TRAFFIC MANAGEMENT PLAN

ON

PROPOSED SUBDIVISION

PART LOT 112 DP 1073791

LYONS ROAD, SAWTELL

Geoff Slattery and Partners Pty Ltd
192 Pacific Highway
COFFS HARBOUR NSW 2450

MAY 2013

TRAFFIC MANAGMENT

1. INTRODUCTION

This traffic impact assessment is prepared for use in a Part 3A Project Application to NSW Department of Planning and Infrastructure for a residential subdivision at part Lot 112 DP 1073791 Lyons Road, Sawtell.

The development is covered by planning documents of Coffs Harbour City Council for residential development and use.

2. PROJECT DETAILS

The site is described as part Lot 112 DP 1073791, Lyons Road, Sawtell.

A collector road access (Bambara Drive) from Lyons Road has been constructed by Coffs Harbour City Council as part of intersection works on Lyons Road. This collector road is proposed to be extended to form the main collector road in the development.

Residential development on the site is proposed as:

165 Torrens title allotments

Refer to layout on drawings in Appendix A.

The development is included in Council's Development Control Plan "North Bonville".

3. EXISTING TRAFFIC CONDITIONS

Refer to layout plan in Appendix A for location details.

3.1 Trunk Road

Lyons Road is the regional trunk road connecting the Sawtell Village with the Pacific Highway. Lyons Road is classified as a Main Road under the RTA and designated as Main Road 540

Lyons Road provides commuter connection to other city roads:

- Pacific Highway
- Toormina Road / Hogbin Drive
- Sawtell CBD

3.2 Collector Road

Bambara Drive has been constructed by Council as a Collector Road, and an intersection with Lyons Road to cater for the anticipated traffic.

Councilôs constructed intersection of Lyons Road and Bambara Drive is generally in accordance with the layout requirements of a Type B intersection. Refer to Appendix B for design details of the as constructed intersection.

Extension of Bambara Dive is the basis of the project collector road.

3.3 Local Roads

There are existing local road connections to Bambara Drive as part of the residential area:

- Rutland Street,
- Mimiwali Close.

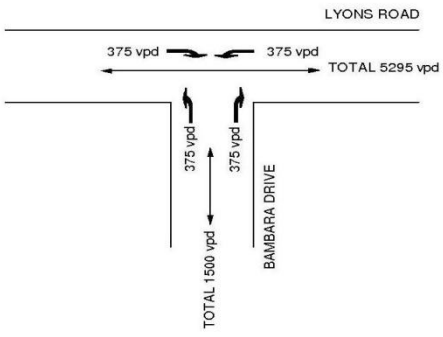
3.4 Existing Traffic Volumes

Coffs Harbour City Council has available traffic counts for Lyons Road in the vicinity of Bambara Drive:

- Actual count in 2008 — 4,705 vehicles per day
- Annual increase applied by Council — 3%
- Estimated count in 2012 — 5295 vehicles per day

Existing traffic use on the Bambara Drive includes existing constructed land and existing approved development waiting construction. There are currently 150 existing allotments able to exit via the intersection. Based on RTA guide to traffic generating developments this would equate to 1500 vpd.

Turning movements are assessed to be equally split between west turning (Pacific Highway to Coffs City CDB) and east turning (Lyons Road to Sawtell CBD, Toormina Shopping Centre, and Coffs City CBD).



EXISTING TRAFFIC

3.5 Traffic Speeds

Lyons Road has sign posted speed of 60 km/hr and Bambara Drive is residential speed of 50 km/hr.

It should be noted that the current intersection was designed and constructed for a sign posted speed of 80km/hr, which has subsequently been reduced to 60km/hr.

4. TRAFFIC GENERATION

4.1 References

The RTA Guide to Traffic Generating Developments sets traffic generation rates for residential allotments at:

Daily vehicle trips	9.0 per dwelling.
Weekday peak hour vehicle trips	0.85 per dwelling.

The Australian Model Code for Residential Developments sets traffic generation rates at:

Daily vehicle trips	10 per dwelling.
Weekday peak hour vehicle trips	10% of daily.

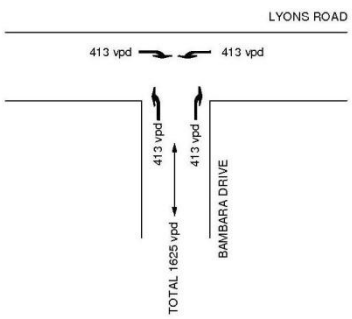
For the purposes of this report the traffic assessment has been assumed at:

Daily vehicle trips	10 per dwelling
Weekday peak hour vehicle trips	1 per dwelling
Lyons Road peak hour	10% of estimated daily traffic

4.2 Traffic Generation

Based on the assumptions in 4.1 above generated traffic is calculated as follows:
Standard residential allotments

165 lots @ 10 vpd	1650 vpd

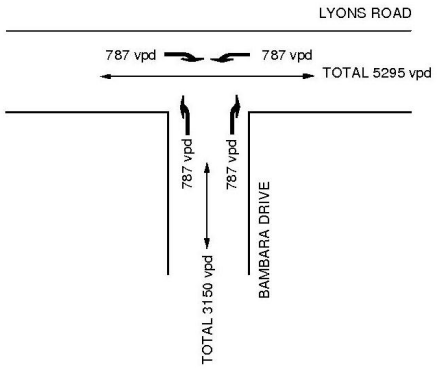


GENERATED TRAFFIC THIS DEVELOPMENT

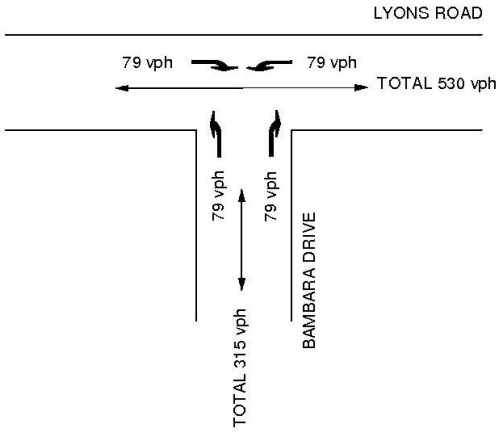
4.3 Total Traffic Generated

As indicated in 4.2 the development is anticipated to generate a total of 1650 new vehicle movements per day.

This will give the intersection a total of 3150 vpd of entering/exiting vehicles.



TOTAL TRAFFIC AFTER DEVELOPMENT



PEAK HOUR TRAFFIC

5. EXISTING INTERSECTION LYONS ROAD AND BAMBARA DRIVE

5.1 Intersection

The existing intersection of Lyons Road and Bambara Drive was constructed by Coffs Harbour City Council in 2008/2009 to cater for the existing development at the time and for development identified in Council's Development Control Plan of North Bonville.

5.2 Design Details

The intersection was designed by consultants to Council, Newnham Karl Weir and Partners.

Design details of the intersection are attached in Appendix B.

5.3 RTA Approvals

Council have advised that the intersection as constructed was approved by the RTA at Concept Stage. A copy of the RTA approval letter to Council is attached as Appendix C.

5.4 Coffs Harbour City Council Developer Contribution Plan

The Developer Contribution Plan for North Bonville includes a specific item for costs of the intersection as constructed. No allowance has been made in the Plan for any modifications to the intersection as the construction was for the overall development of the North Bonville Area.

5.5 Traffic Assessment of Intersection

An assessment has been undertaken of the intersection in accordance with Australian Guide to Traffic Engineering Practice. A summary of the details is as follows.

Item	Existing Development	After Development
Lyons Road Traffic	5295 vpd	5295 vpd
Bambara Drive Traffic	1500 vpd	3150 vpd
Peak Hour Traffic Lyons Road	530	530
Peak Hour Traffic Bambara Drive	150	315
Intersection Function Average Delay	-	2.0 seconds
Turning Storage Required Lyons Road	-	3 cars
Turning Storage Available Lyons Road	-	6 cars
Turning Storage Required Bambara Drive	-	3 cars
Turning Storage Available Bambara Drive	-	> 6 cars

5.6 Intersection Performance

The capacity of the intersection for through and turning traffic will be maintained at a level of service A.

5.7 Further Modelling

Further modelling of the intersection is not considered necessary on the basis of:

- Coffs Harbour City Council has already modelled the intersection as part of the DCP preparation and design,
- RTA approval was given to CHCC for the construction of the intersection,
- CHCC design and construction of the intersection was undertaken for the full extent of the Council DCP.

5.8 Work Required on Intersection

No further works are required to the intersection for this development.

6. INTERNAL CIRCULATION

The development layout has been done to achieve the following traffic circulation:

- All traffic directed to enter and exit Lyons Road via the major intersection,
- Central road in the development to act as a local collector,
- External roads of the development to act as circulating roads,
- Other roads are local streets and connect to central and outer roads.

All locations in the development have multiple routes to access the central collector road.

7. PUBLIC TRANSPORT

There is currently a bus route on Lyons Road for general commuter transport.

As part of this development the bus route is to be expanded to include a loop through the development. This expansion is in accordance with Councilôs Development Control Plan for the locality.

8. COFFS HARBOUR CITY COUNCIL DEVELOPMENT CONTROL PLAN

The Coffs Harbour City Council DCP ñNorth Bonvilleòcovers this development.

The road hierarchy, major roads, circulating traffic, and bus routes are all in accordance with the DCP requirements.

9. COFFS HARBOUR CITY COUNCIL DEVELOPER CONTRIBUTIONS PLAN

The Coffs Harbour City Council Developer Contributions Plan ñNorth Bonvilleò covers this development. As part of this there are requirements for Transport and Traffic Management (refer part copy in Appendix D).

This development as part of any approval is required to contribute to this Developer Contributions Plan.

The intersection on Lyons Road and the start of the collector road leg identified in the Developer Contributions Plan has recently been completed by Council.

It must be noted that the construction works on the intersection were in the majority forward funded by this development. There is an agreement in place with Council in regards to the funding and its application to the development contributions.

10. LYONS ROAD AND PACIFIC HIGHWAY INTERSECTION

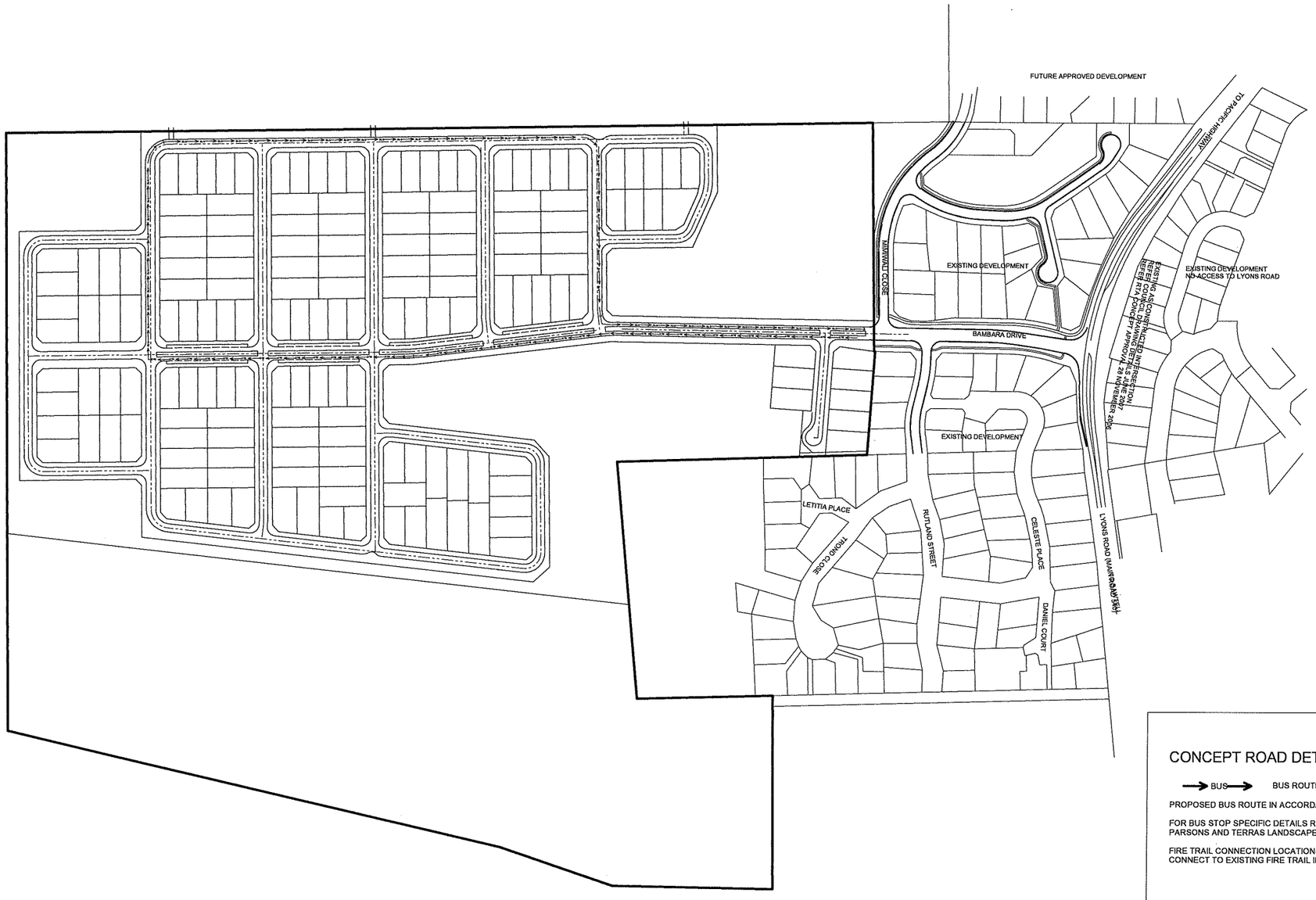
The existing intersection of Lyons Road and Pacific Highway is an interchange constructed as part of the Pacific Highway Stages Englands Road to Lyons Road, and Bonville Deviation.

The intersection was designed to cater for traffic entering from existing Lyons Road, North Bonville Development Area, and Bonville Village Development Area.
Coffs Harbour City Council has advised that as part of the design process details were provided to the RTA of the strategic planning areas to be catered for. In particular the North Bonville DCP was in place and provided target densities.

As this intersection has been designed for the future traffic generations no further assessment is required.

APPENDIX A

TRAFFIC LAYOUT PLAN



CONCEPT ROAD DETAILS

BUS → BUS ROUTE

PROPOSED BUS ROUTE IN ACCORDANCE WITH COUNCIL STRATEGY

FOR BUS STOP SPECIFIC DETAILS REFER TO DETAIL PLANS BY WORLEY PARSONS AND TERRAS LANDSCAPE ARCHITECTS

FIRE TRAIL CONNECTION LOCATIONS TO BONGIL BONGIL NATIONAL PARK CONNECT TO EXISTING FIRE TRAIL INSIDE PARK BOUNDARY

0 100 200

Rev	Date	Revision	Check
A	JULY12	PREFERRED PROJECT DETAIL	

PROPOSED SUBDIVISION
PART LOT 112 DP 1073791
LYONS ROAD
NORTH BONVILLE

DEVELOPMENT APPLICATION
TRAFFIC MANAGEMENT

Engineering Details Shown on This Drawing are Certified Correct

Geoff Slattery BE(Hons) ME Aust. Registered Professional Engineer 97130

Date

Approved on Behalf Coffs Harbour City Council

City Engineer

Date

Scale 1:2000 AT A1 Check if Reduced	CAD Disk No
Surveyed NKW	Datum AMG, AHD
Drawn GES	Design GES
Checked GES	Date JULY 12

Geoff Slattery and Partners Pty Ltd
Civil and Structural Engineers
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Job No	Drawing No
0824	117A
Drawing Sheets	
Dwg of Dwg's	
Council No	

APPENDIX B

DESIGN DETAILS INTERSECTION
LYONS ROAD AND BAMBARA DRIVE

SAWTELL PARK ESTATE

SECTION 94 WORKS – LYONS ROAD INTERSECTION

ROAD & DRAINAGE WORKS
WATER SUPPLY

SHEET	PARTICULARS
	HEADER/COVER SHEET
1	ROADWORKS AND STORMWATER DRAINAGE PLAN
2	ROADWORKS AND STORMWATER DRAINAGE PLAN ~ PIT DETAILS
3	LYONS RD ~ LONG-SECTIONS ~ CROSS SECTIONS
4	LYONS ROAD ~ CROSS-SECTIONS
5	LYONS ROAD ~ CROSS-SECTIONS
6	LYONS ROAD ~ CROSS-SECTIONS
7	LYONS ROAD ~ CROSS-SECTIONS
8	ROAD No 2 ~ LONG-SECTION ~ CROSS SECTIONS
9	ROAD No 2 ~ CROSS-SECTIONS
10	RUTLAND STREET ~ LONG SECTION ~ CROSS-SECTIONS
11	KERB RETURNS 1, 2, 3 & 4
12	CATCHMENT DIAGRAM
13	DRAINAGE CALCULATIONS ~ LONG-SECTIONS LINES 1 & 2
14	WATER RETICULATION ~ PLAN
15	WATER RETICULATION ~ LONG SECTION
16	SERVICES LAYOUT ~ PLAN
17	LINE MARKING AND SIGNAGE ~ PLAN
18	SEDIMENT AND EROSION CONTROL ~ PLAN

CONSULTING SURVEYORS | URBAN PLANNERS | PROJECT MANAGERS
Newnham Karl Weir
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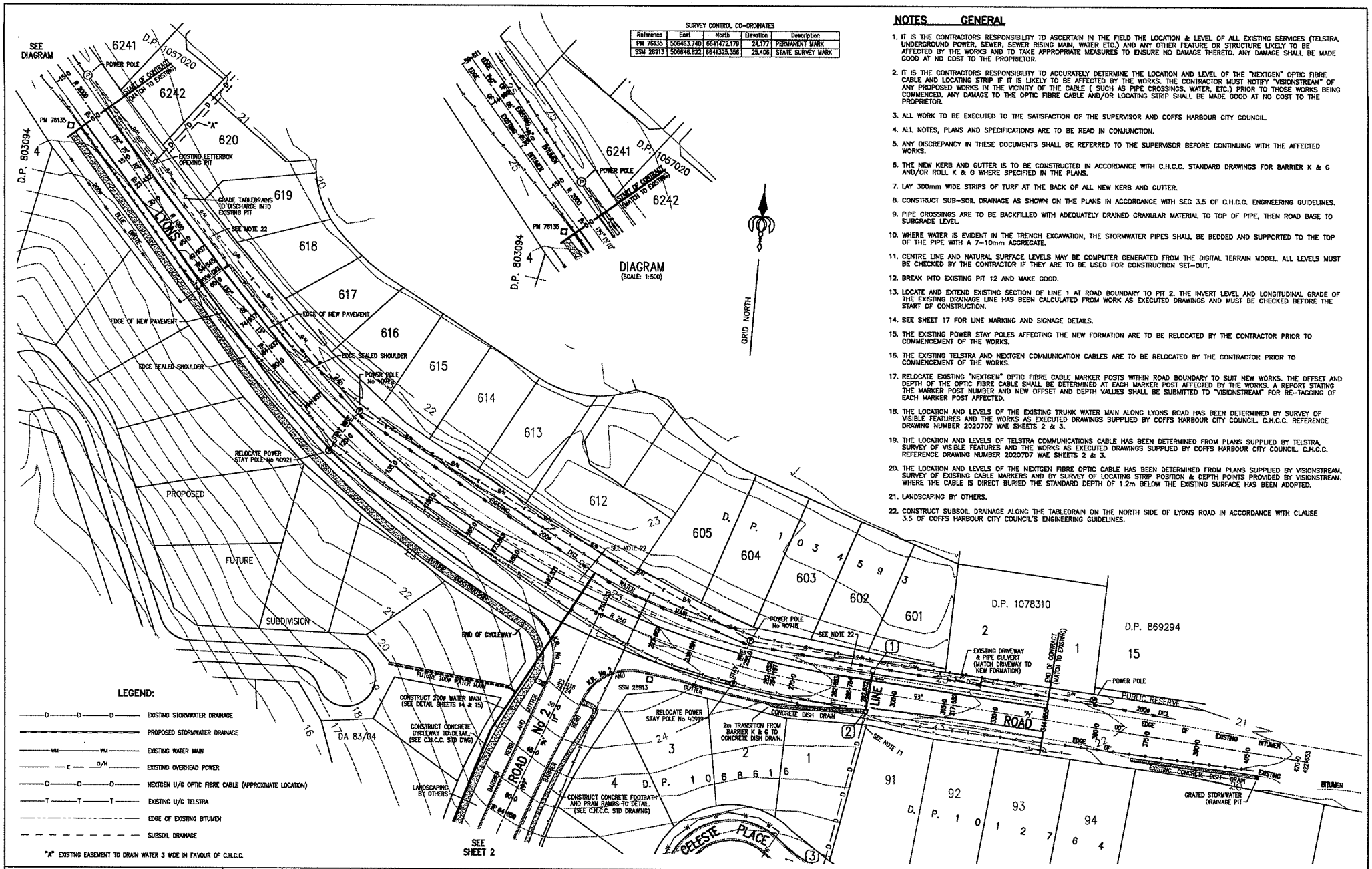
Fax: 02 6652 3064
ABN 21 100 904 783
ACN 100 904 783

NUMBER OF SHEETS – 18
N.K.W.P. PTY. LTD.
PLAN REF. 5237
COFFS HARBOUR CITY COUNCIL
REF. DA 565/03
PLAN DATE – JUNE 2007



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6. THE NEW KERB AND GUTTER IS TO BE CONSTRUCTED IN ACCORDANCE WITH C.H.C.C. STANDARD DRAWINGS FOR BARRIER K & G AND/OR ROLL K & G WHERE SPECIFIED IN THE PLANS.
7. LAY 300mm WIDE STRIPS OF TURF AT THE BACK OF ALL NEW KERB AND GUTTER.
8. CONSTRUCT SUB-SOIL DRAINAGE AS SHOWN ON THE PLANS IN ACCORDANCE WITH SEC 3.5 OF C.H.C.C. ENGINEERING GUIDELINES.
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10. WHERE WATER IS EVIDENT IN THE TRENCH EXCAVATION, THE STORMWATER PIPES SHALL BE BEDDED AND SUPPORTED TO THE TOP OF THE PIPE WITH A 7-10mm AGGREGATE.
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AMEND-MENT	DATE	AMENDMENT DETAILS	AUTHOR-ISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

CITY ENGINEER ——— DATE

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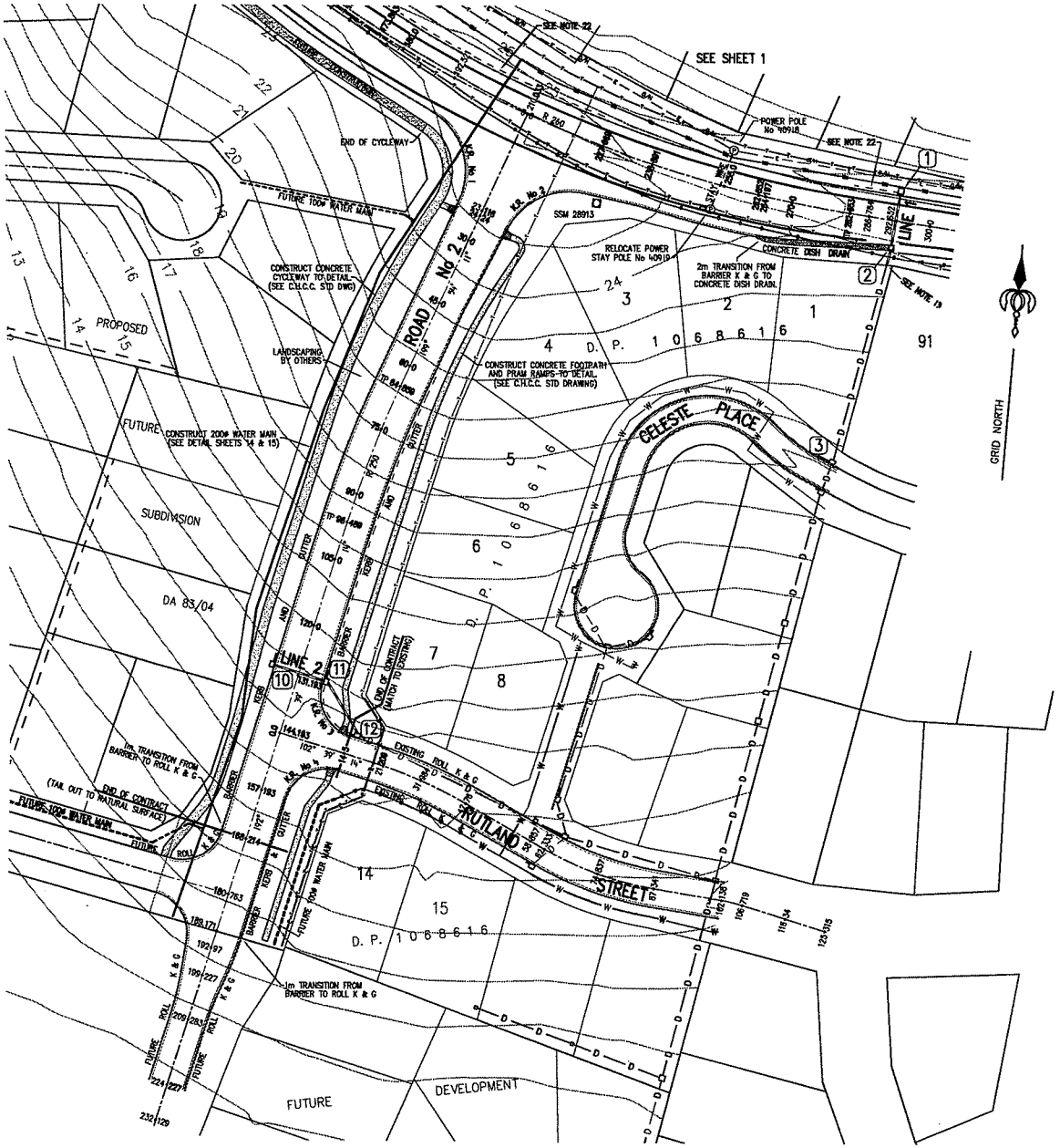
SCALE: 1:500 HOR. CONTOUR INT. 1.0m		SHEET SIZE A1 CAUTION DO NOT SCALE	PROJECT: SAWTELL PARK ESTATE SECTION 94 WORKS - LYONS ROAD INTERSECTION
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	TITLE: ROADWORKS AND STORMWATER DRAINAGE PLAN
DATUM: PM76135 AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	

FILE No. 5237

SHEET 1 OF 18

COUNCIL DRAWING No.



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STORMWATER DRAINAGE PIT DETAILS

PIT No.	TYPE	C/L CHAINAGE	LEVELS		
			TK/NS/PEG	INV. OUT	PIT DEPTH
1	LETTERBOX OPENING PIT	292.652	23.29 INLET	22.256	1.034
2	JUNCTION PIT WITH V DRAIN GRATE & SURROUND	292.652	23.635 INLET	22.086	1.753
10	3.0m GRADE EXIP	130.593	14.018 TK	12.76	1.258
11	3.0m GRADE EXIP	130.593	14.018 TK	12.55	1.468

EXIP = EXTENDED KERB INLET PIT
TK = TOP OF KERB
NS = NATURAL SURFACE

PITS ARE TO BE CONSTRUCTED OF CONCRETE WITH MINIMUM 900 x 900mm INTERNAL DIMENSIONS.

LEGEND:

- EXISTING STORMWATER DRAINAGE
- PROPOSED STORMWATER DRAINAGE
- EXISTING WATER MAIN
- EXISTING OVERHEAD POWER
- NEXTGEN U/G OPTIC FIBRE CABLE (APPROXIMATE LOCATION)
- EXISTING U/G TELSTRA
- EDGE OF EXISTING BITUMEN
- SUBSOIL DRAINAGE

AMENDMENT	DATE	AMENDMENT DETAILS	AUTHORISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

CITY ENGINEER ——— DATE ———

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Fax: 02 6652 3064
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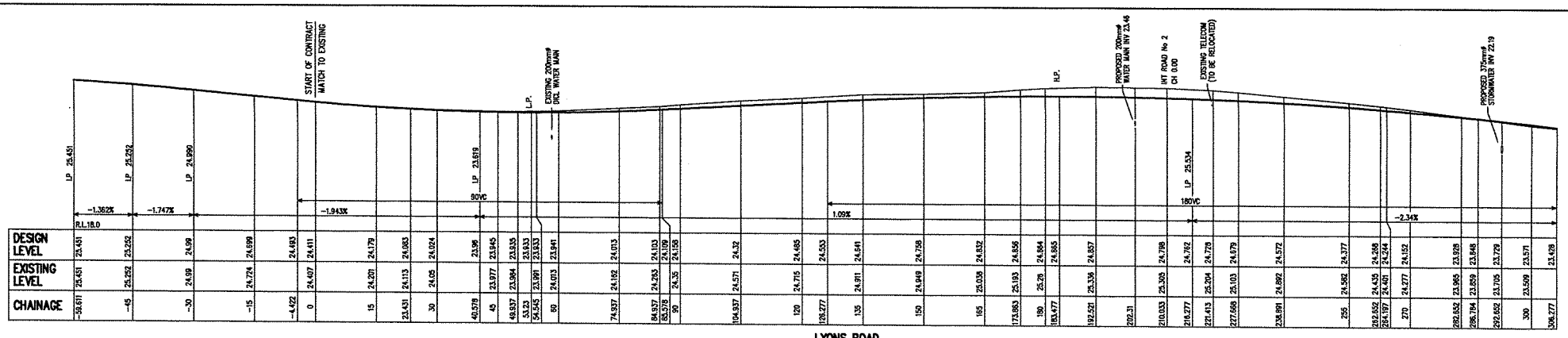
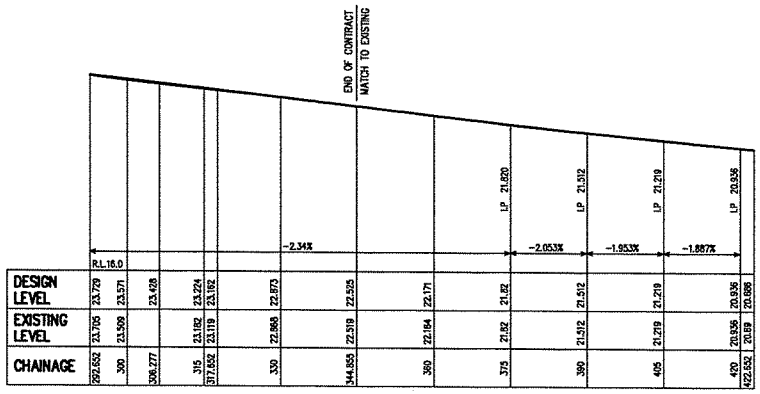
SHEET 2 OF 18

COUNCIL DRAWING No.



LYONS ROAD

SCALE: HORIZONTAL 1:500
VERTICAL 1:100



LYONS ROAD

SCALE: HORIZONTAL 1:500
VERTICAL 1:100

NOTE:

CENTRE LINE AND NATURAL SURFACE LEVELS MAY BE COMPUTER GENERATED FROM THE DIGITAL TERRAIN MODEL. ALL LEVELS MUST BE CHECKED IF THEY ARE TO BE USED FOR CONSTRUCTION SET OUT.

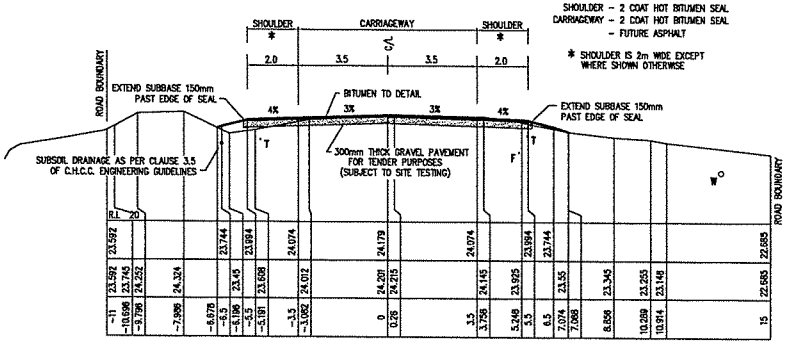
LEGEND:

W – 200ø WATER MAIN
T – TELECOM CABLE
F – OPTIC FIBRE CABLE

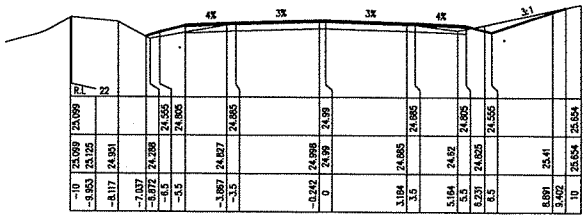
BITUMEN DETAILS

SHOULDER – 2 COAT HOT BITUMEN SEAL
CARRIAGEWAY – 2 COAT HOT BITUMEN SEAL
– FUTURE ASPHALT

* SHOULDER IS 2m WIDE EXCEPT WHERE SHOWN OTHERWISE



15
TYPICAL
SCALE: 1:100 NATURAL



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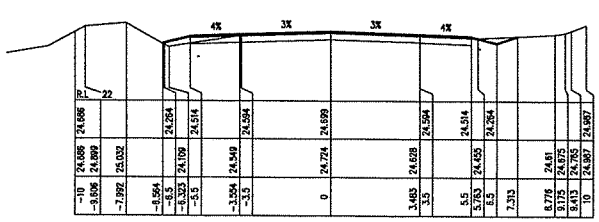

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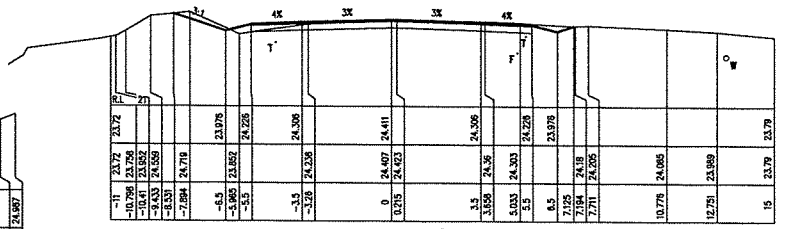


0
START OF CONTRACT

AMEND-MENT	DATE	AMENDMENT DETAILS	AUTHOR-ISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

CITY ENGINEER ——— DATE ———

CONSULTING SURVEYORS | URBAN PLANNERS | PROJECT MANAGERS
Newnham Karl Weir
and Partners Pty Ltd
Incorporating A V Spagnolo & Associates
5 Murdock Street Coffs Harbour 2450
Phone: 02 6652 6630
Fax: 02 6652 3064
ABN 21 100 904 783
ACN 100 904 783

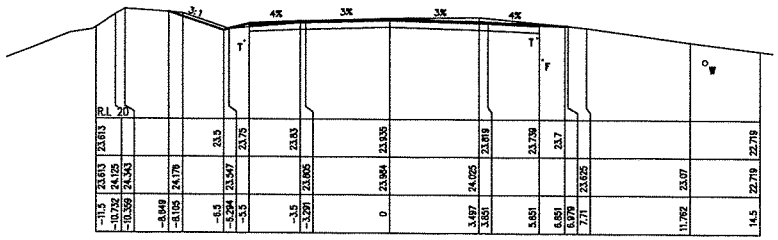
SCALE: AS SHOWN		SHEET SIZE A1 CAUTION DO NOT SCALE	PROJECT: SAWTELL PARK ESTATE SECTION 94 WORKS - LYONS ROAD INTERSECTION
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	TITLE: LYONS ROAD LONG SECTION & CROSS SECTIONS
DATUM: AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	FILE No. 5237 / SHEET 3 OF 18 / COUNCIL DRAWING No.

NOTE:

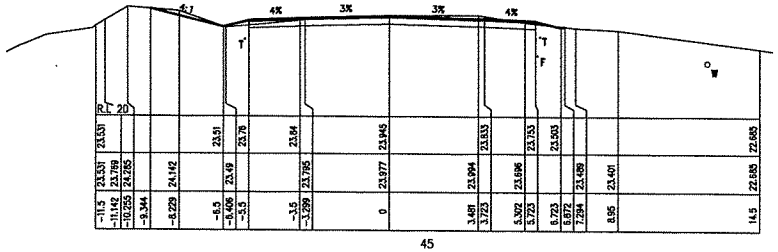
CENTRE LINE AND NATURAL SURFACE LEVELS MAY BE COMPUTER GENERATED FROM THE DIGITAL TERRAIN MODEL. ALL LEVELS MUST BE CHECKED IF THEY ARE TO BE USED FOR CONSTRUCTION SET OUT.

LEGEND:

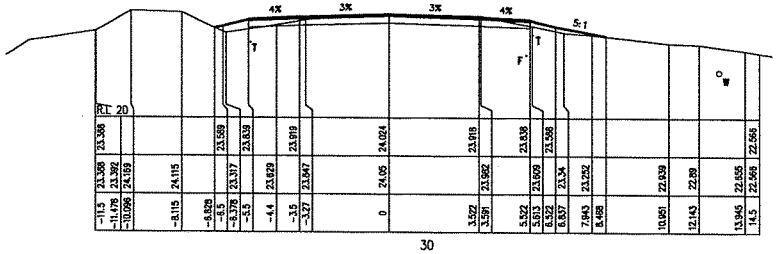
W – 200ø WATER MAIN
T – TELECOM CABLE
F – OPTIC FIBRE CABLE



49.937



45



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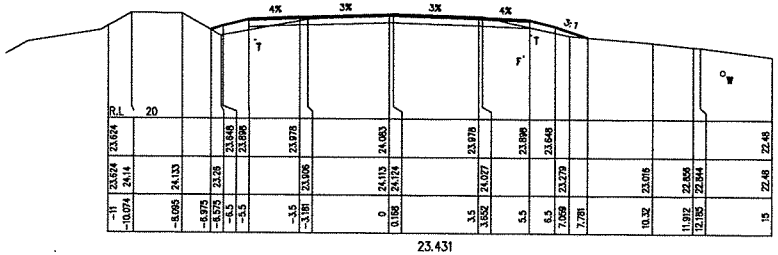
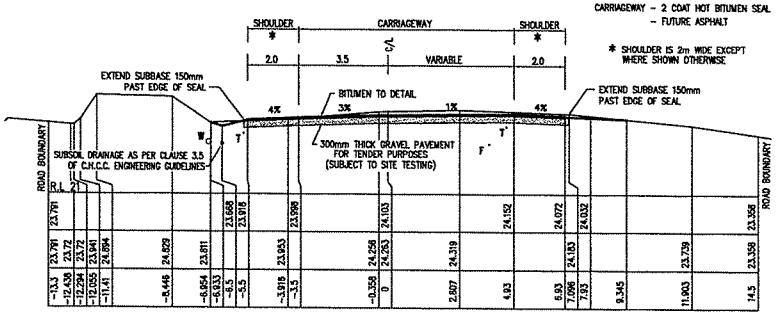


23.431

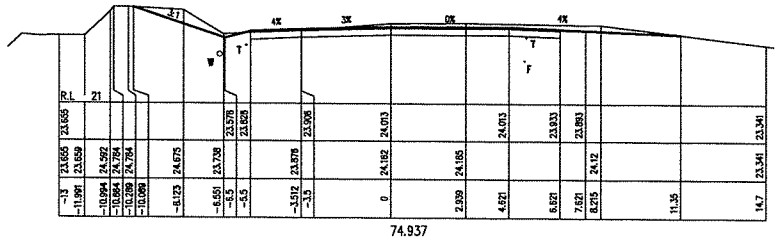
BITUMEN DETAILS

SHOULDER – 2 COAT HOT BITUMEN SEAL
CARRIAGEWAY – 2 COAT HOT BITUMEN SEAL
– FUTURE ASPHALT

* SHOULDER IS 2m WIDE EXCEPT WHERE SHOWN OTHERWISE



84.937
TYPICAL



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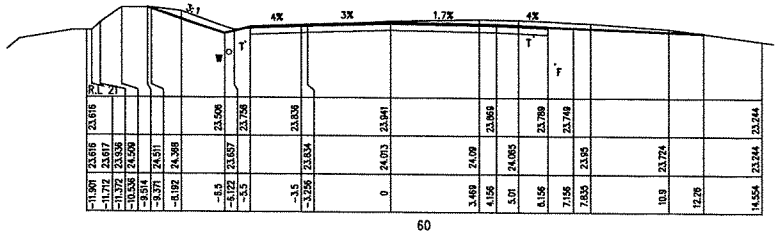

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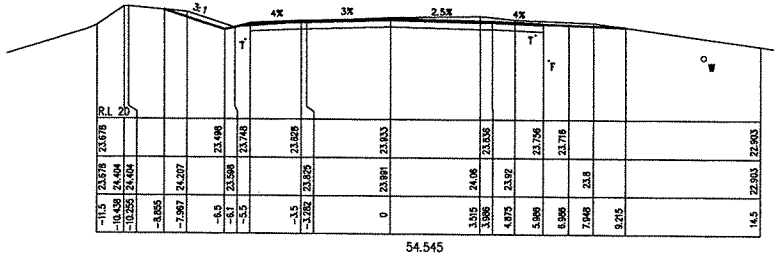


54.545

AMEND-MENT	DATE	AMENDMENT DETAILS	AUTHOR-ISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

CITY ENGINEER DATE

CONSULTING SURVEYORS | URBAN PLANNERS | PROJECT MANAGERS
Newnham Karl Weir
and Partners Pty Ltd
Incorporating A V Spagnole & Associates
5 Murdock Street Coffs Harbour 2450
Phone: 02 6652 6630
Fax: 02 6652 3064
ABN 21 100 904 783
ACN 100 904 783

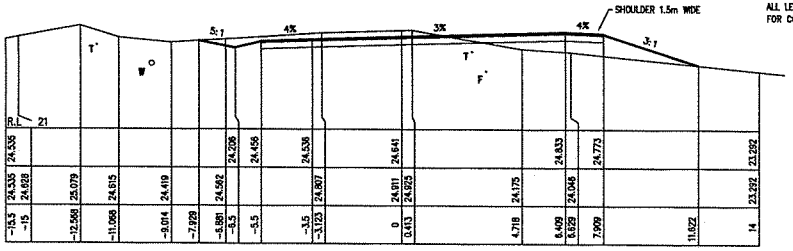
SCALE: 1:100 NATURAL		SHEET SIZE A1 CAUTION DO NOT SCALE	PROJECT: SAWTELL PARK ESTATE SECTION 94 WORKS - LYONS ROAD INTERSECTION
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	TITLE: LYONS ROAD CROSS-SECTIONS
DATUM: AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	FILE No. 5237 / SHEET 4 OF 18 / COUNCIL DRAWING No.

NOTE:

CENTRE LINE AND NATURAL SURFACE LEVELS MAY BE COMPUTER GENERATED FROM THE DIGITAL TERRAIN MODEL. ALL LEVELS MUST BE CHECKED IF THEY ARE TO BE USED FOR CONSTRUCTION SET OUT.

LEGEND:

W – 200ø WATER MAIN
T – TELECOM CABLE
F – OPTIC FIBRE CABLE



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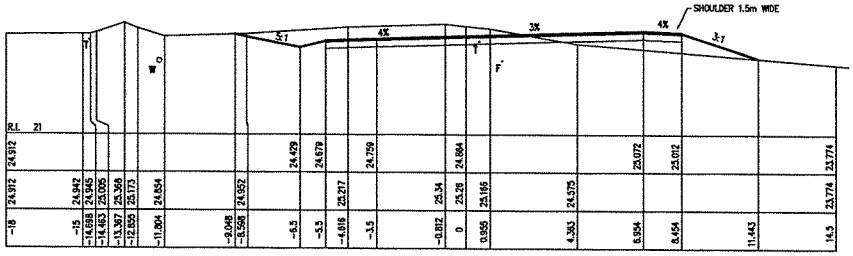
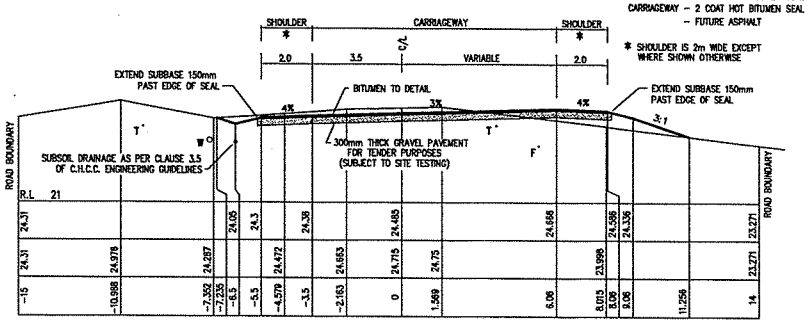


180

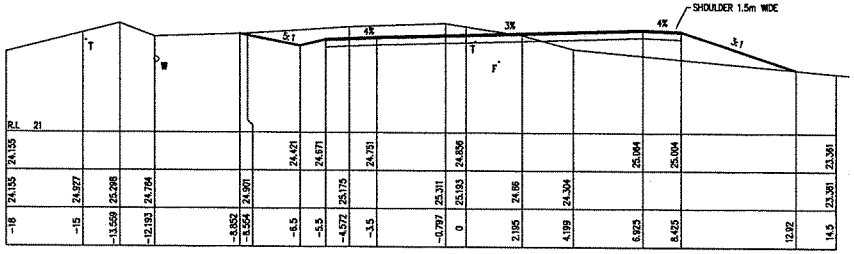
BITUMEN DETAILS

SHOULDER – 2 COAT HOT BITUMEN SEAL
CARRIAGEWAY – 2 COAT HOT BITUMEN SEAL
– FUTURE ASPHALT

* SHOULDER IS 2m WIDE EXCEPT WHERE SHOWN OTHERWISE



120
TYPICAL



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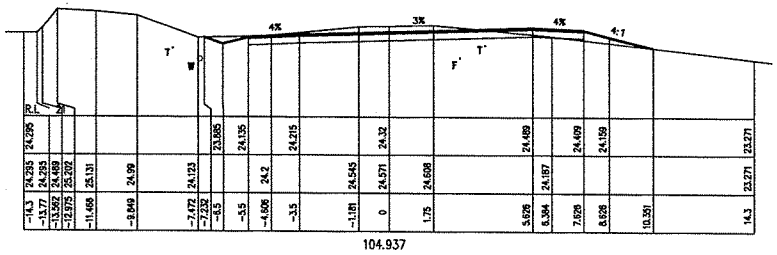
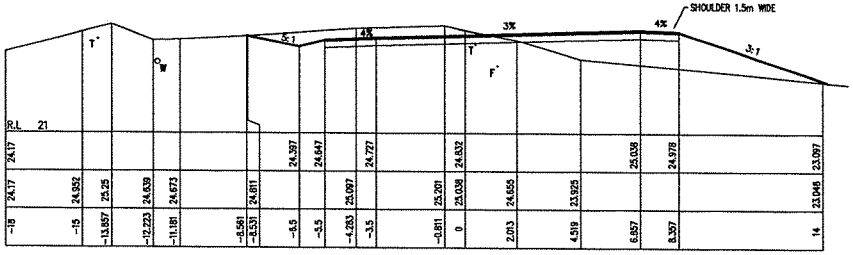


104.937



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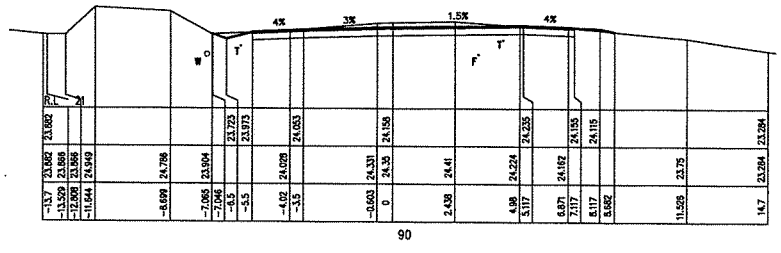

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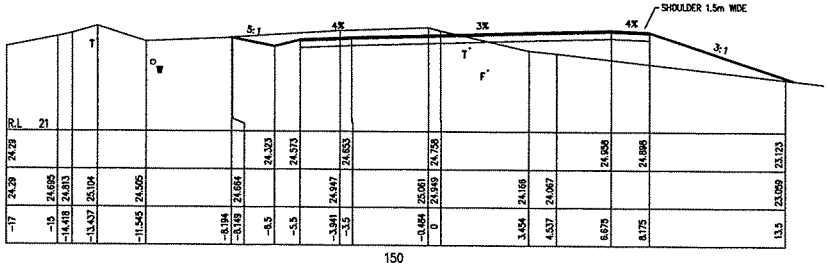


150

AMENDMENT	DATE	AMENDMENT DETAILS	AUTHORISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

CITY ENGINEER ——— DATE

CONSULTING SURVEYORS | URBAN PLANNERS | PROJECT MANAGERS
Newnham Karl Weir
and Partners Pty Ltd
Incorporating A V Spagnolo & Associates
5 Murdock Street Coffs Harbour 2450
Phone: 02 6652 6630
Fax: 02 6652 3064
ABN 21 100 904 783
ACN 100 904 783

SCALE: 1:100 NATURAL		SHEET SIZE: A1 CAUTION DO NOT SCALE	
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	
DATUM: AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	

PROJECT: SAWTELL PARK ESTATE
SECTION 94 WORKS - LYONS ROAD INTERSECTION

TITLE: LYONS ROAD CROSS-SECTIONS

FILE No. 5237

SHEET 5 OF 18

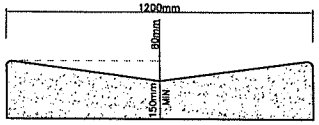
COUNCIL DRAWING No.

LEGEND:

W – 200ø WATER MAIN
T – TELECOM CABLE
F – OPTIC FIBRE CABLE

BITUMEN DETAILS

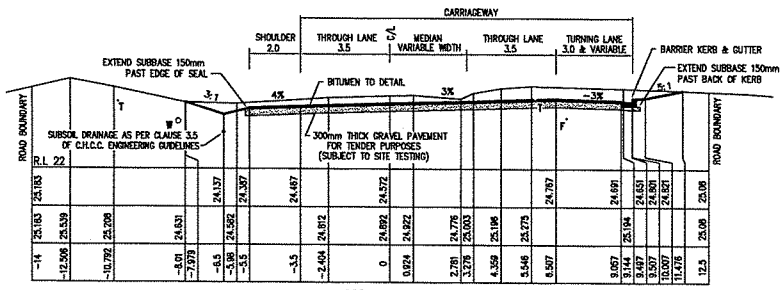
SHOULDER – 2 COAT HOT BITUMEN SEAL
CARRIAGEWAY – 2 COAT HOT BITUMEN SEAL
– FUTURE ASPHALT



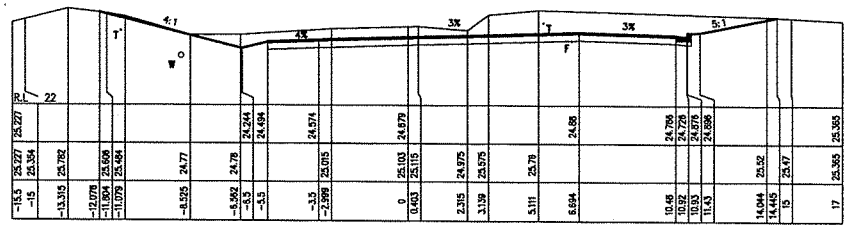
DETAIL
CONCRETE DISH DRAIN

NOTE:

CENTRE LINE AND NATURAL SURFACE LEVELS MAY BE COMPUTER GENERATED FROM THE DIGITAL TERRAIN MODEL. ALL LEVELS MUST BE CHECKED IF THEY ARE TO BE USED FOR CONSTRUCTION SET OUT.



238.891
TYPICAL



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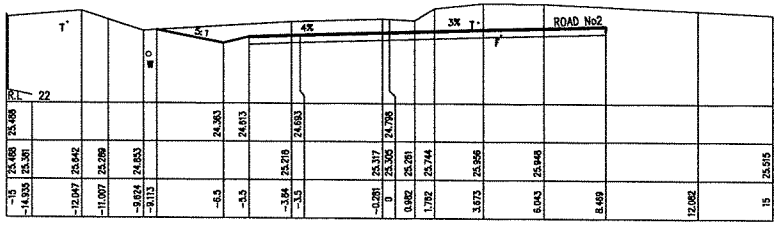
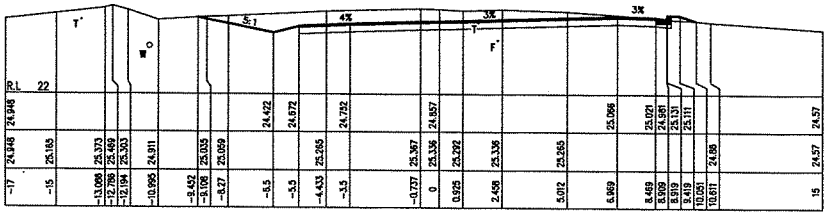
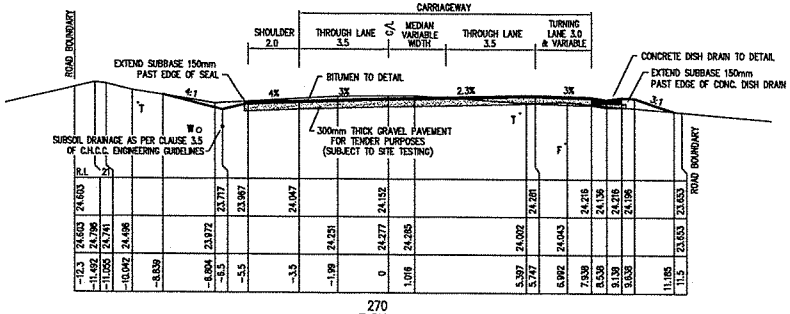


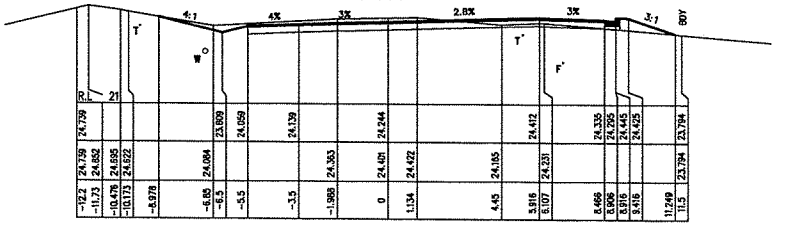
210.033
INTERSECTION



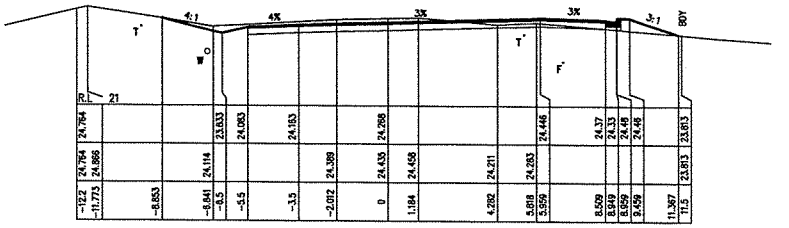
192.521



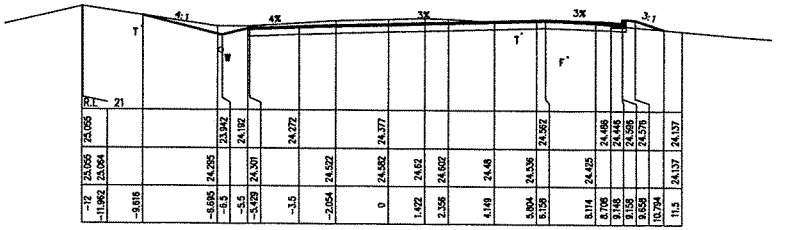
270
TYPICAL



264.197



262.652



255

AMEND-MENT	DATE	AMENDMENT DETAILS	AUTHOR-ISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

CITY ENGINEER ——— DATE ———

CONSULTING SURVEYORS | URBAN PLANNERS | PROJECT MANAGERS
Newnham Karl Weir
and Partners Pty Ltd
Incorporating A V Spagnolo & Associates
5 Murdock Street Coffs Harbour 2450
Phone: 02 6652 6630
Fax: 02 6652 3094
ABN 21 100 904 783
ACN 100 904 783

SCALE: 1:100 NATURAL		SHEET SIZE A1 CAUTION DO NOT SCALE
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.
DATUM: AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:

PROJECT: SAWTELL PARK ESTATE
SECTION 94 WORKS - LYONS ROAD INTERSECTION

TITLE: LYONS ROAD CROSS-SECTIONS

FILE No. 5237

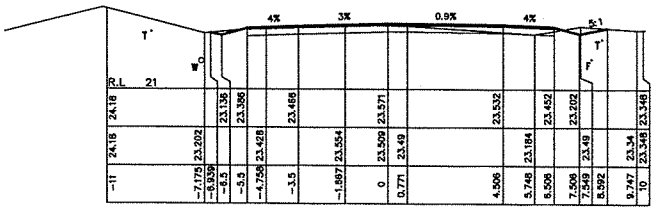
SHEET 6 OF 18

COUNCIL DRAWING No.

BITUMEN DETAILS
SHOULDER – 2 COAT HOT BITUMEN SEAL
CARRIAGEWAY – 2 COAT HOT BITUMEN SEAL
– FUTURE ASPHALT

LEGEND:
W – 200ø WATER MAIN
T – TELECOM CABLE
F – OPTIC FIBRE CABLE

NOTE:
CENTRE LINE AND NATURAL SURFACE LEVELS MAY BE COMPUTER GENERATED FROM THE DIGITAL TERRAIN MODEL. ALL LEVELS MUST BE CHECKED IF THEY ARE TO BE USED FOR CONSTRUCTION SET OUT.



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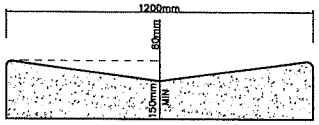
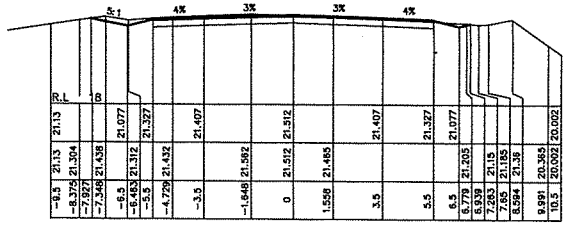


DETAIL
CONCRETE DISH DRAIN



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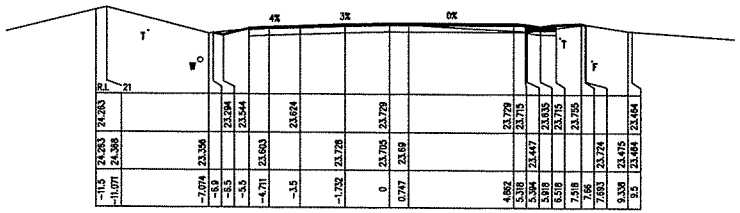
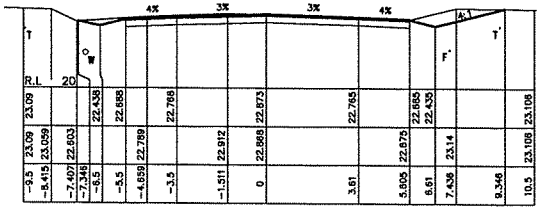


292.652



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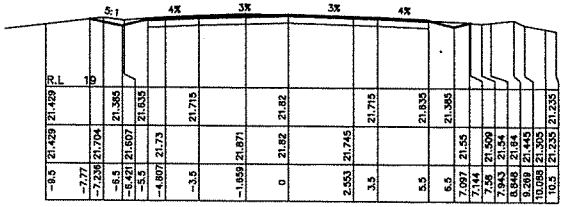

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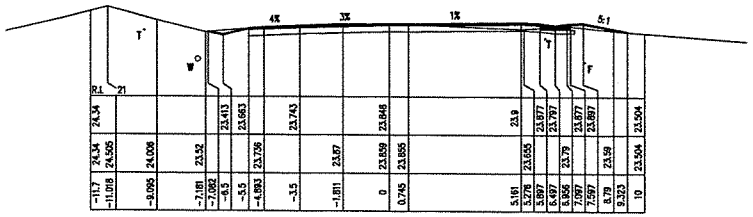
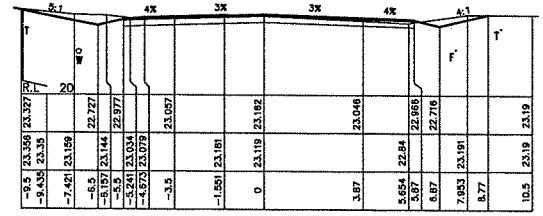


286.784



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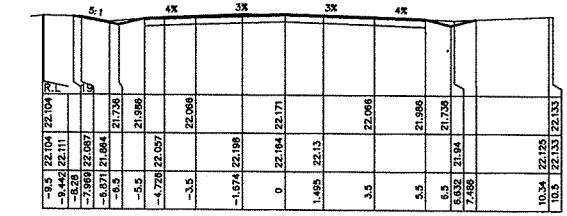

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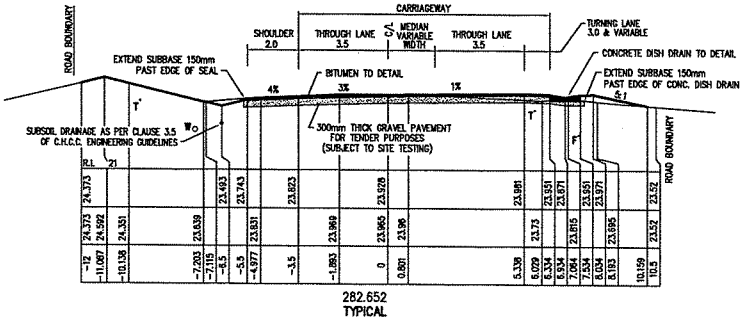
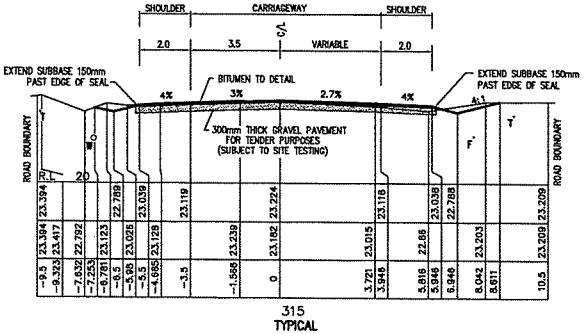
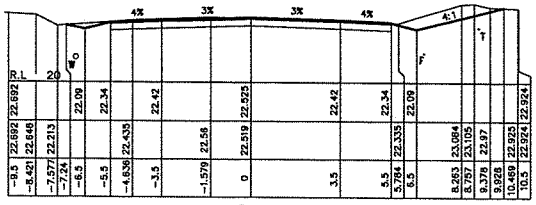


282.652
TYPICAL



315
TYPICAL



344.855
END OF CONTRACT

AMENDMENT	DATE	AMENDMENT DETAILS	AUTHORISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

_____ _____
CITY ENGINEER DATE

CONSULTING SURVEYORS|URBAN PLANNERS|PROJECT MANAGERS
Newnham Karl Weir
and Partners Pty Ltd
Incorporating A V Spagnolo & Associates
5 Murdock Street Coffs Harbour 2450
Phone: 02 6652 6630
Fax: 02 6652 3064
ABN 21 100 904 783
ACN 100 904 783

SCALE: 1:100 NATURAL		SHEET SIZE A1 CAUTION DO NOT SCALE	
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	
DATUM: AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	

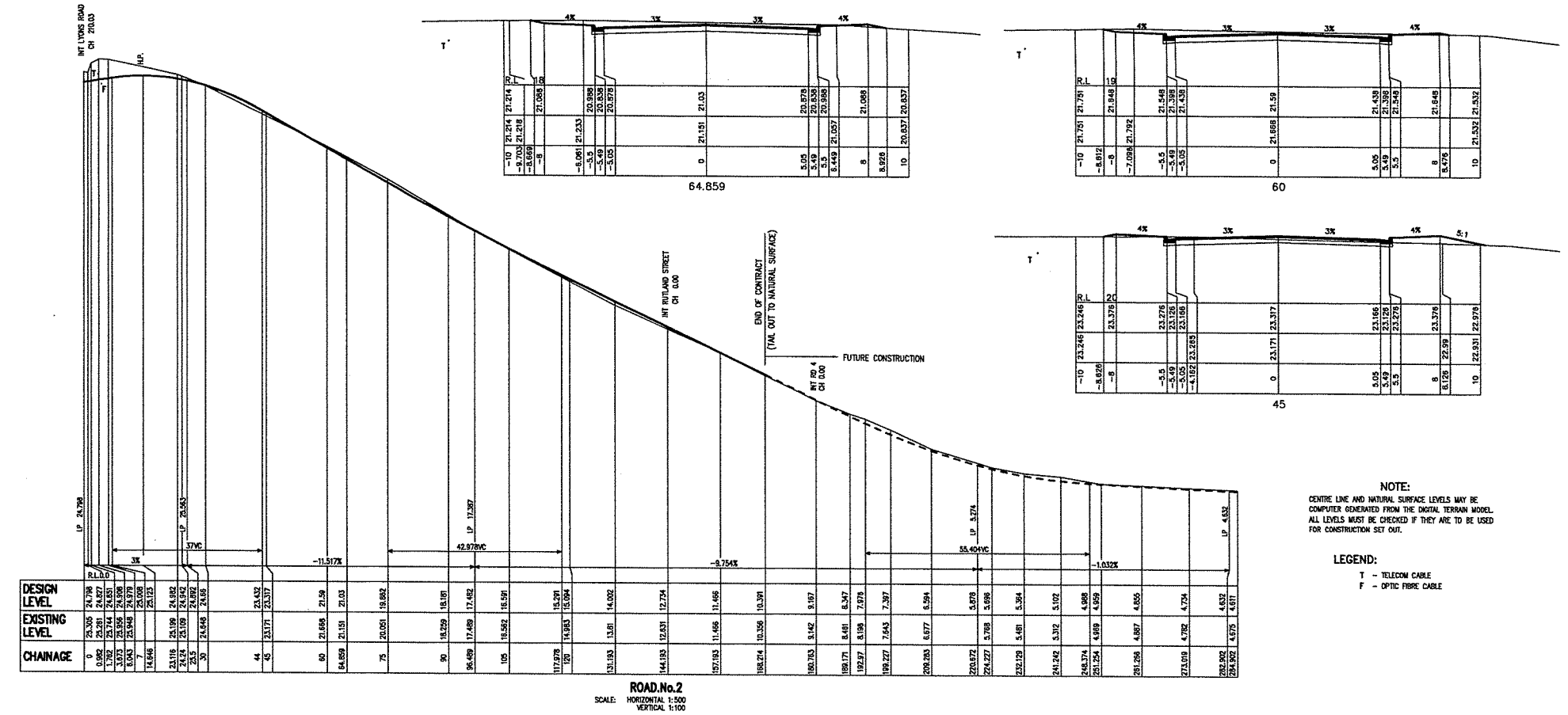
PROJECT: SAWTELL PARK ESTATE
SECTION 94 WORKS - LYONS ROAD INTERSECTION

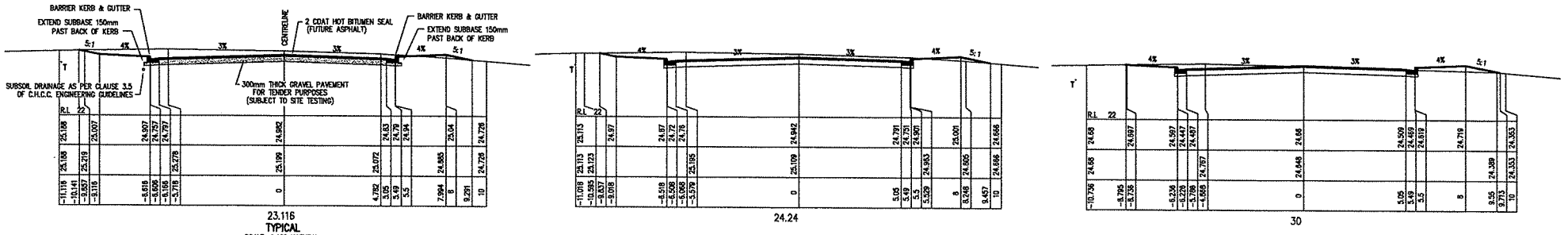
TITLE: LYONS ROAD
CROSS-SECTIONS

FILE No. 5237

SHEET 7 OF 18

COUNCIL DRAWING No.





AMENDMENT	DATE	AMENDMENT DETAILS	AUTHORISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

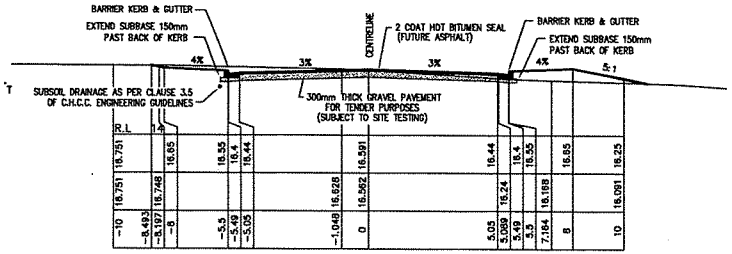
CITY ENGINEER ---------- DATE

CONSULTING SURVEYORS | URBAN PLANNERS | PROJECT MANAGERS
Newnham Karl Weir
and Partners Pty Ltd
Incorporating A.V Spagnolo & Associates
5 Murdock Street Coffs Harbour 2450
Phone: 02 6652 6630
Fax: 02 6652 3064
ABN 21 100 904 783
ACN 100 904 783

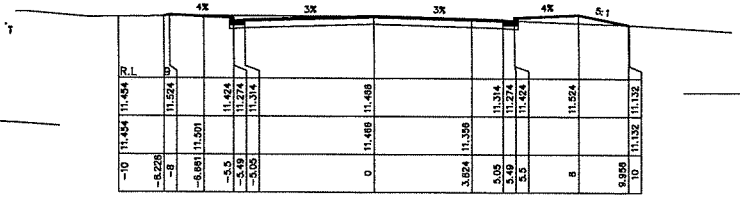
SCALE: AS SHOWN		SHEET SIZE A1 CAUTION DO NOT SCALE	PROJECT: SAWTELL PARK ESTATE SECTION 94 WORKS - LYONS ROAD INTERSECTION
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	TITLE: ROAD No 2 LONG-SECTION CROSS-SECTIONS
DATUM: AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	FILE No. 5237
			SHEET 8 OF 18
			COUNCIL DRAWING No.

NOTE:
CENTRE LINE AND NATURAL SURFACE LEVELS MAY BE COMPUTER GENERATED FROM THE DIGITAL TERRAIN MODEL. ALL LEVELS MUST BE CHECKED IF THEY ARE TO BE USED FOR CONSTRUCTION SET OUT.

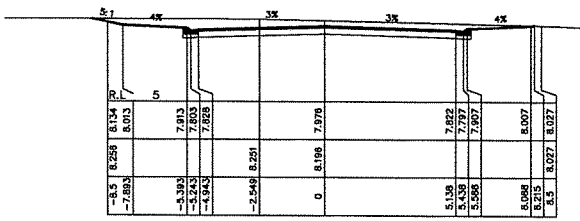
LEGEND: T - TELECOM CABLE



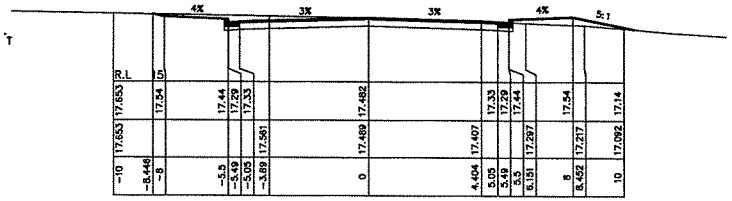
105
TYPICAL



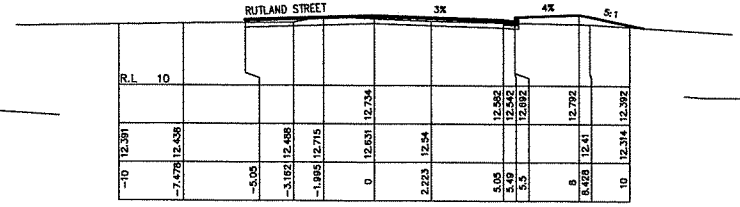
157.193



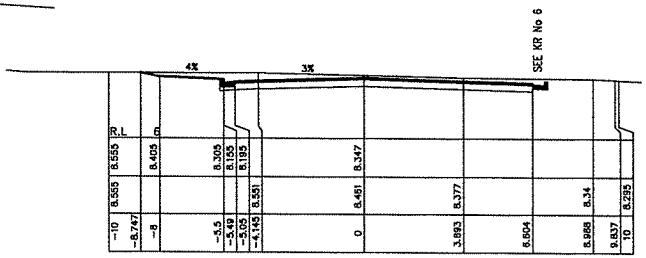
192.97



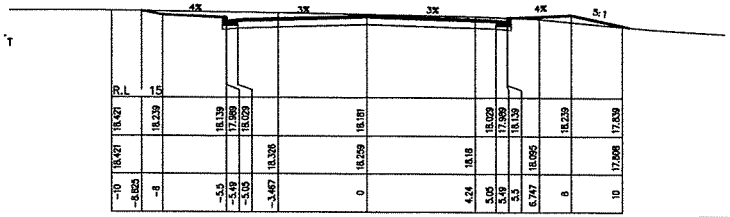
96.489



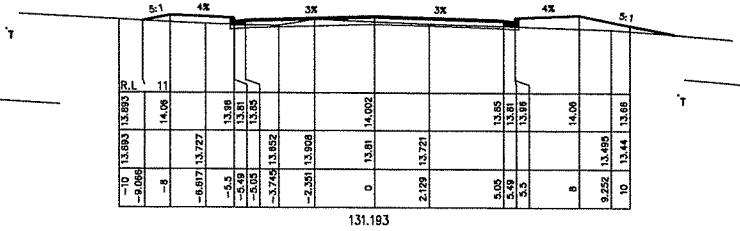
144.193
INTERSECTION



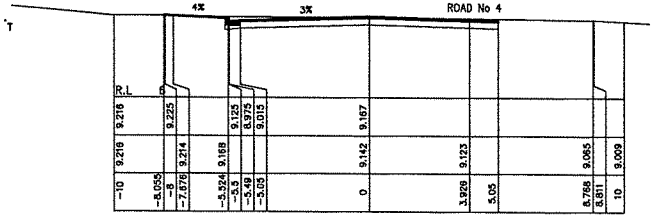
189.171



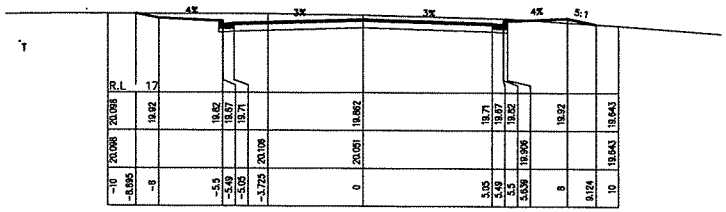
90



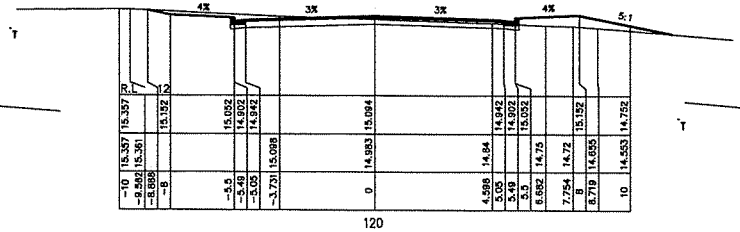
131.193



180.763
INTERSECTION



75



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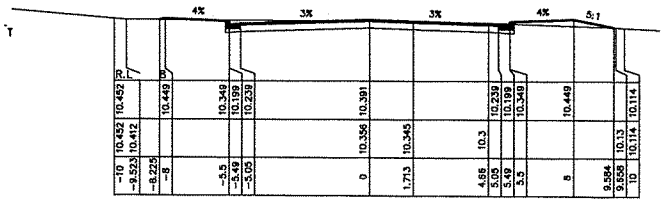


168.214
END OF CONTRACT

AMEND-MENT	DATE	AMENDMENT DETAILS	AUTHOR-ISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

CITY ENGINEER ——— DATE ———

CONSULTING SURVEYORS | URBAN PLANNERS | PROJECT MANAGERS
Newnham Karl Weir
and Partners Pty Ltd
Incorporating A V Spagnolo & Associates
5 Murdock Street Coffs Harbour 2450
Phone: 02 6652 6630
Fax: 02 6652 3084
ABN 21 100 904 783
ACN 100 904 783

SCALE: 1:100 NATURAL		SHEET SIZE A1 CAUTION DO NOT SCALE	
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	
DATUM: AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	

PROJECT: SAWTELL PARK ESTATE
SECTION 94 WORKS - LYONS ROAD INTERSECTION

TITLE: ROAD No 2
CROSS-SECTIONS

FILE No. 5237

SHEET 9 OF 18

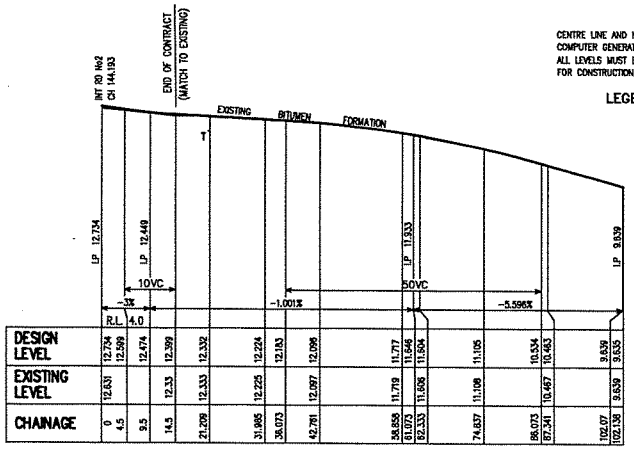
COUNCIL DRAWING No.

NOTE:

CENTRE LINE AND NATURAL SURFACE LEVELS MAY BE COMPUTER GENERATED FROM THE DIGITAL TERRAIN MODEL. ALL LEVELS MUST BE CHECKED IF THEY ARE TO BE USED FOR CONSTRUCTION SET OUT.

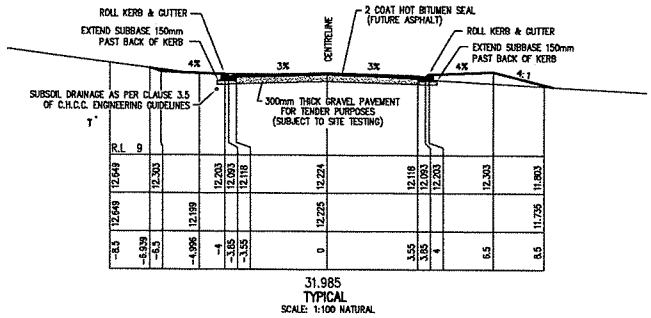
LEGEND:

T - TELECOM CABLE

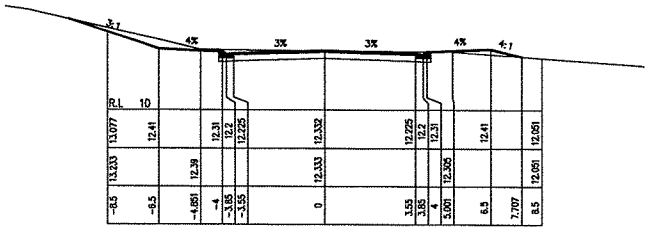


RUTLAND STREET

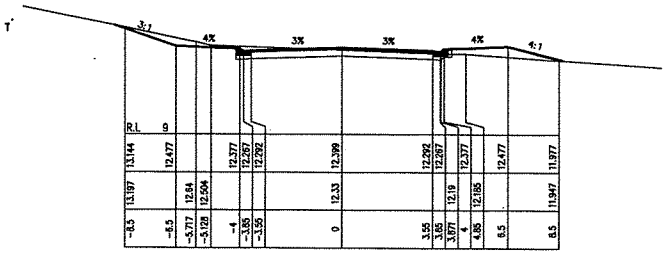
SCALE: HORIZONTAL 1:500
VERTICAL 1:100



31.985
TYPICAL
SCALE: 1:100 NATURAL



21.209



14.5
END OF CONTRACT

AMEND-MENT	DATE	AMENDMENT DETAILS	AUTHOR-ISED BY

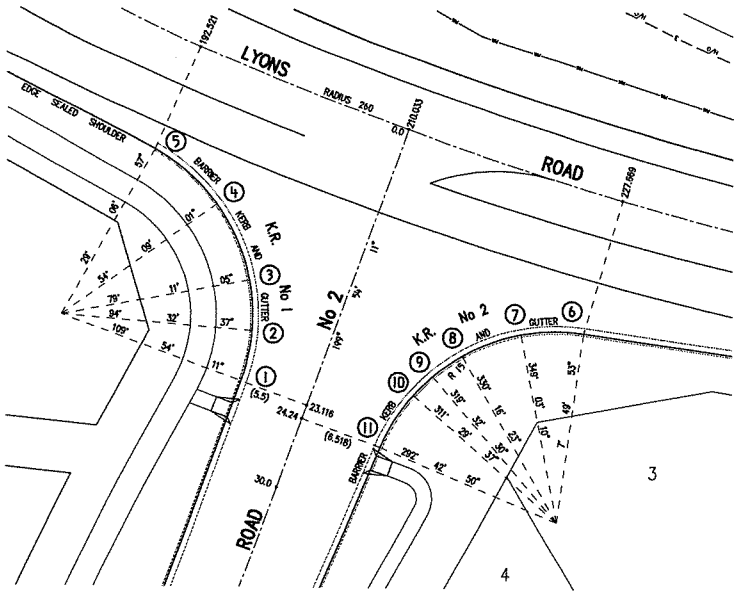
CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

CITY ENGINEER ---------- DATE

CONSULTING SURVEYORS | URBAN PLANNERS | PROJECT MANAGERS
Newnham Karl Weir
and Partners Pty Ltd
Incorporating A.V Spagnole & Associates
5 Murdock Street Coffs Harbour 2450
Phone: 02 6652 6630
Fax: 02 6652 3084
ABN 21 100 904 783
ACN 100 904 783

SCALE: AS SHOWN		SHEET SIZE A1 CAUTION DO NOT SCALE	PROJECT: SAWTELL PARK ESTATE SECTION 94 WORKS - LYONS ROAD INTERSECTION
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	TITLE: RUTLAND STREET LONG-SECTION & CROSS-SECTIONS
DATUM: AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	FILE No. 5237 / SHEET 10 OF 18 / COUNCIL DRAWING No.

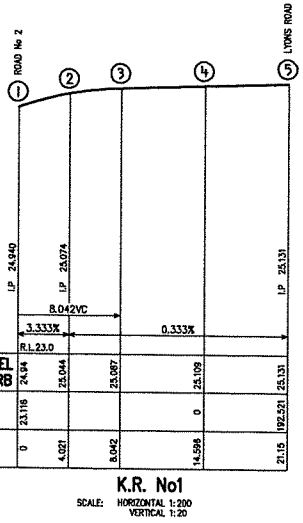


NOTE:

CENTRE LINE AND NATURAL SURFACE LEVELS MAY BE COMPUTER GENERATED FROM THE DIGITAL TERRAIN MODEL.

ALL LEVELS MUST BE CHECKED IF THEY ARE TO BE USED FOR CONSTRUCTION SET OUT.

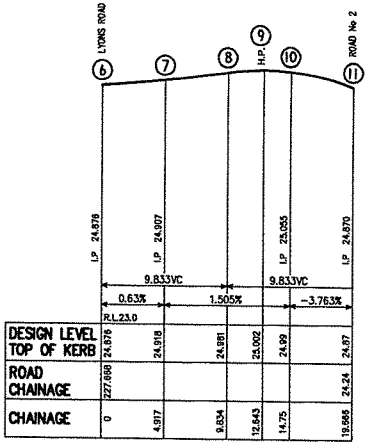
GRID NORTH



DESIGN LEVEL TOP OF KERB	24.94	25.044	25.087	25.109	25.131
ROAD CHAINAGE	23.116			0	192.521
CHAINAGE	0	4.021	8.042	14.598	21.15

K.R. No1

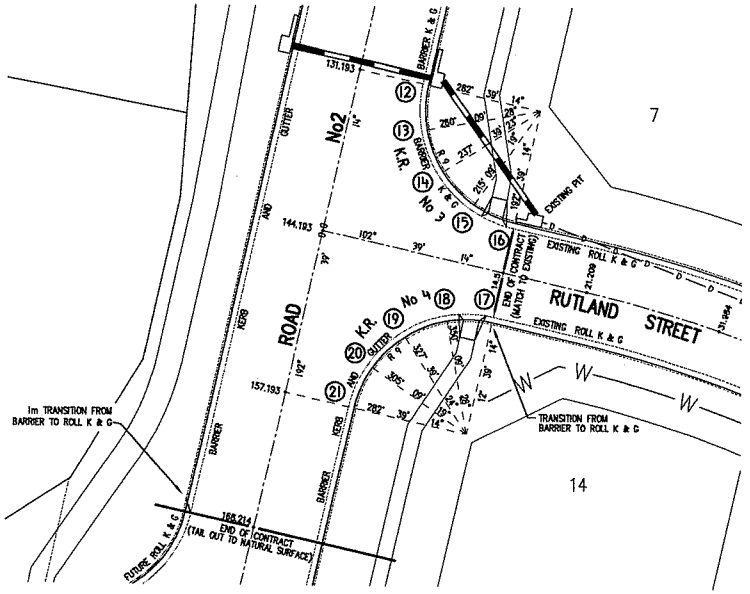
SCALE: HORIZONTAL 1:200 VERTICAL 1:20

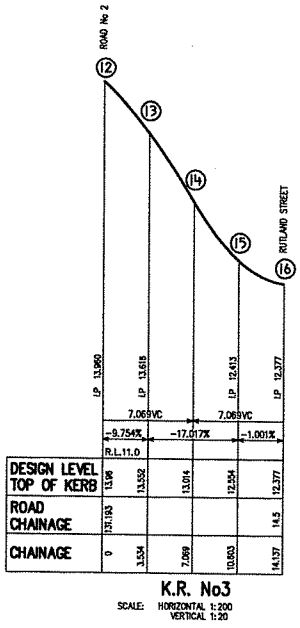


DESIGN LEVEL TOP OF KERB	24.878	24.918	24.881	25.002	24.99	24.87
ROAD CHAINAGE	227.868					
CHAINAGE	0	4.917	9.834	12.843	14.75	19.666	24.24

K.R. No2

SCALE: HORIZONTAL 1:200 VERTICAL 1:20

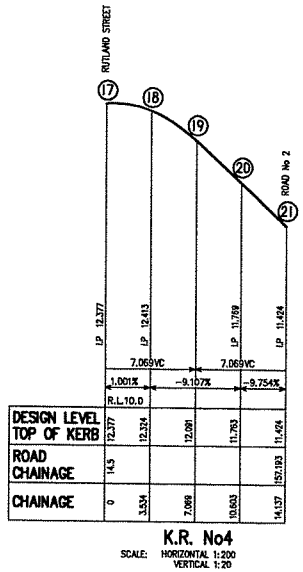




DESIGN LEVEL TOP OF KERB	13.96	13.552	13.014	12.554	12.377
ROAD CHAINAGE	131.193				14.5
CHAINAGE	0	3.534	7.069	10.603	14.137

K.R. No3

SCALE: HORIZONTAL 1:200 VERTICAL 1:20



DESIGN LEVEL TOP OF KERB	12.377	12.324	12.091	11.783	11.424
ROAD CHAINAGE	14.5				157.193
CHAINAGE	0	3.534	7.069	10.603	14.137

K.R. No4

SCALE: HORIZONTAL 1:200 VERTICAL 1:20

AMEND-MENT	DATE	AMENDMENT DETAILS	AUTHOR-ISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

CITY ENGINEER ——— DATE

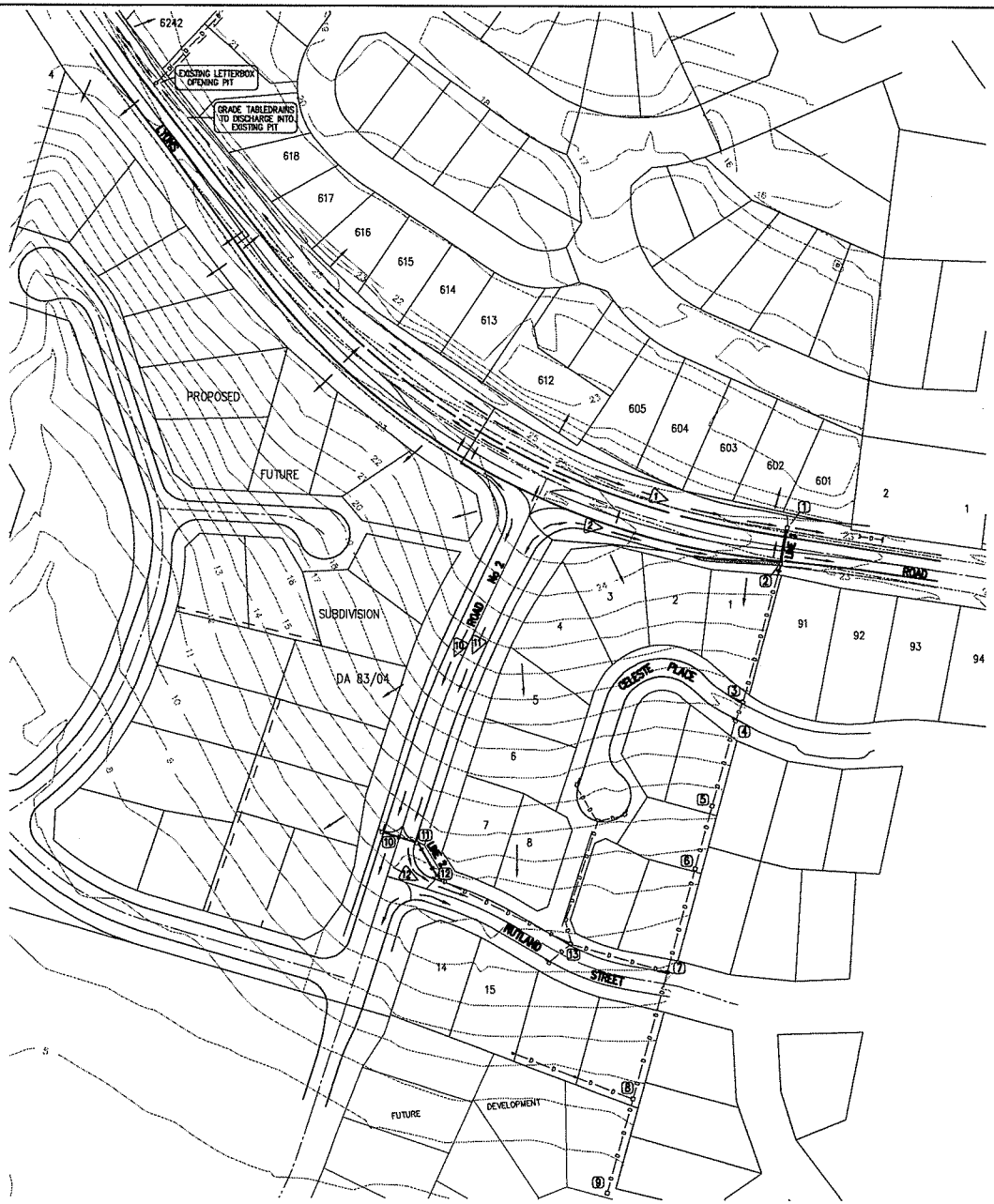
CONSULTING SURVEYORS | URBAN PLANNERS | PROJECT MANAGERS
Newnham Karl Weir
and Partners Pty Ltd
Incorporating A V Spyrou & Associates
5 Murdock Street Coffs Harbour 2450
Phone 02 6652 6630
Fax 02 6652 3064
ABN 21 100 904 783
ACN 100 904 783

SCALE: 1:200		SHEET SIZE A1 CAUTION DO NOT SCALE	PROJECT: SAWTELL PARK ESTATE SECTION 94 WORKS - LYONS ROAD INTERSECTION
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	TITLE: KERB RETURNS 1, 2 ,3 & 4 PLAN & LONG-SECTIONS
DATUM: PM76135 AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	

FILE No. 5237

SHEET 11 OF 18

COUNCIL DRAWING No.



AMENDMENT	DATE	AMENDMENT DETAILS	AUTHORISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

CITY ENGINEER DATE

CONSULTING SURVEYORS | URBAN PLANNERS | PROJECT MANAGERS
Newnham Karl Weir
and Partners Pty Ltd
Incorporating A V Spagnolo & Associates
5 Murdock Street Coffs Harbour 2450
Phone: 02 6652 6630
Fax: 02 6652 3064
ABN 21 100 904 783
ACN 100 904 783

SCALE: 1:800 CONTOUR INT: 1.0m		SHEET SIZE A1 CAUTION DO NOT SCALE
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.
DATUM: AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:

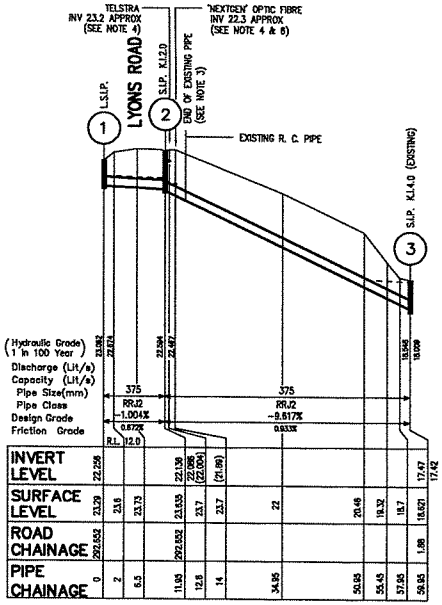
PROJECT: SAWTELL PARK ESTATE
SECTION 94 WORKS - LYONS ROAD INTERSECTION

FILE No. 5237

TITLE: CATCHMENT DIAGRAM

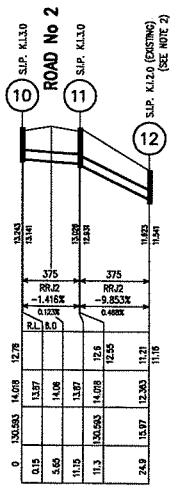
SHEET 12 OF 18

COUNCIL DRAWING No.



LINE.1

SCALE: HORIZONTAL 1:500
VERTICAL 1:100



LINE.2

SCALE: HORIZONTAL 1:500
VERTICAL 1:100

HYDROLOGICAL DESIGN SHEET

PIT	LAND USE	FLOW LENGTH	SLOPE	"n"	TIME	TIME	INTENSITY	CODE	COEFF	AREA	C.A	SUM AREA	Q	BY PASS	TOTAL FLOW	GUTTER SLOPE	FLOW WIDTH	PIT TYPE	LINTEL	INFLOW	BY FLOW	BY PIT	KINEMATIC MIN TIME 5 MAX TIME 20 SAWTELL REMARKS
		m	%		min	min	mm/h			ha	ha	ha	L/s	L/s	L/s	%	m		m	L/s	L/s		
10	1	2.5	4	0.210	1.090			-0.5	0.940	0.029	0.027												
	2	58	10		0.470	5	292 100Yr	-1	1.080	0.068	0.071	0.099	80		80	10	1.522	3	3	72 ADP	8		
11	1	2.5	4	0.210	1.090			-0.5	0.940	0.028	0.026												
	2	58	10		0.470	5	292 100Yr	-1	1.080	0.063	0.068	0.094	76		78	10	1.493	3	3	70 ADP	8	12	
12	1	2.5	4	0.210	1.029			-0.5	0.940	0.005	0.005												
	2	14	10		0.114	5	292 100Yr	-1	1.080	0.013	0.014	0.019	15	6	22	10	0.731	3	2	22		13	
13	1	80	10	0.210	8.520			-0.5	0.940	0.220	0.207												
	2	50	1		1.282	9.8	232 100Yr	-1	1.080	0.020	0.022	0.228	147	13	160	1	3.274	3	4	150 ADP	10	7	
1	1	3.5	25	0.210	0.811			-0.5	0.940	0.063	0.059												
	2	54	1		1.385	5	292 100Yr	-1	1.080	0.140	0.151	0.21	170		170	1	3.36	2		170		1	
2	1	2.5	4	0.210	1.117			-0.5	0.940	0.010	0.009												
	2	38	2		0.689	5	292 100Yr	-1	1.080	0.028	0.030	0.04	32		32	2	1.45	3	2	32			
3	1	45	9	0.210	5.788			-0.5	0.940	0.159	0.159												
	2					5.8	278 100Yr	-1	1.080	0.011	0.012	0.171	132		132	1	3.038	3	4	120 ADP	12		
4								-0.5	0.940	0.007	0.007												
						5 ADP	292 100Yr	-1	1.080	0.011	0.012	0.018	15		15	1	1.182	3	2	15			
5						5 ADP	292 100Yr	-1	1.080	0.014	0.015	0.015	12		12		9999	5		12		5	
6						5 ADP	292 100Yr	-1	1.080	0.014	0.015	0.015	12		12		9999	5		12		6	
7	1	40	8	0.210	5.813			-0.5	0.940	0.178	0.165												
	2	33	5		0.378	6	275 100Yr	-1	1.080	0.014	0.015	0.181	138	10	148	5	2.299	3	4	142 ADP	6		
8						5 ADP	292 100Yr	-1	1.080	0.052	0.056	0.056	45		45		9999	5		45		8	

HYDRAULIC DESIGN SHEET

PIT	TIME	INTENSITY	AREAS	FLOW	LENGTH	DIAMETER	GRADE	H.G.L. GRADE	VEL Q/A	K	HEAD LOSS	VEL CAP	PIPE VEL	PIPE CAP	PIPE TIME	C=C.W., N=MANNINGS MAX TIME 20 SAWTELL BY PASS=0 AREA=SUM.CA REMARKS
	min	mm/hr	ha	L/s	m	mm	%	%	m/s		m	m/s	m/s	L/s	min	
LINE 2 10-11	5	291 100Yr	0.099	72 ADP	11.3 C0.0006	381	1.416	0.123	0.632	5	0.102	2.193	1.64	250	0.11	
11-12	5.1	289 100Yr	0.193	142 ADP	13.6 C0.0006	381	9.853	0.468	1.246	1.2	0.095	5.784	3.96	659	0.06	
12-13	5.2	288 100Yr	0.212	162 ADP	48.5 C0.0006	381	1.758	0.608	1.421	0.8	0.082	2.443	2.28	279	0.36	
13-7	9.8	231 100Yr	0.847	529 ADP	33.5 C0.0006	534	5.718	1.091	2.362	1.8	0.512	5.442	4.65	1219	0.12	
LINE 1 1-2	5	291 100Yr	0.21	170	11.95 C0.0006	381	1.004	0.672	1.495	3.4	0.388	1.847	1.9	211	0.1	
2-3	5.1	289 100Yr	0.25	201	46 C0.0006	381	9.617	0.933	1.785	0.8	0.127	5.714	4.38	851	0.18	
3-4	5.8	278 100Yr	0.421	313 ADP	7.5 C0.0006	381	1.8	2.245	2.745	1.4	0.538	2.331	2.331	286	0.05	
4-5	5.8	277 100Yr	0.439	327 ADP	20 C0.0006	381	10.276	2.449	2.868	0.5	0.21	5.907	5.22	673	0.09	
5-6	5.9	275 100Yr	0.454	337 ADP	21.5 C0.0006	381	9.907	2.6	2.956	0.5	0.223	5.8	5.2	661	0.07	
6-7	6	274 100Yr	0.469	347 ADP	33.5 C0.0006	381	10.324	2.758	3.044	0.5	0.236	5.921	5.32	675	0.11	
7-8	9.9	230 100Yr	1.497	936 ADP	44 C0.0006	610	6.136	1.694	3.203	1.7	0.89	6.126	5.54	1790	0.13	
8-9	10.1	229 100Yr	1.553	967 ADP	32.5 C0.0006	610	4.4	1.807	3.309	0.5	0.279	5.187	4.98	1516	0.11	

NOTES

1. PIT AND NATURAL SURFACE LEVELS MAY BE COMPUTER GENERATED FROM THE DIGITAL TERRAIN MODEL. ALL LEVELS MUST BE CHECKED IF THEY ARE TO BE USED FOR CONSTRUCTION SET OUT.
2. BREAK INTO EXISTING PIT 12 CONNECT AND MAKE GOOD.
3. LOCATE AND EXTEND EXISTING SECTION OF LINE 1 AT ROAD BOUNDARY TO PIT 2. THE INVERT LEVEL AND LONGITUDINAL GRADE OF THE EXISTING DRAINAGE LINE HAS BEEN CALCULATED FROM WORK AS EXECUTED DRAWINGS AND MUST BE CHECKED BEFORE THE START OF CONSTRUCTION.
4. THE LOCATION OF THE TELSTRA CABLE AND "NEXTGEN" OPTIC FIBRE CABLE ARE APPROXIMATE ONLY AND ARE TO BE RELOCATED BY THE CONTRACTOR PRIOR TO THE WORKS COMMENCING.
5. THE LOCATION OF THE EXISTING #200 D.I.C.L. WATER MAIN IS APPROXIMATE ONLY AND WILL NEED TO BE LOCATED PRIOR TO CONSTRUCTION OF LINE 1 AND PIT 1.
6. IT IS THE CONTRACTORS RESPONSIBILITY TO ACCURATELY DETERMINE THE LOCATION AND LEVEL OF THE "NEXTGEN" OPTIC FIBRE CABLE AND LOCATING STRIP IF IT IS LIKELY TO BE AFFECTED BY THE WORKS. THE CONTRACTOR MUST NOTIFY "VISIONSTREAM" OF ANY PROPOSED WORKS IN THE VICINITY OF THE CABLE (SUCH AS PIPE CROSSINGS, WATER, ETC.) PRIOR TO THOSE WORKS BEING COMMENCED. ANY DAMAGE TO THE OPTIC FIBRE CABLE AND/OR LOCATING STRIP SHALL BE MADE GOOD AT NO COST TO THE PROPRIETOR.

AMENDMENT	DATE	AMENDMENT DETAILS	AUTHORISED BY

CLIENT: COFFS HARBOUR CITY COUNCIL

APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL

CITY ENGINEER ——— DATE

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SCALE:	AS SHOWN	SHEET SIZE A1 CAUTION DO NOT SCALE
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.
DATUM: AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:

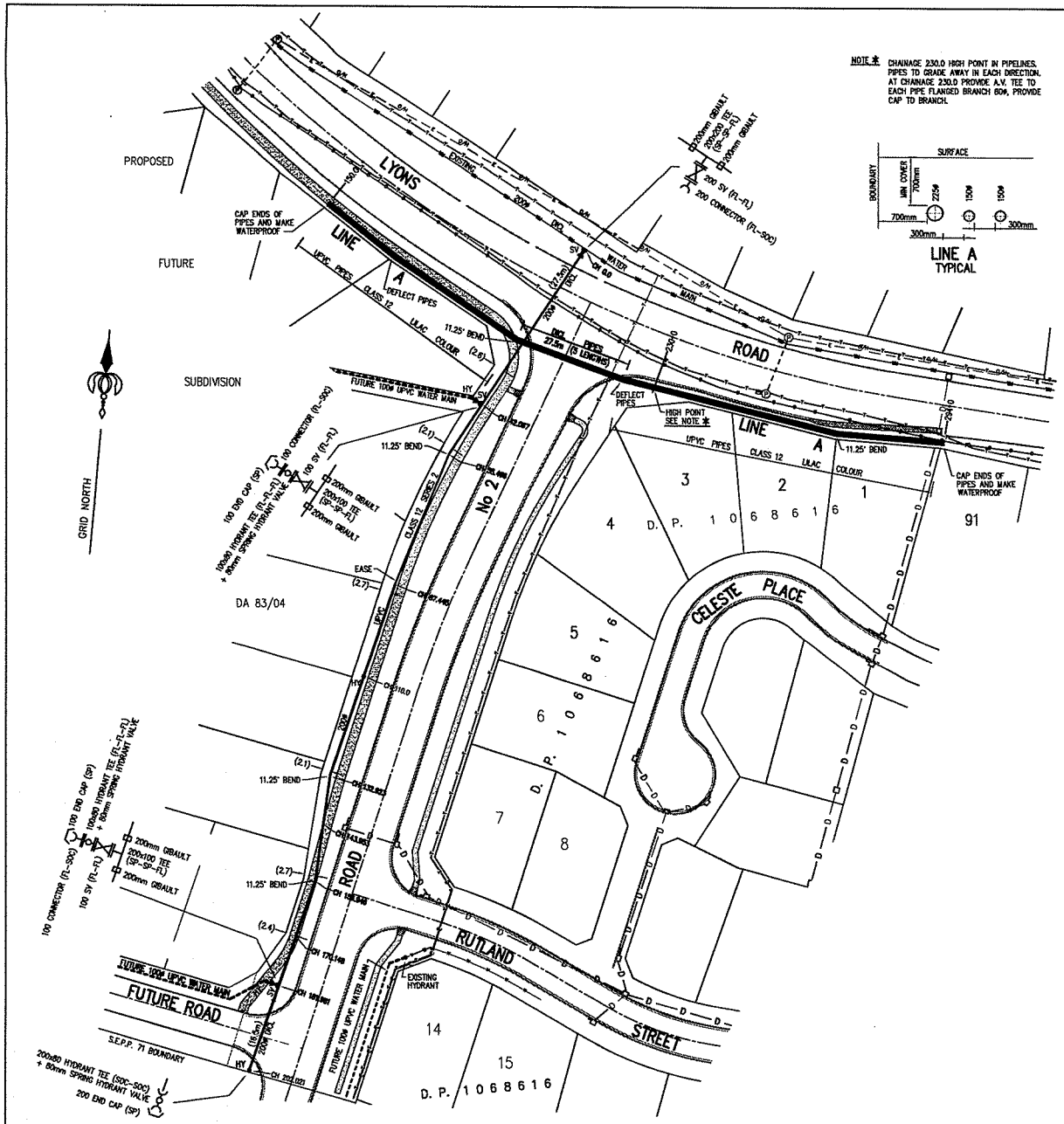
PROJECT: SAWTELL PARK ESTATE
SECTION 94 WORKS - LYONS ROAD INTERSECTION

TITLE: DRAINAGE CALCULATIONS & LONG-SECTIONS LINES 1 & 2

FILE No. 5237

SHEET 13 OF 18

COUNCIL DRAWING No.



NOTES WATER RETICULATION

1. ALL WATER SERVICE CONNECTIONS TO BE CONSTRUCTED AS PER COFFS HARBOUR CITY COUNCIL STANDARD DRAWING No. 2030901.
2. WATER MAINS TO BE LAID TRUE TO GRADE AT 2.4 METRE ALIGNMENT FROM BOUNDARY UNLESS NOTED OTHERWISE.
3. WATER MAINS AROUND CURVED BOUNDARIES TO BE LOCATED BETWEEN 2.1 AND 2.75 METRE ALIGNMENT.
4. PIPES TO BE LAID IN FULL (6 METRE) LENGTHS USING BENDS AND A MAXIMUM DEFLECTION ANGLE OF 3 DEGREES.
5. MINIMUM DEPTH OF COVER TO BE 600 mm OVER PIPE COLLARS.
6. DUCTILE IRON CEMENT LINED ROAD CROSSINGS TO EXTEND 300 mm BEHIND KERB FACE.
7. WATER MAINS TO BE LAID SUCH THAT STORMWATER LINES ARE AVOIDED.
8. "W" TO BE STAMPED ON KERB DIRECTLY ABOVE WATER MAIN ROAD CROSSINGS.
9. STOP VALVES TO HAVE ANTI-CLOCKWISE CLOSING SPINDLES TO CONFORM TO BS 1218 CLASS 1.
10. DISTANCE BETWEEN FINISHED SURFACE AND VALVE SPINDLE TO BE 200-300 mm.
11. DISTANCE BETWEEN FINISHED SURFACE AND TOP OF HYDRANT BALL TO BE 200-300 mm.
12. EACH VALVE AND HYDRANT TO HAVE A WHITE POST AND MARKER PLATE.
13. VALVE COVERS TO BE PAINTED WHITE AND KERBS ADJACENT TO VALVES TO BE MARKED WITH WHITE PAINT.
14. HYDRANT COVERS TO BE PAINTED YELLOW AND KERBS ADJACENT TO HYDRANTS TO BE MARKED WITH YELLOW PAINT.
15. EACH HYDRANT TO BE MARKED WITH A BLUE DELINEATOR SET IN ROAD SURFACE AND 300mm OFF ROAD CENTRELINE ON HYDRANT SIDE.
16. CONNECTIONS TO EXISTING MAINS ARE TO BE MADE BY CONTRACTOR UNDER COUNCIL SUPERVISION AND AT CONTRACTORS COST.
17. ELECTRICAL AND WATER CONDUITS ARE TO BE AT OPPOSITE BOUNDARIES ON EACH LOT.
18. ALL GALVANISED BOLTS, NUTS ON GIBAULTS AND HYDRANTS ETC. ARE TO BE DENSO WRAPPED OR STAINLESS STEEL.
19. UPVC PIPE IS TO BE CLASS 12 RRJ THICK WALLED DUCTILE IRON COMPATIBLE TO AS 2032.
20. CONCRETE TO HAVE MINIMUM COMPRESSIVE STRENGTH OF 10 MPa AT 28 DAYS.

LEGEND:

- PROPOSED FUTURE EXTENSION
- EXISTING WATER MAIN
- WATER RETICULATION EXTENSION 200mm DIA. UPVC (SEE NOTE 19) UNLESS NOTED OTHERWISE
- STORM WATER DRAINAGE
- EXISTING OVERHEAD POWER
- EXISTING U/G POWER
- NEXTGEN U/G OPTIC FIBRE CABLE (APPROXIMATE LOCATION)
- EXISTING U/G TELSTRA
- HY HYDRANT
- SV STOP VALVE

AMEND-MENT	DATE	AMENDMENT DETAILS	AUTHOR-ISED BY

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DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	
DATUM: PM76135 AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	

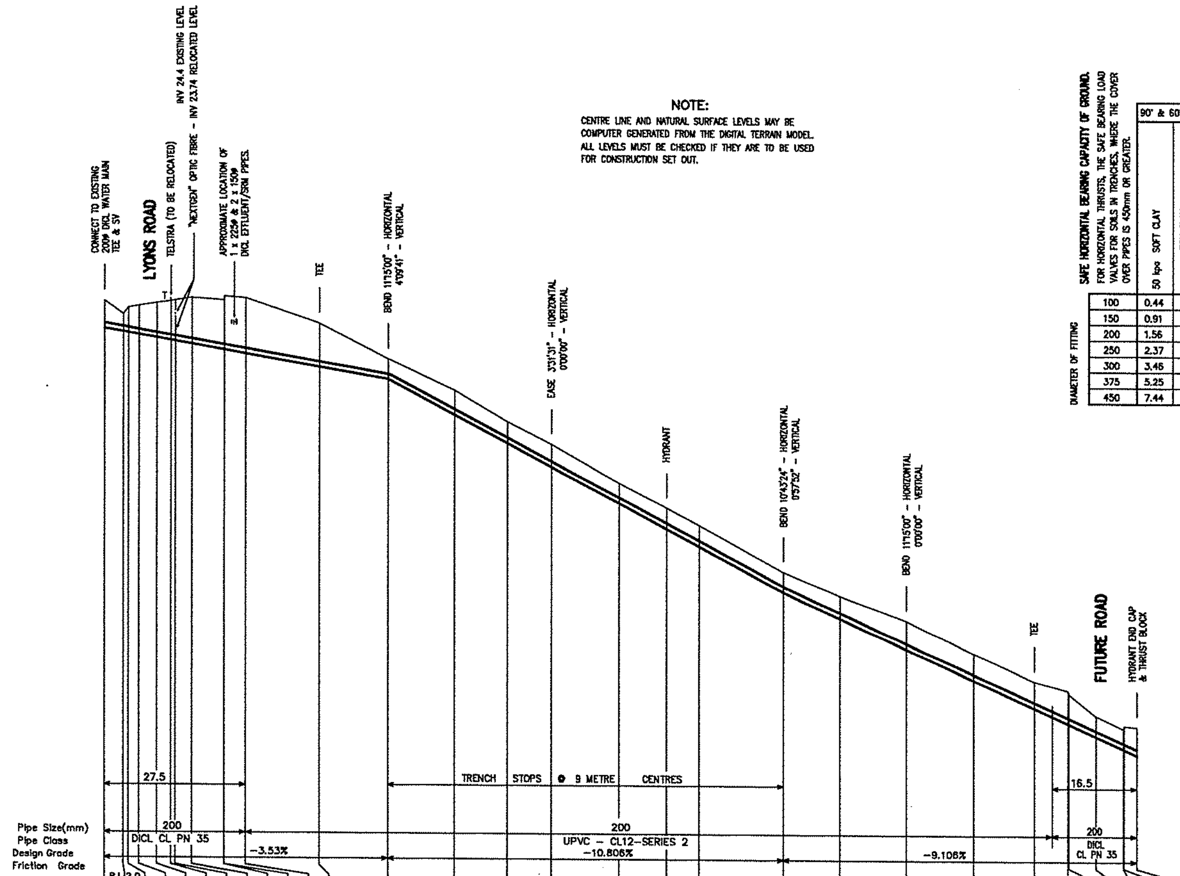
PROJECT: SAWTELL PARK ESTATE
SECTION 94 WORKS - LYONS ROAD INTERSECTION

TITLE: WATER RETICULATION PLAN

FILE No. 5237

SHEET 14 OF 18

COUNCIL DRAWING No.



NOTE:
CENTRE LINE AND NATURAL SURFACE LEVELS MAY BE COMPUTER GENERATED FROM THE DIGITAL TERRAIN MODEL. ALL LEVELS MUST BE CHECKED IF THEY ARE TO BE USED FOR CONSTRUCTION SET OUT.

Pipe Size(mm)	Pipe Class	Design Grade
200	DICL CL PN 35	-3.53%
200	UPVC - CL12-SERIES 2	-10.806%
		-9.106%
200	DICL CL PN 35	

Friction Grade — R.L. 2.0

PIPE CHAINAGE	INVERT LEVEL	SURFACE LEVEL	DEPTH TO INVERT
0	23.82	24.919	1.099
3.7		24.39	
4.7		24.84	
6.72		24.72	
10.22		24.83	
12.98		24.91	
13.9	23.329	24.94	1.611
17.09		25.04	
23.4		24.95	
23.45		25.1	
27.631		25.042	
42.087	22.335	24.058	1.723
55.466	21.862	22.662	0.8
68.488		21.437	
78.823		20.206	
87.445	18.406	19.317	0.911
100.682		17.797	
110.0	15.969	16.81	0.841
116.393		16.133	
132.923	13.492	14.292	0.8
143.954		13.388	
156.946	11.305	12.408	1.103
170.148		11.165	
181.981	9.025	10.066	1.041
188.58		9.71	
188.73		9.6	
194.05		8.74	
199.41	7.438	8.24	0.802
199.56		8.35	
202.021	7.2	8.311	1.111

PROPOSED 200ϕ WATER MAIN

SCALE: HORIZONTAL 1:500
VERTICAL 1:100

HOR. DIST.	& BEARING
42.067	208° 20' 17"
13.399	
31.979	197° 05' 17"
45.478	193° 33' 46"
24.023	182° 49' 52"
25.035	194° 04' 52"
20.04	

MINIMUM THRUST AREA FOR ANCHORAGE IN SQUARE METRES WITH TEST PRESSURE 1300 kpa (NOM. 130m - HEAD)

SAFE HORIZONTAL BEARING CAPACITY OF GROUND. FOR HORIZONTAL THRUSTS, THE SAFE BEARING LOAD VALUES FOR SOILS IN TRENCHES, WHERE THE COVER OVER PIPES IS 450mm OR GREATER.

DIAMETER OF FITTING	90° & 60° HORIZONTAL BENDS				45° & 30° HORIZONTAL BENDS				22 1/2° HORIZONTAL BENDS				11 1/4° HORIZONTAL BENDS				TEES & DEAD ENDS			
	50 kpa SOFT CLAY	100 kpa FIRM CLAY SANDY LOAM	150 kpa SAND & GRAVEL HARD CLAY	200 kpa SAND & GRAVEL CEMENTED WITH CLAY	50 kpa SOFT CLAY	100 kpa FIRM CLAY SANDY LOAM	150 kpa SAND & GRAVEL HARD CLAY	200 kpa SAND & GRAVEL CEMENTED WITH CLAY	50 kpa SOFT CLAY	100 kpa FIRM CLAY SANDY LOAM	150 kpa SAND & GRAVEL HARD CLAY	200 kpa SAND & GRAVEL CEMENTED WITH CLAY	50 kpa SOFT CLAY	100 kpa FIRM CLAY SANDY LOAM	150 kpa SAND & GRAVEL HARD CLAY	200 kpa SAND & GRAVEL CEMENTED WITH CLAY	50 kpa SOFT CLAY	100 kpa FIRM CLAY SANDY LOAM	150 kpa SAND & GRAVEL HARD CLAY	200 kpa SAND & GRAVEL CEMENTED WITH CLAY
100	0.44	0.22	0.15	0.11	0.23	0.12	N	N	0.13	N	N	N	N	N	N	N	0.31	0.16	0.11	N
150	0.91	0.46	0.30	0.23	0.49	0.25	0.16	0.12	0.26	0.13	0.09	N	0.13	N	N	N	0.65	0.33	0.22	0.16
200	1.56	0.78	0.52	0.39	0.83	0.42	0.28	0.21	0.44	0.22	0.15	0.11	0.21	0.10	N	N	1.09	0.55	0.36	0.27
250	2.37	1.18	0.79	0.59	1.27	0.64	0.42	0.32	0.65	0.33	0.22	0.16	0.34	0.17	0.11	N	1.66	0.83	0.55	0.42
300	3.46	1.73	1.15	0.86	1.87	0.94	0.62	0.47	0.96	0.48	0.32	0.24	0.47	0.23	0.16	0.12	2.44	1.22	0.81	0.61
375	5.25	2.63	1.75	1.31	2.83	1.42	0.94	0.71	1.46	0.73	0.49	0.36	0.73	0.36	0.24	0.18	3.72	1.86	1.24	0.93
450	7.44	3.72	2.48	1.86	4.03	2.02	1.34	1.01	2.05	1.03	0.68	0.51	1.04	0.52	0.35	0.26	5.25	2.63	1.75	1.31

MATERIALS LIST

QTY	DESCRIPTION
6	200ϕ GIBAULT
1	200 x 200 TEE (SP-SP-FL)
1	200 SV (FL-FL)
1	200 CONNECTOR (FL-SOC)
2	200 x 100 TEE (SP-SP-FL)
2	100 SV (FL-FL)
2	100 x 80 HYDRANT TEE (FL-FL-FL)
4	80mm SPRING HYDRANT VALVE
3	STOPVALVE COVER BOX & SURROUNDS
4	HYDRANT COVER BOX & SURROUNDS
2	100 CONNECTOR (FL-SOC)
2	100 END CAP (SP)
3	200mm 11.25° BEND (SOC-SOC)
2	200 x 80 HYDRANT TEE (SOC-SOC)
158m	200mmϕ UPVC PIPE CL 12 SERIES 2
44m	200mmϕ DICL CLASS PN 35
8	TRENCH STOPS
1	200 END CAP (SP)

AMENDMENT	DATE	AMENDMENT DETAILS	AUTHORISED BY

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APPROVED ON BEHALF OF COFFS HARBOUR CITY COUNCIL
CITY ENGINEER .... DATE ....

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SCALE: AS SHOWN | SHEET SIZE A1 CAUTION DO NOT SCALE
DATE: JUNE 2007 | SURVEYED: DA/ATH | DRAWN: N.S.
DATUM: AHD. PLANE GRID | DESIGNED: H.K. | CHECKED:

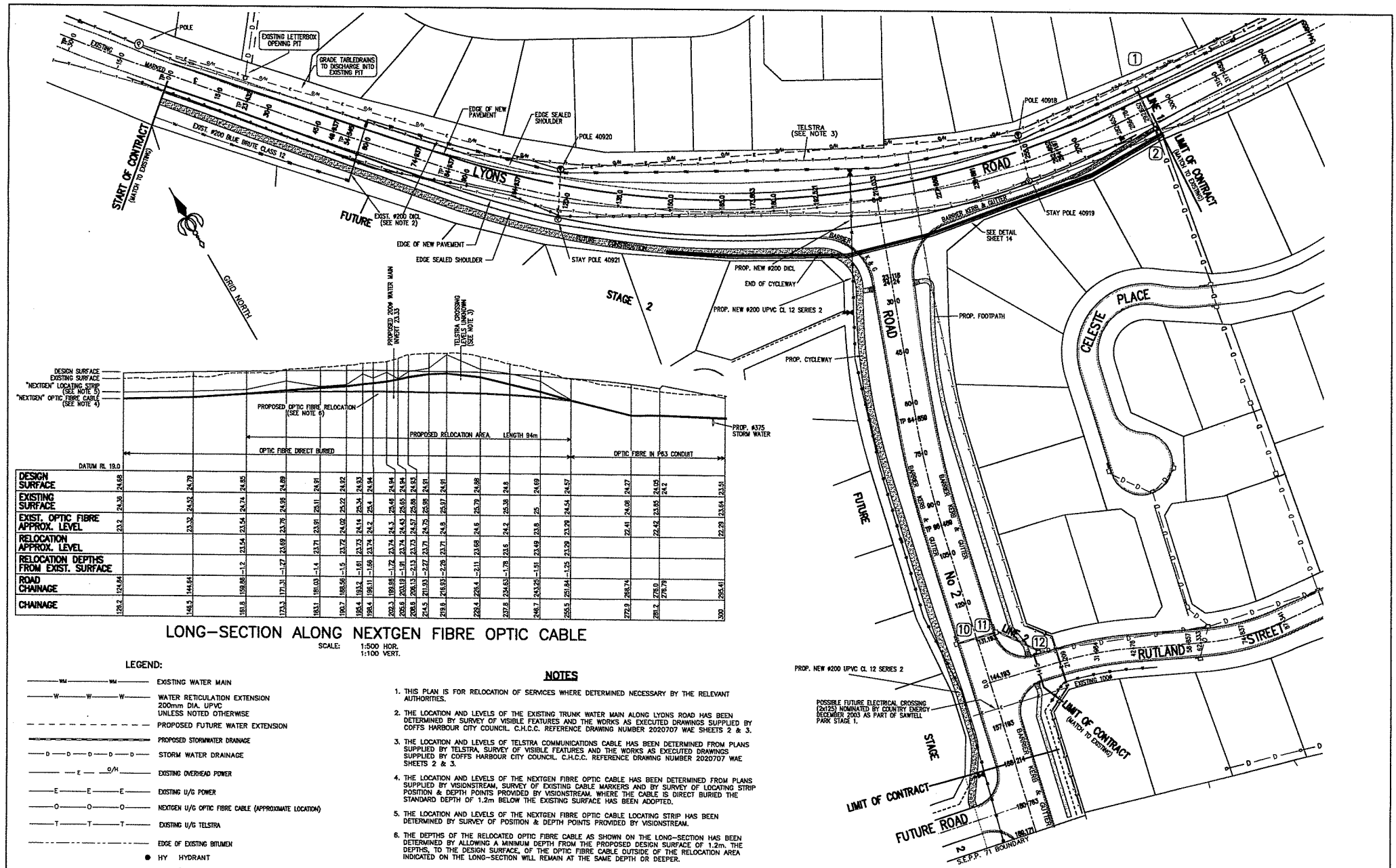
PROJECT: SAWTELL PARK ESTATE SECTION 94 WORKS - LYONS ROAD INTERSECTION

TITLE: WATER RETICULATION LONG SECTION

FILE No. 5237

SHEET 15 OF 18

COUNCIL DRAWING No.



LONG–SECTION ALONG NEXTGEN FIBRE OPTIC CABLE

SCALE: 1:500 HOR.
1:100 VERT.

LEGEND:

- EXISTING WATER MAIN
- WATER RETICULATION EXTENSION 200mm DIA. UPVC UNLESS NOTED OTHERWISE
- PROPOSED FUTURE WATER EXTENSION
- PROPOSED STORMWATER DRAINAGE
- STORM WATER DRAINAGE
- EXISTING OVERHEAD POWER
- EXISTING U/G POWER
- NEXTGEN U/G OPTIC FIBRE CABLE (APPROXIMATE LOCATION)
- EXISTING U/G TELSTRA
- EDGE OF EXISTING BITUMEN
- HY HYDRANT
- SV STOP VALVE

NOTES

1. THIS PLAN IS FOR RELOCATION OF SERVICES WHERE DETERMINED NECESSARY BY THE RELEVANT AUTHORITIES.
2. THE LOCATION AND LEVELS OF THE EXISTING TRUNK WATER MAIN ALONG LYONS ROAD HAS BEEN DETERMINED BY SURVEY OF VISIBLE FEATURES AND THE WORKS AS EXECUTED DRAWINGS SUPPLIED BY COFFS HARBOUR CITY COUNCIL. C.H.C.C. REFERENCE DRAWING NUMBER 2020707 WAE SHEETS 2 & 3.
3. THE LOCATION AND LEVELS OF TELSTRA COMMUNICATIONS CABLE HAS BEEN DETERMINED FROM PLANS SUPPLIED BY TELSTRA, SURVEY OF VISIBLE FEATURES AND THE WORKS AS EXECUTED DRAWINGS SUPPLIED BY COFFS HARBOUR CITY COUNCIL. C.H.C.C. REFERENCE DRAWING NUMBER 2020707 WAE SHEETS 2 & 3.
4. THE LOCATION AND LEVELS OF THE NEXTGEN FIBRE OPTIC CABLE HAS BEEN DETERMINED FROM PLANS SUPPLIED BY VISIONSTREAM, SURVEY OF EXISTING CABLE MARKERS AND BY SURVEY OF LOCATING STRIP POSITION & DEPTH POINTS PROVIDED BY VISIONSTREAM. WHERE THE CABLE IS DIRECT BURIED THE STANDARD DEPTH OF 1.2m BELOW THE EXISTING SURFACE HAS BEEN ADOPTED.
5. THE LOCATION AND LEVELS OF THE NEXTGEN FIBRE OPTIC CABLE LOCATING STRIP HAS BEEN DETERMINED BY SURVEY OF POSITION & DEPTH POINTS PROVIDED BY VISIONSTREAM.
6. THE DEPTHS OF THE RELOCATED OPTIC FIBRE CABLE AS SHOWN ON THE LONG–SECTION HAS BEEN DETERMINED BY ALLOWING A MINIMUM DEPTH FROM THE PROPOSED DESIGN SURFACE OF 1.2m. THE DEPTHS, TO THE DESIGN SURFACE, OF THE OPTIC FIBRE CABLE OUTSIDE OF THE RELOCATION AREA INDICATED ON THE LONG–SECTION WILL REMAIN AT THE SAME DEPTH OR DEEPER.

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CITY ENGINEER ——— DATE ———

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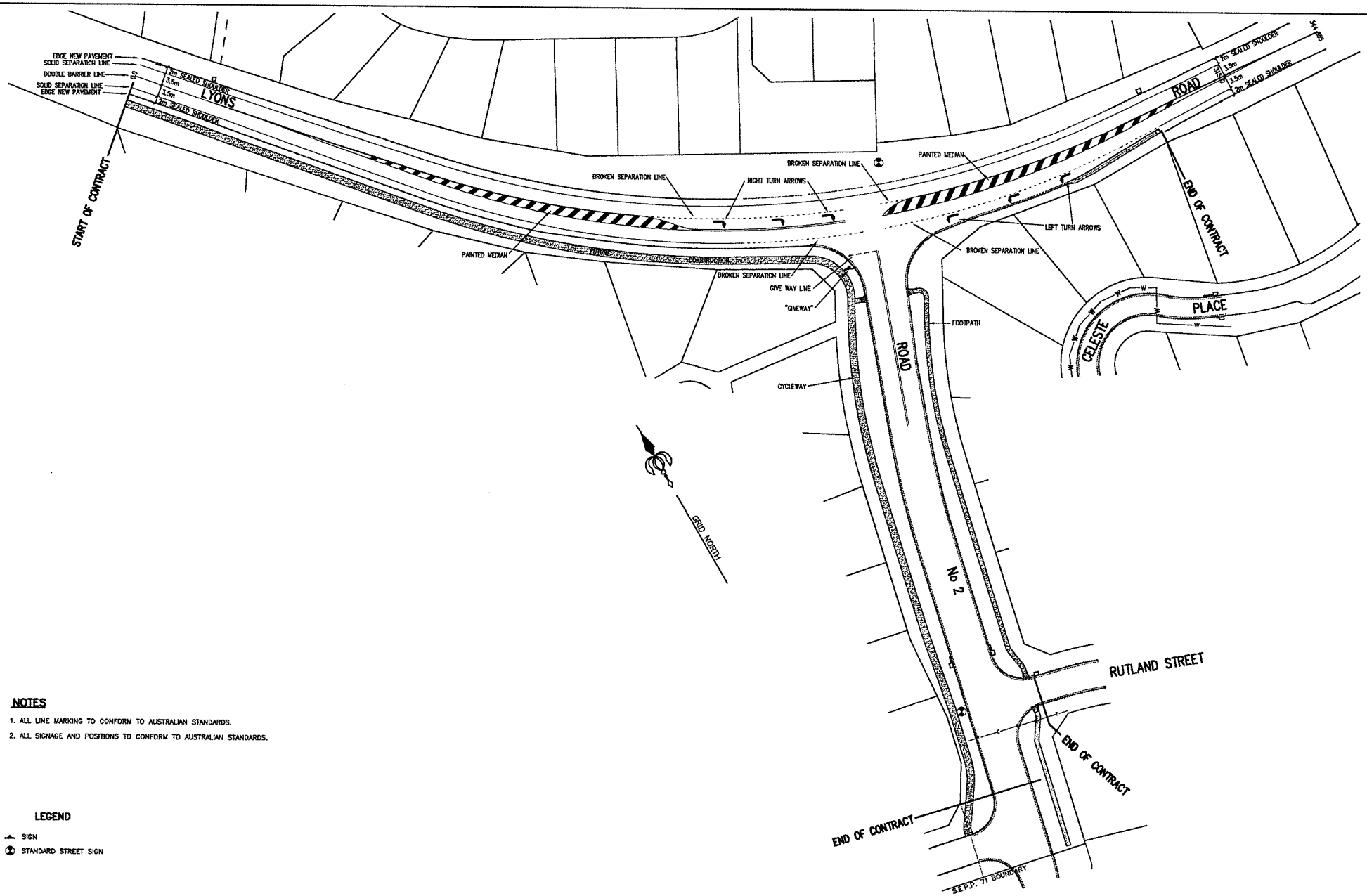
SCALE: 1:500		SHEET SIZE A1 CAUTION DO NOT SCALE	PROJECT: SAWTELL PARK ESTATE SECTION 94 WORKS - LYONS ROAD INTERSECTION
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	TITLE: SERVICES LAYOUT PLAN
DATUM: AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	

FILE No. 5237
SHEET 16 OF 18
COUNCIL DRAWING No.



NOTES

1. ALL LINE MARKING TO CONFORM TO AUSTRALIAN STANDARDS.
2. ALL SIGNAGE AND POSITIONS TO CONFORM TO AUSTRALIAN STANDARDS.

LEGEND

- SIGN
- STANDARD STREET SIGN

AMENDMENT	DATE	AMENDMENT DETAILS	AUTHORISED BY

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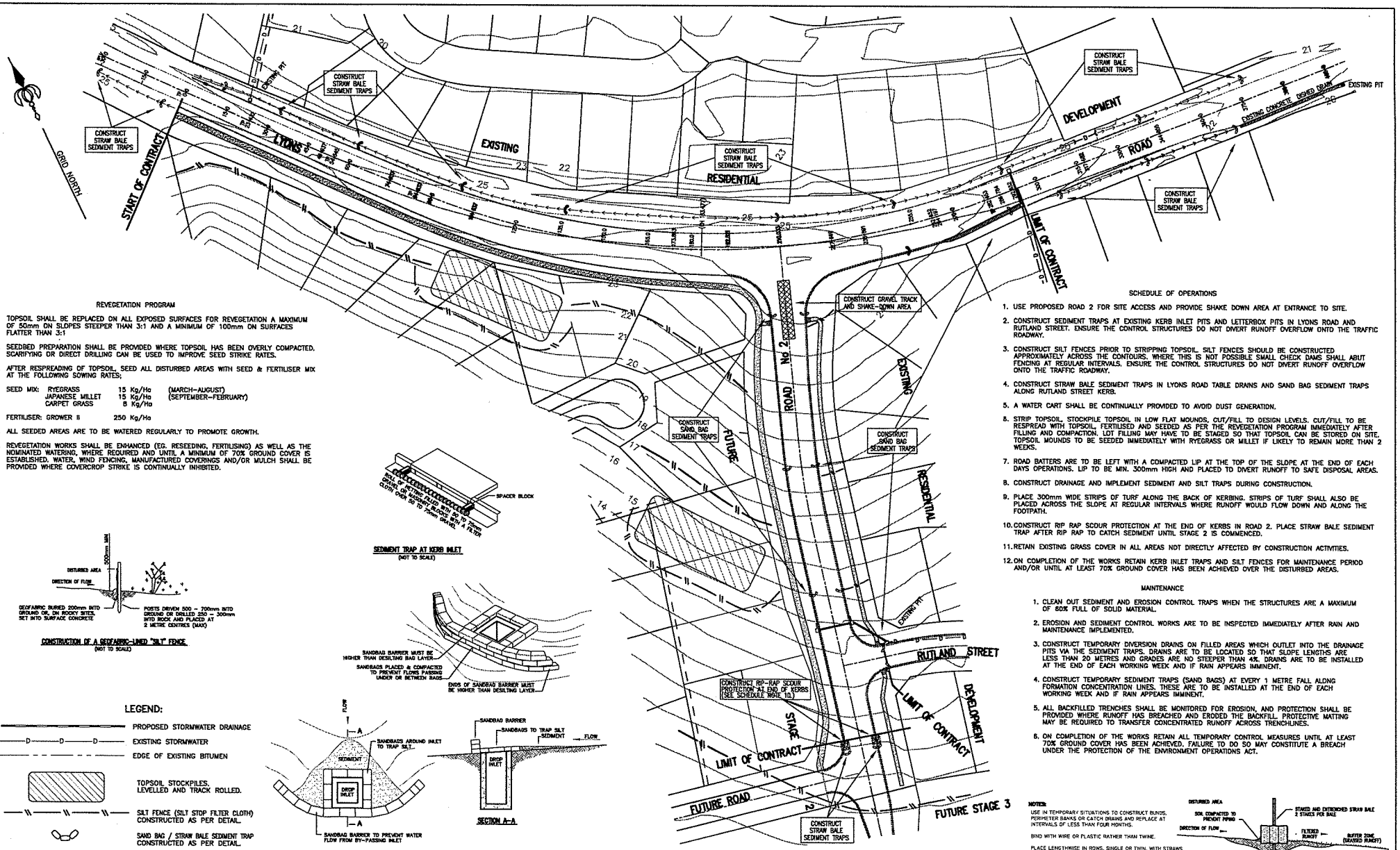
SCALE: 1:500		SHEET SIZE A1 CAUTION DO NOT SCALE	PROJECT: SAWTELL PARK ESTATE SECTION 94 WORKS - LYONS ROAD INTERSECTION
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	TITLE: LINE MARKING AND SIGNAGE PLAN
DATUM: PM76135 AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	FILE No. 5237 / SHEET 17 OF 18 / COUNCIL DRAWING No.



REVEGETATION PROGRAM

1. TOPSOIL SHALL BE REPLACED ON ALL EXPOSED SURFACES FOR REVEGETATION A MAXIMUM OF 50mm ON SLOPES STEEPER THAN 3:1 AND A MINIMUM OF 100mm ON SURFACES FLATTER THAN 3:1
2. SEEDBED PREPARATION SHALL BE PROVIDED WHERE TOPSOIL HAS BEEN OVERLY COMPACTED. SCARIFYING OR DIRECT DRILLING CAN BE USED TO IMPROVE SEED STRIKE RATES.
3. AFTER RESPREADING OF TOPSOIL, SEED ALL DISTURBED AREAS WITH SEED & FERTILISER MIX AT THE FOLLOWING SOWING RATES;

SEED MIX:	RYEGRASS	15 Kg/Ha	(MARCH–AUGUST)
	JAPANESE MILLET	15 Kg/Ha	(SEPTEMBER–FEBRUARY)
	CARPET GRASS	8 Kg/Ha	
FERTILISER:	GROWER II	250 Kg/Ha	

4. ALL SEEDED AREAS ARE TO BE WATERED REGULARLY TO PROMOTE GROWTH.
5. REVEGETATION WORKS SHALL BE ENHANCED (EG. RESEEDING, FERTILISING) AS WELL AS THE NOMINATED WATERING, WHERE REQUIRED AND UNTIL A MINIMUM OF 70% GROUND COVER IS ESTABLISHED. WATER, WIND FENCING, MANUFACTURED COVERINGS AND/OR MULCH SHALL BE PROVIDED WHERE COVERCROP STRIKE IS CONTINUALLY INHIBITED.

LEGEND:

- PROPOSED STORMWATER DRAINAGE
- EXISTING STORMWATER
- EDGE OF EXISTING BITUMEN
- TOPSOIL STOCKPILES. LEVELLED AND TRACK ROLLED.
- SILT FENCE (SILT STOP FILTER CLOTH) CONSTRUCTED AS PER DETAIL.
- SAND BAG / STRAW BALE SEDIMENT TRAP CONSTRUCTED AS PER DETAIL.
- GRAVEL TRACK AND SHAKE-DOWN AREA. 20m LONG x 4m WIDE x 200mm THICK.

SCHEDULE OF OPERATIONS

1. USE PROPOSED ROAD 2 FOR SITE ACCESS AND PROVIDE SHAKE DOWN AREA AT ENTRANCE TO SITE.
2. CONSTRUCT SEDIMENT TRAPS AT EXISTING KERB INLET PITS AND LETTERBOX PITS IN LYONS ROAD AND RUTLAND STREET. ENSURE THE CONTROL STRUCTURES DO NOT DIVERT RUNOFF OVERFLOW ONTO THE TRAFFIC ROADWAY.
3. CONSTRUCT SILT FENCES PRIOR TO STRIPPING TOPSOIL. SILT FENCES SHOULD BE CONSTRUCTED APPROXIMATELY ACROSS THE CONTOURS. WHERE THIS IS NOT POSSIBLE SMALL CHECK DAMS SHALL ABUT FENCING AT REGULAR INTERVALS. ENSURE THE CONTROL STRUCTURES DO NOT DIVERT RUNOFF OVERFLOW ONTO THE TRAFFIC ROADWAY.
4. CONSTRUCT STRAW BALE SEDIMENT TRAPS IN LYONS ROAD TABLE DRAINS AND SAND BAG SEDIMENT TRAPS ALONG RUTLAND STREET KERB.
5. A WATER CART SHALL BE CONTINUALLY PROVIDED TO AVOID DUST GENERATION.
6. STRIP TOPSOIL, STOCKPILE TOPSOIL IN LOW FLAT MOUNDS, CUT/FILL TO DESIGN LEVELS. CUT/FILL TO BE RESPREAD WITH TOPSOIL, FERTILISED AND SEEDED AS PER THE REVEGETATION PROGRAM IMMEDIATELY AFTER FILLING AND COMPACTION. LOT FILLING MAY HAVE TO BE STAGED SO THAT TOPSOIL CAN BE STORED ON SITE. TOPSOIL MOUNDS TO BE SEEDED IMMEDIATELY WITH RYEGRASS OR MILLET IF LIKELY TO REMAIN MORE THAN 2 WEEKS.
7. ROAD BATTERS ARE TO BE LEFT WITH A COMPACTED LIP AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS OPERATIONS. LIP TO BE MIN. 300mm HIGH AND PLACED TO DIVERT RUNOFF TO SAFE DISPOSAL AREAS.
8. CONSTRUCT DRAINAGE AND IMPLEMENT SEDIMENT AND SILT TRAPS DURING CONSTRUCTION.
9. PLACE 300mm WIDE STRIPS OF TURF ALONG THE BACK OF KERBING. STRIPS OF TURF SHALL ALSO BE PLACED ACROSS THE SLOPE AT REGULAR INTERVALS WHERE RUNOFF WOULD FLOW DOWN AND ALONG THE FOOTPATH.
10. CONSTRUCT RIP RAP SCOUR PROTECTION AT THE END OF KERBS IN ROAD 2. PLACE STRAW BALE SEDIMENT TRAP AFTER RIP RAP TO CATCH SEDIMENT UNTIL STAGE 2 IS COMMENCED.
11. RETAIN EXISTING GRASS COVER IN ALL AREAS NOT DIRECTLY AFFECTED BY CONSTRUCTION ACTIVITIES.
12. ON COMPLETION OF THE WORKS RETAIN KERB INLET TRAPS AND SILT FENCES FOR MAINTENANCE PERIOD AND/OR UNTIL AT LEAST 70% GROUND COVER HAS BEEN ACHIEVED OVER THE DISTURBED AREAS.

MAINTENANCE

1. CLEAN OUT SEDIMENT AND EROSION CONTROL TRAPS WHEN THE STRUCTURES ARE A MAXIMUM OF 60% FULL OF SOLID MATERIAL.
2. EROSION AND SEDIMENT CONTROL WORKS ARE TO BE INSPECTED IMMEDIATELY AFTER RAIN AND MAINTENANCE IMPLEMENTED.
3. CONSTRUCT TEMPORARY DIVERSION DRAINS ON FILLED AREAS WHICH OUTLET INTO THE DRAINAGE PITS VIA THE SEDIMENT TRAPS. DRAINS ARE TO BE LOCATED SO THAT SLOPE LENGTHS ARE LESS THAN 20 METRES AND GRADES ARE NO STEEPER THAN 4%. DRAINS ARE TO BE INSTALLED AT THE END OF EACH WORKING WEEK AND IF RAIN APPEARS IMMINENT.
4. CONSTRUCT TEMPORARY SEDIMENT TRAPS (SAND BAGS) AT EVERY 1 METRE FALL ALONG FORMATION CONCENTRATION LINES. THESE ARE TO BE INSTALLED AT THE END OF EACH WORKING WEEK AND IF RAIN APPEARS IMMINENT.
5. ALL BACKFILLED TRENCHES SHALL BE MONITORED FOR EROSION, AND PROTECTION SHALL BE PROVIDED WHERE RUNOFF HAS BREACHED AND ERODED THE BACKFILL. PROTECTIVE MATTING MAY BE REQUIRED TO TRANSFER CONCENTRATED RUNOFF ACROSS TRENCHLINES.
6. ON COMPLETION OF THE WORKS RETAIN ALL TEMPORARY CONTROL MEASURES UNTIL AT LEAST 70% GROUND COVER HAS BEEN ACHIEVED. FAILURE TO DO SO MAY CONSTITUTE A BREACH UNDER THE PROTECTION OF THE ENVIRONMENT OPERATIONS ACT.

NOTES:
USE IN TEMPORARY SITUATIONS TO CONSTRUCT BUNDS, PERIMETER BANKS OR CATCH DRAINS AND REPLACE AT INTERVALS OF LESS THAN FOUR MONTHS.
BIND WITH WIRE OR PLASTIC RATHER THAN TWINE.
PLACE LENGTHWISE IN ROWS, SINGLE OR TWIN, WITH STRAWS PARALLEL TO THE GROUND SURFACE.
EMBED BALE INTO THE SOIL TO A DEPTH ON THE UPSLOPE SIDE OF AT LEAST 100mm.
ANCHOR BALE SECURELY TO THE GROUND BY 2 STAKES OR PICKETS DRIVEN THROUGH THE CENTRE.

STRAW BALE SEDIMENT TRAP
(NOT TO SCALE)

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Fax: 02 6652 3064
ABN 21 100 904 783
ACN 100 904 783

SCALE: 1:600 HOR.		SHEET SIZE A1	PROJECT: SAWTELL PARK ESTATE
CONTOUR INT. 1.0m		CAUTION DO NOT SCALE	SECTION 94 WORKS - LYONS ROAD INTERSECTION
DATE: JUNE 2007	SURVEYED: DA/ATH	DRAWN: N.S.	TITLE: SEDIMENT & EROSION CONTROL PLAN
DATUM: PM76135 AHD. PLANE GRID	DESIGNED: H.K.	CHECKED:	

FILE No. 5237

SHEET 18 OF 18

COUNCIL DRAWING No.

RTA

File No: 110.5314
Your reference: 1514664
Ms Liz Smith

The General Manager
Coffs Harbour City Council
Locked Bag 155
COFFS HARBOUR NSW 2450

North Bonville DCP – MR540, Lyons Road Proposed Intersection.

Dear Sir

I refer to your letter dated 8 November 2006 regarding a concept plan for construction of a new intersection on Lyons Road to service the North Bonville residential development area.

The Roads and Traffic Authority (RTA) has no objection to the proposal providing the following comments in relation to road safety and network efficiency are considered.

- All works should be designed for the 80km/h prevailing speed limit.
- Council should verify the length of the proposed right turn bay for storage length.
- Sight distance from the side road should be checked and should conform to AUSTROADS requirements.

Should you wish to discuss this matter further please do not hesitate to contact Ms Liz Smith at the Grafton Regional Office on 6640 1345.

Yours faithfully

28 NOV 2006

Jim Campbell
A/Regional Manager, Northern Region

Roads and Traffic Authority
31 Victoria Street Grafton NSW 2460 | PO Box 576 Grafton NSW 2460 | T 02 6640 1300 | www.rta.nsw.gov.au

TRANSPORT AND TRAFFIC MANAGEMENT

INTRODUCTION

The strategy for the movement of people within and through North Bonville recognises the dependence on the motorcar, yet provides for an efficient and convenient network of pedestrian and bicycle routes. The strategy also provides the infrastructure needed for a bus service.

EXISTING FACILITIES

Access to North Bonville is obtained from Lyons Road with the Pacific Highway being the westerly boundary of the study area.

IDENTIFIED NEEDS

The transport demands within North Bonville can be categorised in terms of the road network, public transport and pedestrian/bicycle network.

Road Network

A road hierarchy has been established classifying roads as collector or local roads in accordance with their functional characteristics. The road network will be governed by the collector road which has been established to reduce the number of access points on to Lyons Road and ensure the safe movement of vehicles and pedestrians.

This contribution plan provides for the development of the collector road and associated traffic management measures. The collector road will be constructed from Lyons road in a southerly direction for approximately 200 metres. As this section of road is the major access for all future lots, all lots will be required to contribute towards the construction of the collector road and Lyons Road intersection works.

Local roads will be at the expense of the developer.

Public Transport

The provision of a good public transport system will reduce car dependency, provide for energy efficiency and enable residents without a private vehicle to maintain reasonable mobility, particularly the elderly and those less than 17 years of age. Opportunities for public transport within North Bonville are limited to the provision of a possible bus service.

To provide for a safe, comfortable and efficient bus service, certain basic facilities are required, including bus shelters and seats. It is proposed to provide bus shelters/seats along the collector road which has the highest frequency of use. A total of three shelters will be provided.

Pedestrian and Bicycle Ways

The provision of pedestrian and bicycle facilities in residential areas can provide an important alternative transport route for both recreation and functional journeys. The proposed routes are identified in Map 3 and have been designed to relate to the need for access to the neighbourhood park, surrounding recreational facilities and shops.

Pedestrian and cycle routes are to be provided in the form of on-road footpaths/cycleways on low order local roads and off-road footpaths/cycleways on the collector road. In addition, cycle refuge lanes are also to be provided on Lyons Road and on the collector road.

PROPOSED FACILITIES

The following table summarises the traffic and transport facilities, which will be funded using Section 94 contributions on the basis of the local and district facilities.

Collector Road

First 200m of restricted access Road, plus intersection construction at Lyons Road	$750,000

Traffic Management

Cycle & pedestrian paths	$277,650
No right-turn barrier (at minor entrance) @ $10,000 $30,000	
3 Bus Shelters @ $15,000 each	$45,000
Refuge for bicycles on Lyons Road 2 unit @ $12,000/unit	$24,000
Route lighting 200m @ $35 per metre	$7,000
15% design and supervision	$170,047
15% contingencies	$195,555
TOTAL	**$1,499,252**

CALCULATION OF CONTRIBUTION RATE

The contribution rate is calculated as follows:

C = Cost of community facility

L = Less funds levied or collected to date

P = Expected population

C = $1,499,252

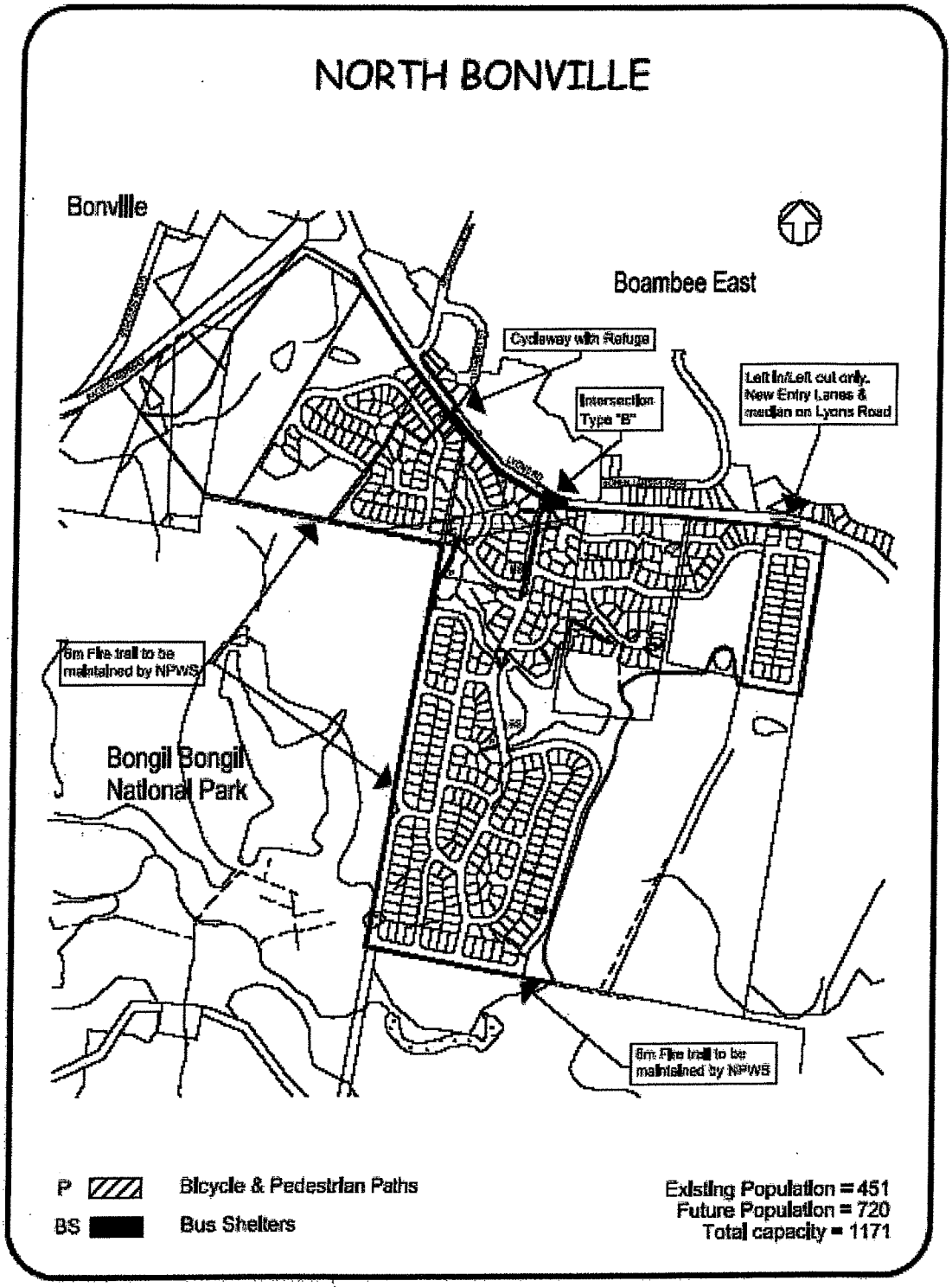
L = $388,632

P = 720

$$= \frac{(\$1,499,252 - \$388,632)}{720}$$

$$= \frac{\$1,110,620}{720}$$

= $1,542.53 per person



MAP 3
TRAFFIC & TRANSPORT STRATEGY