

Appendix A
Design checklist



Design Review Checklists

PACIFIC HIGHWAY DEVELOPMENT PROJECTS

Prepared For
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Issue.	Date	Description	Approved by
1.0	30/01/06	Design Review Checklists – Draft – Issue for Comment	RBD
2.0	16/02/06	Design Review Checklists – Revised Draft for Review	RBD
3.0	31/03/06	Design Review Checklists + Minimum Documentation – For Acceptance	RBD

Checklist 3: Concept Design

Issue	Yes	No	Comment
General			
3.1- Have the options been designed with a strategy for the future development to six lanes, i.e. 3 lanes in each direction?	X		Yes. 6-Lane in median. Some re-design req'd in future to upgrade halfway creek duplication. One lane median, one lane west side.
3.2- Have the proposed access arrangements for the Class A and Class M been identified?	X		Refer Drawings / Traffic & Transport report / Access Strategy Report
3.3- Has a stage 1 safety audit on the preferred option been carried out?	X		Complete 4/9/07
3.4- Will the proposed options tie-in or be consistent with adjacent roads, land forms and traffic management?	X		Ties in to S2W interchange at South end. Ties into existing highway at north end.
3.5- Have traffic switches been considered and located at practicable points?	X		Yes. Crossovers located at regular intervals. Refer drawings.
3.6- Are sections of existing highway which can be utilised being upgraded?	X		Where possible. Refer Dwgs / Concept Design report.
3.7- Does the new construction interfere in any way with an existing structure (such as an existing bridge)?	X		Halfway creek bridge to be demolished and re-built.
3.8- Are there any known constructability or staging issues for the proposed option?	X		Underpass near Range Rd. Refer Staging considerations in Concept Design Report (CDR)
3.9- Have the affects of property adjustments been investigated? (e.g. Can we avoid an affect?)	X		Refer property impacts section of CDR. Where possible impacts have been avoided.
3.10- Has further geotechnical information been considered in the design? (Pavement design and typical cross sections)	X		Typical sections provided. Pavement design in progress. Refer also Geotech design report.
Survey			
3.11- Is the ground model information adequate and appropriate?	X		Whilst patchy in some areas, is adequate for concept design.
3.12- Have all the constraints including utilities been identified?	X		3-D utility model created.
3.13- Is the utility information complete and the affect catered for in the design?	X		Impacts on utilities noted in CDR.

Issue	Yes	No	Comment
Geometry			
3.14- Are the horizontal and vertical alignments co-ordinated?	X	X	Where possible. Some overlap between Vert and Horiz curves, but generally on large (2000+) radius curves. Main issue at Ch 11000 – using existing hwy alignment.
3.15- Have compound curves been avoided?	X		
3.16- Are auxiliary lanes on steep grades provided if needed?	N/A		No auxiliary lanes warranted. Steep grades are only for short lengths.
3.17- Do the horizontal and vertical clearances meet the all Authority requirements? Eg rail, pedestrian bridges, etc. Are all clearances adequate – vertical (5.3m, 5.5m for pedestrian overbridge), - horizontal (to abutment faces etc, working width), navigation clearance.	X		No Rail. V Low pedestrian. Clearance as per guidelines.
3.18- Are there any curves with adverse crossfall?	X		Only where radius > 2000.
3.19- Is superelevation sufficient at all locations where required?	X		Super provided as per Design guidelines / Road Design Guide (RDG).
3.20- Do superelevation transitions conform to the geometry shown in Section 2 of the Road Design Guide (i.e. relative grade and length relative to design speed and pavement width, butterfly pavements etc).	X		Super provided as per Design guidelines / RDG.
3.21- Have sunrise or sunset problems which may create a hazard for motorists been considered (e.g. ramp location)?	X		Project runs north south. Only possible location at Ch 10600, but that is at bottom of sag curve anyway.
Cross Section			
3.22- Is the cross section suitable for the design? Considerations include:- <ul style="list-style-type: none"> - Pavement drainage - Design of the pavement itself - Suitability of kerb types used - Guard fence location, (should be no closer than 150mm behind face of kerb to prevent nuisance damage to vehicles) - Terminal treatments proposed for guard fence and Type F barriers - Gully pit grates should be behind the edge line (not proud into the lane itself) - Working width requirements (mentioned elsewhere) 	X X X X		Longitudinal Drainage provided in Cuts. Kerb is SO type traversable, and is behind min 2.5m shoulder Guard fence is behind min 2.5m shoulder. Terminals designed in accordance with RDG and model drawings

Issue	Yes	No	Comment
3.23- Has provision been made for road maintenance vehicles to be used safely at the site?	X		3m wide cleared path for maintenance vehicles at property boundary. Access provided to permanent sed basins
3.24- Have the needs of cyclists been satisfactorily considered, especially at intersections?	X		2.5-3.0m wide shoulders for cyclist use. Cyclists crossing carriageways at intersections to use the right turn lane.
3.25- Have off road cycle lanes been considered?	X		Not required
3.26- Have the following features been allowed for: <ul style="list-style-type: none"> • emergency telephone bays • truck lay-bys • cross carriageway access • emergency 'U' Turn bays • access 'U' Turn Bays • heavy vehicle inspection bays • rest areas 	X X X X X X	X	Phones provided at breakdown bays coincidental with emergency crossovers. Truck rest area being designed. No other truck lay bys. Cross carriageway access/emergency uturns at approx 2.5km intervals Access u-turns at intersections. No heavy vehicle inspection bay required.
3.27- Has a minimum width of 11.5 m been provided on bridges where additional width cannot be added later and there is off-road provision for cyclists?		X	All bridges can be widened. No off road cyclist provision.
3.28- Has adequate boundary width been allowed for? <ul style="list-style-type: none"> - Erosion, Sedimentation and water quality structures - Noise walls and mounds - Stockpile sites - Batch Plants - Compound Sites - Drainage lines and Structures eg swales - Maintenance tracks - Exclusion fencing - Service roads 	X X X X X X	X X X	Permanent sed basins included in boundary Stock piles, batch plants and compounds assumed to be leased during construction. All other listed items have been allowed for in the determination of the property boundaries.

Issue	Yes	No	Comment
Drainage			
3.29- Have watercourses been modelled and have impacts assessed for 1 in 50 year and 1 in 100 year Average Recurrence Intervals (ARI) and the Probable Maximum Flood (PMF)	X		All watercourses modelled in drains for 1:100y storm. Floodplain modelled in 2D flood mapping for 1:100y and PMF.
3.30- Is flooding immunity in accordance with PHO guidelines?	X		Yes. Both carriageways flood free in 100 year storm.
3.31- Has the stormwater design been carried out in accordance with AR & R.	X		Yes. Confirmed by GHD Newcastle design review.
3.32- Are the road grades and crossfalls adequate and satisfactory for drainage (eg long flat grades)?	X		4% crossfall adopted on flat grade areas.
3.33- Pavement Drainage - Has the 1 in 100 year ARI been modelled and a check made of flow levels to ensure that nuisance flooding is avoided. - Has a drainage system been provided to pick up all pavement water, including any drainage layers	X X		Longitudinal and transverse drainage provided. Nuisance flooding avoided. Combination of piped drainage and
3.34- Have the Average Recurrence Intervals specified in the brief been used for the following applications. o Culverts where surcharge is allowable o Structures where surcharge is undesirable o Channels and open drains o Gutter flow spread limited to width of shoulder o Piped system (including pits) o Major storm check for no property damage o Major storm check for no structure damage	 X X X X X X X		All designed in accordance with Pac Hwy Design Guidelines
3.35- Surface Flow Check concentrations of water and long surface drainage paths on pavement superelevation transition areas. For the 50mm per hour rainfall design event the maximum: - water depth on pavement in the through lanes including intersections and on auxiliary lanes on the approaches to interchanges and intersections is 5mm or less - change in depth of flow across the pavement over any 10m	 X		Reviewed using RTA surface flow calculator spreadsheet.. Refer doc: G:\21\14152\Tech\Aquaplan.xls Flow junction depths checked and ok.

Issue	Yes	No	Comment
<u>Intersections and Interchanges</u>			
3.36- Are the intersection/interchanges consistent with the Upgrade strategy?	X		No interchanges in project. Intersections where required.
3.37- Are the number, type and location of intersections and/or interchanges appropriate?	X		Reduction in number of intersections overall. Accesses rationalised where possible.
3.38- Have all major generators of traffic (including housing or shopping centres) been identified and catered for in the design?	X		Refer RODR
3.39- Are additional auxiliary lanes provided where required?	N/A		No auxiliary lanes required.
3.40- Has deceleration / acceleration been catered for completely in auxiliary lane?		X	No Decel / Accel provided at minor li/lo accesses. Otherwise full length provided.
3.41- Has Safe Intersection Sight Distance been achieved?	X		Reviewed in conjunction with Steve Lees. Checked in MX 5-8-07
3.42- Does a B-Double route connect to the Highway?	X		Lemon Tree Road, Existing Highway
3.43- Does the intersection cater for the design vehicle?	X		B-Double turning paths catered for
3.44- Do intersections have adequate queue length/storage for turning movements (including in the centre of a staggered intersection)?	X		Very low queuing quantities. Deceleration lanes provide adequate length.
3.45- Does any median or any island safely account for: <ul style="list-style-type: none"> • Vehicle alignments and paths? • Future traffic signals? • Pedestrian storage space and surface? • Turning path clearance? • Stopping sight distance to the nose? • Mountability by errant vehicles? 	X X X X	X X	No traffic signals proposed No allowance for peds required Yes All trafficable SO kerb used.
3.46- Do the intersection layouts, ramps, roadways etc. look to be complete with the traffic figures?	X		Low traffic figures on all intersections.
3.47- Has the need for kerbed or painted islands and refuges been considered?	X		Where required to prevent traffic movements.

Issue	Yes	No	Comment
Environment			
3.48- Does the concept design conform to the environmental studies performed to date? (eg PEI, specialist studies, etc). Does the concept design satisfy the requirements of the REF or EIS if one has been completed?	X		Refer CDR for details on environmental studies.
3.49- Have the specific studies been carried out and incorporated into the design? <ul style="list-style-type: none"> - Traffic - Environment <ul style="list-style-type: none"> • Flora and Fauna • Indigenous heritage • Non Indigenous heritage • Noise • Urban design • Water quality - Geotech 	 X X X X X X X X		All of the listed studies have been carried out. Further details in Concept Design Report, or in the actual specialist reports
3.50- Has the environmental design been developed in consultation with appropriate agencies with consideration given to: <ul style="list-style-type: none"> - Erosion, sedimentation and water quality infrastructure - Fauna underpasses, glider crossings and fauna fencing; - Fish friendly structures, including waterway design; and - Construction and operational noise measures. - Noise sensitive pavement areas 	 X X X X X		Erosion and sedimentation, fauna, flora and aquatic issues discussed with DECC. Design prepared in accordance with DECC requirements. Low-noise pavements are not required for this project due to minor nature of noise impacts.
3.51- Are underpass facilities appropriate?	X		Underpasses are to be based on performance specification rather than prescriptive to allow the adoption of best practice at the detail design stage.
3.52- Have preliminary landscaping areas been identified?	X		Yes. Refer Landscaping / Urban Design report from EDAW.
3.53- Are noise walls necessary? (If so, check location in regard to sight distance and maintenance requirements).		X	No. Noise mitigation will generally be by earth mounds and treatment of individual properties.

Have the following minimum standards been met?		Yes	No	Comments
3.54- Carriageway				
Horizontal Alignment	110 km/h	X		
Curve Radius	Min 750m Des ≥1200	X		Ch 9800 – R = 1081 Ch 11000 – R = 1101 Ch 16600 – R = 1160 (exist halfway creek duplic) Ch 24400 – R = 1100
Vertical Alignment	Min 100 km/h Des 110 km/h	X X		100km/h design adopted at top of Dirty Creek Range – Refer to CDR for details
Grade	Max 4.5 %		X	6.2% grade adopted at top of dirty creek range to facilitate use of existing pavement. Refer CDR for details.
Crossfall	Max 3 %		X	4% adopted at flat locations on flood plain
Stopping Sight Distance (R _T)	2.5 sec		X	Generally 2.5 sec adopted. 100km/h Crest at top of Dirty Creek Range has only 1.5s reaction time. Elsewhere OK.
Horizontal - Manoeuvre Sight Distance	210 m 195 m	X X		Sight distance achieved.
Vertical	Min 175 m Des 210 m	X X		Sight distance achieved.
Upgrade Lanes (in each direction)	2	X		
Lane Width (including interchange ramps and auxiliary lanes)	3.5 m	X		
Nearside (Outside) Shoulder	2.5 m Max. 3.0 m	X X		All shoulders between 2.5 and 3.0m wide
Offside (Median) Shoulder	0.5 m Max. 3.0 m	X X		Generally 0.5, with widening adjacent to barriers, on bridges for sight distance.
Outside Verge (adjacent 4 to 1 or flatter batters, excluding rounding)	Min. 0.5 m Min. 1.0 m	X		Verge widened in some locations.

Have the following minimum standards been met?		Yes	No	Comments
Outside Verge (adjacent barrier)		X		
Median Verge (adjacent 4 to 1 or flatter batters, excluding rounding)	Min. 0.5 m	X		0.5m verge throughout. No batters steeper than 4:1
Cutting Berm (adjacent SO gutter)	Min. 0.5 m Des. 2.0 m	X X		Berm generally 2.0m
Median Width	Min. 5.0 m Des. 12.0 m	X X		Median 12.0m except in halfway creek duplication.
Outside Clear Zone	11.0 m	X		Barriers provided where clear zone not achieved.
3.55- Bridges				
General	10.5 m	X		3.0 Shoulder + 2 x 3.5 lane + 1.0 shoulder
Lanes	2 x 3.5 m	X		
Outside Shoulder Bridges < 50m	2.5 m 3.0 m	X		Generally 3.0m
Median Shoulder	Min. 1.0 m Max. 3.0 m	X		Generally 1.0m
3.56- General				
Boundary Clearance	Min 6.0m Des 15.0m	X X		6.0m adjacent to service roads. 15.0m elsewhere
Drainage Transverse drainage (Where surcharge allowed)	1in 100 1in 50	X X		Designed in accordance with AR&R87
Bench Vertical Spacing: - Batters steeper than 2 to 1 - Batters 2 to 1 or flatter	7.0 m 10.0 m	X X		Refer typical cross sections
Bench width: - Cutting - Fill	Min 4.5 m Min 4.0 m	X X		Refer typical cross sections
Tunnels:	11.5 m	N/A		

Have the following minimum standards been met?		Yes	No	Comments
<ul style="list-style-type: none"> - minimum width between barriers - pedestrian refuge behind barrier - superelevation - clearance - grade 	<p style="text-align: center;">1.0 m</p> <p style="text-align: center;">Max 3 %</p> <p style="text-align: center;">Min 5.3 m</p> <p style="text-align: center;">Max 3 %</p>			
<p>Have the following features been allowed for:</p> <ul style="list-style-type: none"> - heavy vehicle inspection bays - rest areas 		X	X	<p>Inspection bays not required.</p> <p>Rest areas north and south bound nr Lemon Tree Road.</p>

Minimum Documentation – Concept Design

Feature	Newsletters	Display	Drawings
Plan	√ North Point up	√ - North Point up	√ - Ch L-R 1:2000 A3
Long Section			√ as above
Cross Section			√ min. 50 + const 1:1000 A3
Typicals	√	√	√
Cadastral	√	√	√
Landscaping / Urban	(√)	√	√
Lighting (Basic)			√
Pavement			√
Bridges		√	√
Drainage			√
Mosaic	√	√	√
Intersections	√ locations	√ stick Layout	√ Detail Layout
Constraints:			
- Flooding	√	√	√
- Utilities		√	√
- Environmental	√	√	√
- Developments		√	√