-Part Boxed 90° External Corner (Refer design detail DC07)

When preferred there is an option available for 90° boxed external corner finish. While the base piece is installed prior to the installation of weatherboards, once the male cap piece is pushed into place and allowance made for the fixing of Palliside moulded end plugs.

2-Part Boxed 135° Corner (Refer design detail DC37)

The 135° corner can be used for either internal or external corners by reversing the base section, as is commonly required around bay windows.

Care should be taken to avoid taking the weatherboards past the clearly marked witness lines of the selected base piece. The cap piece is then fixed in place and allowance made for the Palliside moulded end plugs to be inserted using solvent cement.

2.3.4 Non-Standard Corners *(Refer design detail DC25)*

Drawings are available showing how to provide custom made back flashings for non standard corners.

2.3.5 Timber Boxed Corners *(Refer design detail DC32)*

If preferred, timber corner facings may be used to enhance the character of design. A drawing is available demonstrating how to complete this option. A timber scriber can be cut to suit the traditional weatherboard profile or moulded end plugs can be used.

Timber facings should be screwed through the Palliside into the framing behind, sealed and painted to suit.

2.4 Jointing Options

Note: As stated in the Palliside Technical Guide covering (paragraph 2.5) weathertightness scope; there is no limitation when using the moulded flat soaker option for drained cavity installation.

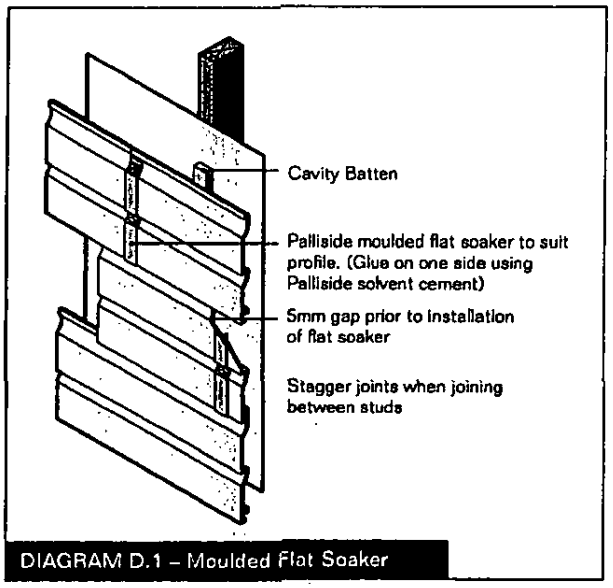


DIAGRAM D.1 – Moulded Flat Soaker

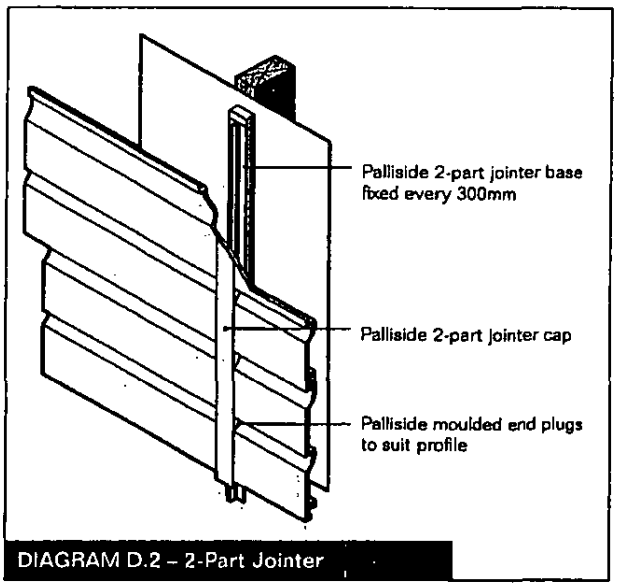


DIAGRAM D.2 – 2-Part Jointer

2.4.1 Moulded Flat Soakers

Moulded flat soakers that match the shape of the chosen weatherboard profile can be used. When using this option the soakers can be installed off stud, providing that weatherboard joints are staggered.

When installing weatherboards a 5mm gap must be a left to cover minimal thermal movement. The flat soaker can be inserted later by carefully applying solvent cement to one side of the back of the flat soaker. (Push the soaker in place ensuring that that it engages correctly and that the spine of the soaker is hard against the weatherboard on the solvented side).

There is no base piece required for this option

2.4.2 2-Part Jointer

The female base piece is installed prior to installation of weatherboards and must be fixed in place at maximum 300mm centres. When fixing weatherboards leave them 5mm short of the spine of the base piece. The cap is then fixed in place and allowance made for Palliside moulded end plugs to be inserted in place using solvent cement.

This jointing option can only be used when joining on stud. This jointing option can be hidden by strategic placement of downpipes etc.

2.5 Installation of Weatherboard

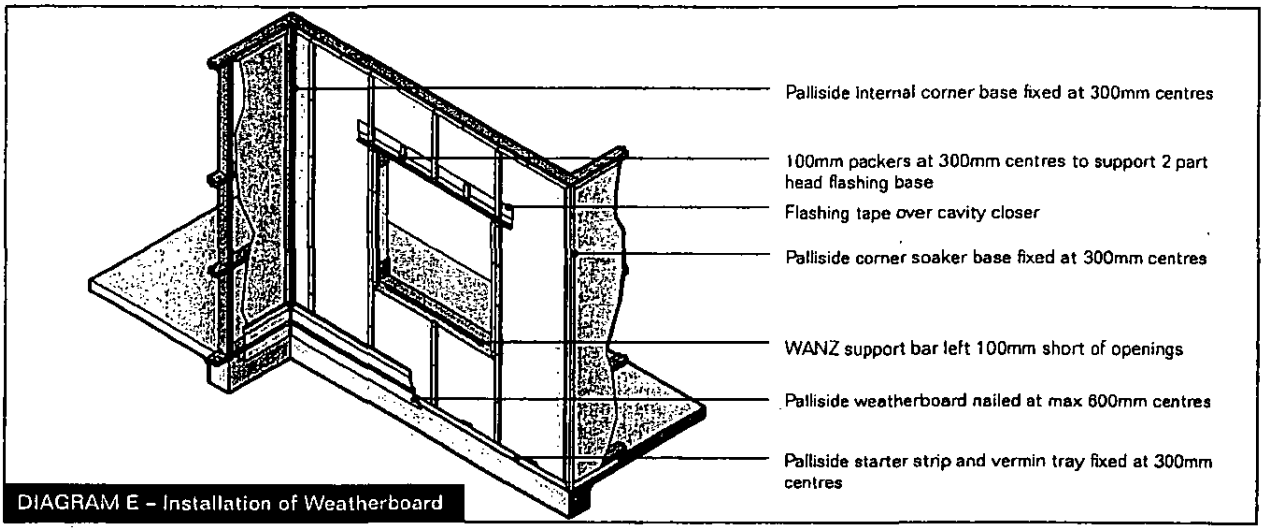


DIAGRAM E – Installation of Weatherboard

Once starting heights have been confirmed, building paper/wrap correctly lapped and fixed and base accessories have been fixed in place, it is time to commence the installation of weatherboards

When nailing Palliside, point the fixing slightly downward (this is to avoid splitting the top of the back part of the weatherboard, which leads to creeping out of level during installation) and nail from one end to the other or from the middle outwards.

Fix at maximum 600mm centres leaving a 5mm[4] gap between weatherboards when joining the boards.

Notes:

- **Ensure Palliside nails, are hit home firmly but not over nailed**
- **When using brads use 2 per stud skewed.**
- **When using screws ensure that the head of the screw is flush with the fixing groove to ensure the next weatherboard can overlap without interference.**

Push into place the next course of boards correctly and continue fixing.

The locking procedure is designed tight to protect from water and dust. If difficulty is experienced interlocking the weatherboards, lay a timber off-cut on the upper edge of the board and gently tap into place with a hammer. Do not hit directly down on top of the weatherboard.

It is advisable to check that the courses of weatherboard remain level using a spirit level and/or storey rod.

[4] **When using the moulded flat soaker joining option.**

2.5.1 Install Weatherboard to Sill Height

Carry out installation of weatherboard as described earlier to the base of the opening, cutting weatherboard around opening to suit (making sure that the cut of the weatherboard is no higher that the sill trimmer plate). Pack out weatherboard at sill trimmer. Fix the cut board at maximum 600mm centres. To ensure that the fixing will be covered by the widow joinery, place it within 10mm of the top of the cut board.

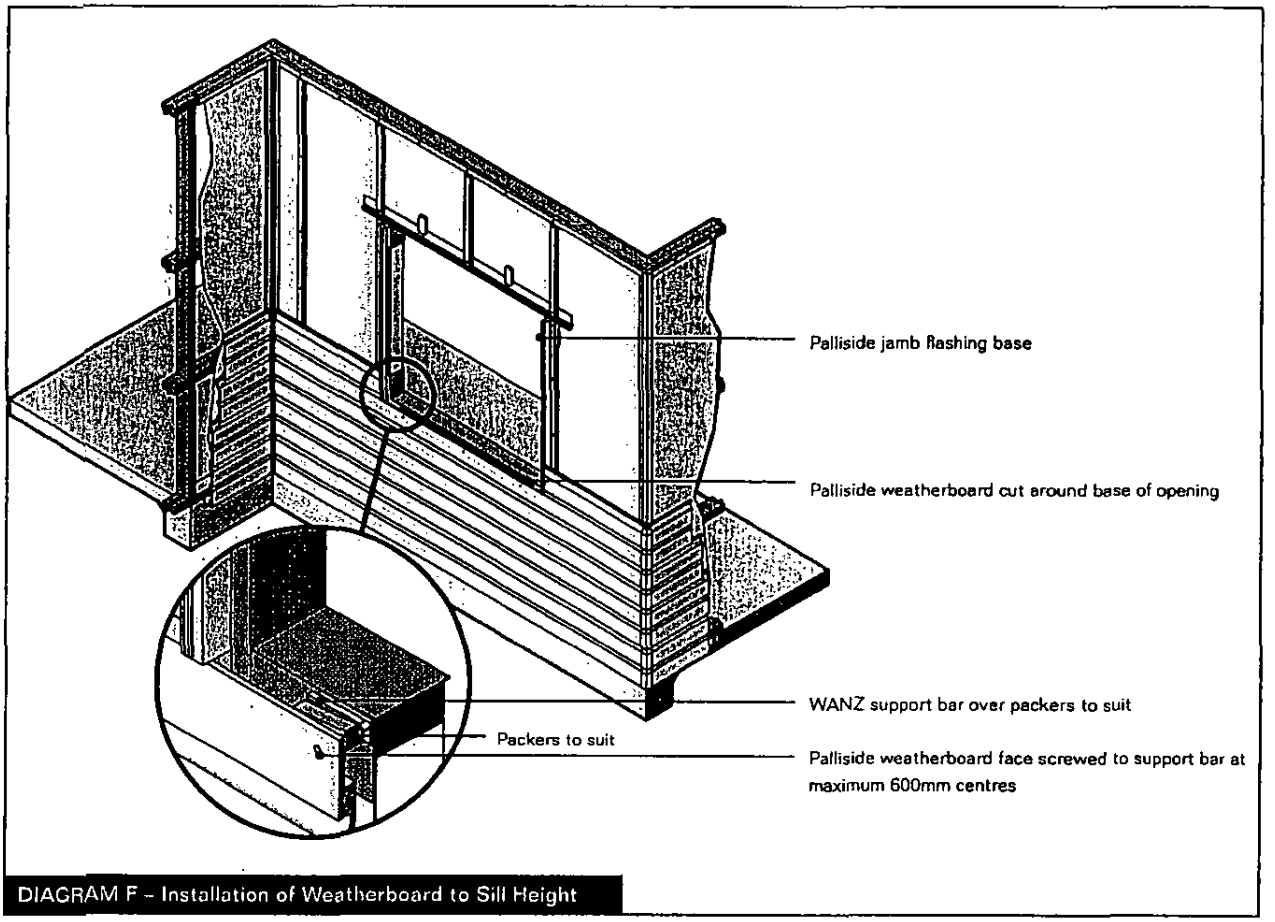


DIAGRAM F – Installation of Weatherboard to Sill Height

2.5.1.1 Packing Out Cut Weatherboards

When starting or finishing on a part board or where a part board finishes below joinery, timber packers should be used to pack out the weatherboard. Board off-cuts (6mm x 2) can often be used for packing out the Rusticated profile (18mm).

Any horizontal cut areas still need to be nailed in place at a maximum 600 mm centres. Nail these areas so that the fixing is not visible (eg. Covered by joinery or trim). Fastfix fasteners can be used in some instances, particularly in holding the weatherboard and head flashing in place above windows.

2.5.1.2 Cut Traditional Board Start (Horizontal Only)

Due to the tapered nature of the traditional weatherboard profile, starting part way up the face of the weatherboard may make the area unsuitable for using any of the standard starting trims discussed in this document. Therefore particular care needs to be taken with the weatherboard cut.

If desired, the two-part channel trim can be used by modifying (reducing) the base and cap to allow the cap to fit tighter to the base. Due to the modification, solvent cement may be required to glue the cap piece in place. Drain holes still need to be drilled to allow moisture to get out.

2.5.1.3 Installation of Weatherboard Below Doors and Ranch Sliders *(Refer design detail DC44)*

Palliside weatherboard must be cut around and continued below doors and ranch sliders. The WANZ Support bar also meets the requirement of vermin proofing in this application.

2.6 Installation of Window Flashings and joinery

Windows should not be installed into the openings until the weatherboard has been fixed to the sill height and sill and jamb base flashings fixed correctly in place.

All aluminium joinery should be compliant with the parameters outlined in the Palliside Technical Guide (paragraph 2.9.1).

2.6.1 Installation at Base of Opening (Sill)

There is no sill tray required when installing Palliside over a drained cavity, however the cut weatherboard below the opening must be fixed to the support bar/packer (if used) at maximum 600mm centres before installing joinery.

Depending on the gap between the front of the weatherboard some sort of vermin protection may be required. This can be achieved by trimming the required tear off strips from a length of vermin tray and placing it facing outward fixed in place behind the face of the weatherboard. The vermin strip will be non-visible after installing the selected joinery.

2.6.2 Installation of Jamb Flashing Base and Joinery

The base of the vertical jamb flashing is fixed in place either side of openings prior to the installation of joinery and weatherboards. This flashing is compatible for both Palliside profiles.

Cut the jamb flashing base to match the height of the opening. Fix this flashing in place so that the spine of the jamb flashing is flush against the side of the opening. Repeat this process for both sides of the opening.

At this point measure the width of the joinery ensuring you will have a minimum flange cover of at least 10mm either side of the opening once the joinery is installed, as outlined in the Palliside Technical Guide (paragraph 2.9.1)

2.6.3 Installation of Joinery

Place joinery into the opening then pack and nail in place ensuring that the joinery is level.

While the joinery does not need to be centred it must be fixed so that:

- **A minimum 7.5mm gap is maintained around the perimeter between the joinery reveal and the opening (to allow for an airseal to be installed).**
- **There is at least 10mm flange cover over the jamb flashing base either side (the line on the face of the jamb flashing base nearest the spine indicates the minimum 10mm cover required) and 8mm at the sill.**

Do not remove any of the tear off tabs from the jamb flashing base at this stage.

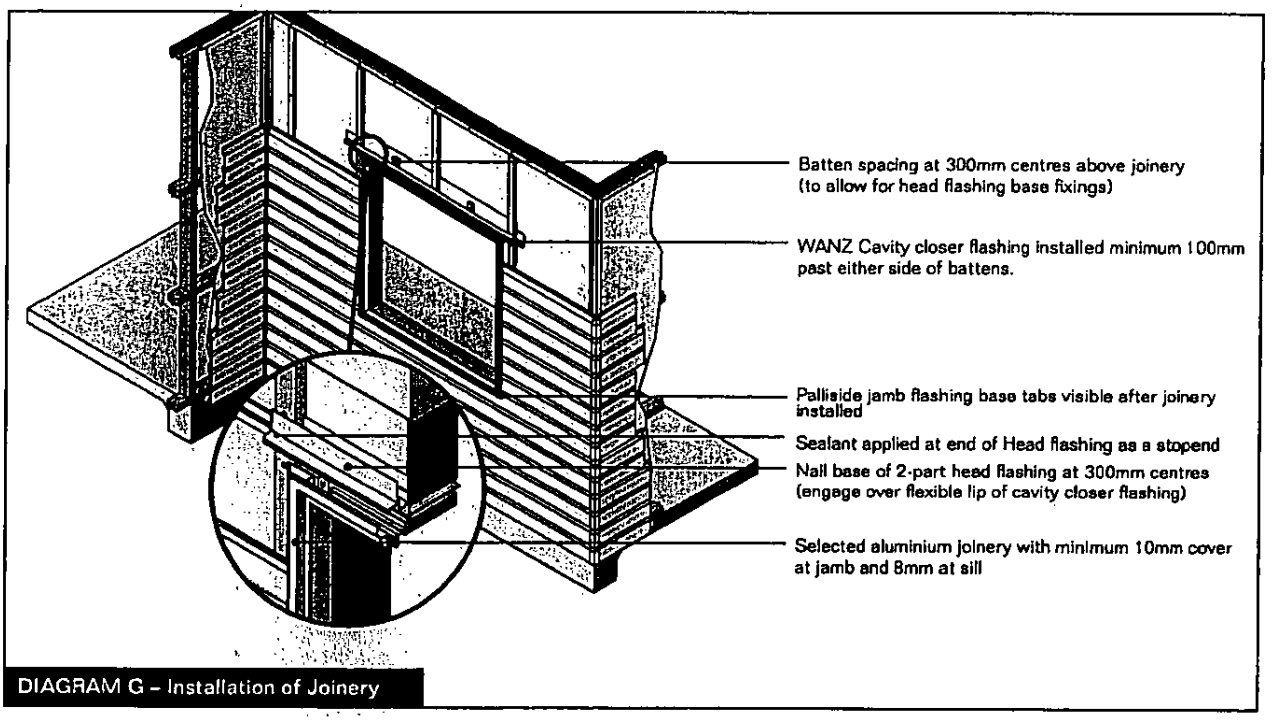


DIAGRAM G – Installation of Joinery

2.6.3.1 Windows Close Together

Where two windows closely adjoin each other it may be necessary to tack windows in place and remove at least one while the weatherboard is installed to the head flashing height.

2.6.4 Installation to Head of Window

Continue to install weatherboards either side of the opening up to the head flashing level.

2.6.5 Installation of Head Flashing

Clip together the 2-part head flashing and place it above the joinery so that the base engages the flexible lip of the cavity closer against the cavity battens behind and the cap rests on the flange of the aluminium. Centre this in place so the there is a minimum 20mm cover either side of the joinery. Nail through the base of the head flashing at 300mm centres. There is no need to tape the head flashing when it is placed in front of the cavity battens.

- **Nail packers (to suit) in place to the base of the head flashing evenly spaced at maximum 600 centres.**
- **Apply sealant at either end of the head flashing to form a head flashing stop end.**
- **Remove the head flashing cap and insert cut weatherboard in place**

2.6.6 Installation of Weatherboard Above Joinery

Measure where the cut is required for the head flashing to penetrate the face of the weatherboard. Cut the weatherboard out to suit, taking care to ensure that the horizontal cut for the head flashing is neatly finished and will allow the head flashing to sit tidily

2.6.6.1 Full Weatherboard Profile Above Joinery

If it works out that a full weatherboard profile can be placed above the head flashing it will be necessary to cut a slot into the weatherboard either side of the opening to allow for the head flashing to be fitted in place.

Then trim the nailing groove from a weatherboard off-cut (e.g. taken from the cut around the base of the opening) and nail this across the base of the head flashing, level with the nailing groove either side of the opening. Place the weatherboard in place and continue.

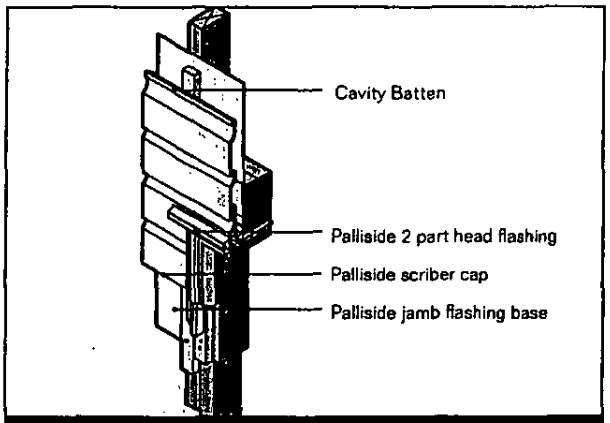


DIAGRAM H.1 - Cut Weatherboard Profile at Head Flashing

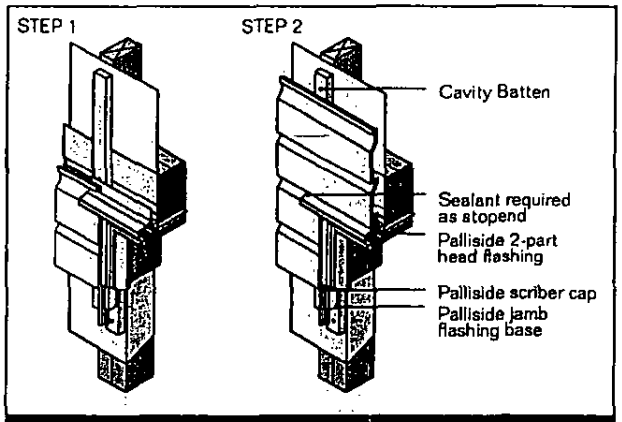


DIAGRAM H.2 - Full Weatherboard Profile at Head Flashing

2.6.6.2 Slot to Side of Head Flashing.

In instances where the base piece of the head flashing penetrates the cut weatherboard slightly, slope the cross-section of the cut on an angle to allow the base to sit nicely. Use sealant to provide additional protection in these areas.

2.6.6.3 Securing Weatherboard Above Head Flashing in Place

When the head flashing has been cut into the weatherboard profile it is necessary to hold the base of the weatherboard in place above the head flashing using Fastfix Fasteners, unless head flashing has been installed in accordance with paragraph 2.6.6.1

To achieve this ensure that the weatherboard is correctly packed out and pre-drill 6mm holes at 600mm centres spaced evenly across the face of the opening. Hammer Fastfix fastener in place.

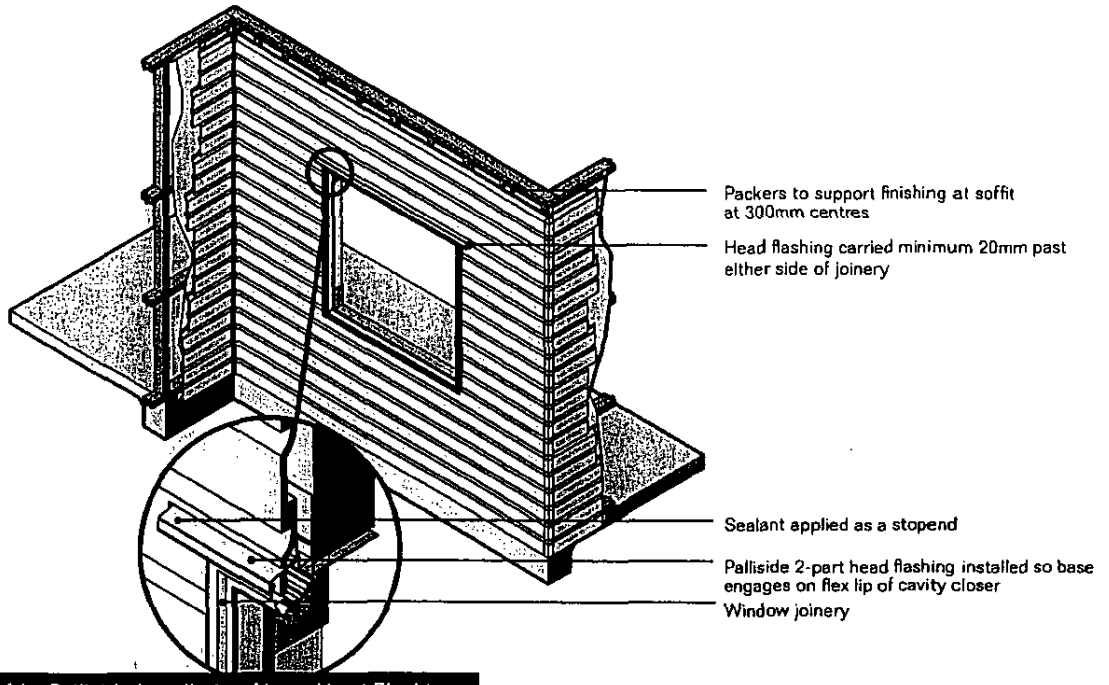


DIAGRAM I – Palliside Installation Above Head Flashing

2.7 Installation to Soffit

Carry out the installation of the weatherboard above the head flashing to soffit.

2.7.1 Soffit Finish

Trim and pack out weatherboard to suit soffit height (particularly horizontal soffit finishes). For best results reduce the spacing of these packers to 300mm centres.

2.7.1.1 Horizontal Soffit Finish

Palliside foam soffit mould is a 40mm x 18mm cornice moulding which can be used as a horizontal finish at soffit line. This trim is available in 3.6m lengths to match the chosen Palliside colour.

This accessory may be either face nailed using 40x2.0mm HDG jolt-heads punched and covered with a dab of matching solvent applied to hide the fixing, or fixed using finishing brads (2 skewed at 300mm centres).

When installing the Rusticated Profile the 2-Part Channel trim may also be suitable providing that the weatherboard does not finish in the scallop part of the profile.

2.7.1.2 Gable Ends and Rakes

It is recommended that the Palliside 2-Part Channel trim should be used in these areas as a finishing trim.

If using the 2-Part Channel the base will need to be fixed in place prior to the installation of the top weatherboards. Before inserting the cap, insert a continuous strip of Polyethylene Foam (PEF) Rod or Inseal tape placed between the spine of the 2-Part Channel base and the weatherboard.

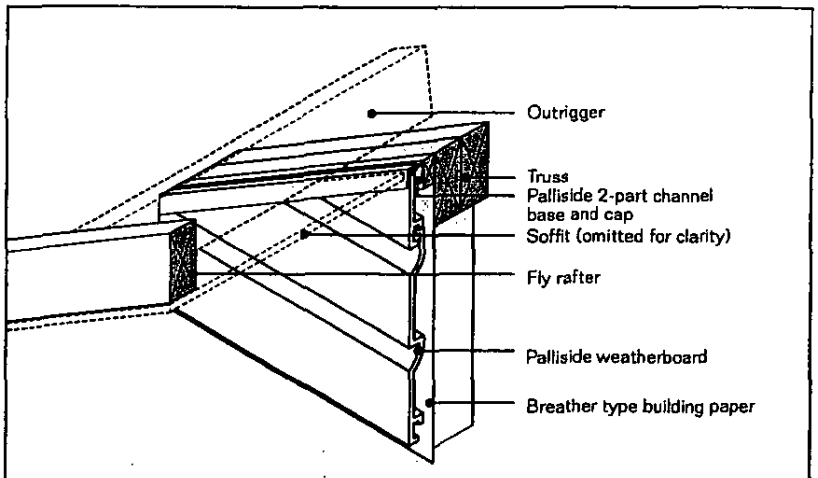


DIAGRAM J –Gable End Finish

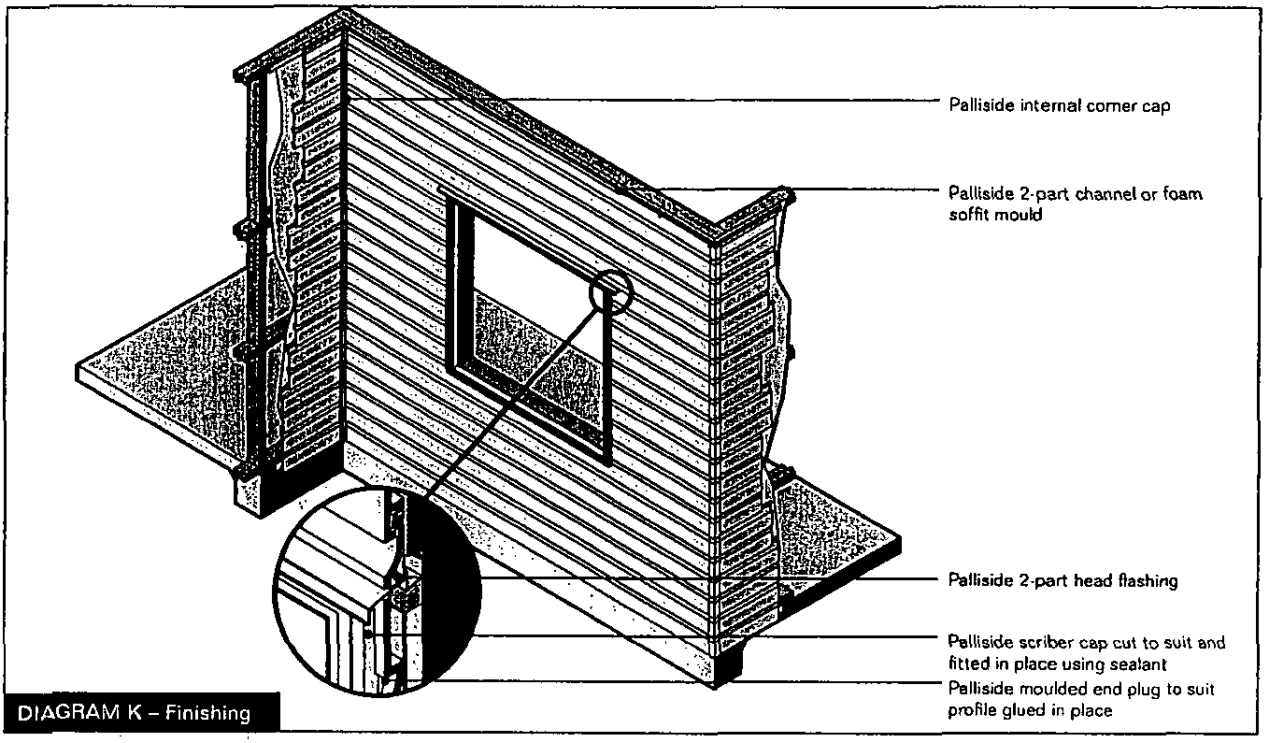


DIAGRAM K – Finishing

2.8.1 Openings

2.8.1.1 Prefit the Scriber Caps

Cut the scriber cap to suit the total height of the window allowing for a 15° taper to the top. This will allow for a tidy finish where the head flashing cap is inserted later.

Prefit the scriber cap in place to the side of the window ensuring that the scriber abuts firmly to the side of the aluminium joinery. (It may be necessary to remove one of the tear-offs from the jamb flashing base to allow this to occur)

2.8.1.2 Installation of Head Flashing Cap Piece

Install the cap of the head flashing in place so the front face is resting on the front of the scriber caps. Apply sealant where the head flashing cap sits on top of the head of the aluminium joinery flange.

2.8.1.3 Sealing Scriber Caps in Place

Once the head flashing cap has been installed, remove the scriber cap and carefully apply a bead of sealant to the surface of the scriber where it intersects the base of the jamb flashing and re-insert in place.

Note: Sealant is a preferred option rather than solvent cement for this area as it will allow the removal of these cap accessories later if necessary.

2.8.1.4 Insertion of End Plugs

Install the Palliside moulded end plugs to the side of the windows by carefully applying solvent cement into the gaps of the weatherboard profile and inserting the end plug in place, flush with the outside of the scriber cap.

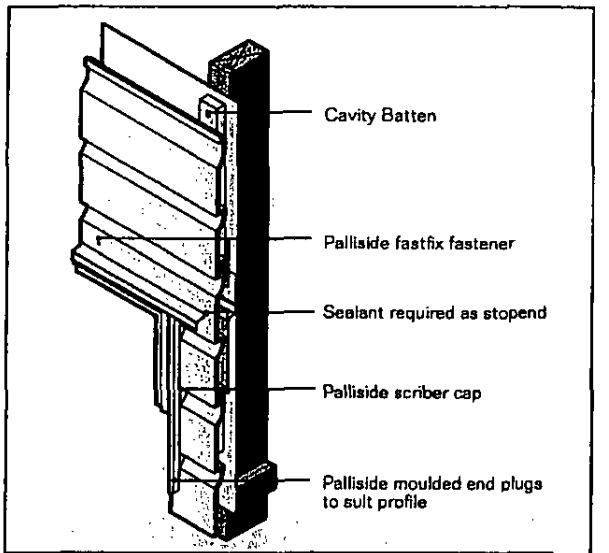


DIAGRAM L – Scriber Cap Finish at Head Flashing

2.9 Continue the Installation Process on Remaining Walls

If the 90° external corner soaker option has been selected Palliside corner soakers can be pushed (clipped) in place (using the rubber handle of a hammer or rubber mallet) after the installation of each course of boards. This helps keep track of board profile alignment.

2.9.1 Finishing of Corners and Trims

All other finishing trims including boxed corner caps, internal corner caps and flat soakers can be applied during the weatherboard installation process or later at the completion of the installation if preferred. End plugs can then be applied where applicable with solvent cement.

2.9.2 Solvent Cement and Sealant

Solvent cement is used for fixing Palliside end plugs and flat soakers in place.

- **When using solvent cement, care should be taken to avoid any solvent being placed on the parts of extruded PVC accessories that are visible such as the caps of boxed corners and channel trims (this can lead to dimpling).**
- **Excess solvent should be removed straight away by using a damp rag. Do not wait for solvent to dry before doing this.**
- **Be aware that Palliside solvent cement takes time to adhere therefore apply solvent and wait approximately 2 minutes before installing end plugs or flat soakers.**
- **Apply solvent to gap where end plug is to be placed; do not apply solvent to the end plug itself.**
- **Apply solvent to one side of the flat soaker and push in place wiping away excess solvent.**

A range of MS based sealants matching the Palliside colours is available. These and other neutral cured or MS based sealants can be applied to Palliside in the following scenarios:

- **To form a flashing stop-end above joinery**
- **Around the area where the head flashing penetrates the weatherboard to the sides of joinery.**
- **Installation of the jamb flashing scriber caps**
- **As an alternative to Palliside solvent cement**
- **Finishing around penetrations such as pipes, etc.**

Note: The use of solvent cement or sealant should not substitute the use of sound weathertightness principles and/or tidy finishing.

2.9.3 Installation of Airseals

As specified in the Palliside Technical Guide, paragraph 2.8.3, Windows, doors and other penetration openings shall be fitted with flexible air seals (that comply with NZBC Acceptable Solution E2/AS1 Paragraph 9.1.6).

2.9.4 Specific Details

A range of details are available for access from the product website **www.palliside.co.nz.**

These include:

2.9.4.1 Pipe Penetrations (Refer design detail DC20)

Ensure pipe penetrations are flashed correctly as shown in the design detail. Pipe flanges and/or sealant should be applied where required to provide additional protection.

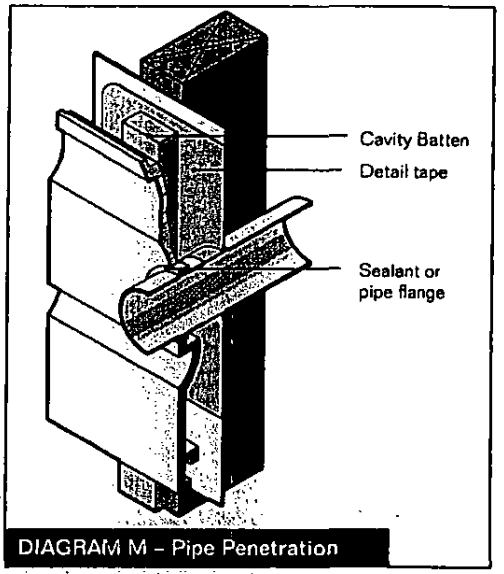


DIAGRAM M – Pipe Penetration

2.9.4.2 Boxed Timber Corners, Timber Facings and Planted Timber Sills (Refer design details DC32-DC35)

Details are available covering the installation of timber corners and facings and may help add additional character to the home.

Facings are screwed in place through the Palliside weatherboards, may be finished using moulded Palliside end plugs to suit the chosen profile or a traditional timber scriber. Once gaps have been filled/sealed, these can be painted either to match the Palliside or in a colour to suit.

2.9.4.3 Meter-box Head Sill and Jamb (Refer design details DC13-15)

Ensure that the installation of the meter-box is carried out in accordance with the appropriate details as shown in these design detail.

2.9.4.4 Non-Standard Corners and Customised Flashings (Refer design detail DC25)

This details the custom flashing of non-standard corners

2.9.4.5 Palliside to Brick Veneer Junction Details (Refer design details DC25-30)

When installing Palliside weatherboards in combination with brick veneer a range of junction details (Internal Corner, External Corner, Brick Sill, Inter-storey and Vertical Join) are available. These details provide a suggestive means of flashing between these claddings. Other methods may be adopted providing that they demonstrate sound weathertightness principles. If in doubt speak with the designer, consult your local BCA or phone Dynex Extrusions Limited for guidance.

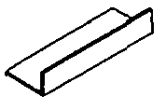
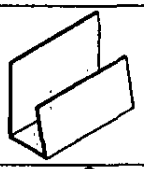
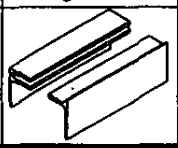
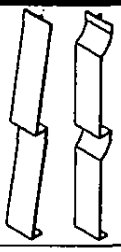
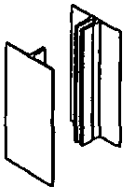
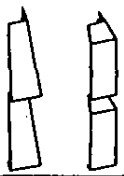
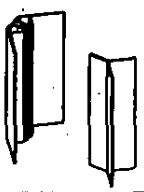
2.9.4.6 Palliside Installed Above Joinery Between Brick (Refer design detail DC31)

This detail sets out the method of installing Palliside weatherboard above joinery between brick veneer.

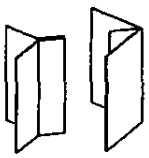
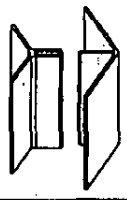
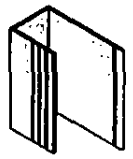
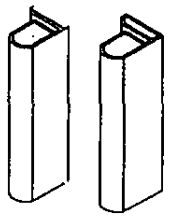
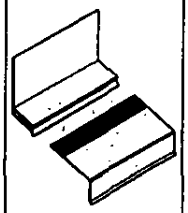
2.9.4.7 Drained Cavity Inter-Storey Junction (Refer design detail DC42)

Refer to the Palliside Technical Guide, paragraph 2.12.6, to see whether there is a requirement for this junction.

3.0 COMPONENT SELECTION GUIDE

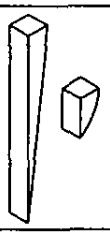
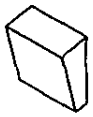
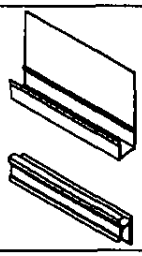
Item	Item Code	Length	Description	Installation of base piece	Installation of Cap Piece	Comments & references
STARTING TRIMS refer paragraph 2.1						
Starter strip MVSWHT3.6		3.6m	Required when installing a full board at the base of the application. Not required to be colour matched due to it being a non-visual base accessory.	Prior to Installation of weatherboard	n/a	Diagram B Paragraph 2.2.1
Cavity Vermin Tray MVCVT3.6		3.6m	Required when installing Palliside over drained cavity. Not required to be colour matched due to it generally being a non-visual base accessory.	Prior to Installation of weatherboard	n/a	Diagram B Paragraph 2.2.2 Drained Cavity only
One-Part Channel Trim Insert Colour MVCH__3.6		3.6m	Also referred to, as 'J' mould is available in colours to match selected Palliside weatherboard.	Prior to Installation of weatherboard	n/a	Paragraph 2.2.3
2-Part Channel Trim Insert Colour MV2CH__3.6		3.6m	2-Part Channel trim is available in colours to match selected Palliside weatherboard.	Prior to Installation of weatherboard	After weatherboard has been installed	Paragraph 2.2.4 and 2.7.1
JOINTING OPTIONS refer paragraph 2.4						
Moulded Flat Soaker Insert Colour MVSF__ Rusticated OR Traditional Insert Colour MVSFTRAD__		per unit	Moulded flat soakers come in double profile and are available in a colour and shape to match the weatherboards. One side of the soaker is adhered using solvent cement.	n/a	During or after weatherboard has been installed	Diagram D.1 Paragraph 2.4.1 Soakers can be joined between stud providing they are staggered
2-Part Jointer Insert Colour MVJ__2.7 Base and Cap		2.7m	Vertical joints on stud can be made using the two-part jointer that is available in colours to match selected Palliside weatherboard.	Prior to Installation of weatherboard	After weatherboard has been installed	Diagram D.2 Paragraph 2.4.2 (Base must be fixed on stud)
CORNER OPTIONS refer paragraph 2.3						
External 90° Corner Soaker Option MVCB2.7 (Base)		2.7m	The Corner Soaker Base can only be used in conjunction with the Corner Soakers and is not required to be colour matched due to it being a non-visual base accessory.	Prior to Installation of weatherboard	n/a	Diagram C.1 Paragraph 2.3.1
Insert Colour MVSC__ Rusticated OR Traditional Insert Colour MVSCTRAD__		per unit	Moulded corner soakers come in double profile and are available in a colour and shape to match the weatherboards.	n/a	During installation of weatherboard to 2nd wall	Diagram C.1 Paragraph 2.3.1
Boxed 90° Internal Corner MVIBWHT3 (Base) Insert Colour MVIC3__ (Cap)		3.0m	This option provides a boxed corner finish for 90° internal corners. Only the Male cap piece is required to be colour matched as the base piece is non-visual.	Prior to Installation of weatherboard	After weatherboard has been installed	Diagram C.2 Paragraph 2.3.2 (End plugs required)

Colour Codes: WH = white, CR = cream, GN = green, TEA = tea

Item	Item Code	Length	Description	Installation of base piece	Installation of Cap Piece	Comments & references
Boxed 90° External Corner Insert Colour MVIE__3.6 (Female and Male)		3.6m	This option provides a boxed corner finish for 90° external corners. Each unit comprising a female base piece and a male cap piece, both matching the selected Palliside colour	Prior to Installation of weatherboard	After weatherboard has been installed	Diagrams C.1 Paragraph 2.3.3 (End plugs required)
2-Part Boxed 135° Corner Insert Colour MV135__2.7 Reversible to suit both external and internal option		2.7m	The 135° corner can be used for either internal or external corners by reversing the base section, as is commonly required around bay windows. And is available to match the selected Palliside colour.	Prior to Installation of weatherboard	After weatherboard has been installed	Paragraph 2.3.3 (End plugs required)
WINDOW FLASHINGS refer paragraph 2.6						
WindowJamb Flashing Base MVWJFB3.6		3.6m	The base of the vertical jamb flashing is fixed in place either side of openings prior to the installation of joinery and weatherboards. The jamb flashing is not required to be colour matched due to it being a non-visual base accessory. This flashing is compatible for both Palliside profiles.	After sill tray has been installed and prior to insertion of joinery	n/a	Diagram F Paragraph 2.6.2
Window Scriber Cap Insert Colour MVWSCR__3.6 Rusticated OR Traditional Insert Colour MVWSCR TRAD__3.6		3.6m	The scriber cap is inserted into the jamb flashing base and available to match the selected Palliside colour. There is a different cap required to match each profile thickness and Palliside end plugs are still required to complete the installation.	n/a	After weatherboard windows and head flashing have been installed	Diagram L Paragraph 2.8.1
2-Part PVC Head Flashing Insert Colour MV2Z__3.6B (Base) Insert Colour MV2Z__3.6C (Cap) MV2ZAL__3.6 (Aluminum cap)		3.6m	The Palliside 2-Part head flashing is designed to improve the ease of installation of the weatherboard above joinery and is available in matching Palliside colours. If preferred an aluminium cap piece can be purchased and used with the PVC base piece (and powder coated to the match the joinery colour)	Prior to the installation of the weatherboard above the inserted joinery	Once the weatherboard above the opening has been installed and the scriber caps have been inserted in place	Diagrams H.1 H.2 and L Paragraph 2.6.5 and 2.8.1.2

Colour Codes: WH = white, CR = cream, GN = green, TEA = tea

FINISHING TRIMS refer paragraph 2.8

Item	Item Code	Length	Description	Installation of base piece	Installation of Cap Piece	Comments & references
Moulded End Plugs Insert Colour MVEP__ Rusticated OR Traditional Insert Colour MVEPTRAD__		Per Unit	Palliside end plugs are available in both rusticated and traditional profiles to match selected Palliside colours.	n/a	Insert in to profile gaps with solvent cement after weatherboard joinery and all vertical trim caps have been installed	Diagrams K and L Paragraph 2.8.1
Fastfix Fastener Insert Colour PSF12__		50 Per Pack	Palliside fastfix fasteners are mainly used to hold a cut weatherboard above the head flashing in place and come in colours to match selected Palliside weatherboard.	n/a	Once weatherboard above joinery has been fixed in place.	Paragraph 2.6.6.3
Foam Soffit Mould Insert Colour FMBC8__3.6		3.6m	Palliside foam soffit mould is a 40mm x 18mm cornice moulding which can be used as a horizontal finish at soffit line. This trim is available to match the chosen Palliside colour.	n/a	Once top weatherboard has been installed	Diagram I Paragraph 2.7.1
Solvent Cement Insert Colour MCS__		180gm Tube	Available in matching Palliside colours to cement in place end plugs and flat soakers			Paragraph 2.9.2
Palliside Nails PSIDENAILS		5kg Box	Palliside 40 x 2.5mm Nail			
Sealant Insert Colour MSMSS__		375ml Canister	Available in matching Palliside colours for finishing around head flashing and other areas requiring attention to detail			Paragraph 2.9.2
Cavity Closer Trim and Support Bar			For use at the head flashing level for cavity installation only. For use at base of opening to support joinery. Comes in white as not required to be colour matched			Available for Purchase via preferred window fabricator

Colour Codes: WH = white, CR = cream, GN = green, TEA = tea

Notes

Contact Details

For further information visit the website www.palliside.co.nz or alternatively contact:

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PO BOX 19-133, Avondale, Auckland, New Zealand.
FREEPHONE 0800 439 639

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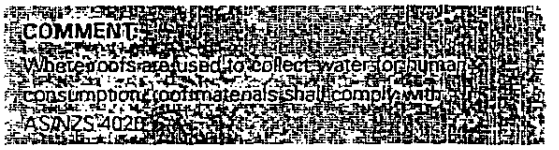
8.1 General

8.1.1 Weathertightness

Roof *claddings* shall meet the requirements of NZBC E2.2, and be specified and *constructed* in accordance with the provisions of Paragraph 8.1.2 to Paragraph 8.5.



8.1.2 Limitations

This Acceptable Solution is limited to roof *cladding systems* listed in Paragraph 3.2.

8.1.3 Maintenance

Maintenance of *claddings* shall be carried out as necessary to achieve the expected *durability* of the material – refer Paragraph 2.5.

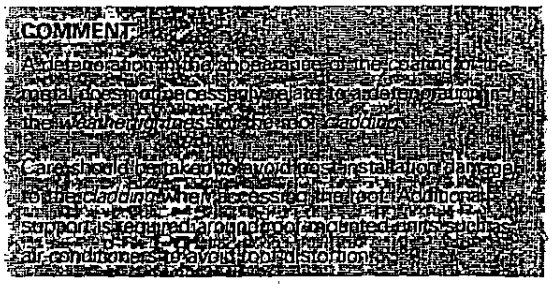
The extent and nature of the necessary maintenance is dependent on the:

a) Type of *cladding* used,

b) Position of the *cladding* on the *building*,

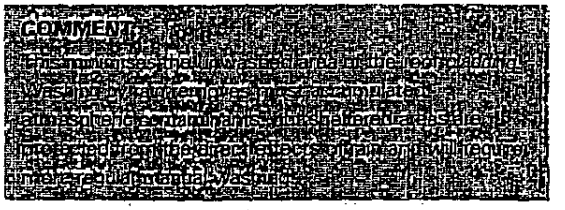
c) Geographical location of the *building*, and

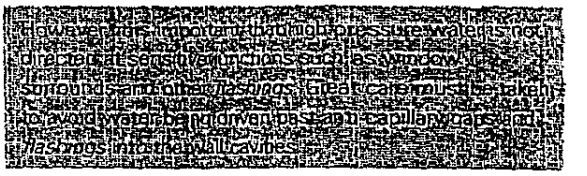
d) Specific site conditions.



8.1.3.1 Projecting eaves

Soffits and verges of all projecting *eaves* shall be closed in.

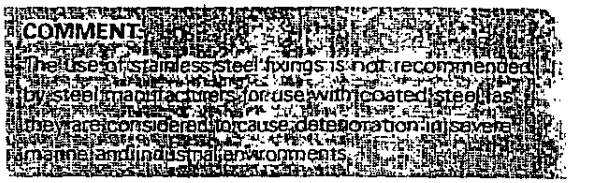




8.1.4 Fixings

Fixings shall be as specified in Paragraph 8.2 to Paragraph 8.5.

Fixings for roof *claddings* and *flashings*, where necessary, shall be selected from Table 20 to minimise corrosion.



8.1.5 Underlays

All *roof underlays* shall have laps of no less than 150 mm.

Where required, *roof underlays* complying with Table 23 shall be laid either:

a) Vertically, when the roof pitch is not less than 8° (1:7), or

b) Horizontally, with the upper sheets lapped over lower sheets to ensure water is shed to the outer face of the underlay.

8.1.5.1 Underlay support

Roof underlays shall be installed in a manner that prevents ponding of water by:

a) Allowing *roof underlays* classed as extra heavy or heavy in AS/NZS 4200 to span no more than 1200 mm in one direction, or

b) If supported by a corrosion-resistant material:

   i) *roof underlays* classed as medium light or extra light in AS/NZS 4200 shall span no more than 300 mm in one direction, and shall be used only at pitches of 8° or above, or

   ii) *roof underlays* classed as extra heavy or heavy in AS/NZS 4200 shall be used at pitches less than 8°.

Appropriate corrosion-resistant materials are polypropylene tape or a minimum 0.9 mm diameter steel wire mesh galvanized in compliance with AS/NZS 4534.

8.1.6 Gutters

Gutters shall be sized to comply with E1/AS1.

Where gutter depth is reduced to allow entry of a *valley gutter*, the reduced depth shall be used to calculate the capacity of the gutter.

Downpipes discharging to a lower roof shall be fitted with a spreader as detailed in Figure 20, with the discharge limited to a section of roofing with no side laps.

Spreaders shall not be used on *masonry tile* roofs unless a *roof underlay* is installed.

A maximum catchment area of 25 m² shall be permitted to discharge via a spreader on to a lower roof area.

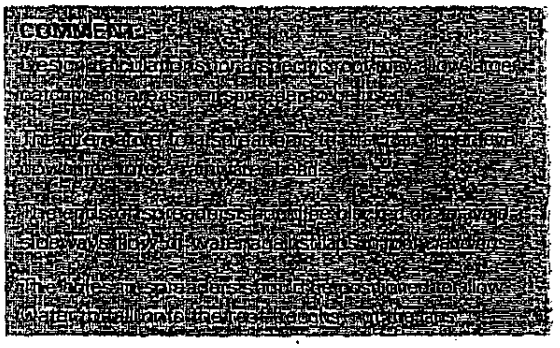
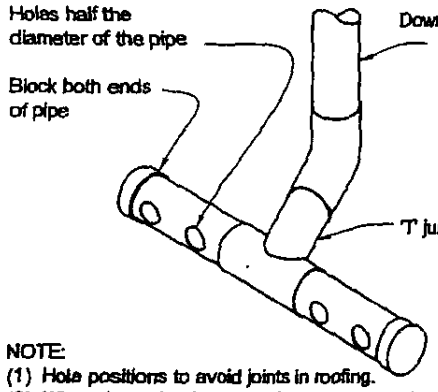


Figure 20: Spreader for roof discharge
Paragraph 8.1.6



NOTE:
(1) Hole positions to avoid joints in roofing.
(2) When downpipe is located in corner, spreader to be L-shaped.

8.1.6.1 Internal, valley and hidden gutters

Internal, *valley* and *hidden gutters* shall:

a) Be continuously supported with gutter boards, treated in accordance with NZS 3602,

b) If metal, be separated from any CCA treatment by *roof underlay*,

c) Have no fixings in gutter bottom or sides,

d) Have all joints lapped and sealed in accordance with Paragraph 4.5.2,

e) Receive no direct discharge from downpipes or spreaders, and

f) Be formed from the same material as the roofing, or:

i) G5000 series aluminium to AS/NZS 1734, temper O, with a minimum thickness of 1.2 mm, or

ii) X5CrNiMo 17-12-2 (316) stainless steel in accordance with Table 1 of ISO/TS 15510 with a minimum thickness of 0.45 mm, or

iii) C1100 or C1220 copper to AS 1566 with a minimum thickness of 0.7 mm, or

iv) butyl rubber, complying with Paragraph 4.3.9, on timber or plywood.

AZ150 or Z275 coated steel with a factory finish shall only be used where gutters can be readily maintained to prevent ponding and may be easily replaced within 15 years.

AZ150 or Z275 coated steel without a factory finish shall not be used.

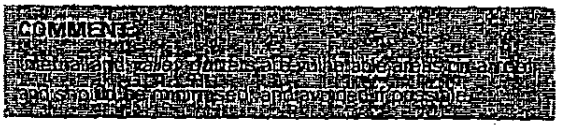
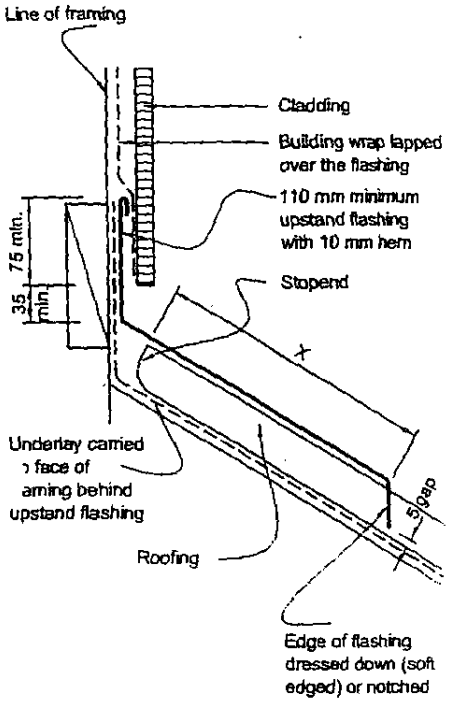


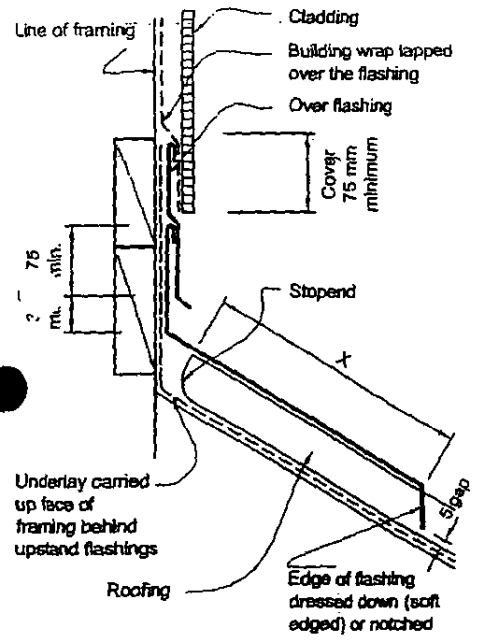
Figure 7: Basic apron flashing
Paragraphs 4.2.1.1, 4.6.1.1 a), 4.6.1.4 b), and 5.1

NOTE: (1) X = variable according to *wind zone* – refer Table 7.

(2) *Stopends* to profiled metal – refer Figure 49.



(a) ONE PIECE FLASHING



(b) TWO PIECE FLASHING

5.0 Roof/Wall Junctions

5.1 Apron flashings

All roof-to-wall junctions shall be made *weathertight* by using an *apron flashing* as outlined in Paragraph 4.6.1.1, and shown in Figure 7, that:

a) Provides a minimum lap under the wall *cladding* of 75 mm in accordance with Table 7, except that:
   i) pressed metal tiles shall have a secondary *flashing* fitted in order to achieve the minimum required overlap of wall *cladding*,

b) For profiled metal, incorporates *stopends* at the upper end of the roof *cladding* as per Paragraph 8.4.13,

c) Provides a minimum clearance from the wall *cladding* to the roofing in accordance with Table 7, and

d) Extends over the roofing by a minimum cover in accordance with Paragraph 4.6.1.1 and Table 7, depending on the:
   i) *wind zone*,
   ii) pitch of the roof, and
   iii) profile of the roof *cladding*.

COMMENT

Details for specific wall *cladding systems* are given in Paragraph 9.0.

Where the roof finishes within the length of an adjacent wall, a *kick-out* or *stopend* as detailed in Figure 8 shall be provided to direct water out from the wall *cladding* onto the roof *cladding* and gutter.

5.2 Gutters, barges and fascias

Where gutters, barges or fascias terminate against *claddings*, these shall be installed after the wall *cladding*, and after any protective finishes have been applied.

Gutters, barges and fascias shall terminate so as to leave a gap of 10 mm from the finished wall *cladding* as shown in Figure 8.

8.1.6.2 Valley gutters

Valley gutters shall be *constructed* as shown for the applicable roof *cladding*, and shall:

a) Not change direction in plan form,

b) Not be used with roof pitches below 12.5°,

c) Be fixed at the upper end only,

d) Be secured with a purpose-made clip system for the remaining length,

e) Have a minimum clearance of 100 mm between the ends of the roof *cladding*,

f) Have a minimum depth of 20 mm minimum at the edges of the *valley gutter*,

g) Have a minimum depth of 50 mm at the centre of the *valley gutter*, and

h) Have minimum widths in accordance with the catchment area feeding into the *valley gutter* as shown in Table 8.

Table 8: Maximum catchment areas for valley gutters
Paragraphs 8.1.6.2 and 8.4.16.2, Figures 27, 37 and 51

COMMENT

8.1.6.3 Internal gutters

Internal gutters shall be *constructed* as shown for the applicable roof *cladding*, and shall:

a) Be dimensioned to provide the greater of a:
   i) calculated size as per E1/AS1, or
   ii) minimum depth of 70 mm and minimum width of 300 mm,

b) Be sized to provide an additional freeboard allowance of 20 mm minimum,

c) Be provided with a weir outlet and discharge into a rainhead that has an overflow with the bottom below the sole of the gutter, and

d) Allow for an *expansion joint* at the upper end.

8.1.7 Roof penetrations

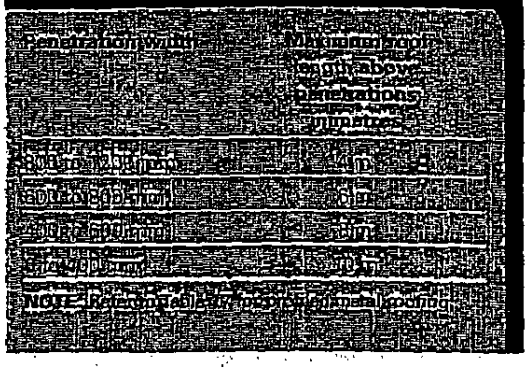
Roof penetrations shall be made *weathertight* in accordance with Paragraph 8.2 to Paragraph 8.5.

Where roof penetrations are required for large openings such as roof lights and *chimneys*, this Acceptable Solution is limited to the following requirements:

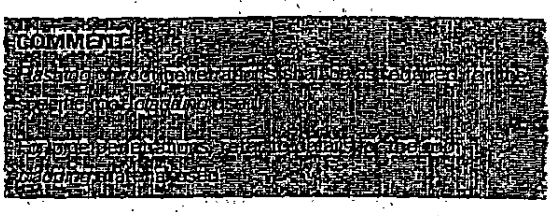
a) The edge of roofing penetrations over 200 mm wide shall be supported in either direction with additional *framing* as shown in Figure 21, and

b) For the catchment area of the roof above the penetration as shown in Figure 22, the roof length shall be limited to:
   i) for profiled metal roofing, Table 17
   ii) for other roof *claddings*, the areas shown in Table 9.

Table 9: Maximum catchment areas above penetrations
Paragraph 8.1.7 b) and Figure 22



COMMENT



SPECIFICATION

PROPOSED DEVELOPMENT for

THE HOUSING FOUNDATION of NEW ZEALAND.

TYPE 4A HOUSE
LOT 32 – NO. 19 TITCH PL ,
GLEN EDEN.

BUILDERS: Goldsmith Developments . ph: 021 750 280.

This Specification is to be read in conjunction with the accompanying drawings and any other drawing which may be issued during the currency of the contract.
Any item shown in this Specification and not shown on the drawings and vice versa shall be equally binding as though included in both.
The contractor shall provide a form of contract which is to be completed by all parties before the commencement of any work on the site.
Any additions, omissions or variations to the contract shall be authorized in writing and an agreed price stated.
The owners are to ensure that all boundary marker pegs are in place and exposed for the inspection.

This project has been designed to comply with the New Zealand Building Code and Building Regulations. Specific design is by a registered Engineer.
It is the responsibility of the contractors and workmen employed in this contract to make themselves familiar with the related documents pertaining to their trade.

ALL WORK MUST COMPLY WITH THE NEW ZEALAND BUILDING CODE.

BENNETT DRAUGHTING
116 RED HILL ROAD
PAPAKURA

EXTERIOR CLADDING RISK SCORE ANALYSIS

DATE: **August 2008**

ADDRESS **Housing Foundation of New Zealand - Type 4 House**

BUILDING FACE TYPICAL

ELEV ALL

RISK SCORE	LOW	MEDIUM	HIGH	VERY HIGH	SCORE
WIND ZONE	LOW	MEDIUM	HIGH	VERY HIGH	
	0	0	1	2	1
NUMER OF STOREY'S	1 STOREY	2 STOREY'S IN PART	2 STOREY'S	MORE THAN 2 STOREY'S	
	0	1	2	4	2
ROOF TYPE	HIP OR GABLE WITH EAVES	GABLE WITHOUT EAVES OR SIMPLE MONO-PITCH	COMPLEX SHAPES & DORMERS	MULTIPLE LEVELS COMPLEX SHAPES PARAPETS	
	0	1	3	5	0
EAVE WIDTH	GREATER THAN 600 MM @ FIRST FLOOR LEVEL	450-600 OR GREATER THAN 600 MM @ 2ND FLOOR LEVEL	100-450MM OR 450MM @ 2ND FLOOR LEVEL	0-100MM, 100-450MM @ 2ND FLOOR LEVEL 450-600MM @ 3RD FLOOR LEVEL	
	0	1	2	5	1
ENVELOPE CAPACITY	SIMPLE RECTANGULAR L, T OR BOOMERANG ALL WALLS COVERED BY EAVES.	BUILDINGS WITH ROOFS ABUTTING ADJACENT WALLS	BUILDINGS & MULTIPLE CLADDING AND ROOFLINE ABUTTING ADJACENT WALLS	AS HIGH WITH MULTIPLE PENETRATIONS, OTHER THAN DOORS & WINDOWS, THROUGH WALLS, COMPLEX JUNCTIONS	
	0	1	3	6	3
DECKS & BALCONIES	NONE, TIMBER SLAT DECK OR PORCH @ GROUND LEVEL	FULLY COVERED IN PLAN BY ROOF OR TIMBER SLAT DECK ATTACHED @ 1ST FLOOR OR 2ND FLOOR LEVELS	EXPOSED IN PLAN OR CANTILEVERED @ 1ST FLOOR LEVEL	EXPOSED IN PLAN OR CANTILEVERED @ 2ND FLOOR LEVEL OR ABOVE	
	0	2	4	6	0
KEY		**0-10 MEDIUM RISK**			7

ENGINEERS CALCULATIONS

- SPECIFIC DESIGN ON THE MASONRY FIREWALLS.
- SPECIFIC DESIGN & PRODUCER STATEMENT for the FLOOR SLABS.

PROPOSED DEVELOPMENT for

THE HOUSING FOUNDATION of NEW ZEALAND .

TYPE 4A HOUSE.
WEST COAST RD SUBDIVISION.

BUILDERS : Goldsmith Developments. Ph : 021 750 280

LINTELS OUTSIDE NZS 3604 SIZED EX GANGNAIL CHARTS
Housing Foundation of New Zealand
Type 4A House

BEAM 1	Garage Door – supports Gable truss.	Use table 1 Gangnail charts.
Span = 4.80		Supported Span = 1.5
Use **FB25M Gangnail Flitch.**	MAX SPAN = 5.90	

ALL DETAILS AS PER THE GANGNAIL / MITEK FLITCH CHARTS - UPDATED AUGUST 2007

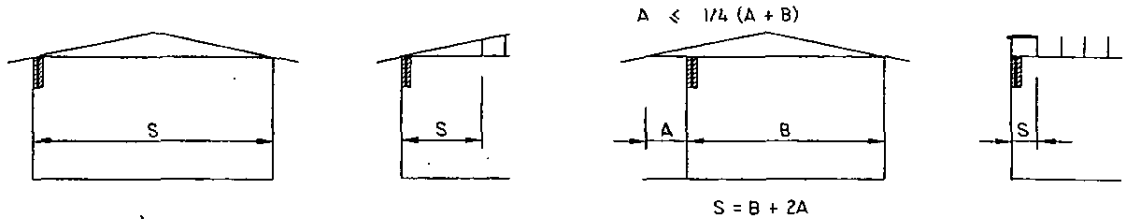


TABLE 1: MSG8, VSG8, MSG6 or Unverified No. 1 Framing

LINTELS SUPPORTING ROOF AND CEILING ONLY

	LINTEL SIZE	MAXIMUM LINTEL SPAN (m) SUPPORTED ROOF SPAN 'S' (m)												
		3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
LIGHT ROOF	FB15L	3.44	3.21	3.03	2.89	2.75	2.60	2.47	2.36	2.26	2.17	2.10	2.03	1.96
	FB20M	4.93	4.68	4.48	4.32	4.15	4.00	3.87	3.73	3.58	3.44	3.32	3.21	3.11
	FB25L	5.17	4.91	4.70	4.53	4.26	4.02	3.82	3.65	3.50	3.37	3.25	3.14	3.04
	FB25M	5.90	5.59	5.36	5.16	5.00	4.86	4.74	4.63	4.53	4.37	4.22	4.08	3.95
	FB30M	6.81	6.46	6.19	5.96	5.78	5.61	5.47	5.35	5.23	5.13	5.04	4.95	4.79
HEAVY ROOF	FB15L	2.92	2.72	2.57	2.45	2.30	2.17	2.06	1.97	1.89	1.82	1.75	1.69	1.64
	FB20M	4.21	3.99	3.82	3.68	3.52	3.39	3.26	3.12	2.99	2.87	2.77	2.68	2.59
	FB25L	4.41	4.19	4.01	3.79	3.56	3.36	3.19	3.05	2.92	2.81	2.71	2.62	2.54
	FB25M	5.03	4.77	4.57	4.41	4.27	4.15	4.04	3.95	3.80	3.65	3.52	3.40	3.30
	FB30M	5.81	5.51	5.28	5.09	4.93	4.79	4.67	4.56	4.47	4.38	4.27	4.13	4.00

B.1

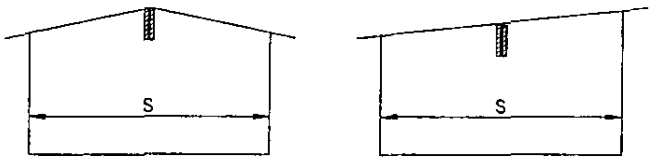


TABLE 2: MSG8, VSG8, MSG6 or Unverified No. 1 Framing

FLITCH BEAM RIDGE BEAM SUPPORTING ROOF AND SARKING OR CEILING (RAFTERS @ 1200mm CRS MAX)

	LINTEL SIZE	MAXIMUM LINTEL SPAN (m) SUPPORTED ROOF SPAN 'S' (m)									
		5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
LIGHT ROOF	FB15L	3.03	2.89	2.75	2.60	2.47	2.36	2.26	2.17	2.10	2.03	1.96
	FB20M	4.55	4.34	4.15	4.00	3.87	3.73	3.58	3.44	3.32	3.21	3.11
	FB25L	4.85	4.54	4.26	4.02	3.82	3.65	3.50	3.37	3.25	3.14	3.04
	FB25M	5.78	5.50	5.27	5.07	4.90	4.74	4.55	4.37	4.22	4.08	3.95
	FB30M	6.85	6.60	6.39	6.15	5.94	5.75	5.52	5.30	5.12	4.95	4.79
HEAVY ROOF	FB15L	2.57	2.45	2.30	2.17	2.06	1.97	1.89	1.82	1.75	1.69	1.64
	FB20M	3.86	3.68	3.52	3.39	3.26	3.12	2.99	2.87	2.77	2.68	2.59
	FB25L	4.08	3.79	3.56	3.36	3.19	3.05	2.92	2.81	2.71	2.62	2.54
	FB25M	4.90	4.66	4.47	4.30	4.15	3.96	3.80	3.65	3.52	3.40	3.30
	FB30M	5.84	5.63	5.42	5.21	5.03	4.81	4.61	4.43	4.27	4.13	4.00

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All generally used loadings are given below, refer to calculations for any specific cases.

Sig. MP Date. 8.8.2007

Job Name. Design Calculation for New Zealand Housing @ West Coast Rd West Auckland

No geotechnical assessment has been carried out on this site to support the assumed soil propoperties used in these calculations.

Liability will not be accepted should soils properties differ from those used in design.

Soil Data.

$q_{working} = CN_c/F = 50*6/3 = 100kPa$

$q_{ultimate} = \Phi CN_c = 0.5*50*6 = 150kPa$

Shaft Adhesion = 25kPa (NZBC)

Roofing.

Concrete Tiles. (Terracotta)	0.60	kPa
Galvanised Steel.	0.12	kPa

Walls.

Framing	Stud Centres.		
	300	400	600
100 x 50	0.30	0.28	0.27
150 x 50	0.41	0.39	0.38
	kPa	kPa	kPa

Lining.	Sheet Thickness.			
	9.5mm	12.5mm	16mm	19mm
Gib.	0.07	0.09		
Fyreline.	0.07	0.10	0.12	0.14
Braceline.	0.09			
	kPa	kPa	kPa	kPa

Gypsum. (two coat / 12mm)	0.22	kPa
Glazing.	0.28	kPa

Flooring /10mm.

Ceramic Tiles	0.20	kPa
Terazzo Paving.	0.22	kPa
PVC Tiles.	0.05	kPa
Cork.	0.05	kPa

Framing	Joist Centres. (with nogs)		
	300	400	600
150 x 50	0.14	0.12	0.10
200 x 50	0.20	0.17	0.14
250 x 50	0.25	0.21	0.17
300 x 50	0.30	0.25	0.20
	kPa	kPa	kPa

Ceiling /10mm.

Acoustic Tiles.	0.08	kPa
Portland Cement Plaster.	0.22	kPa

Boarding.

Board Type.	Sheet Thickness.				
	7.5mm	9mm	12mm	15mm	18mm
Softboard.	0.035	0.040	0.055	0.070	0.085
Hardboard.	0.055	0.065	0.090	0.110	0.130
Fibreboard.	0.020	0.025	0.035	0.045	0.055
Plasterboard.	0.070	0.085	0.120	0.140	0.170
Hardboard.	0.080	0.095	0.120	0.150	0.180
Chipboard.	0.055	0.070	0.090	0.110	0.130
Plywood.	0.045	0.055	0.075	0.090	0.110
Weatherboard.	0.030	0.035	0.045	0.055	0.070
	kPa	kPa	kPa	kPa	kPa

Others.

Brick Work 90mm	2.30	kPa	
Concrete 100mm	2.40	kPa	
125mm	3.00	kPa	
150mm	3.60	kPa	
200 Series Block.	1.65	kPa	Solid
	1.10	kPa	Partial
150 Series Block.	1.40	kPa	Solid
	0.90	kPa	Partial
Timber Wet	7.20	kNm^{-3}	
12% M/C	4.90	kNm^{-3}	

Standard Design Weights.

Walls	(Weatherboarded)	0.30	kPa
	(Plastered)	0.60	kPa
Roofs	(Conc Tiled)	0.60	kPa
	(Sheet Profile)	0.10	kPa
	(Live)	0.25	kPa
Flooring	(Dead)	0.40	kPa
	(Live)	1.50	kPa
Decking	(Dead)	0.25	kPa
	(Live)	2.00	kPa

Seismic Loading.

$C = C_h(t,\mu)S_pRZL_u$

$C_u = 0.35*0.67*1.0*0.6*1.0$ = 0.14 (Intermediate Soils / Auckland / Braced Frame)

$C_u = 0.69*0.67*1.0*0.6*1.0$ = 0.28 (Intermediate Soils / Auckland / Reinf. Masonry)

Wind Loading.

$q(z)_u = 0.6*(V*M_{ls}*M_{(z,cat)}*M_s*M_t*M_r)^2*0.001$

$q(z)_u = 0.6*(45*0.93*0.85*1.0*1.0*1.0)^2*0.001$ = 0.76kPa (Terrain #2 / Auckland / <3m)

$q(z)_u = 0.6*(45*0.93*0.91*1.0*1.0*1.0)^2*0.001$ = 0.87kPa (Terrain #2 / Auckland / 3-5m)

$q(z)_u = 0.6*(45*0.93*0.75*1.0*1.0*1.0)^2*0.001$ = 0.59kPa (Terrain #3 / Auckland / <5m)

Design Codes.

NZS4203:1992	LOADINGS
NZS3101:1995	CONCRETE
NZS3404:1997	STEEL
NZS3603:1993	TIMBER
NZS4230:1990	MASONRY

MITCHELL VRANJES
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Naresh M. Panchia - Associate M.E., M.I.P.E.N.Z., CP Eng.

Ref. Sh. No.

Sig. J Paling Date. 8/8/2007

Job Name: Gold Smith Development

Design Calculations for New Zealand Housing Foundation, Gold Smith Developments

Design Boundary Block wall

consider wind + EQ lateral forces.

category 2 wind zone - developing subdivision $M_t = 3.0$

$V_{sit,\beta} = 45 \times 1.0 \times 0.96 \times 1.0 \times 1.0$
$= 43.2 m/s$

$P = 43.2^2 \times 0.5 \times 1.2$
$= 1.12 kPa$

$W_u = 1.12 \times 0.6$ (600mm strip)
$= 0.67 kN/m$

$M^*_w = 3.0 kNm$

Earthquake actions

Assume shallow soil $T = 0.4s$ $C_h(t) = 2.36$
Glen Eden $Z = 0.13$
$N = 1.0$
$R_u = 1.0$

$\therefore C(t) = 2.36 \times 0.13$
$= 0.31$

Partially grouted block wall, $\mu = 1.25$

$S_p = 1.3 - 0.3 \times 1.25$
$= 0.925$

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Ref. _____ Sht. No. _____

Sig. _____ Date. _____

Job Name: _____

Soil Class C

$$k_m = \frac{(1.25-1)\times 0.4}{0.7} + 1 = 1.14$$

$$C_d(T_1) = \frac{0.31\times 0.925}{1.14} = 0.25$$

$W_E = 0.25\times 0.6\times 2.45$ 600mm strip
$= 0.37\ kN/m$

$M^*_E = 1.7\ kNm$

Wind Governs, $M^* = 3.0\ kNm$

try D12's @ 600mm c/c

$d = 190/2 = 95mm$

$T = A_s f_y = \pi\times 12^2/4\times 300 = 33.9\ kNm$

$b_w = 200m$

$$a = \frac{33.9\times 10^3}{0.85\times 8\times 10^3\times 0.19} = 26mm$$

$jd = d - a/2 = 95 - 13 = 82\ mm$

$\phi M_n = \phi T jd = 33.9\times 82.0\times 085 = 2.4\ kNm$ NG.

try D16 bars @ 600mm c/c

$T = 60.3kN$ $a = 46mm$

$jd = 72mm$ $\phi M_n = 0.85\times 60.3\times 72 = 3.7\ kNm > M^* = 3.0kNm$
Use D16 bars @ 600mm c/c

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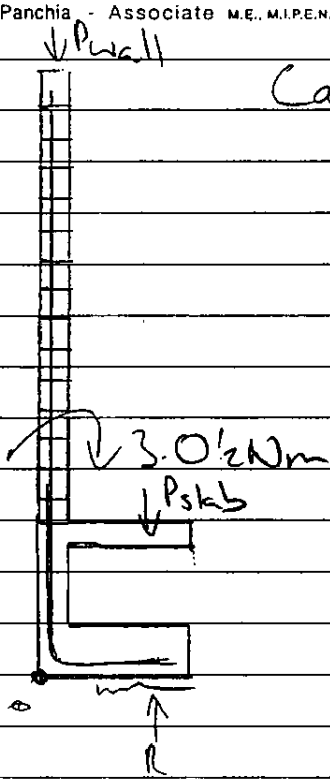

Case 1

$R = \Sigma P$ $P_{wall} = 2.45 \times 0.6 \times 3$
$= 4.41 kN$

$P_{slab} = 24 \times (2 \times 0.2)$
$= 9.6 kN/m$

$R = 14.0 kN$

$\Sigma M_o = 4.41 \times 0.19/2 + 9.6 \times 0.8^2/2 - 14x = 0$
$x = 0.25$

$M_R = 14 \times 0.25$
$= 3.5 kNm$

$3.5 kNm > 3.0 kNm$ OK for overturning.

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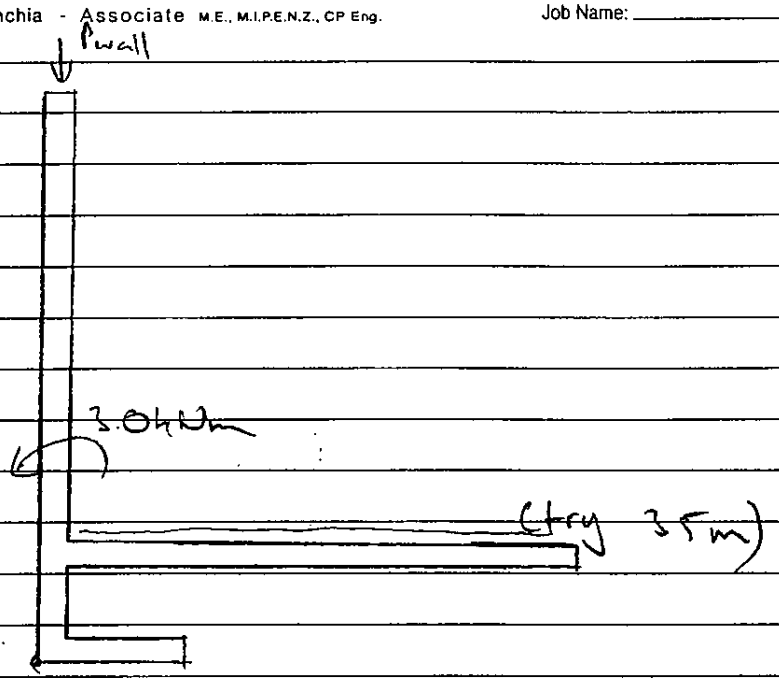
Ref: Sht No:

Sig. Date.

Job Name:



$W_{slab} = 24 \times 0.2 \times 1.0$
$= 4.8 kN/m$

$P_{wall} = 4.4 kN$ $\quad R = 4.8 \times 3.5 + 4.4 = 21.2 kN$

$\Sigma M_b = 4.4 \times 0.19/2 + 4.8 \times 3.5^2/2 - 21.2 \times x = 0$
$x = 1.41$

$M_R = 21.2 \times 1.41$
$= 29.9 kN > 3.0 kNm$ OK.

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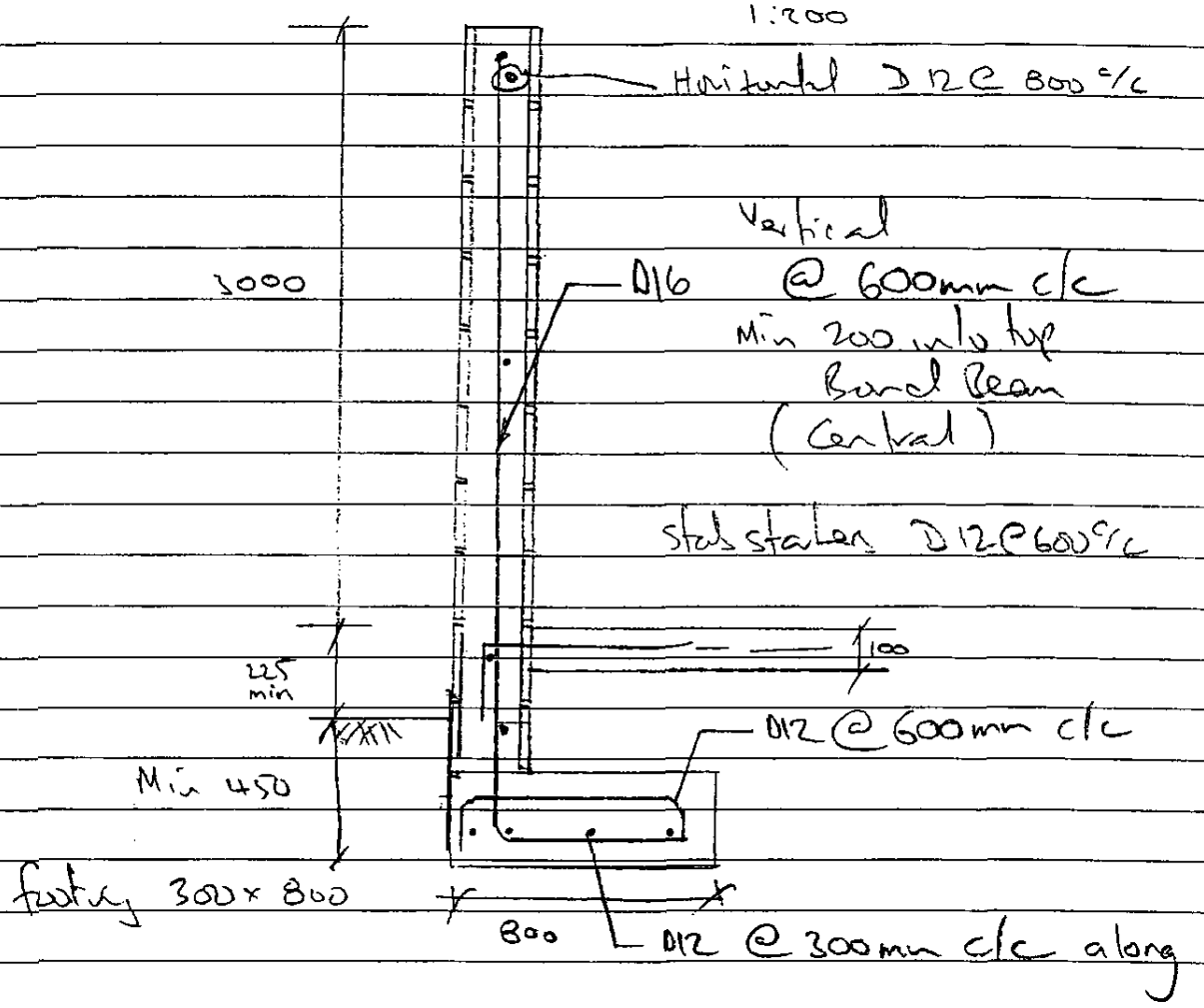
Sig. _____ Date. _____

Job Name: _____

Firewall Section



■ **GRAFTON:**
Ground Floor, 2 Kari Street, Auckland. PO Box 65-248, Mairangi Bay
Ph: 09-307 2141 Fax: 09-307 2143 email: grafton@mvengineers.com

■ **PAPAKURA:**
2nd Floor, 37 Elliott Street, PO Box 72-799, Papakura
Ph: 09-298 8800 Fax: 09-298 9920 email: papakura@mvengineers.com

Bracing Design

Storey.	lower of 2
Foundation Type	Slab
Wind Zone.	high
LOWER LEVEL	
Attic space	no
Earhquake Zone.	C

Job No: WEST COAST ROAD DEVELOPMENT

Address: TYPE 4A - WEST COAST ROAD

Location	From PIM
Region	
Terrain	
Exposure	
Topography	
TopoGraphic Zone	

FOR EARTHQUAKE:

Roof Weight.	light			
Roof Pitch.	26 - 45 deg			
Cladding	heavy	Walls	E= 6.9	BUs/m2

FOR WIND.

Building Height.	8 m	walls across	= 154	BUs/m2
Roof Height.	3 m	walls along	= 154	BUs/m2
Stud Height.	2.4 m			

ROOF or BUILDING LENGTH.	BL =	10.6 m
ROOF or BUILDING WIDTH.	BW =	12.33 m
GROSS ROOF or BUILDING PLAN AREA.	GPA =	93.5 m2

Earthquake Load: (Walls)	E x GPA =	6.9	x	93.5	=	**645** BUs
Wind - Across: Walls	W x BL =	154	x	10.6	=	**1632** BUs
Wind - Along: Walls	W x BW =	154	x	12.33	=	**1899** BUs

AMENDED PLAN

Bracing Design

ALONG - Walls Lower Storey

Label	Min. Bu's	No.	Brace Type	Height (m)	Length (m)	WIND Rating	WIND B.U.'s Achieved	E/QUAKE Rating	E/QUAKE B.U.'s Achieved
A			TYPE8	2.4	7.2	200	1440 *	200	1440 *
				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved									
B		1	BLP-0.6	2.4	0.6	145	87	135	81
				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved							87		81
C		2	GS2-2.4	2.4	3.5	90	315	80	280
		3	BLG-1.2	2.4	1.2	150	180	130	156
		4	BLP-0.9	2.4	1.6	145	232	145	232
				2.4					
				2.4					
				2.4					
Achieved							727		668
D		5	GS1a-1.8	2.4	1.8	65	117	55	99
		6	GS2-2.4	2.4	3	90	270	80	240
		7	GS1a-2.4	2.4	2.4	75	180	65	156
		8	GS2-2.4	2.4	2.4	90	216	80	192
				2.4					
				2.4					
Achieved							783		687
E		9	BL1-0.6	2.4	0.6	125	75	115	69
		10	BL1-0.6	2.4	0.6	125	75	115	69
		11	BL1-0.6	2.4	0.6	125	75	115	69
		12	BL1-0.6	2.4	0.8	125	100	115	92
				2.4					
				2.4					
Achieved							325		299
F				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved									
	Total Achieved.						1922		1735
	Total Required.						1899		645

* NOTE - THE MASONRY WALL FACTORS ARE NOT INCLUDED IN THE TOTALS TO AVOID DISTORTION OF OVERALL UNITS. (PLAN DOES AS EXTRA UNITS)

Bracing Design

ACROSS - Walls Lower Storey

Label	Min. Bu's	No.	Brace Type	Height Lm	Length Lm	WIND Rating	WIND B.U.'s Achieved	E/QUAKE Rating	E/QUAKE B.U.'s Achieved
L		13	BL1-0.6	2.4	0.6	125	75	115	69
		14	BLP-0.9	2.4	1.2	145	174	145	174
		15	BL1-0.4	2.4	0.4	120	48	115	46
				2.4					
				2.4					
				2.4					
Achieved							297		289
M		16	BL1-0.6	2.4	0.6	125	75	115	69
		17	BL1-0.6	2.4	0.6	125	75	115	69
		18	BLG-1.2	2.4	1.4	150	210	130	182
		19	BL1-0.4	2.4	0.4	120	48	115	46
				2.4					
				2.4					
Achieved							408		366
N		20	BLG-0.6	2.4	1	145	145	130	130
		21	BLG-1.2	2.4	1.4	150	210	130	182
		22	BLG-0.6	2.4	0.7	145	102	130	91
				2.4					
				2.4					
				2.4					
Achieved							457		403
O		23	BLP-0.9	2.4	2.3	145	334	145	334
				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved							334		334
P		24	BLP-0.9	2.4	1.2	145	174	145	174
		25	BLP-0.9	2.4	1.2	145	174	145	174
				2.4					
				2.4					
				2.4					
				2.4					
Achieved							348		348
Q				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved									
	Total Achieved.						1843		1740
	Total Required.						1632		645

Bracing Design

Storey.	upper of 2
Foundation Type	Slab
Wind Zone.	high
UPPER LEVEL	
Attic space	no
Earthquake Zone	C

Job No: WEST COAST ROAD DEVELOPMENT

Address: TYPE 4A - WEST COAST ROAD

Date: 12/09/2008

Location From PIM

Region	
Terrain	
Exposure	
Topography	
TopoGraphic Zone	

FOR EARTHQUAKE.

Roof Weight.	light			
Roof Pitch.	26 - 45 deg			
Cladding	light	Walls	E= 3.3	BUs/m2

FOR WIND.

Building Height.	8	m
Roof Height.	3	m
Stud Height.	2.4	m

walls across	=	78	BUs/m2
walls along	=	78	BUs/m2

ROOF or BUILDING LENGTH.	BL =	10.6 m
ROOF or BUILDING WIDTH	BW =	6.33 m
GROSS ROOF or BUILDING PLAN AREA.	GPA =	67 m2

Earthquake Load (Walls)		E x GPA =	3.3	x	67	=	**221** BUs
Wind - Across	Walls	W x BL =	78	x	10.6	=	**827** BUs
Wind - Along	Walls	W x BW =	78	x	6.33	=	**494** BUs

AMENDED PLAN

Bracing Design

ALONG - Walls Upper Storey

Label	Min. Bu's	No.	Brace Type	Height (m)	Length (m)	WIND Rating	WIND B.U.'s Achieved	E/QUAKE Rating	E/QUAKE B.U.'s Achieved
A		26	GS1a-2.4	2.4	2.4	75	180	65	156
				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved							180		156
B		27	GS2-2.4	2.4	2.4	90	216	80	192
				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved							216		192
C		28	GS1a-2.4	2.4	2.4	75	180	65	156
		29	BL1-0.6	2.4	1.2	125	150	115	138
				2.4					
				2.4					
				2.4					
				2.4					
Achieved							330		294
D				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved									
E				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved									
F				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved									
	Total Achieved.						726		642
	Total Required.						494		221

Bracing Design

ACROSS - Walls Upper Storey

Label	Min. Bu's	No.	Brace Type	Height Lm	Length Lm	WIND Rating	WIND B.U.'s Achieved	E/QUAKE Rating	E/QUAKE B.U.'s Achieved
L		30	BL1-0.6	2.4	0.6	125	75	115	69
		31	BL1-0.6	2.4	0.6	125	75	115	69
				2.4					
				2.4					
				2.4					
				2.4					
Achieved							150		138
M		32	GS1a-1.8	2.4	1.8	65	117	55	99
		33	GS2-1.8	2.4	1.8	80	144	70	126
				2.4					
				2.4					
				2.4					
				2.4					
Achieved							261		225
N		34	GS1a-1.8	2.4	1.8	65	117	55	99
		35	GS2-2.4	2.4	2.4	90	216	80	192
				2.4					
				2.4					
				2.4					
				2.4					
Achieved							333		291
O		36	BL1-0.6	2.4	1.2	125	150	115	138
				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved							150		138
P				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved									
Q				2.4					
				2.4					
				2.4					
				2.4					
				2.4					
Achieved									
	Total Achieved.						894		792
	Total Required.						827		221

THE NEW ZEALAND BUILDING CODE

The documents listed below identify requirements to ensure a building is safe, durable, healthy, accessible and energy efficient, and list the acceptable solutions.

No.	Title	
HB	New Zealand Building Code Handbook	
A1	Classified Uses	
A2	Interpretation	
B1	Structure	AS1
B2	Durability	AS1
C1	Outbreak of Fire	AS1
C2	Means of Escape	AS1
C3	Spread of Fire	AS1
C4	Structural Stability During Fire	AS1
D1	Access Routes	AS1
E1	Surface Water	AS1
E2	External Moisture	AS1
E3	Internal Moisture	AS1
F2	Hazardous Building Materials	AS1
F4	Safety From Falling	AS1
F5	Construction and Demolition Hazards	AS1
G1	Personal Hygiene	AS1
G2	Laundering	AS1
G3	Food Preparation and Prevention of Contamination	AS1
G4	Ventilation	AS1
G5	Interior Environment	AS1
G7	Natural Light	AS1
G8	Artificial Light	AS1
G9	Electricity	AS1
G10	Piped Services	AS1
G11	Gas as an Energy Source	AS1
G12	Water Supplies	AS1
G13	Foul Water	AS1, AS2
H1	Energy Efficiency	AS1

The relevant documents are to be utilised in association with the attached drawings and specification.

Design Steps 4 and 5 – Bracing Units Achieved (Wind and Earthquake)

MARCH 2006

TABLE 1: Bracing Unit Ratings for 10mm GIB® Standard Plasterboard and any other 10mm and 13mm GIB® plasterboard.

TYPE	LENGTH (m)	LINING REQUIREMENT	OTHER REQUIREMENTS	BU PER METRE	
	MINIMUM		DIAGONAL BRACE	WIND	EARTHQUAKE
GS1a	1.8	10mm GIB® Standard Plasterboard one face fixed horizontal or vertical	yes	65	55
	2.4			75	65
GS2	1.2	10mm GIB® Standard Plasterboard both sides fixed horizontal or vertical[1]	no	70	60
	1.8			80	70
	2.4			90	80

TABLE 2: Bracing Unit Ratings for 10mm GIB Braceline®, 10mm GIB Noiseline® and 10mm GIB Toughline® (fixed with GIB Braceline® screws or GIB Braceline® nails)

TYPE	LENGTH (m)	LINING REQUIREMENT	OTHER REQUIREMENTS		BU PER METRE	
	MINIMUM		DIAGONAL BRACE	HOLD-DOWNS	WIND	EARTHQUAKE
BL1	0.4	GIB Braceline® one face fixed horizontal or vertical[2]	no	yes	120	115
	0.6		no	yes	125	115
BL1a	1.8	GIB Braceline® one face fixed horizontal or vertical[2]	yes	yes	130	115
BLP	0.6	GIB Braceline® one face fixed horizontal or vertical, 7mm D-D plywood on the other[1,2]	no	yes	145	135
	0.9				145	145
BLG	0.6	GIB Braceline® one face, 10mm GIB® Standard on the other face, linings fixed horizontal or vertical[1,2]	no	yes	145	130
	1.2				150[3]	130

Notes:

1) Where linings are specified on both faces, each face must be fastened as a bracing element.
2) GIB Aqualine® can be used in place of GIB Braceline® in bracing elements 900mm or longer, provided the perimeter of the element is fixed with GIB Braceline® nails or screws spaced at 100mm centres generally, using the GIB Braceline® corner fixing pattern.
3) A maximum of 150 BU/m is recommended for any bracing system used with NZS 3604:1999 construction. Higher ratings generate loads beyond the capacity of NZS 3604:1999 timber foundation and slab details. If ratings exceed 150 BU/m, hold downs and foundations must be the subject of specific structural engineering design.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow system specifications.

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GIB® Bracing Systems, March 2006

Winstone Wallboards Ltd accepts no liability if GIB® Bracing Systems are not used in accordance with instructions contained in this publication.

Use Only the Current Specification

This publication may be superseded by a new publication Winstone Wallboards Ltd accepts no liability for reliance upon publications that have been superseded. Before using this publication check whether this is the current publication, simply call the GIB® Helpline on 0800 100 442 or visit www.gib.co.nz

Substitution

GIB® Bracing Systems are not generic. Where specified, GIB® branded components must be used when specifying and installing GIB® Bracing Systems. Substitution is not in accordance with the instructions contained in this publication.

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Acknowledgements

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Assistance was provided by BRANZ with the design of the procedure for determination of the WIND ZONE.

BRANZ APPRAISED
SPECIFY WITH CONFIDENCE

BRANZ Appraisal Certificate No. 294 (2006)
GIB® Bracing Systems, 2006

Table of Contents

MARCH 2006

Page

GIB® Bracing System Changes 3

Introduction 4
Scope of Use
Compliance with the New Zealand Building Code (NZBC)
Appraisal
Limitations
GIB® Bracing Systems in Water-Splash Areas
Renovation
How to use this Document

DESIGN

Design Step 1 – Wind 5-8
The Wind Zone
Wind Region
Terrain
Site Exposure
Topographic Classification
Working out the Bracing Units (BUs) Required for Wind

Design Step 2 – Earthquake 9
The Earthquake Zone
Working out the Bracing Units (BUs) Required for Earthquake
Roof Space Areas

Design Step 3 – Distribution of Wall Bracing Elements 10

Design Steps 4 and 5 – Bracing Units Achieved (Wind & Earthquake) 12-13
Wall Heights other than 2.4m
GIB® Bracing Systems - EzyBrace™ Specification Numbering System
Panel Hold-downs
Bracing Units (BUs) achieved - Wind and Earthquake

Wall Bracing Calculation Sheets 14-15

BRACING DEMAND TABLES – WIND 16
Tables W12, W15

BRACING DEMAND TABLES – EARTHQUAKE 17-22
Tables EQ1, EQ2, EQ3, EQ4, EQ5, EQ6

CEILING DIAPHRAGMS 24-25
Ceiling Diaphragms
Ceiling Diaphragms – Steel Battens

CONSTRUCTION DETAILS 26-28
GIB® Bracing System Changes
Framing
Fastening GIB® Plasterboard Linings
Plywood
Fire Resistance and Noise Ratings
Jointing and Stopping
Fastening the Bracing Element to Timber Floors
Fastening the Bracing Element to Concrete Slabs
Panel Hold-Down Details
Openings in Bracing Elements
GIB® Bracing Systems in Water-Splash Areas
Renovation
Angle Braces
Top Plate Connections
Guidelines for Intersecting Walls
Fixing the Perimeter of a Bracing Element
Fixing in the Field of the Bracing Element
Horizontal Fixing
GIB® Bracing Systems - EzyBrace™ Specification Numbering System

Panel Hold-Down Details (illustrations) 29

Fastener Layouts – GIB® Standard Bracing Elements (illustrations) 30

Fastener Layouts – GIB Braceline® Bracing Elements (illustrations) 31

GIB® Bracing Systems Installation Checklist 32

Introduction

Scope of Use

This document is a guide to wall bracing of buildings constructed in accordance with NZS 3604:1999, Standard for Timber Framed Buildings not requiring specific design.

It is for owners, architects, engineers, draftsmen and builders, and designed to help the user to determine a building's wall bracing needs. It explains how to use GIB® Bracing Systems to resist **wind** and **earthquake** forces.

The information contained in this document is believed to be correct and accurate. However, all due care should be exercised by those who use it. If necessary, appropriate advice should be sought. Winstone Wallboards Ltd accepts no liability if the system is not used in accordance with instructions contained in this literature.

Compliance with the New Zealand Building Code (NZBC)

GIB® Bracing Systems comply with the requirements of NZS 3604:1999, when designed and installed in accordance with this brochure. NZS 3604:1999 is an Acceptable Solution to NZBC Clause B1 Structure.

Under normal conditions of dry internal use GIB® Bracing Systems have a service life in excess of 50 years and satisfy the requirements of NZBC Clause B2 Durability.

Appraisal

The document entitled GIB® Bracing Systems has been appraised by BRANZ Ltd. BRANZ Appraisal Certificate No. 294 (2006).

Limitations

GIB® plasterboard must be stacked flat and protected from the weather.

GIB® plasterboard must be handled as a finishing material.

GIB® plasterboard in use must not be exposed to liquid water or be installed in situations where extended exposures to humidities above 90% RH can reasonably be expected.

GIB® Bracing Systems must not be used in showers or shower over bath situations.

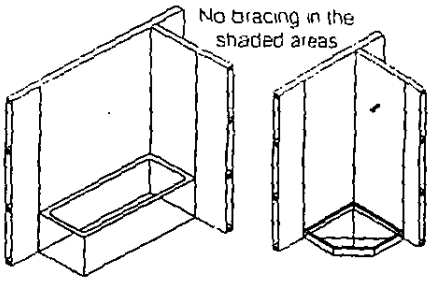
It is highly recommended not to install GIB® plasterboard in any situation where external claddings are not in place or the property is not adequately protected from the elements. If GIB® plasterboard is installed under these conditions, the risk of surface defects such as peaking or cracking is greatly increased.

GIB® Bracing Systems in Water-Splash Areas

When GIB® plasterboard is installed in locations likely to be frequently exposed to liquid water it must have an impervious finish. Examples are adhesive fixed acrylic shower linings over GIB Aqualine® with an approved waterproof membrane as a substrate for ceramic tiles.

The NZBC requires 15 years durability in these situations. Bracing elements are required to have a durability of 50 years. Winstone Wallboards recommends that bracing elements are not located in shower cubicles or behind baths because of durability requirements, the likelihood of renovation, and practical issues associated with fixing bracing elements to perimeter framing members.

Otherwise GIB® Bracing Systems can be used in water-splash areas as defined by NZBC Clause E3, provided these are maintained impervious for the life of the building.



Renovation

When relining walls during the process of renovation, ensure that bracing elements are reinstated (check the building plans).

How to use this Document

This document will guide you through the process of designing a bracing system and filling out a bracing schedule in accordance with NZS 3604:1999 step by step. Where reference is made to the GIB® Site Guide, use the latest version.

External forces (Bracing Units (BUs) required or demand)

Step 1: Work out the required number of **BUs** for **wind**

↓

Step 2: Work out the required number of **BUs** for **earthquake**

The structure's resistance (Bracing Units (BUs) achieved or capacity)

Step 3: Ensure adequate distribution of **wall bracing elements**

↓

Step 4: Work out the achieved number of **BUs** for **wind**

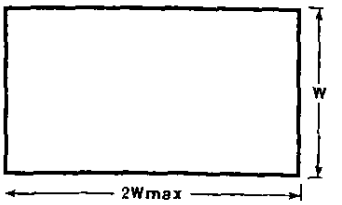
↓

Step 5: Work out the achieved number of **BUs** for **earthquake**

Ceiling Diaphragms

MARCH 2005

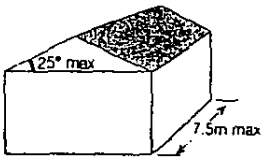
GIB® ceiling diaphragms are strong and stiff horizontal bracing elements which effectively transfer loads over large distances. They are used to space bracing lines further apart than 5 metres (single top plate), or 6 metres (double top plate).
A ceiling diaphragm shall be square or rectangular. Its length shall not exceed twice its width. The width being measured horizontally between supporting walls. Ceiling diaphragms under light and heavy roofs are required to comply with NZS3604:1999.



Limitations for 10mm or 13mm GIB® Standard Plasterboard Ceiling Diaphragms

- Diaphragms not steeper than 25 degrees to the horizontal shall not exceed 7.5 metres in length.
- 10mm or 13mm GIB® Standard Plasterboard is fastened at 150mm centres to the boundary members around the entire perimeter of the diaphragm.

  Fasteners – 32mm x 6g GIB® Grabber® Drywall Screws or 30mm x 2.8mm GIB® Nails.

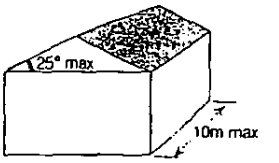


GIB® Standard Plasterboard Diaphragms

Limitations for GIB Ultraline® Ceiling Diaphragms

- Diaphragms not steeper than 25 degrees to the horizontal shall not exceed 10 metres in length.
- GIB Ultraline® is fastened at 150mm centres to the boundary members around the entire perimeter of the diaphragm

  Fasteners – 32mm x 6g GIB® Grabber® Drywall Screws or 30mm x 2.8mm GIB® Nails.

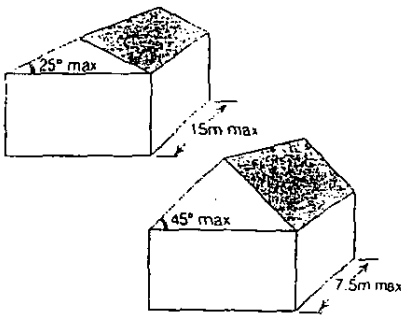


GIB Ultraline® Diaphragms

GIB Braceline® Ceiling Diaphragms

- Diaphragms not steeper than 25 degrees to the horizontal shall not exceed 15 metres in length.
- Diaphragms not steeper than 45 degrees to the horizontal shall not exceed 7.5 metres in length.
- GIB Braceline® is fastened at 150mm centres to the boundary members around the entire perimeter of the diaphragm.

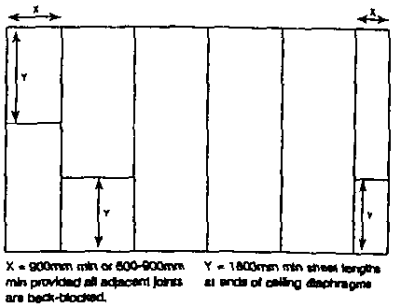
  Fasteners – 32mm x 7g GIB Braceline® Drywall Screws or 35mm GIB Braceline® Nails.



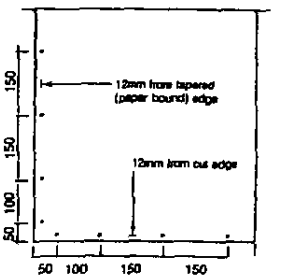
GIB Braceline® Ceiling Diaphragms

General Fixing Requirements for GIB® Ceiling Diaphragms

- Linings shall be installed over the entire area of the diaphragm.
- Fastening shall be no less than 12mm from sheet edges.
- Sheets shall be supported by framing members (e.g., ceiling battens) spaced at no more than 450mm centres for 10mm GIB® plasterboard and at no more than 600mm centres for 13mm GIB® plasterboard.
- Sheets within the diaphragm area may be fastened and finished conventionally in accordance with the publication entitled, "GIB® Site Guide". All joints shall be paper tape reinforced and stopped. It is recommended that sheet butt joints are formed off framing and back-blocked (see "GIB® Site Guide").
- Use full width sheets where possible. At least 900mm wide sheets with a length not less than 1800mm shall be used. Sheets less than 900mm wide but no less than 600mm may be used provided all joints with adjacent sheets are back-blocked (see "GIB® Site Guide").
- Openings are allowed within the middle third of the diaphragm's length and width. Fixing of sheet material to opening trimmers shall be at 150mm centres. Neither opening dimension shall exceed a third of the diaphragm width. Larger openings, or openings in other locations, require specific engineering design. Refer "Openings in Bracing Elements" page 27.
- Fasteners are placed at 150mm centres around the ceiling diaphragm starting at 50mm and 150mm from the sheet corners.



Sheet Widths and Lengths in Ceiling Diaphragms



Fastening pattern for ceiling diaphragms

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow system specifications.

Construction Details

MARCH 2006

GIB® Bracing Systems Changes

GIB® Bracing Systems have undergone a thorough review as part of Winstone Wallboards ongoing programme to make GIB® systems simpler, easier and faster for customers to use. Users of the previous systems will notice some significant changes. Please review this technical literature in detail to make yourself aware of these changes. The key differences are as follows:

- The new EzyBrace™ Specification Numbering System is designed to make specification, installation and identification of GIB® Bracing Systems easier.
- A rationalised number of bracing element types and a more consistent construction method.
- Fasteners must not be placed closer than 18mm to a sheet end or a cut edge or no closer than 12mm to the tapered (paper bound) machine edge of the GIB® plasterboard sheets.
- Some hold down details and corner fastening details have changed.
- A new 35mm GIB Braceline® Nail replaces the 32mm GIB Braceline® Nail in GIB Braceline® bracing elements.
- GIB® plasterboard sheets used in GIB® Bracing Systems March 2006 must have a manufacturing date after 16 January 2006
- No additional framing is required for narrow panels.
- Introduction of a shorter 0.4m bracing element.
- Ability to substitute GIB Aqualine® for GIB Braceline® with modified fastener patterns.

Note: The bracing systems in the GIB® Bracing Systems 1999-2003 technical literature will remain valid, however, transfer to the systems contained in this publication is recommended for new designs for the benefits these systems offer.

Framing

General framing requirements such as grade, spacings and installation shall comply with the provisions of NZS 3604:1999. Winstone Wallboards Ltd recommends the use of kiln-dried machine stress graded framing (KD MSG). To achieve the published bracing performance the minimum actual framing dimensions are 90 x 35mm for external walls and 70 x 35mm for internal walls

Wall bracing tests on GIB® Bracing Systems were undertaken without nogs. Nogs are not considered to add to the bracing performance of the wall

Fastening GIB® plasterboard Linings

GIB® Standard Plasterboard bracing systems must be fastened using minimum length 32mm x 6g GIB® Grabber® Drywall Screws or 30 x 2.8mm GIB® Nails. GIB Braceline® bracing systems must be fastened with 32mm x 7g GIB Braceline® screws, or 35mm GIB Braceline® nails.

GIB® plasterboard linings for designated bracing elements are fastened at 150mm centres around the perimeter of the bracing element. For GIB® Standard bracing elements fasteners are placed at 50 and 150mm from the sheet corner (see page 30). For GIB Braceline® bracing elements fasteners start at 50, 100 and 150mm from the sheet corner (see page 31). Fasteners must be placed 12mm from the tapered edge (paper bound) and 18mm from the cut edge.

Fastening in the field of the bracing element is conventional and the screw and glue method is recommended as outlined in the "GIB® Site Guide".

When fixing part sheets of GIB® plasterboard, a minimum width of 300mm applies for bracing elements.

Horizontal fixing is recommended. If fixing vertically, full height sheets shall be used where possible. Where sheet end butt joints are unavoidable they must be formed over nogs or over the studs and fastened at 200mm centres. Alternatively, the sheet end butt joints may be back-blocked.

Plywood

'Plywood' specified in BLP is grade D-D 7mm construction plywood manufactured to AS/NZS 2269:2004, fixed with 30 x 2.8mm flat head nails at 150mm centres around the perimeter of the bracing element and at 300mm centres to intermediate framing.

Fire Resistance and Noise Ratings

10mm GIB Braceline®, 10mm GIB Aqualine®, 10mm GIB Noiseline®, 10mm and 13mm GIB Ultraline® and 10mm GIB Toughline® may be substituted for 10mm GIB Fyreline® in fire rated constructions. 10mm GIB Braceline® and 10mm GIB Toughline® may be substituted for 10mm GIB Noiseline® in GIB® Noise Control Systems.The fastener length for the fire rated system applies. The field of the braced element must also be fastened in accordance with the fire rated specification (adhesive not permitted).

Jointing and Stopping

All sheet joints must be paper tape reinforced and stopped in accordance with the publication entitled "GIB® Site Guide".

Fastening the Bracing Element to Timber Floors

Fastening the bottom plate of a GIB® wall bracing element to a timber framed floor must be in accordance with NZS3604:1999 with pairs of 100 x 3.75mm hand driven nails or three 90 x 3.15mm power driven nails at 600mm centres. In addition panel hold-downs, as detailed on page 29, must be installed when specified for the particular bracing element type (BL1, BL1a, BLG and BLP).

Fastening the Bracing Element to Concrete Slabs

Fastening the bottom plate of an external wall for bracing element GS1a is in accordance with NZS 3604:1999. On internal bracing lines, the bottom plate of wall bracing elements GS1a and GS2 may be fixed using minimum 65mm x 3.8mm shot fired fasteners fitted with 16mm discs, spaced at 150mm and 300mm from the end studs and thereafter at 600mm centres. Wall bracing elements BL1, BL1a, BLG and BLP installed on both external and internal walls require a panel hold-down connection at each end of the bracing element (see page 29). Within the length of the bracing element bottom plates are fixed in accordance with NZS 3604:1999.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow system specifications.

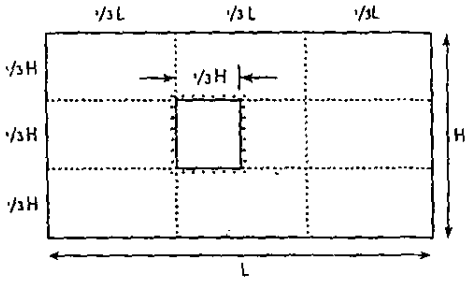
Construction Details

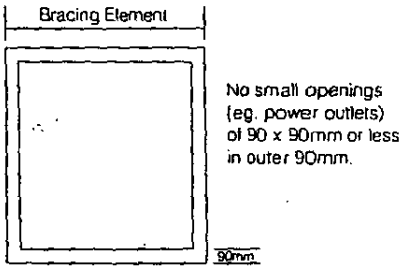
Panel Hold-Down Details

GIB® Standard Bracing Systems GS1a and GS2 do not require specific connections at the bracing element ends.
GIB Braceline® Bracing Systems BL1, BL1a, BLP and BLG all have panel hold-down connections at each end of the bracing element. Refer to page 29 for construction details.

Openings in Bracing Elements

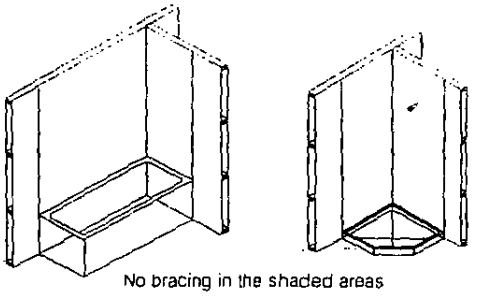
Openings are allowed within the middle third of a wall bracing element's length and height. Neither opening dimension shall be more than one third of the element height. Wall linings are fixed to opening trimmers at 150mm centres. Small openings (e.g. power outlets) of 90 x 90mm or less may be placed no closer than 90mm to the edge of the braced element.





GIB® Bracing in Water-Splash Areas

Bracing elements are required to have a durability of 50 years. Winstone Wallboards recommends that bracing elements are not located in shower cubicles or behind baths because of durability requirements, the likelihood of renovation, and practical issues associated with fixing bracing elements to perimeter framing members.
Otherwise GIB® Bracing Systems can be used in water-splash areas as defined by NZBC Clause E3, provided these are maintained impervious for the life of the building.
GIB Aqualine® can be used in place of GIB® Standard in bracing elements. GIB Aqualine® can be used in place of GIB Braceline® in bracing elements 900mm or longer, provided the perimeter of the element is fixed with GIB Braceline® nails or screws at 100mm centres generally, using the GIB Braceline® corner fixing pattern.



No bracing in the shaded areas

Renovation

When relining walls during the process of renovation, ensure that bracing elements are reinstated (check the building plans).

Angle Braces

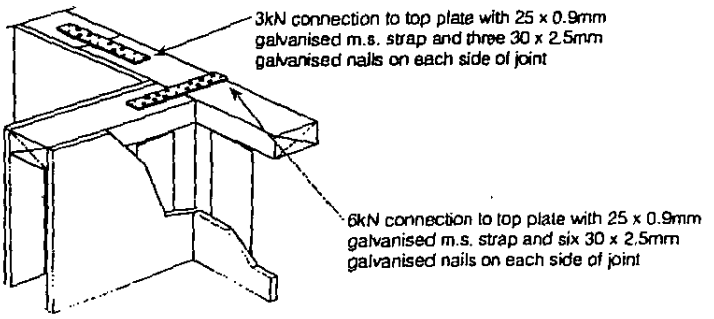
Angle braces serve to keep frames square during transport and construction. They also act as part of the temporary bracing of a building under construction.
Where specified, metal angle braces must be placed at an angle no steeper than 55 degrees, and within the designated length of the bracing element. For elements longer than 3.6 metres, pairs of angle braces (in opposite directions) are required. Fixing of angle braces is with three 30 x 2.8mm galvanised flat head nails to top and bottom plates, and two 30 x 2.8mm nails to intermediate framing.

Top Plate Connections

The top plate of a wall that contains one or more wall bracing elements shall be jointed according to the rating of the highest-rated individual wall bracing element as follows:

(a) Rating not exceeding 100 bracing units: A 3kN connection as shown or by an alternative fixing of 3kN capacity in tension or compression along the plate;

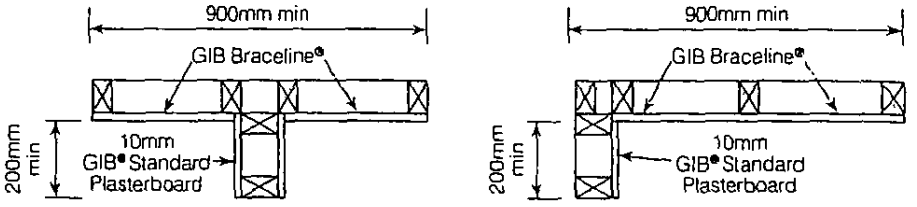
(b) Rating exceeding 100 bracing units: A 6kN connection as shown or by an alternative fixing of 6kN capacity tension or compression along the plate.



Construction Details

Guidelines for Intersecting Walls

GIB® Bracing Elements may have intersecting walls with a minimum length of 200mm. Bracing element sheets shall be fixed and jointed as given on pages 30 and 31. Fasteners are required around the perimeter of the bracing element. Vertical joints at T-junctions (illustrated below) shall be fixed and jointed as specified for intermediate sheet joints. **The bracing element length must be no less than 900mm.**



Where a Wall Bracing Element is interrupted by a T or L junction the element is deemed to be continuous for the whole length (900mm in the example illustrated above).

Fixing the Perimeter of a Bracing Element

A bracing element can consist of a part sheet (such as in a 600 mm long BL1 element), or multiple sheets (such as in a 2.4 metre or longer GS1a element). The critical fasteners are located around the perimeter of a bracing element as outlined on the fastener layout pages. The perimeter of a bracing element must be connected to a continuous member such as studs or plates. Connection to a row of nogs is not acceptable.

Fixing in the Field of the Bracing Element

Fixing in the field of a bracing element is conventional and for GIB® wall bracing elements this means that adhesive fixing is recommended, eliminating the need for mechanical fasteners in the body of the sheets.

For GIB® ceiling diaphragms the screw and glue method is recommended resulting in a minimum number of mechanical fasteners along the centre line in the body of the sheets.

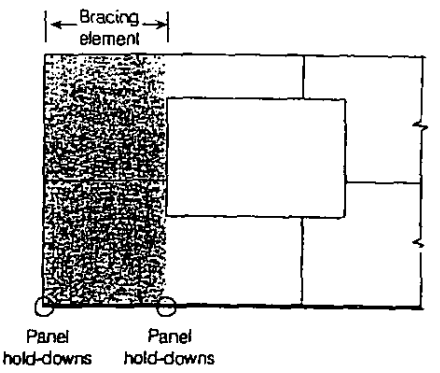
When applied correctly, paper-tape and stopped joints within the bracing element are strong enough to transfer loads within the element and conventional fixing of intermediate sheet joints to framing is sufficient.

Any sheet end butt joints within the field of the bracing element must be back-blocked in accordance with the "GIB® Site Guide".

Consult the "GIB® Site Guide" for further details on recommended fixing details.

Horizontal Fixing

GIB Braceline® linings may be fixed horizontally when linings extend under/over door or window openings. GIB Braceline® fasteners are provided around the perimeter of the bracing element.



GIB® Bracing Systems – EzyBrace™ Specification Numbering System

The EzyBrace™ Specification Numbering System is designed to make specification of GIB® Bracing Systems by designers and identification on site by builders and building officials more transparent. Note: the EzyBrace™ Specification Numbering System (and sub-components thereof) are protected by copyright.

GS = GIB® Standard Plasterboard
BL = GIB Braceline®
BLP = GIB Braceline® / Plywood
BLG = GIB Braceline® / GIB® Standard Plasterboard

1 = lined one side
2 = lined both sides
a = angle brace

Therefore,
GS1a = GIB® Standard Plasterboard one side with an angle brace
GS2 = GIB® Standard Plasterboard both sides
BL1 = GIB Braceline® one side
BL1a = GIB Braceline® one side with an angle brace
BLP = GIB Braceline® one side, Plywood on the other
BLG = GIB Braceline® one side, GIB® Standard Plasterboard on the other

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow system specifications.

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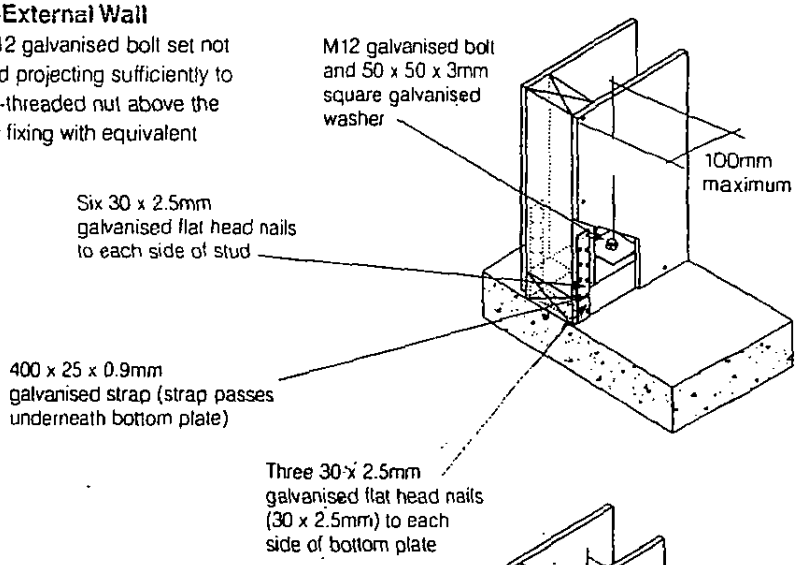
Panel Hold-down Details

MARCH 2006

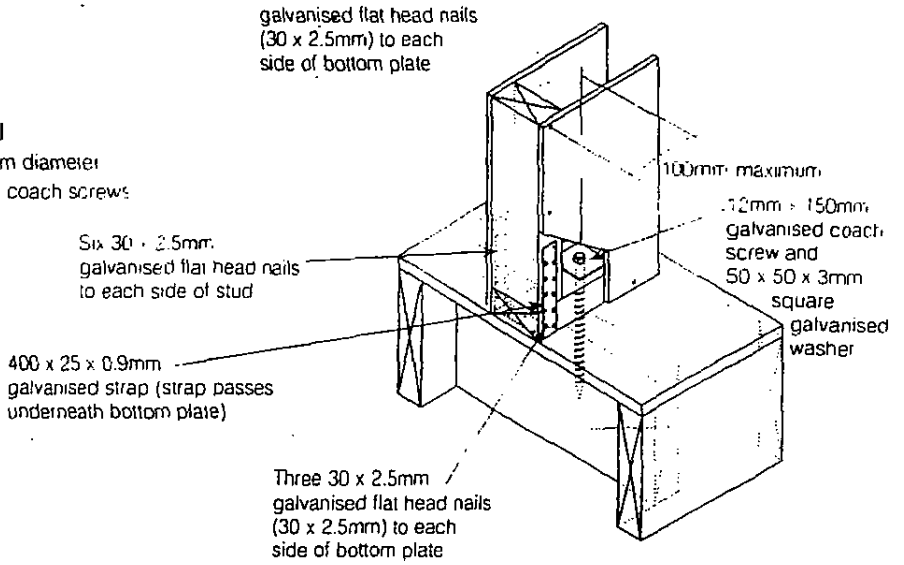
Concrete Floor – Internal / External Wall

Bottom plate is fixed using an M12 galvanised bolt set not less than 75mm into concrete and projecting sufficiently to allow for a 3mm washer and fully-threaded nut above the timber. Alternatively a proprietary fixing with equivalent capacity may be used.



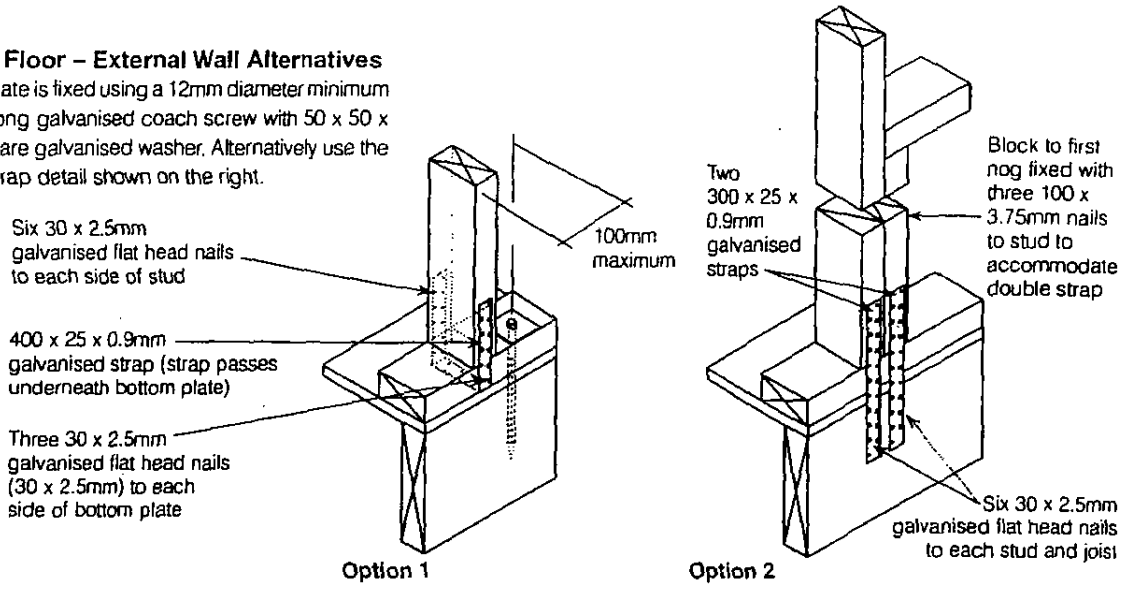
Timber Floor – Internal Wall

Bottom plate is fixed using a 12mm diameter minimum 150mm long galvanised coach screws



Timber Floor – External Wall Alternatives

Bottom plate is fixed using a 12mm diameter minimum 150mm long galvanised coach screw with 50 x 50 x 3mm square galvanised washer. Alternatively use the double strap detail shown on the right.



Notes:

Additional thickness and/or corrosion protection is required in exposed and sheltered applications. (Consult NZS 3604:1999).
To maintain a flush surface for the wall linings, it is recommended that hold down straps are checked into the framing.

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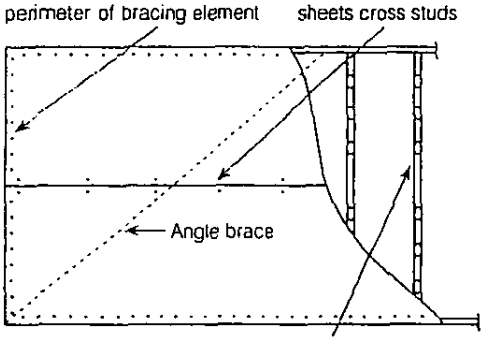
Fastener Layouts – GIB® Standard Bracing Elements

MARCH 2006

For 10mm GIB® Standard Plasterboard and any other 10mm and 13mm GIB® plasterboard

32mm x 6g GIB® Grabber® Drywall Screws or 30mm GIB® Nails at 150mm centres to perimeter of bracing element

Single 32mm x 6g GIB® Grabber® Drywall Screws or 30mm GIB® Nails where sheets cross studs

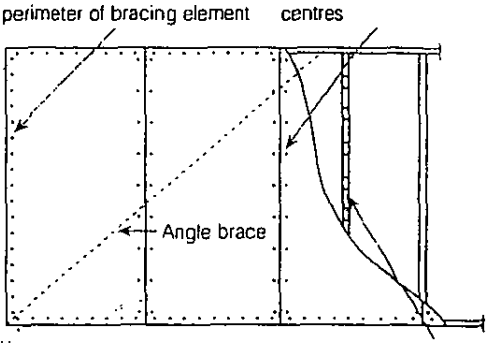


GS1a (lined one side) (Horizontal Fixing)

Daub of GIBFix® adhesive at 300mm centres to intermediate studs

32mm x 6g GIB® Grabber® Drywall Screws or 30mm GIB® Nails at 150mm centres to perimeter of bracing element

Single 32mm x 6g GIB® Grabber® Drywall Screws or 30mm GIB® Nails at 300mm centres

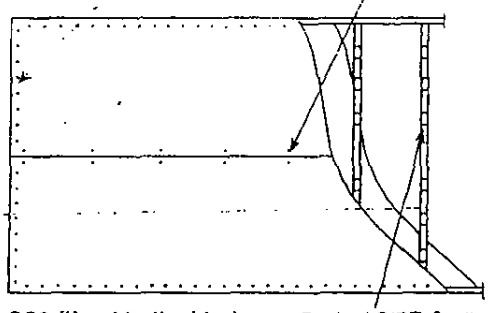


GS1a (lined one side) (Vertical Fixing)

Daub of GIBFix® adhesive at 300mm centres to intermediate studs and nogs

32mm x 6g GIB® Grabber® Drywall Screws or 30mm GIB® Nails at 150mm centres to perimeter of bracing element

Single 32mm x 6g GIB® Grabber® Drywall Screws or 30mm GIB® Nails where sheets cross studs

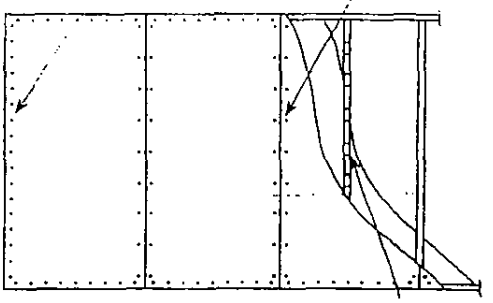


GS2 (lined both sides) (Horizontal Fixing)

Daub of GIBFix® adhesive at 300mm centres to intermediate studs

32mm x 6g GIB® Grabber® Drywall Screws or 30mm GIB® Nails at 150mm centres to perimeter of bracing element

Single 32mm x 6g GIB® Grabber® Drywall Screws or 30mm GIB® Nails at 300mm centres



GS2 (lined both sides) (Vertical Fixing)

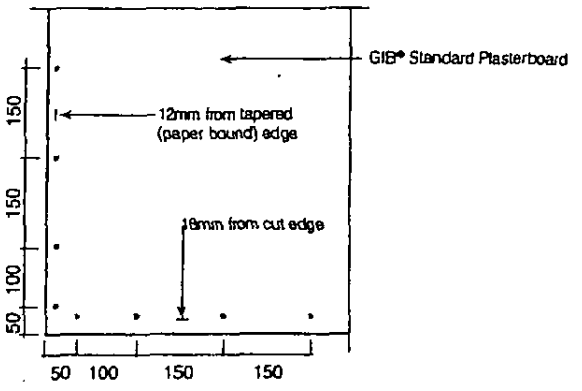
Daub of GIBFix® adhesive at 300mm centres to intermediate studs and nogs

Fixing the perimeter of a GIB® Standard Plasterboard bracing element

Fasteners are placed no closer than 12mm to the tapered (paper bound) machine edge of the GIB® plasterboard sheets. Fasteners are placed no closer than 18mm to a sheet end or a cut sheet edge.

For GIB® Standard bracing elements fasteners are placed at 150mm centres around the bracing element perimeter, starting at 50 and 150mm from the sheet corners.

Fastening pattern for GIB® Standard bracing elements



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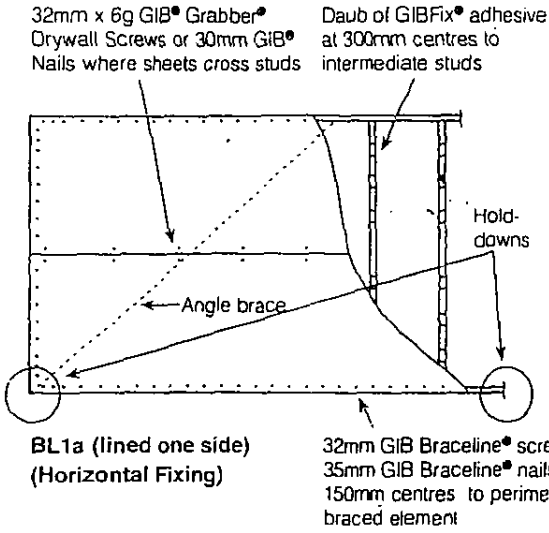
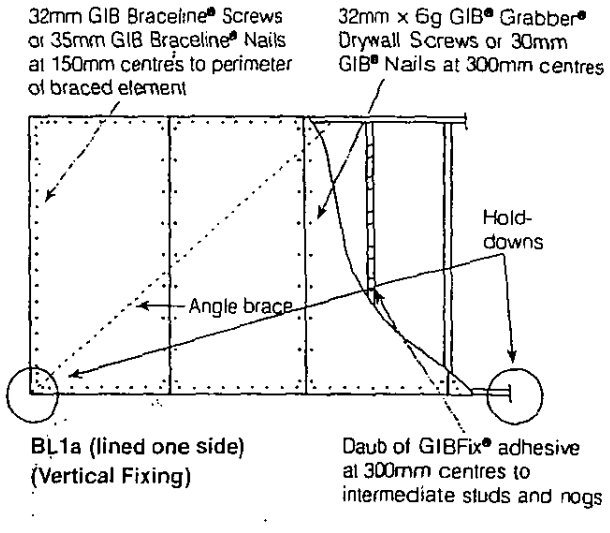
Fastener Layouts – GIB Braceline® Bracing Elements

MARCH 2006

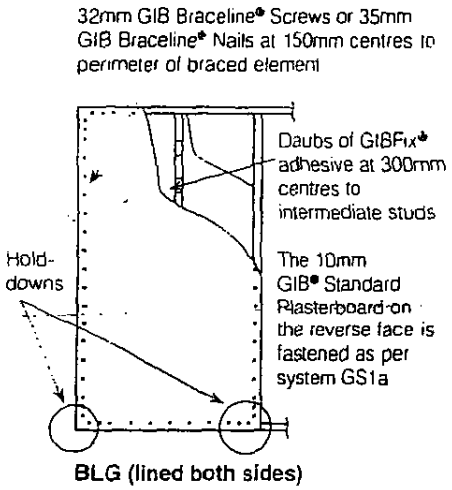
For 10mm GIB Braceline®, 10mm GIB Noiseline® and 10mm GIB Toughline®



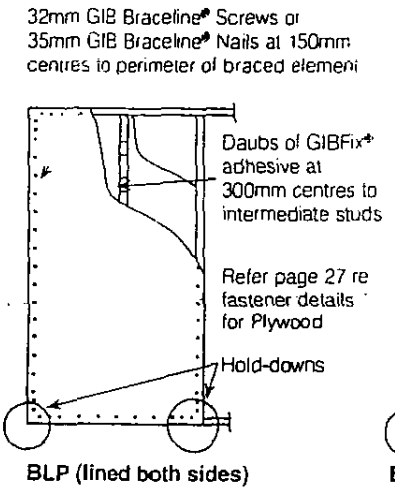
BL1a (lined one side) (Horizontal Fixing)



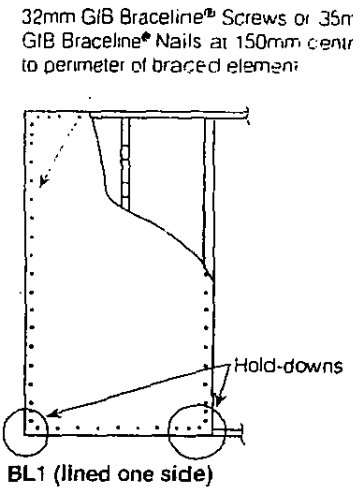
BL1a (lined one side) (Vertical Fixing)



BLG (lined both sides)



BLP (lined both sides)



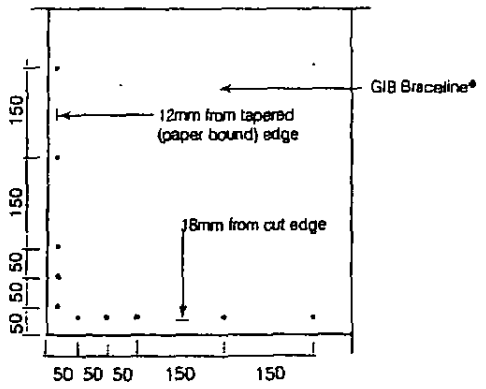
BL1 (lined one side)

Fixing the perimeter of a GIB Braceline® bracing element

Fasteners are placed no closer than 12mm to the tapered (paper bound) machine edge of the GIB® plasterboard sheets. Fasteners are placed no closer than 18mm to a sheet end or a cut sheet edge.

For GIB Braceline® systems, fasteners are placed at 150mm centres around the bracing element perimeter, starting at 50, 100 and 150mm from the sheet corners.

Fastening pattern for GIB Braceline® bracing elements



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GIB® Bracing System Installation Checklist

MARCH 2006

Contract ID	
Site Address	
Specifier	
Building Contractor	
Plasterboard Installer	
Check carried out by	
Date	

Reference Material: GIB® Bracing Systems, GIB® Site Guide (Edition current at time of installation).

PRE LINING	Y	N	CHECKED BY	DATE
Bracing element position corresponds with the bracing plan				
Hold-down straps correctly positioned and installed *(systems incorporating "BL")*				
Hold-down straps checked in flush with framing				
Hold-down bolts correctly positioned and installed				
No power points or light switch outlets situated within 90mm of the edge of the element. *Easier to move now than later.*				
Any opening larger than 90 x 90mm is positioned in the middle third of the element both vertically and horizontally				
Braces extend from top to bottom plates. Angle braces installed correctly				
No bracing elements situated within a shower cubicle or above a bath				
POST LINING	**Y**	**N**	**CHECKED BY**	**DATE**
Correct corner fastening pattern has been used for the specified system				
Perimeter fastenings are correctly spaced for the system being used				
Correct fasteners have been used. *32mm GIB® Grabber® or GIB® Nails for all GS systems and 32mm GIB Braceline® screws or 35mm GIB Braceline® nails for BL systems.*				
Sheet end butt joints within the bracing element are back-blocked				
CEILING DIAPHRAGMS	**Y**	**N**	**CHECKED BY**	**DATE**
Steel battens are directly fixed to framing. *Clip system cannot be used in ceiling diaphragm applications.*				
Perimeter of the diaphragm is fixed to a single continuous member along each edge				
No sheets shorter than 1800mm used in diaphragm				
End sheets are a minimum of 600mm wide x 1800mm long				
Longitudinal joint adjacent to end sheet is back-blocked if end sheet is between 600mm and 900mm wide				
Corner fastenings correct				
Sheet end butt joints back-blocked				

able 2. Ratings for 2.4m high Panelbrace wall bracing elements

hese ratings apply to walls detailed in accordance with NZS 3604 and this leaflet. The hold-down value determines which details should e used.

he 6kN hold-down is a dropped panel detail with no steel straps or a single strap at each end of the wall.

he 12kN hold-down (Type D) is two straps at each end of the wall.

Wall Type	Minimum wall length (m)	Minimum Plywood thickness(mm)	Nail* Spacing (mm)	Hold down (kN)	Stud spacing (mm)	Bracing units/m (20 bracing units = 1kN) Wind	Earthquake	
Ratings for plywood component only								
SP4	0.45	7	75	6	450	70	85	
2	0.6	7	150	6	600	85	85	
SP1	0.9	7	150	6	450 or 600	100	100	
SPST1	1.2	7	150	-	600	90	80	
SP6	0.9	12	150	6	450 or 600	115	110	
SP8D	0.9	7	150	12	450	125	135	
SP5D	1.2	7	75	12	600	130	135	
SP10	1.8	7	75	6	450	135	135	
Ratings for plywood one side and additional sheathing on the other								
								additional sheathing
SP2G	0.6	7	150	6	600	95	95	Gib Board®
SP1G	0.9	7	150	6	450 or 600	100	100	Gib Board®
SP11G	1.8	7	150	6	450 or 600	140	120	Gib Board®
	0.9	7	150	6	450 or 600	145	145	Braceline®
3	0.9	12	150	6	450 or 600	120	110	Gib Board®
SP6GD	0.9	12	150	12	450 or 600	145	135	Gib Board®

e these spacings at all edges and ends of sheets. Within the sheet, spacings may be double that specified.

mm plywood use 30 x 2.5mm galvanised flathead nails.

m Plywood use 50mm x 2.8mm or larger galvanised flathead nails.

Steel Framing

Use SPST1 for plywood on light steel frames. Use button head self drilling, self tapping screws for Panelbrace and standard plywood and counter sunk stainless steel self drilling, self tapping screws for cladding applications. Refer Carter Holt Harvey Plywood Technical Note "Plywood on steel frame" for more detail.

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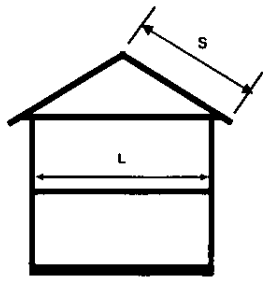
CONQRA RAFT FLOOR SYSTEM

RAFTFLOOR DESIGN - EDGE BEAM

<Job No.>:	15193	Date:	19/09/2008
<Job Title>:	Lot 32,19 Titch Place	Designer:	BR
<Description>:	Edge beam	Checker:	DBL

Loadings

Upper Wall must be Timber



Tributary Roof and Floor Lengths

WALLS

Lower: Timber

(North/South Taupo)

	=	38	kg/m²
	=	0.37	kPa
Height	=	2.50	m
Load/m	=	0.93	kN/m

Upper: Timber

(North/South Taupo)

	=	38	kg/m²
	=	0.37	kPa
Height	=	2.50	m
Load/m	=	0.93	kN/m

Other (Specify Wall Weight)

Weight	=	150	kg/m²
	=	1.47	kPa
Height	=	2.50	m
Load	=	4	kN/m

SUSPENDED MID-FLOOR

Tributary Length L/2

Unit/Floor	=	Timber	
Topping	=	N/A	
	=	0.38	kPa
Live Loading	=	1.50	kPa
Super Imposed Dead	=		kPa
Tributary Span	=	2.50	m
Dead Load/m	=	0.95	kN/m
Live Load/m	=	3.75	kN/m

ROOF

Tributary Length = S

Light	=	0.46	kPa
Live Loading		0.25	kPa
Tributary Span	=	4.20	m
Dead Load/m	=	1.93	kN/m
Live Load/m	=		kN/m

Loadings Summary

Walls	5.54	kN/m	Dead
Mid Floors	0.95	kN/m	Dead
	3.75	kN/m	Live
Slab*	2.31	kN/m	Dead+SDL
	1.35	kN/m	Live
Roof	1.93	kN/m	Dead
		kN/m	Live^
Extra Dead		kN/m	Dead
Extra Live		kN/m	Live

* Includes Edge Beam Weight, SDL = 0.5 kPa LL = 1.5 kPa

^ Roof LL not added if midfloor exists else LL = 0.25 kPa

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CONQRA RAFT FLOOR SYSTEM

Job Details: Lot 32 19 Titch Place *15193* *19/9/08*

Working Loads	Dead		10.73	kN/m
	Live		5.10	kN/m
Ultimate Loads (1.2G + 1.5Q)	Dead		12.88	kN/m
	Live		7.65	kN/m
Total Ultimate Load on Edge		w =	20.53	kN/m

Wall Construction Type — Standard Block min beam width 300mm

Edge Beam Details

Beam Width =	300	mm
Pod Depth =	200	mm
Top slab Depth =	100	mm
Self Weight =	2.16	kN/m
Construction Type =	Standard Raft	

Standard Raft Construction

Dependable Bearing Capacity: 100 kPa

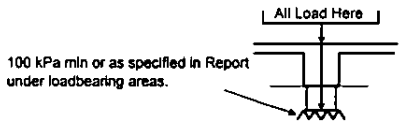
Bearing Check = OK!
Working Pressure = 43 kPa

Steel Requirements - As Per CONQRA Std Drg's

Top Steel: 1HD12
Btm Steel: 2HD12

Continuous Piers

(N.B. All Edge Beam Load in to 'strip' footing)
Assume 100 kPa Bearing Under Edge Beam,
unless a Soil Report Indicates otherwise.



Bearing Capacity under Piers: 100 kPa

Bearing Check =
Pressure = kPa

Steel Requirements - As Per CONQRA Std Drg's

Top Steel:
Btm Steel:

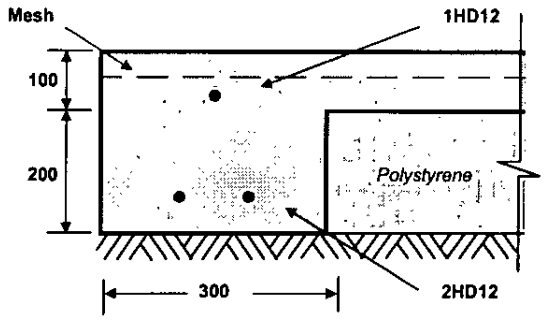
The prescribed Edge Beam design is:

Location (ie: which wall):

All external footings

Standard Raft Contruction

300 mm wide edge beam with
1HD12 in top & 2HD12 in bottom



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CONQRA RAFT FLOOR SYSTEM

RAFTFLOOR DESIGN - INTERNAL LOADBEARING RIB

<Job No.>:	15193	Date:	19/09/2008
<Job Title>:	Lot 32 19 Titch Place	Designer:	BR
<Description>:	Internal thickening	Checker:	DBL

Loadings

WALLS

Lower: HOTBloc | Solid

Light (North/South Taupo)

=	400	kg/m²
=	3.92	kPa
Height =		m
Load/m =		kN/m

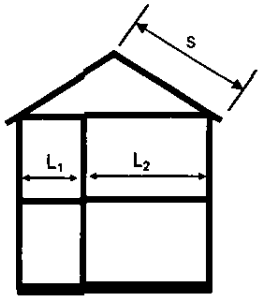
Upper: HOTBloc | Solid

Light (North/South Taupo)

=	400	kg/m²
=	3.92	kPa
Height =		m
Load/m =		kN/m

Other (Specify Wall Weight)

Weight =	30	kg/m²
=	0.29	kPa
Height =	2.50	m
Load =	1	kN/m



Tributary Roof and Floor Lengths

SUSPENDED MID-FLOOR

Tributary Length = $(L_1+L_2)/2$

Unit/Floor =	Timber	
Topping =	N/A	
=	0.38	kPa
Live Loading =	1.50	kPa
Super Imposed Dead =		kPa
Tributary Span =	3.20	m
Dead Load/m =	1.22	kN/m
Live Load/m =	4.80	kN/m

ROOF

Tributary Length = S (Check if Rafter or Truss)

Heavy =	0.84	kPa
Live Loading	0.25	kPa
Tributary Span =		m
Dead Load/m =		kN/m
Live Load/m =		kN/m

Loadings Summary

Walls	0.74	kN/m	Dead
Mid Floors	1.22	kN/m	Dead
	4.80	kN/m	Live
Slab*	4.47	kN/m	Dead+SDL
	2.70	kN/m	Live
Roof		kN/m	Dead
		kN/m	Live^
Extra Dead		kN/m	Dead
Extra Live		kN/m	Live

* Includes Internal Rib Weight, SDL = 0.5 kPa LL = 1.5 kPa

^ Roof LL not added if midfloor exists else LL = 0.25 kPa

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CONQRA RAFT FLOOR SYSTEM

Job Details: Lot 32 19 Titch Place Job Number: 15193 19/9/08

Working Loads	Dead	6.42	kN/m
	Live	7.50	kN/m
Ultimate Loads (1.2G + 1.5Q)	Dead	7.71	kN/m
	Live	11.25	kN/m
Total Ultimate Load on Internal	w =	18.96	kN/m

Internal Rib Details

Rib Width =	300	mm
Pod Depth =	200	mm
Top slab Depth =	100	mm
Self Weight =	1.44	kN/m
Construction Type	Standard Raft	

Standard Raft Construction

Dependable Bearing Capacity: 100 kPa

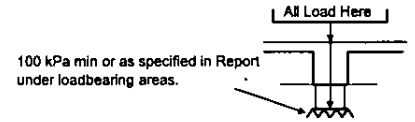
Bearing Check = OK!
Working Pressure = 31 kPa

Steel Requirements - As Per CONQRA Std Drg's

Btm Steel: 2HD12

Continuous Piers

(N.B. All Interal Load in to 'strip' footing)
Assume 100 kPa Bearing Under Loadbearing Rib,
unless a Soil Report indicates otherwise.



Bearing Capacity: 100 kPa

Bearing Check =
Pressure = kPa

Steel Requirements - As Per CONQRA Std Drg's

Btm Steel:

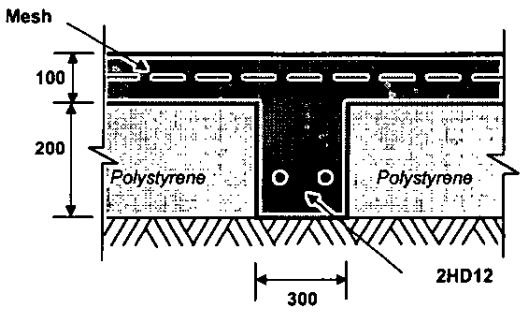
The prescribed internal rib design is:

Location (ie: which wall):

Internal thickening

Standard Raft Contruction,

300 wide Rib required with 2HD12 in bottom



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CONQRA RAFT FLOOR SYSTEM

RAFTFLOOR DESIGN - INTERNAL LOADBEARING RIB

<Job No.>:	15193	Date:	19/09/2008
<Job Title>:	Lot 32 19 Titch Place	Designer:	BR
<Description>:	Standard Rib	Checker:	DBL

Loadings

WALLS

Lower: HOTBloc | Solid | Light | (North/South Taupo)

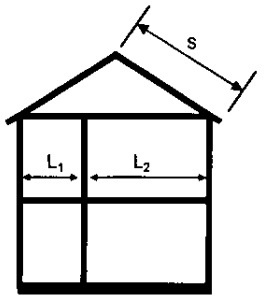
= 400 kg/m²
= 3.92 kPa
Height = m
Load/m = kN/m

Upper: HOTBloc | Solid | Light | (North/South Taupo)

= 400 kg/m²
= 3.92 kPa
Height = m
Load/m = kN/m

Other (Specify Wall Weight)

Weight = 30 kg/m²
= 0.29 kPa
Height = 2.50 m
Load = 1 kN/m



Tributary Roof and Floor Lengths

STANDARD RIB

SUSPENDED MID-FLOOR

Tributary Length = $(L_1+L_2)/2$

Unit/Floor = Timber
Topping = N/A
= 0.38 kPa
Live Loading = 1.50 kPa
Super Imposed Dead = kPa

Tributary Span = m
Dead Load/m = kN/m
Live Load/m = kN/m

ROOF

Tributary Length = S (Check if Rafter or Truss)

Heavy = 0.84 kPa
Live Loading 0.25 kPa

Tributary Span = m
Dead Load/m = kN/m
Live Load/m = kN/m

Loadings Summary

Walls	0.74	kN/m	Dead
Mid Floors		kN/m	Dead
		kN/m	Live
Slab*	4.40	kN/m	Dead+SDL
	2.70	kN/m	Live
Roof		kN/m	Dead
		kN/m	Live^
Extra Dead		kN/m	Dead
Extra Live		kN/m	Live

* Includes Internal Rib Weight, SDL = 0.5 kPa LL = 1.5 kPa
^ Roof LL not added if midfloor exists else LL = 0.25 kPa