

Our Ref CE008530 :DK/KS/SH

Contact Kris Stone



30 May 2007

Twin Towns Services Club
C/- GMP Management
Level 5, 91 Scarborough Street
SOUTHPORT QLD 4215

Attention: Mr Ian Pert

Dear Sir

**TWEED HEADS TWIN TOWNS
RESPONSE TO REQUEST FOR FURTHER INFORMATION**

Reference is made to the New South Wales Department of Planning Director General's Environmental Assessment Requirement correspondence dated 10 January 2007 regarding the proposed Twin Towns Services Club expansion at Tweed Heads.

This letter documents our formal response to the traffic and transport matters raised in the Director General's correspondence. Each traffic engineering related point is individually reproduced below and response provided for ease of reference.

***Project Application for the Redevelopment of the Twin Towns Services Club
Wharf Street, Tweed Heads - Lot 1 DP 777183
Application Number: 06_0237***

"6. Traffic and Vehicular Access

Point 6.1

Provide a traffic impact study in accordance with the relevant provisions of Table 2.1 of the RTA's Guide to Traffic Engineering Developments which assesses potential construction and operational impacts of existing intersections and the capacity of the road network to safely and efficiently cater for the additional vehicular traffic generated. In particular, the following issues need to be addressed:

- consideration of access arrangements for service, delivery and emergency service vehicles from Wharf Street;*
- location of loading bays."*

A traffic impact study has been undertaken to determine the magnitude of any development traffic impacts on the external road network. The study also gives consideration to on-site issues including loading and access. A copy of the Cardno Eppell Olsen design note entitled *Twin Towns Services Club – Development Traffic Impacts* is attached.

"Point 6.2

Demonstrate compliance with relevant Council and RTA traffic and car parking codes, including justification for any reductions sought in the number of car parking spaces provided."

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A car parking assessment has previously been prepared in relation to the proposed expansion of the Twin Towns Services Club. It is understood that this assessment has already been lodged as part of the development application with Tweed Shire Council. A copy of the Cardno Eppell Olsen assessment titled *Twin Towns Services Club – Parking Requirements* dated 30 October 2006 is attached for your reference.

“Point 6.3

Demonstrate compliance with Council’s Driveway Access to Property Guidelines.”

The development application proposes modifications to the current egress only crossover on Wharf Street. The reconfigured driveway will provide for loading vehicle access only and has been designed in accordance with a vehicle swept path assessment for an articulated vehicle. Access concept drawings (*SK-A-100 and SK-A-101*) prepared by Cardno Eppell Olsen are attached.

“Point 6.4

Address issues relating to access and car parking on and/or across Crown Land in consultation with the Department of Lands.”

It is apparent that the existing Twin Towns servicing and loading provisions are not adequate, particularly in that access by an articulated vehicle (AV) is currently restricted. Advice from Twin Towns management is that AV access is required at least once per fortnight which is associated with setup for large stage shows.

The attached concept drawings (*SK-A-100 and SK-A-101*) prepared by Cardno Eppell Olsen illustrate the reconfigured service area proposal including, access and circulation aisle arrangements. The proposed arrangements are considered to provide improved definition between loading vehicles and other club users.

The proposed access design does not require any of the adjacent lands located to the immediate south of the redevelopment site which is understood to be Crown land.

7. Pedestrian Access and Amenity

“Point 7.1

Demonstrate continuity and integration of pedestrian movement routes though and within the site.”

The redevelopment proposes the construction of an at-grade parking layout similar to that already adopted on the subject site. The proposed layout will make available a total of 118 car spaces. Given the limited size and nature of the car park it is not considered necessary to provide dedicated pedestrian facilities within the site. The low speed nature of the car park will ensure that pedestrians can access their vehicles by travelling along the car parking aisles which have been designed with a minimum width of 6.5m.

“Point 7.2

Demonstrate compliance with access requirements from the club premises to the reserve as set out by the Jack Evans Boat Harbour Reserve Trust and the Department of Lands.”

Tweed Shire Council officers have advised that the Jack Evans Boat Harbour redevelopment is currently at the concept design stage. The attached *Jack Evans Boat Harbour Schematic Design Plan* (Tweed Heads Shire Council prepared in August 2006) illustrates an indicative pedestrian link between the Twin Towns Services Club and the Jack Evans Boat Harbour.

The *Jack Evans Boat Harbour Schematic Design Plan* indicates a pedestrian link from the Services Club site providing a connection to the “regional cycle-way” which it is understood is to be constructed as a three metre wide concrete shared path. The shared path is shown following the periphery of the harbour and facilitates access to the other harbour side precincts located to the north and south.

The Tweed Shire Council master plan concept has been developed further by Imagine Design who has been engaged to document the Jack Evans Boat Harbour redevelopment landscape component. The attached Image Design drawing (*Twin Towns – Foreshore LCP-001*) again shows a pedestrian connection to the Services Club site at note 12. A copy of this plan is attached. No formal requirements have been identified in relation to the pedestrian connection within the subject site.

The development plans illustrate a pedestrian connection to the Jack Evans Boat Harbour in accordance with those illustrated on both plans referred to herein. No formal arrangements have been determined within the subject site given that the connection is expected to only service the Services Club.

“Point 7.3

Address issues relating to pedestrian safety at the Wharf Street pedestrian crossing.”

Tweed Shire Council officers have advised that one accident was reported at the pedestrian crossing during the period starting 2003 and finishing 2006. No details were available as to the nature of the single reported incident. A qualitative inspection of the existing zebra crossing installation did not identify any significant safety issues. Signage and line marking associated with the crossing are still clearly visible to oncoming motorists and sight lines to and from the crossing are also considered adequate with no significant obstructions present.

The proposed reconfiguration of the Wharf Street loading crossover will mean that trucks are no longer required to reverse out into traffic in order to exit the site. All servicing trucks will be able to exit the site in a forward gear. Further, the loading area will be separated from the general club car park thereby banning general traffic movements from the Wharf Street crossover.

Please contact this office if you require any further clarification of the traffic matters addressed in this letter.

Yours faithfully

A handwritten signature in black ink, appearing to read 'K Stone'.

Kris Stone
Traffic Engineer
for Cardno Eppell Olsen

Enc: Cardno Eppell Olsen letter 'Twin Towns Services Club – Parking Requirements dated 30 October 2006
Cardno Eppell Olsen design note 'Twin Towns Services Club – Development Traffic Impacts
Jack Evans Boat Harbour Schematic Design Plan (TSC)
Twin Towns – Foreshore (Imagine Design LCP-001)

Our Ref CE008530

Contact Shane Healey

30 October 2006

GMP Management
Level 5
91 Scarborough Street
Southport Qld 4215
Attention: Mr Ian Pert

Dear Sir,

**TWIN TOWNS SERVICES CLUB EXPANSION
PARKING REQUIREMENTS**

Reference is made to our recent discussions regarding the proposed expansions to the Twin Towns Services Club at Tweed Heads. This letter documents preliminary evaluation of parking demands for the expanded club using the same assessment methodology adopted by this firm and documented in reporting dated 11 April 2006. The methodology involves a first principles approach based upon expected maximum patron occupancy (provided by the club) and information on arrival mode and vehicle occupancy identified by previous surveys for the existing club facilities.

The increases in parking demand envisaged to be generated by the expanded club facilities have then been added in accordance with Tweed Shire Council DCP2 requirements.

Patronage Forecasts – Existing Club

Australasian Traffic Surveys (ATS) was commissioned to undertake patronage surveys at the Twin Towns Services Club on Friday 10 March 2006 between the hours of 8:30am and 10:00pm. These surveys were the basis of the previous parking demand analysis. Friday was identified by Twin Towns management as the peak business day and is therefore considered to be an appropriate design event to ascertain the peak visitation of the club.

The surveys comprised:

- patron door counts at each of the three existing development entrances; and
- patron questionnaire surveys identifying the transport arrival modes and associated vehicle occupancies where appropriate.

The door counts identified that the peak patron accumulation within the club (including show room) was 1,849 patrons which occurred at approximately 8:00pm on the night

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of the survey. The observed profile of patron accumulation is shown graphically in Figure 1.

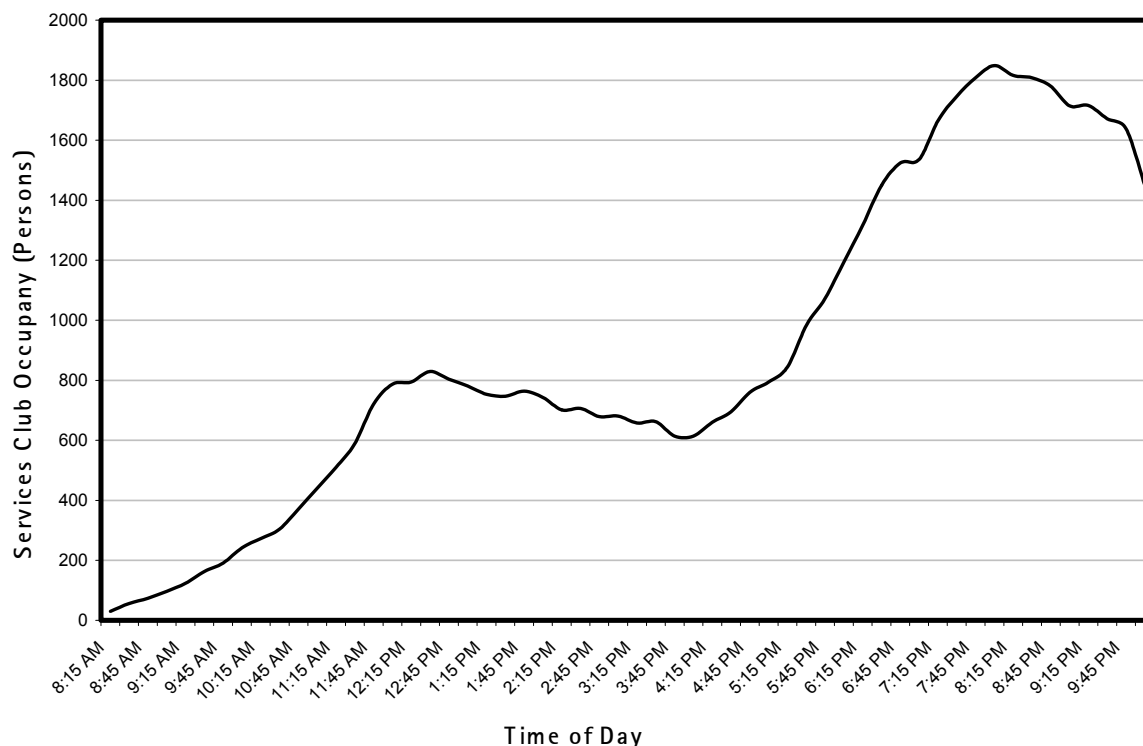
For the purposes of car parking demand estimation, it is appropriate to consider:

- patrons who are in the club; and
- patrons who are either in the process of arriving or leaving;
- staff.

The patrons who are either arriving or leaving could be searching for or departing a car park and thereby create an overlap in the demand which should be accommodated. To account for this overlap, patrons leaving and departing within the 15 minute period prior to the peak were also included in the club occupancy for the purposes of the car parking calculations.

The peak patron accumulation within the club for the purposes of parking demand for the existing club facilities was therefore **2,083 people**.

Figure 1 **2006 Survey Results**
Patronage Accumulation Profile



Twin Towns management has provided visitation records by month for the full year of 2005. This information identified that August 2005 was the peak visitation month with a total attendance of 81,915 visitors. March 2005 recorded an attendance of 65,212 visitors. Given that the surveys were conducted during the month of March, the surveyed peak patronage has therefore been factored up to the peak month (August) using a ratio of 1.256 developed from 2005 records. In accordance with this

data, the peak design patronage accumulation is calculated to be **2,617 patrons** for the existing club facilities.

Patron Arrival Mode

The questionnaire surveys undertaken in March 2006 identified the following breakdown of arrival modes throughout the day:

Table 1 *Twin Towns Questionnaire Survey Results*

Arrival Mode	Daily Results (8:00am – 10:00pm)		Time Periods					
			8:00am – 12:00pm		12:00pm – 4:00pm		4:00pm – 10:00pm	
Private car	258	51.3%	136	82.4%	20	34.5%	102	36.4%
Taxi	14	2.8%	0	0.0%	0	0.0%	14	5.0%
Walk	155	30.8%	27	16.4%	9	15.5%	119	42.5%
Bus/Coach	74	14.7%	2	1.2%	28	48.3%	44	15.7%
Bicycle	1	0.2%	0	0.0%	0	0.0%	1	0.4%
Other	1	0.2%	0	0.0%	1	1.7%	0	0.0%

The questionnaire results indicate variance in the mode of arrival across the day with the proportion by private car significantly higher in the morning period. Previous assessments have been based upon the average daily arrival trend which indicated 51.3% by private vehicle. Advice from the club is that this arrival rate is not illustrative of the arrival mode at the peak event time which as proven by the survey results is 34.5% to 36.4% by private vehicle between 12.00pm and 10.00pm. A figure of 45% has therefore been utilised which is more reflective of night time arrival trends but is still conservative.

The total number of patrons therefore expected to arrive via private car during the design event has been calculated as follows:

$$2,617 \text{ patrons} \times 45\% = 1,178 \text{ patrons (by car).}$$

Vehicle Occupancy

The questionnaire surveys requested information on the vehicle occupancy for those patrons arriving by private vehicle. On average, the vehicle occupancy recorded was 2.21 persons per vehicle. It is noted that the vehicle occupancy ranged between 2.13 and 2.29 depending on the time of day which represents a fairly consistent result. The peak guest car parking accumulation, using the average occupancy figure observed, is calculated as follows:

$$1,178 \text{ patrons} \div 2.21 \text{ patrons per car} = 533 \text{ cars.}$$

Employee Parking Demands

Employee parking demands have been calculated in the same manner as that identified for patrons, with the exception that no allowance for overlap was incorporated. Twin Towns management has advised that a total of 148 employees currently work during the evening shift, being the peak guest patronage time. The breakdown of arrival mode for staff was confirmed via the original questionnaire survey; the results of which indicated that 82 staff or approximately 55.4% of staff arrive via private vehicle. Assuming a vehicle occupancy of 1 staff member per vehicle, the peak car accumulation for staff will be in the order of **82 cars**.

The total peak car accumulation is then calculated as the sum of visitor/patron cars and staff cars as follows:

553 guest cars + 82 staff cars = 615 cars.

Using the above methodology and questionnaire information regarding arrival modes, the peak car parking demand associated with the existing Twin Towns Services Club development during a Friday night and factored up to represent the busiest month of the year is currently in the order of **615 spaces**.

The above analysis is consistent in approach with reporting previously prepared for the Twin Towns Services Club but the total has been reduced as a result of using the night time arrival mode data

Expanded Club Facilities – Parking Requirements

The proposed expansions to the services club are understood to primarily include refurbishment of existing club areas and some increased facilities. Bayden Goddard Design drawing 335 SK-02 (copy attached) describes the following floor area increases:

- new cinemas and meeting rooms – 280 seat capacity;
- new ballroom – 810sq.m floor area.

It is considered reasonable to calculate additional car parking requirements for these uses in accordance with criteria documented in Tweed Shire Council Development Control Plan No. 2 – Site Access and Parking Code (DCP2).

The relevant requirements for the above uses in the recently adopted DCP2 are:

- cinema – 1 parking space/10 seats;
- function centre – 0.3 parking spaces/seat plus 0.5 parking spaces/staff.

Table 2 therefore presents the calculations of additional car parking requirements.

Table 2 **Car Parking Requirements (DCP2)**

Land Use Component	Yield	Parking Rate (DCP2)	Parking Requirement (Spaces)
Cinema/Meeting Room	280 seats	1 space/10 seats	28
Ballroom	810sq.m (400 seats/10 staff)	0.3 spaces/seat + 0.5 spaces/staff	125
Total			153

Given the location of the services club within the Tweed Heads CBD area, the proximity to surrounding accommodation opportunities and extensive promotion of accommodation packaging undertaken by Twin Towns, it is likely that a high proportion of patrons to the above uses will also be patrons of surrounding uses including particularly the Harbour and Ocean resort towers. The parking demand for the new uses is therefore likely to be significantly lower than the isolated rates documented in DCP2.

Section 4.8 of DCP2 allows for a reduction of up to 30% of parking requirements for land uses within the Tweed Heads CBD area. Further, Table 4.9 states that the requirements for reception and conference centres can be reduced where the facility is attached to a hotel.

Surveys of usage of hotel ancillary facilities undertaken by this firm in the Cairns CBD reported around 50% usage of these ancillary facilities by guests of the adjacent hotels.

On the basis of the above information, it is considered reasonable to relax the requirements of the ballroom by 50% and restaurant/cinema facilities by the 30% envisaged by DCP2.

The total parking demand envisaged for the club is therefore **698 spaces** representing the sum of the previous demand calculations (615 spaces for the existing club facilities) and the requirements of the new uses in accordance with DCP2 (83 spaces).

Parking Supply

Parking supply for the Twin Towns club is provided in three locations being:

- at ground level beneath the services club;
- within the basements of the Harbour and Ocean towers;
- on street within the area surrounding the club (e.g. Wharf and Boundary Streets).

Table 3 below presents the available supply located within the twin towns development lands. This table excludes any use of Council controlled land on the foreshore of the Jack Evans Boat Harbour which has to date been utilised for some car parking, and includes the number of spaces proposed on the service club site subsequent to the proposed modifications.

Table 3 *Twin Towns Development Parking Supply*

Site	Spaces available to the Services Club	Residential Spaces	Retail Spaces	Resort Spaces*	Hotel Spaces	TOTAL
Ocean Tower	307	109	0	0	59	475
Harbour Tower	309	0	14	198	0	521
Services Club	123 [#]	0	0	0	0	123
TOTAL	739	109	14	198	59	1119

* Advice from B&P Surveys identifies that the 198 resort spaces are available to both resort uses and the services club.

[#] The total number of spaces has reduced from that documented in correspondence dated 18 May 2006 given that the use of Council controlled foreshore parking has now been deleted.

The above summary tabulation indicates that the parking supply exclusively available to the services club is some **41 spaces** surplus of the demand identified.

B&P Surveys has identified that a further 100 spaces within the Stage 2 Tower (Harbour Tower) are available for shared use of the resort and the services club. If 50 of these spaces were available to the club at the peak demand time, the surplus would increase to 91 spaces.

It is noted that use of the average arrival mode figure (51.3%) results in a surplus of 16 spaces, assuming that 50 of the shared spaces are made available to the club facilities.

It is also recognised that the methodology adopted herein is an estimate based upon the surveyed (aggregated) results and therefore incorporates some degree of error. However, even when adopting the most conservative assumptions, the likelihood of overflow occurring on street as a result of insufficient on site car parking appears to be low.

Please call should you have any queries in relation to this matter.

Yours faithfully

A handwritten signature in black ink, appearing to read 'SH Healey', written in a cursive style.

Shane Healey
Principal
for **Cardno Eppell Olsen**

Our Ref: CE008530

Date: 30 May 2007

DESIGN NOTE

TWIN TOWNS SERVICES CLUB - DEVELOPMENT TRAFFIC IMPACTS

This design note documents the traffic assessment undertaken in relation to the proposed redevelopment of the Twin Towns Services Club at Tweed Heads. The following traffic and transport matters are addressed herein:

- discussion of surrounding road network;
- review of development access arrangements;
- estimation of likely traffic generation;
- analysis of the impact of development generated traffic on the adjacent Council controlled road network;
- review of trafficable basement design;
- identification of suitable development servicing arrangements.

Development Proposal

The proposed development incorporates the demolition of part of the existing Twin Towns Services Club and the construction of a new building in its place.

The proposed expansions to the services club are understood to primarily include refurbishment of existing club areas and some increased facilities. Bayden Goddard Design drawing 335 SK-02 (copy attached) describes the following floor area increases:

- new cinemas and meeting rooms – 280 seat capacity;
- new ballroom – 810sq.m floor area.

The remaining areas are understood to simply replace the existing development uses within the club.

Surrounding Road Network

The development site has frontages to both Wharf Street and Boundary Street. Wharf Street has been constructed with a two lane divided road cross-section with a varying reserve width including localised widening for auxiliary turn lanes and kerbside parking/loading spaces. A parallel parking/loading/bus set down lane is currently provided on the eastern side of Wharf Street.

Boundary Street has also been constructed with a two lane divided road cross-section in the vicinity of the subject site. Boundary Street currently provides a number of angled on-street parking opportunities along the southern side of the road as well as double loaded bays in the centre of the dividing median.

Access to the redevelopment site is proposed generally in accordance with the current access arrangements. An all movements driveway cross-over is located on Boundary Street approximately 55m east of the Wharf Street/Boundary Street/Griffith Street roundabout. Eastbound vehicles wishing to access the subject site can use the auxiliary lane storage made available in the centre median providing for approximately three vehicles to queue clear of other traffic movements.

The driveway currently situated on Wharf Street is signed as an exit only crossover. The application proposes the reconfiguration of this crossover so that it also permits loading access to/from the site. The revised driveway is not anticipated to create any additional conflicts with the zebra pedestrian crossing given no right turn movements will be allowed out of the site.

It is noted that the majority of the Twin Towns Services Club car parking supply is located within the Ocean and Harbour Tower basements. Vehicular access to these parking supplies is achieved via an all movements cross-over located on Stuart Street approximately 50m south of the Griffith Street intersection.

The proposed redevelopment will generate additional traffic on the surrounding road and street network. For the purposes of this evaluation, the following intersections in the immediate vicinity of the redevelopment site have been analysed to determine the magnitude of any traffic impacts:

- Wharf Street/Bay Street (signalised intersection);
- Bay Street/Stuart Street (unsignalised T- junction);
- Griffith Street/Stuart Street (unsignalised T-junction);
- Wharf Street/Boundary Street/Griffith Street (single circulating lane roundabout).

Background Traffic Demands

Future background traffic demands at each intersection were generated for 2009 and 2019 design horizons. Additionally, a baseline analysis was conducted to determine existing 2007 operations. These assessment horizons have been determined following a review of the development application and represent the expected year of completion and 10 years following.

Background traffic demands at the future design horizons have been determined using both the expected rate of background traffic growth and surrounding approved developments currently under construction. A linear growth rate of 4% per annum was applied to the surveyed volumes. Traffic movements associated with the Twin Towns Stage 2 tower (recently completed), Dolphin Hotel redevelopment (recently approved) and the Ultima development (currently under construction) have been generated and distributed to the external traffic network. Traffic movements associated with the surrounding approved developments have been sourced from development application details where available.

It should be recognised that the existing Services Club development is currently generating a level of traffic demand which is included in the surveyed traffic flows. For this reason, only the net increase in development trips directly associated with the yield increases identified earlier herein have been used in estimating the “With Development” traffic demands. Further discussion in relation to this is provided in the following section.

Development Traffic Generation

The peak hour traffic generation associated with the net increase in redevelopment yields has been estimated in accordance with parking survey findings outlined in the Cardno Eppell Olsen correspondence titled *Twin Towns Services Club – Parking Requirements* dated 30 October 2006.

The peak patronage occupancy counts and interview surveys identified the following key arrival characteristics for trips generated by the Services Club:

- 51.3% - percentage of Club patrons who arrive via private car;
- 2.21 - average vehicle occupancy of trips generated by Club.

Twin Towns Services Club

Table 1 ***Redevelopment Generated Traffic (net increase)***

Land Use Component	Yield	Person Trips Via Private Car	Vehicle Trips
Cinema/Meeting Room	280 seats	144 (i.e. $280 \times 51.3\%$)	65 (i.e. $144 / 2.21$)
Ballroom	400 seats	205 (i.e. $400 \times 51.3\%$)	93 (i.e. $205 / 2.21$)
Total	680 seats	349 persons	158 Vehicles

Table 1 identifies that a maximum of 680 seats will be possible as part of the proposed redevelopment yield net increase. This yield corresponds to 349 people travelling to the site via private car (i.e. $680 \times 51.3\%$) and 158 new vehicle trips when the average vehicle occupancy is considered (i.e. $349 / 2.21$).

The estimation of a peak hour generation using this methodology for the purposes of external operational assessment is considered conservative given it assumes that all patrons for these uses enter the development site within the same one hour peak period.

The remaining traffic generation associated with the Services Club is considered to be adequately represented as part of the background traffic demands.

Development Traffic Distribution

The following greater distribution of development traffic to/from the subject development has been adopted for this assessment based upon consideration of the locations of likely employment, schools, services, and attractions:

- 40% (to/from the north west of the site via Griffith Street);
- 30% (to/from the south east of the site via Wharf Street);
- 20% (to/from the south west of the site via Bay Street);
- 10% (to/from the north east of the site via Boundary Street).

The PM peak hour analysis is based on the assumption that the new trips will have an 80%/20% in/out directional distribution. Furthermore, new development trips were distributed to the Services Club car park and the Twin Towns Ocean and Harbour parking supplies in accordance with the relative number of parking spaces provided within each supply as illustrated in Table 2.

Table 2**Twin Towns Development Parking Supply**

Site	Spaces available to the Services Club		Parking Area Supply Percentage
Ocean Tower	307	616	83%
Harbour Tower	309		
Services Club	123	123	17%
TOTAL	739	739	-

The above figure has been simplified to 80% of trips in/out to/from the Ocean and Harbour basement and 20% of trips in/out to/from the Services Club site.

The “With Development” design year volumes have been formulated by adding the estimated development traffic demands to the “No Development” scenario volumes. A copy of the traffic volume plots used for the purposes of this assessment are attached at Figures 1–5.

Development Traffic Operations

As indicated earlier herein, the following study intersections have been identified for assessment:

- Wharf Street/Bay Street (signalised intersection);
- Bay Street/Stuart Street (unsignalised T- junction);
- Griffith Street/Stuart Street (unsignalised T-junction);
- Wharf Street/Boundary Street/Griffith Street (single circulating lane roundabout).

The operating performance of the above intersections has been assessed using the aaSIDRA modelling suite for the “No Development” and “With Development” scenarios at the 2007, 2009 and 2019 design horizons. The results of the analyses are documented in the following sections.

Wharf Street/Bay Street Intersection

Located to the southeast of the subject site, the Wharf Street/Bay Street intersection currently functions as a four-way signalised intersection. The operating performance of the intersection for each assessment scenario is presented in Table 3 below.

Table 3**Wharf Street/Bay Street PM Peak Performance Characteristics**

Scenario	No Development			With Development		
	Degree of Saturation	Average Delay (s)	Critical Queue (m)	Degree of Saturation	Average Delay (s)	Critical Queue (m)
2007	99.4%	38	350	N/A		
2009	100.0% (1)	38	394	100.0% (1)	36	387
2019	107.8%	69	883	107.8%	74	940

The results in Table 1 indicate that the subject intersection is already operating above capacity (i.e. DOS>90%).

Note (1) in Table 3 illustrates that the degree of saturation ‘locks out’ at 100% for the auxiliary right turn lane on the northern Wharf Street approach. The above results also illustrate that the average intersection delay and critical queue lengths reduce following the addition of development traffic for the 2009 assessment scenario. The variation is considered to be the result of aaSIDRA trying to model the complex reactions between the turn lane and adjacent through traffic lane.

The above results show that the subject intersection will operate above generally accepted performance criteria (i.e. DOS>90%) at the 2019 design horizon. The addition of development traffic does not impact on the worst case movement and does not bring forward the need to complete upgrading works. Detailed aaSIDRA outputs are attached.

The Section 94 contributions levied on the development for transport infrastructure could be allocated to complete required upgrading works at this intersection given its the importance to the local area.

Bay Street/Stuart Street Intersection

Bay Street currently has perpendicular on street parking located at the centre median separating the two trafficable lanes. This arrangement results in the provision of an unsignalised T-junction with a large median (approximately 6m) which facilitates two stage operations. For example: right turning vehicles exiting Stuart Street undertake the movement in two parts consisting of the following:

- crossing manoeuvre across single lane of eastbound through traffic;
- merge manoeuvre into westbound traffic stream.

The operating performance of this junction for the relevant assessment scenarios is demonstrated in Table 4 below

Table 4 *Bay Street/Stuart Street PM Peak Performance Characteristics*

Scenario	No Development			With Development		
	Degree of Saturation	Average Delay (s)	Critical Queue (m)	Degree of Saturation	Average Delay (s)	Critical Queue (m)
2007	21%	6	6	N/A		
2009	23%	6	6	24%	6	6
2019	33%	8	6	34%	8	6

The above analysis results indicate that the subject intersection will operate below capacity (i.e. DOS<80%) for the "With Development" scenario at 2019. No upgrading is therefore deemed necessary.

Griffith Street/Stuart Street Intersection

The Griffith Street/Stuart Street intersection currently exists as an unsignalised T-junction, with Stuart Street forming the minor leg. An auxiliary right turn lane is provided on Griffith Street for movements turning into Stuart Street. Right turn movements out of Stuart Street into Griffith Street are not permitted.

Table 5 *Stuart Street/Griffith Street PM Peak Performance Characteristics*

Scenario	No Development			With Development		
	Degree of Saturation	Average Delay (s)	Critical Queue (m)	Degree of Saturation	Average Delay (s)	Critical Queue (m)
2007	36.6%	4	14	N/A		
2009	39.4%	4	16	41.5%	4	18
2019	84.9%	6	53	89.2%	8	64

The analysis results in Table 5 show that the subject intersection will operate above capacity (i.e. DOS>80%) at the 2019 design horizon for the “No Development” assessment scenario. The worst case movement is the left turn out of Stuart Street. The analysis adopts an acceptance gap of five seconds and a follow up gap of three seconds. These values assume that vehicles turning left out of Stuart Street do not effect other opposing through movements.

Further sensitivity testing was undertaken to determine the effect of reducing the five second acceptance gap adopted by the analysis. It was assumed that left turning vehicles would be willing to accept smaller gaps (i.e. $T_A=4.5$ sec) in the through traffic stream given the increased level of expected delays. Motorists typically accept smaller gaps during peak periods and it is considered that 4.5 seconds does not represent a significant safety concern. The findings of the sensitivity test are illustrated below in Table 6.

Stuart Street/Griffith Street PM Peak Performance Characteristics

Table 6 ***Gap Acceptance Sensitivity Test***

Scenario	No Development			With Development		
	Degree of Saturation	Average Delay (s)	Critical Queue (m)	Degree of Saturation	Average Delay (s)	Critical Queue (m)
2019	69.0%	5	30	72.3%	5	33

The above analysis results indicate that the subject intersection will operate below capacity (i.e. DOS<80%) at the 2019 design horizon for the “With Development” scenario assuming motorists are willing to accept headway gaps equal to or exceeding 4.5 seconds. No upgrading to the existing intersection form is therefore considered necessary.

Wharf Street/Boundary Street/Griffith Street/Clark Street Intersection

The Wharf Street/Boundary Street/Griffith Street/Clark Street intersection has been constructed as a single circulating lane roundabout. The roundabout has been constructed with a 17 metre internal island diameter and a circulating lane which varies in width between 6.5 and 7.0m. All intersection approaches provide a single shared lane for all movements with the exception of Clark Street which only allows for one-way movements exiting the roundabout.

Stuart Street/Griffith Street PM Peak Performance Characteristics

Table 5

Scenario	No Development			With Development		
	Degree of Saturation	Average Delay (s)	Critical Queue (m)	Degree of Saturation	Average Delay (s)	Critical Queue (m)
2007	80.6%	13	113	N/A		
2009	92.1%	18	193	94.6%	22	239
2019	133.7%	420	2627	134.8%	449	2860

The above results illustrate that the addition of development traffic could be expected to increase the intersection’s worst case degree of saturation by 1.1% (i.e. 134.8%-133.7%). The degree of saturation figure for the “No Development” assessment scenario increases by approximately 4.16% per annum between 2009 and 2019 (i.e. 133.7%-92.1% / 10 years). The degree of saturation increase resulting from the proposed development is therefore similar to that which occurs approximately every three months for the “No Development” assessment scenario. The development is therefore considered to have a negligible impact on the roundabout and does not bring about the need for any additional upgrading works beyond those already required at the 2019 horizon by the background traffic demands.

Development Servicing

Tweed Shire Council's Development Control Plan 2 – Site Access and Parking Code identifies that provision must be made for one Heavy Rigid Vehicle (HRV) to undertake servicing wholly on-site. Servicing vehicles are currently understood to enter the site via the egress only Wharf Street access and complete necessary manoeuvres to access the servicing area.

The application proposes the reconfiguration of the existing service area such that it provides increased separation and definition of movements. The attached concept drawings (SK-A-100 and SK-A-101) prepared by Cardno Eppell Olsen illustrate the proposed access arrangements on Wharf Street. The loading dock crossover has been designed in accordance with the AV swept path requirement.

Discussions with key redevelopment stakeholders has identified that the AV's service the site as part of large stage shows. The concept design allows all servicing vehicle to exit the site in a forward gear. Importantly, the design does not require trucks to reverse into oncoming traffic given the relocation of the general vehicle access further to the south. The attached drawings illustrate the extent of additional lands required by the reconfiguration.

Conclusions

This design note has been prepared for the proposed redevelopment of the existing Twin Towns Services Club. This design note addresses the following:

- discussion of surrounding road network;
- review of development access arrangements;
- estimation of likely traffic generation;
- analysis of the impact of development generated traffic on the adjacent Council controlled road network;
- review of trafficable basement design;
- identification of suitable development servicing arrangements.

The following conclusions are made regarding traffic matters associated with the proposed development:

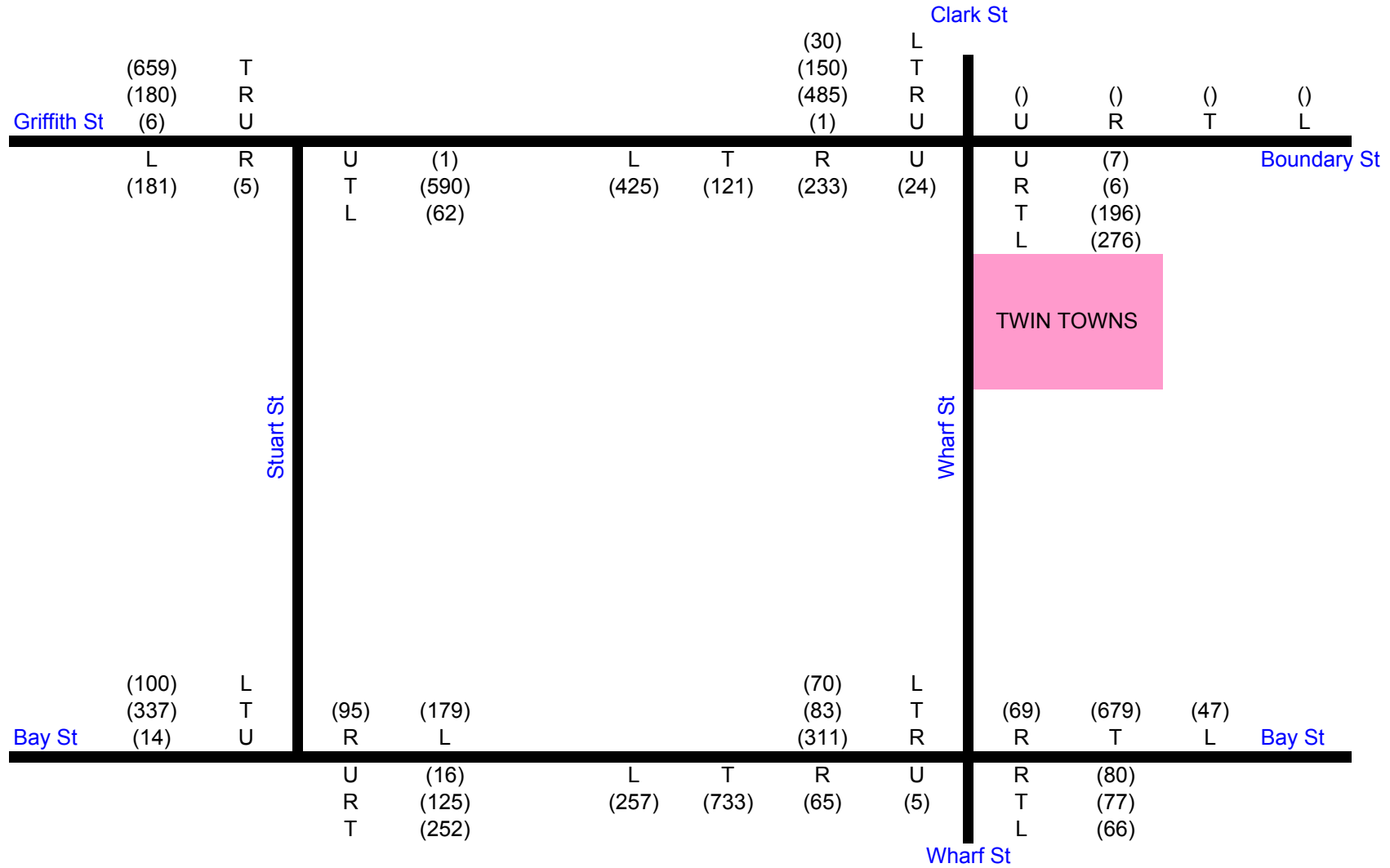
- the intersection of Stuart Street and Griffith Street will operate below capacity at 2019 assessment horizon for the "With Development: scenario assuming motorists accept a leading gap of 4.5 seconds. No upgrading works are considered necessary to negate the development traffic impacts;
- the intersection of Stuart Street and Bay Street will operate below capacity at the 2019 design horizon for the "With Development" assessment scenario. No upgrading works are considered necessary to negate development traffic impacts;
- the intersection of Wharf Street and Bay Street already operates above capacity with existing "No Development" traffic demands. The addition of development traffic has a minimal impact on the operation of the intersection and does not bring about the need for additional upgrading works;

- the Wharf Street/Boundary Street/Griffith Street/Clark Street roundabout intersection will exceed capacity (i.e. DOS>85%) by the year 2009 for the “No Development” assessment scenario. The addition of development traffic has a minimal impact on the operation of the intersection but does not bring about the need for additional upgrading works;
- the construction of additional circulating lanes or ultimate signalisation of the roundabout is required to provide additional capacity at the 2019 design horizon;
- the redevelopment of the Services Club proposes the reconfiguration of the existing egress only crossover on Wharf Street. The application proposes the construction of a dedicated loading entry/exit crossover. The proposed arrangements do not required any additional Crown lands.

Year: 2007

Scenario: Background Traffic+Ultima Development+Dolphin Hotel Development+Twin Towns Stage 2 Development

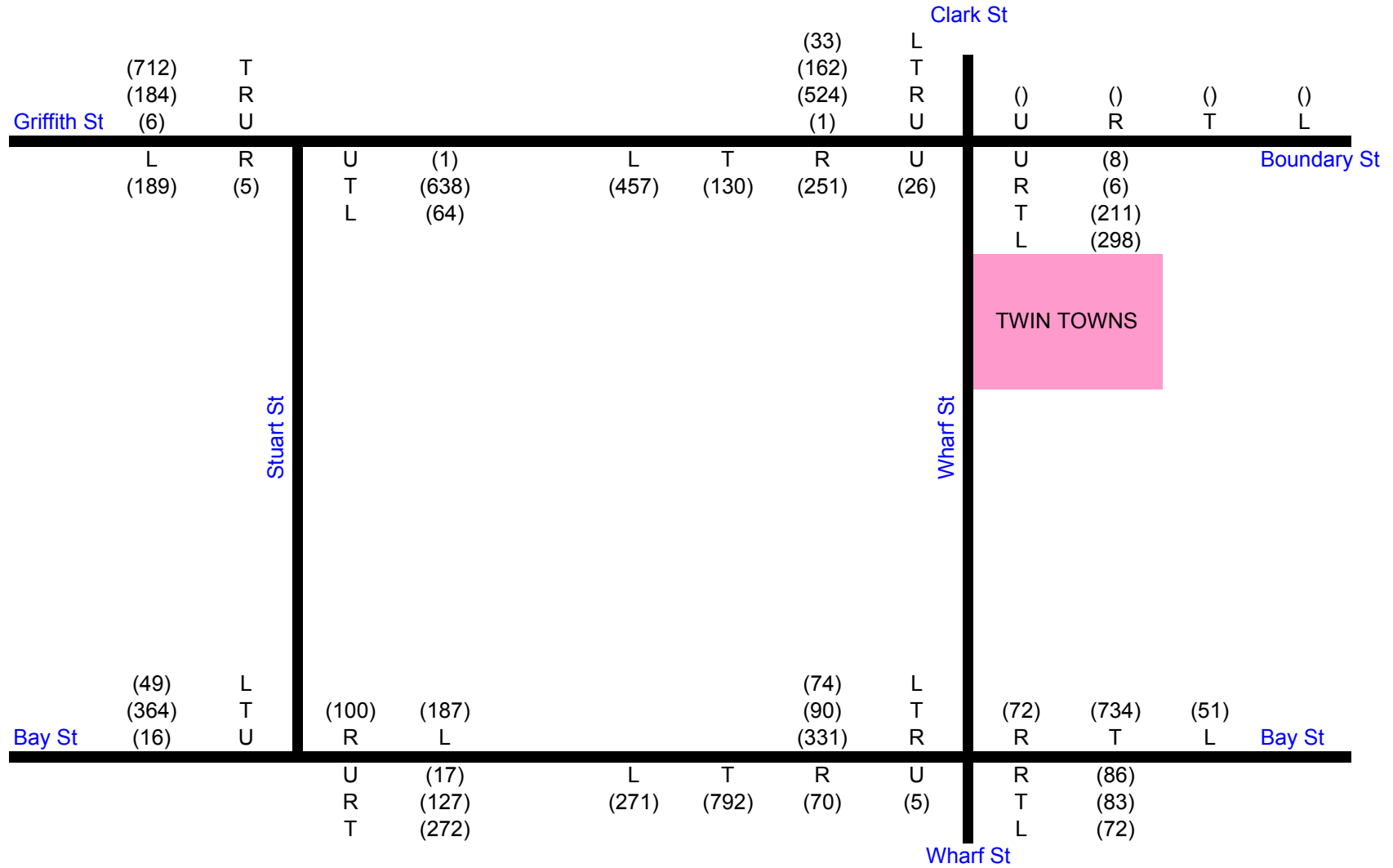
Figure #: 1



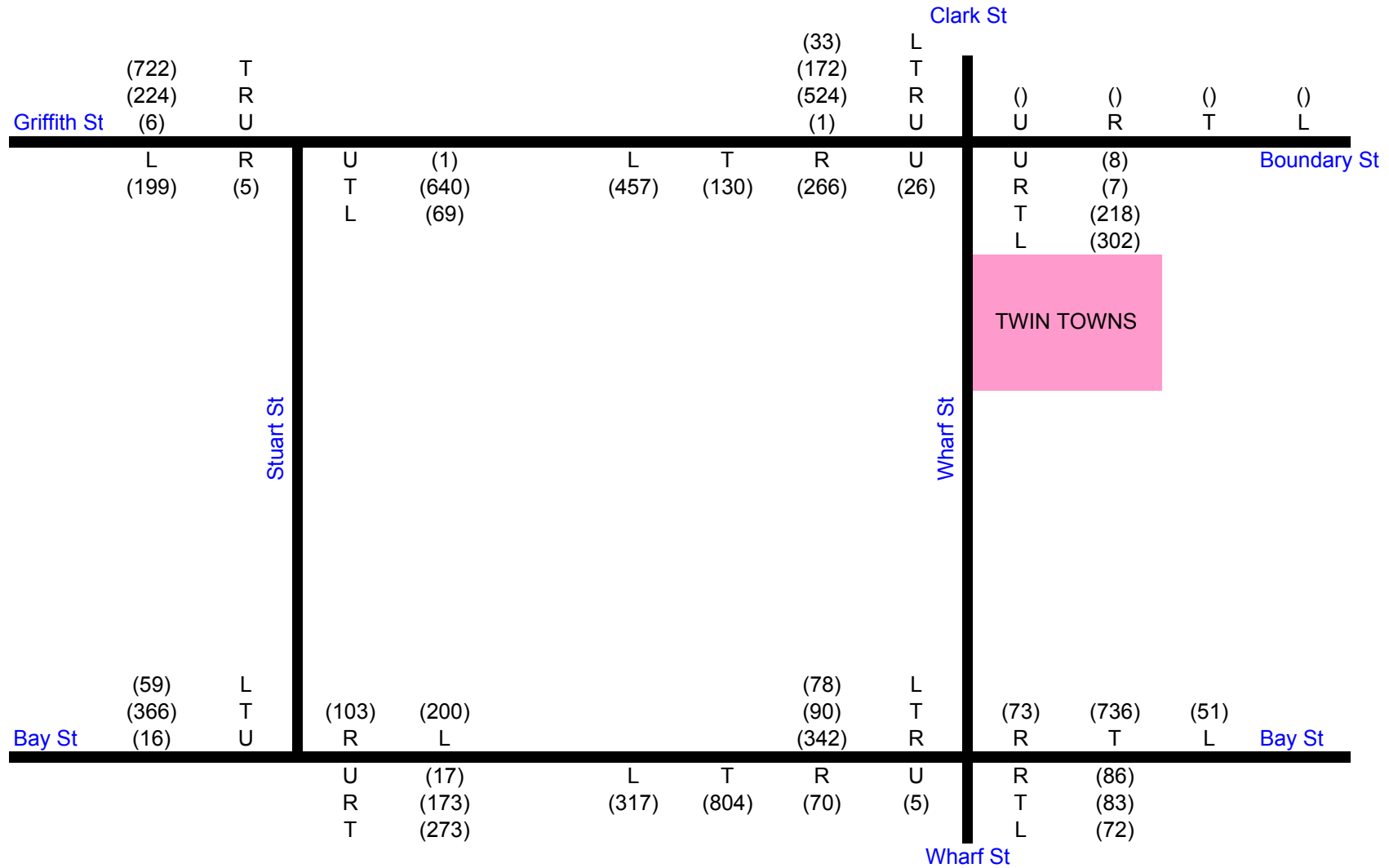
Year: 2009

Scenario: Background Traffic+Ultimate Development+Dolphin Hotel Development+Twin Towns Stage 2 Development

Figure #: 2



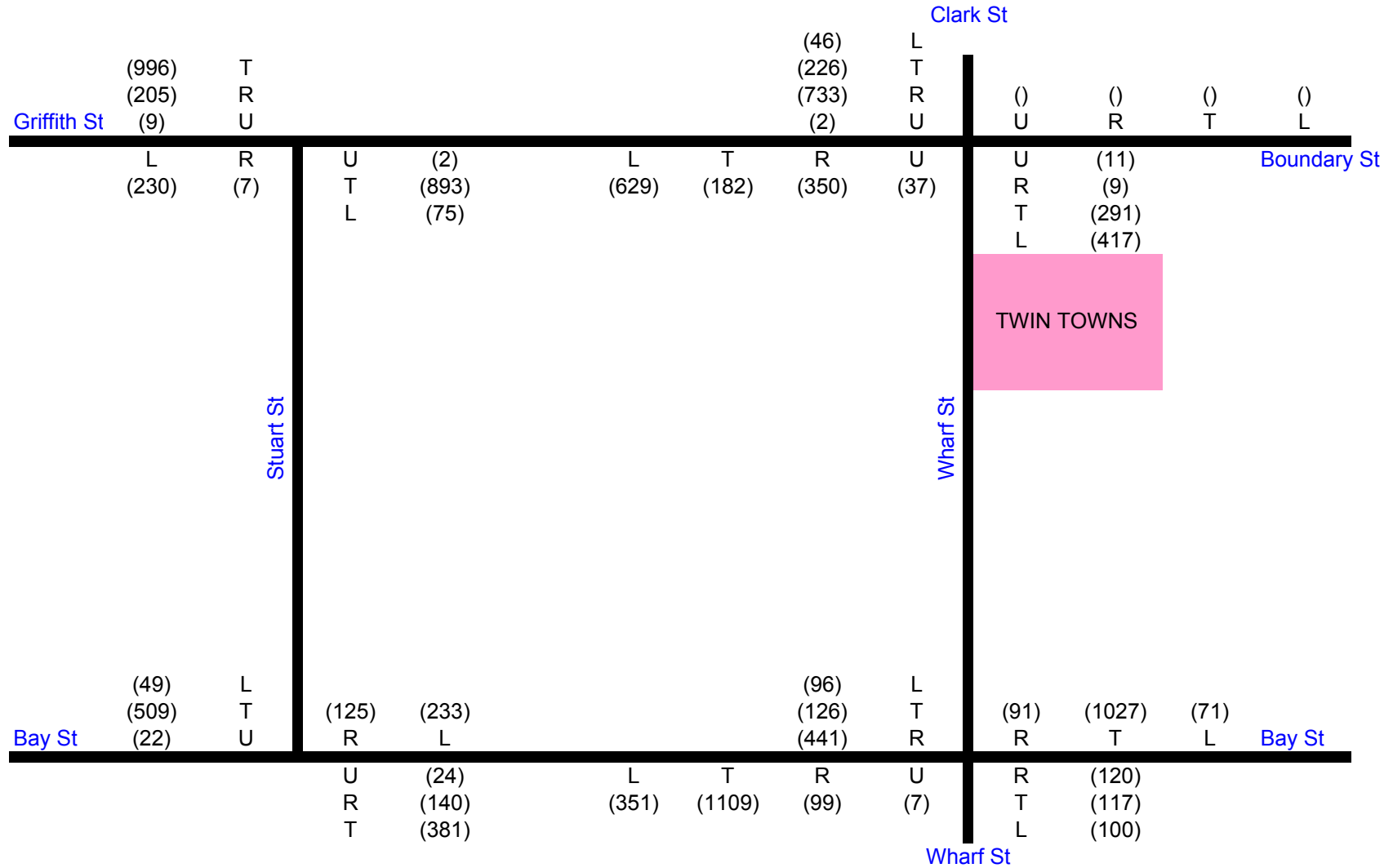
Year: 2009
Scenario: Background Traffic+Ultimate Development+Dolphin Hotel Development+Twin Towns Stage 2 Development+REDEVELOPMENT TRAFFIC
Figure #: 3



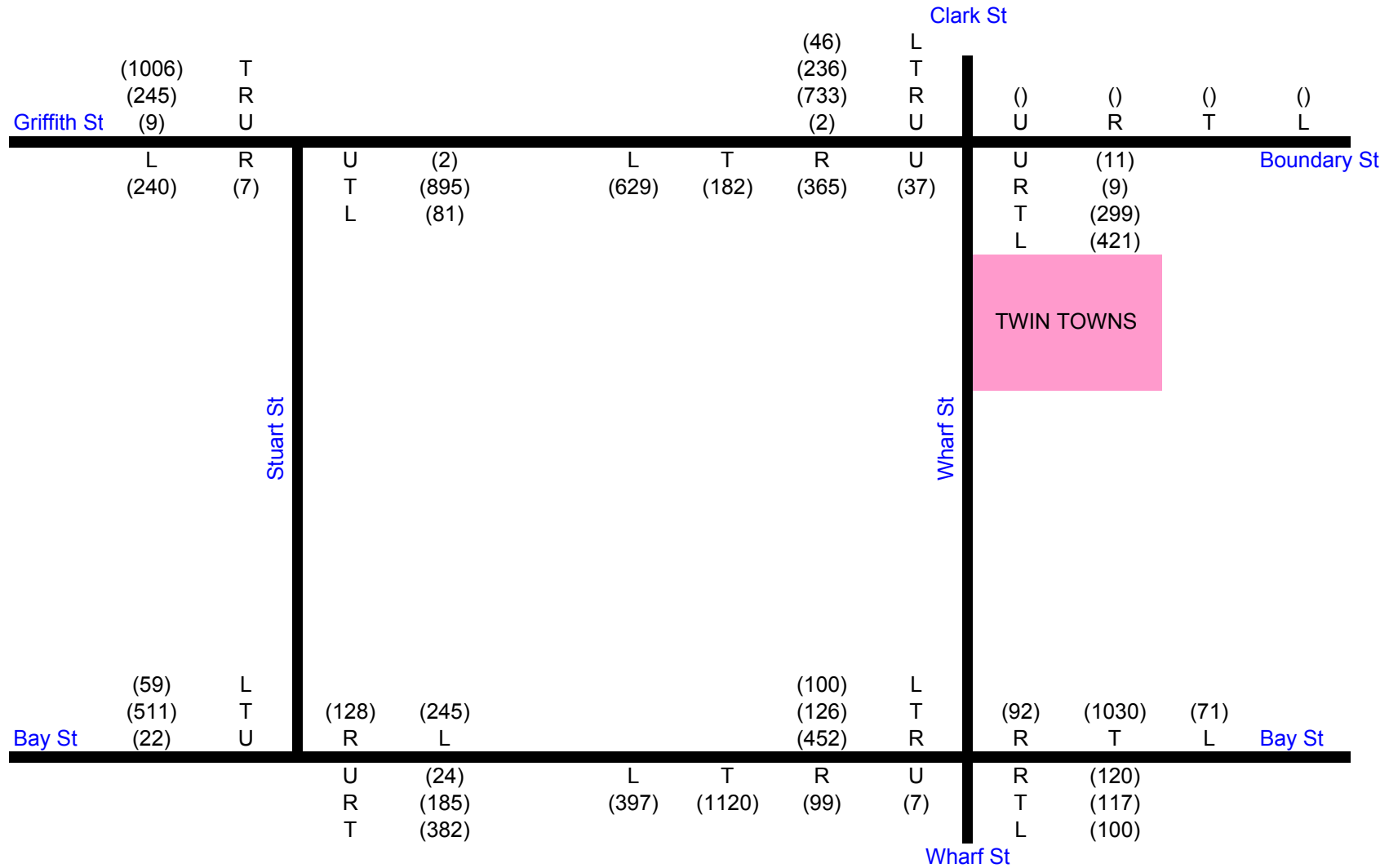
Year: 2019

Scenario: Background Traffic+Ultimate Development+Dolphin Hotel Development+Twin Towns Stage 2 Development

Figure #: 4



Year: 2019
 Scenario: Background Traffic+Ultimate Development+Dolphin Hotel Development+Twin Towns Stage 2 Development+REDEVELOPMENT TRAFFIC
 Figure #: 5





EXISTING CARPARKING ARRANGEMENT

THIS DRAWING HAS BEEN PRODUCED BASED ON INFORMATION SUPPLIED BY OTHERS. WHILE ALL ATTEMPTS HAVE BEEN MADE TO ENSURE THE ACCURACY OF THE DRAWING, BAYDEN GODDARD DESIGN WILL NOT BE HELD RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED.

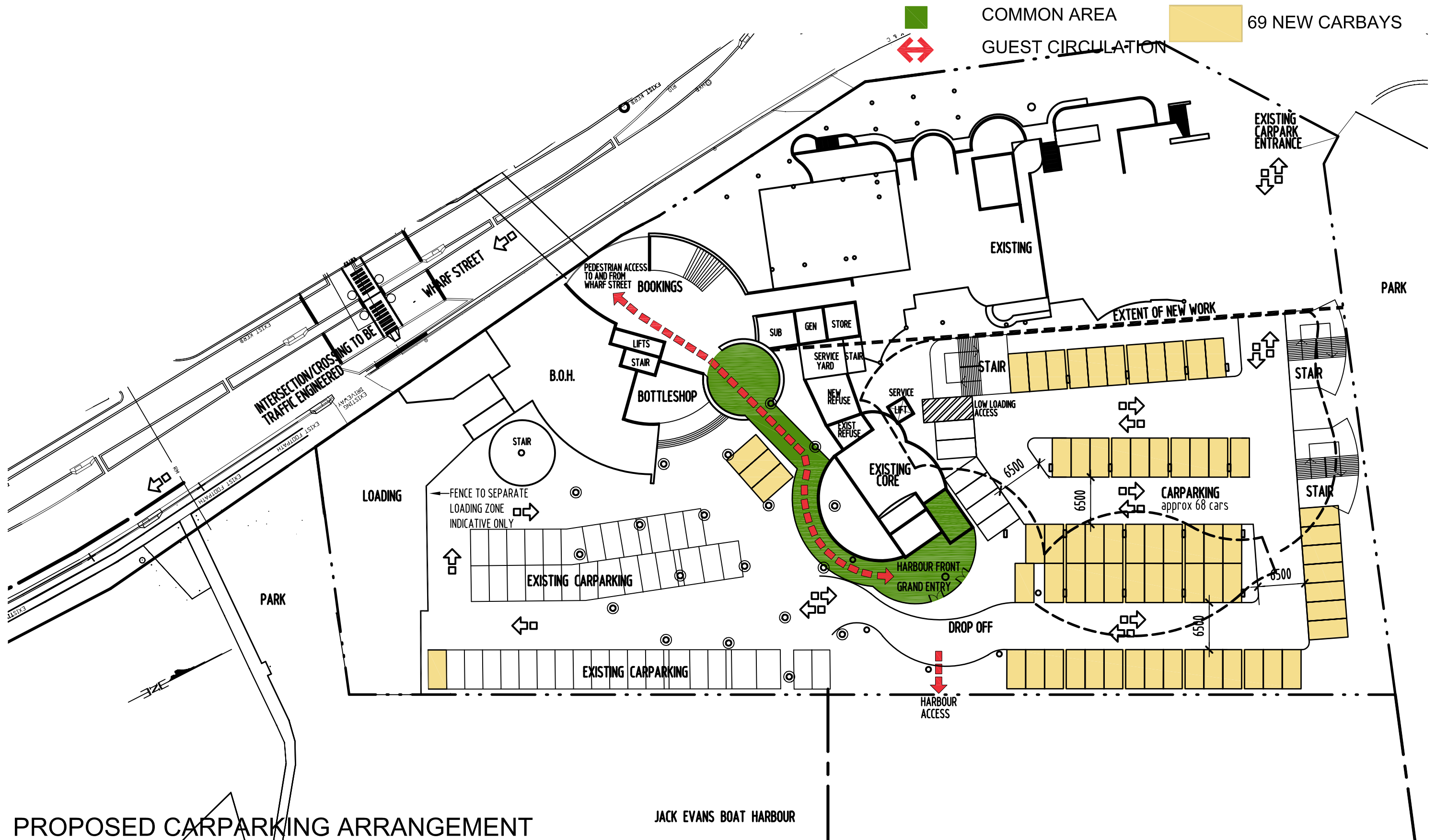
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TWIN TOWNS SERVICES CLUB
EXISTING CARPARKING ARRANGEMENTS
TWIN TOWNS

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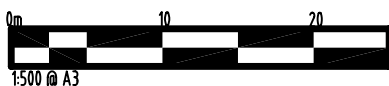
JOB # 335 18.05.07 SK-01 C



PROPOSED CARPARKING ARRANGEMENT

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JACK EVANS BOAT HARBOUR

TWIN TOWNS SERVICES CLUB

PROPOSED CARPARKING ARRANGEMENTS

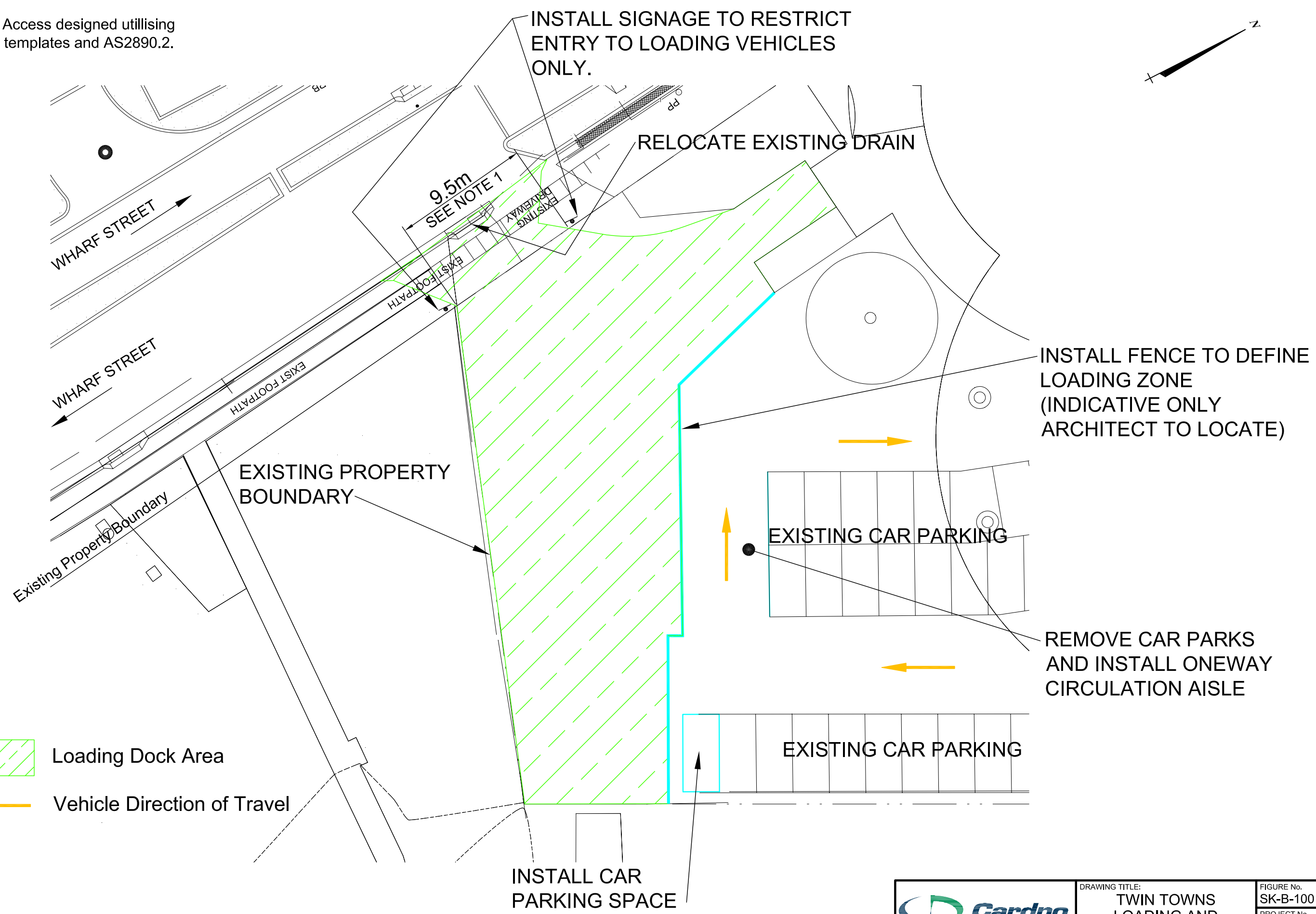
TWIN TOWNS WATERFRONT REDEVELOPMENT

B G D

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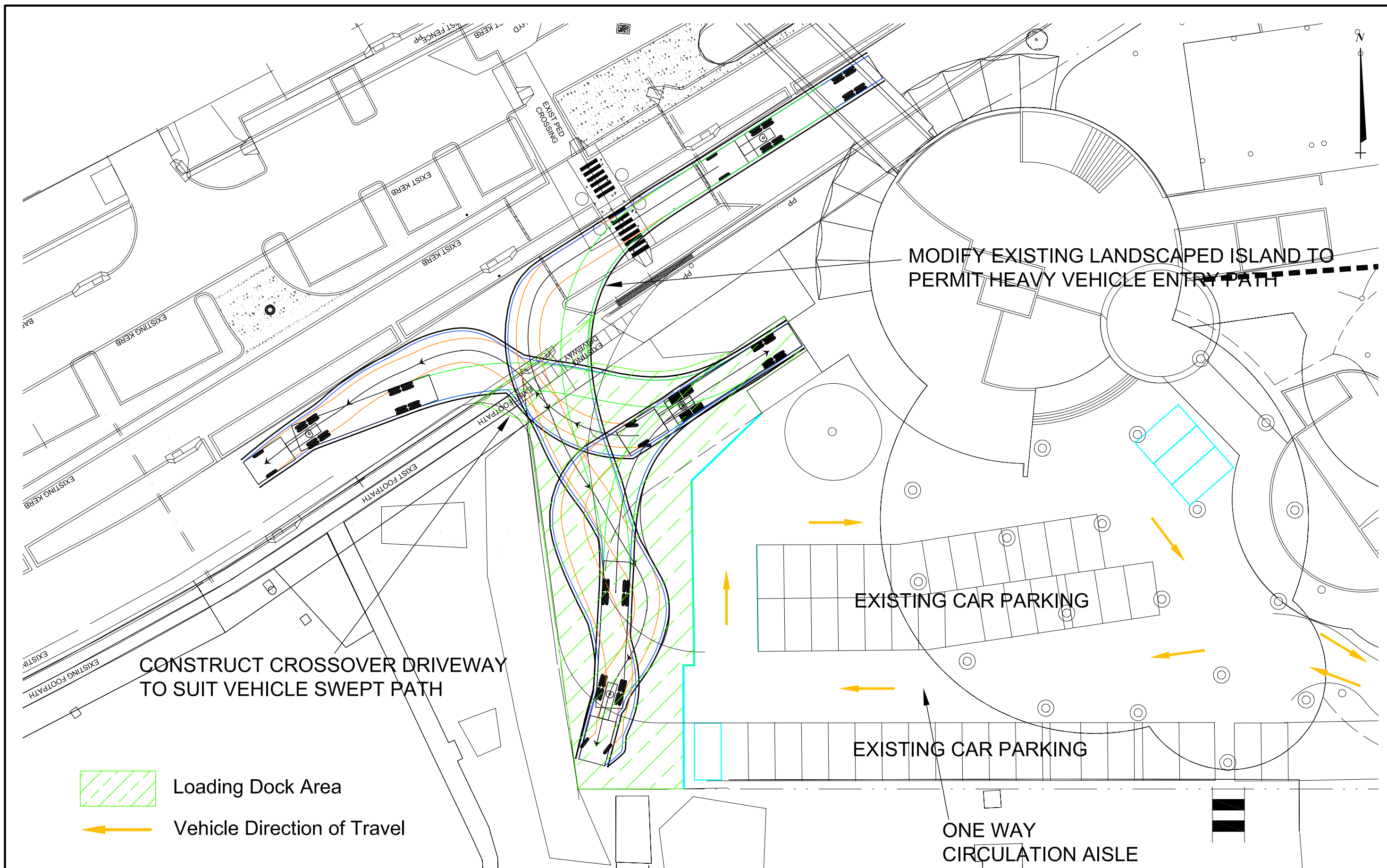
JOB # 335 18.05.07 SK-02 E

NOTE:
1. Loading Access designed utilising
AV turning templates and AS2890.2.



 Loading Dock Area
 Vehicle Direction of Travel

	DRAWING TITLE:	FIGURE No.
	TWIN TOWNS	SK-B-100
	LOADING AND	PROJECT No.
	PUBLIC ACCESS	CE008530
DATE		30/05/2007



DRAWING TITLE:
TWIN TOWNS
LOADING 19M AV
SWEEP PATH

LEGEND

STRUCTURES & FURNITURE - ALL AREAS

- Timber Edge-seat
- Concrete Edge-seat Wall
- Shower
- Drinking Taps

SURFACES & VEGETATION - ALL AREAS

- Open Lawn
- Gardens
- Slopes And Mounds
- Permeable Gravel Surface
- (Graphic with no dots or crosses at centre)
Existing trees to be retained and enhanced by additional planting of similar species

INDIGENOUS PUBLIC PLACEMAKING PROJECT

- Interpretive Language Pavement
- Feature Semi-permeable Pavement
- Bbq And Picnic Table Areas
- Shelter Structures
- Story Wall Features
- Feature Furniture bands, to incorporate seating, BBQ facilities, picnic tables, rubbish bins and bench space

OLD BORDER CARAVAN PARK SITE - SOUTH

- Main Aqua Playground equipment area
- Formal Plaza, Promenade & Water Feature area
- Water Feature

CHRIS CUNNINGHAM PARK

- Minor paths & permeable drainage channels
Paths double as drainage infrastructure n line with water sensitive design (WSUD) policies.

- ENTRY PLAZA AND BUS SHELTER AREA**
Infrastructure Strips incorporating: WSUD Soak Pit and drainage features including ephemeral-flood tolerant planting, Seating Low seating tables, Existing Tree pits, planter boxes, rubbish bins and signage
- BBQ & Picnic Table Areas**

PUBLIC ART, LANDSCAPE FEATURES & LIGHTING

- HISTORIC WATER LINE REFERENCES**
Includes a variety of features in the landscape that provide opportunities to use different surface treatments, level changes, steps, materials, lighting or public art projects
- In ground, surface LED lighting line:**
surface lights to extend through plaza area and across Anzac Memorial site
- Local Stonework Walls:** Different stone surfaces reference the geomorphological history of the region, from the mountain ranges to the sedimentary beds

- LIGHTING**
The majority of the lighting for the jack evans boat harbour will be incorporated in infrastructural elements such as hand rails and seating, shelters and buildings, the uplighting of trees and other details
- Promenade Poles** Formal feature poles

O.B.C.P FOLLIES

- The Steel mesh follies reference the old roads of the caravan park and can be transformed for many purposes, from temporary art installations to signage frames and lighting features

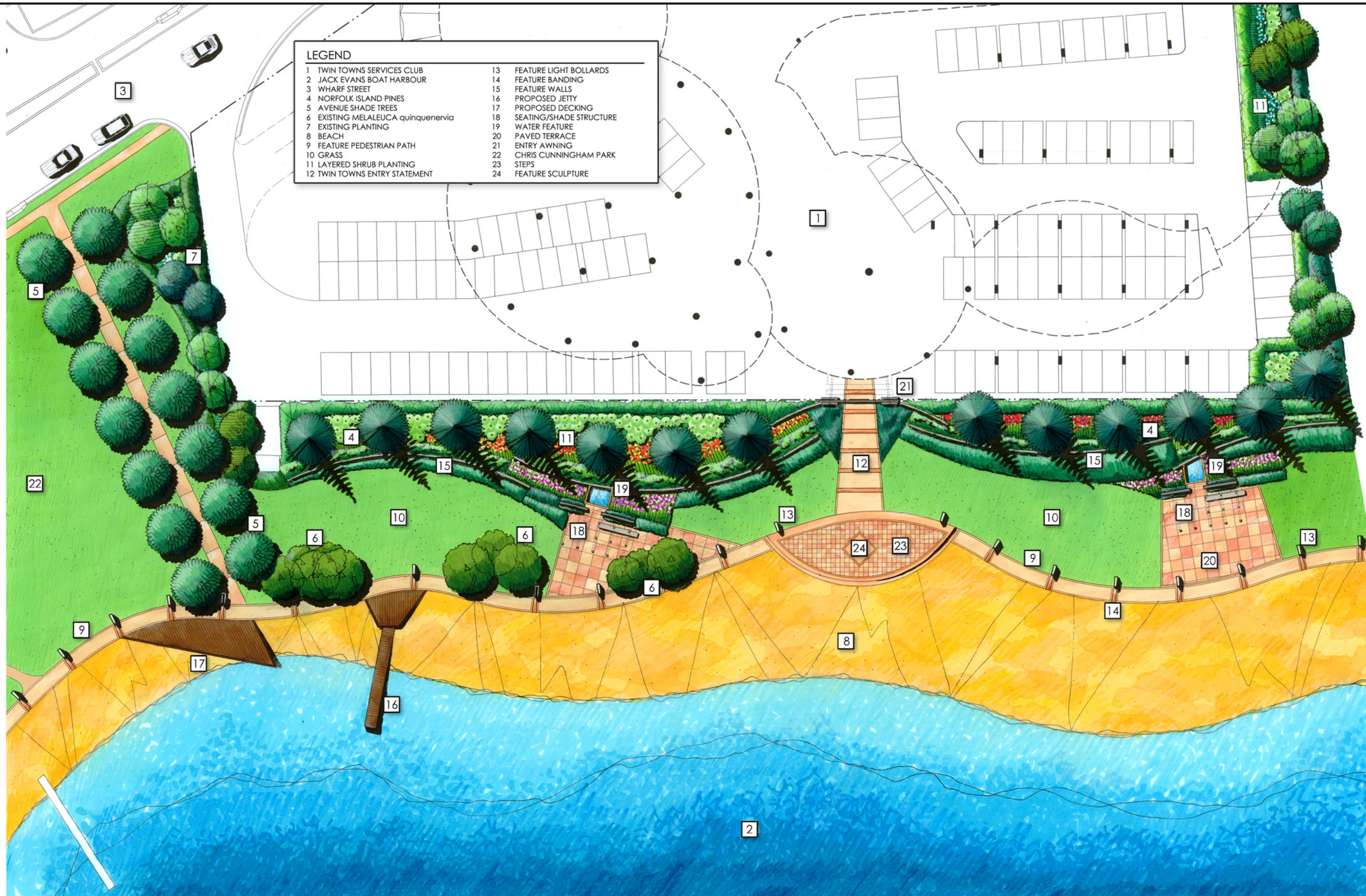


About this plan...

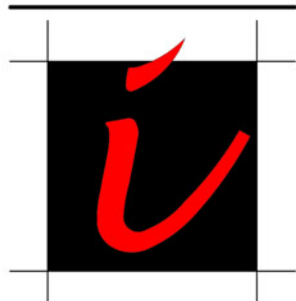
- This plan is intended to:
- Show the schematic design framework for the entire Jack Evans Boat Harbour.
 - Show key areas of access and movement
 - Locate key facilities such as amenities and car parking
 - Provide an overview of the design from which to base the more detailed design areas shown on other plans.
 - Define the different design spaces including the IPPP project parklands, Water playground area, Entry Plazas, Market Spaces, Promenades, Boardwalks, BBQ areas and Passive Open Space.

TREE PLANTING

- Densely planted same species coastal plants - to form solid canopy with interesting trunk form
- Entry Plaza flowering tree species - small trees with interesting bark
- Screening species with textured foliage and some screening qualities
- Large shade tree species
- Formal Avenue shade species
- Smaller columnar shaped tree species with light foliage for transparency and texture
- Coastal Woodland species adjacent to car-park and picnic areas
- Pandanus trees near beach areas and picnic shelters in Chris Cunningham park
- Open Parkland - feature large tree species of different varieties as specimens to create different texture and light and shade
- Formal Grid of light coloured and canopied shade trees
- Densely planted rainforest species to create dense tall slender trunks and high canopy, such as rainforest undergrowth experience
- Feature Boundary Planting



LEGEND			
1	TWIN TOWNS SERVICES CLUB	13	FEATURE LIGHT BOLLARDS
2	JACK EVANS BOAT HARBOUR	14	FEATURE BANDING
3	WHARF STREET	15	FEATURE WALLS
4	NORFOLK ISLAND PINES	16	PROPOSED JETTY
5	AVENUE SHADE TREES	17	PROPOSED DECKING
6	EXISTING MELALEUCA quinquenervia	18	SEATING/SHADE STRUCTURE
7	EXISTING PLANTING	19	WATER FEATURE
8	BEACH	20	PAVED TERRACE
9	FEATURE PEDESTRIAN PATH	21	ENTRY AWNING
10	GRASS	22	CHRIS CUNNINGHAM PARK
11	LAYERED SHRUB PLANTING	23	STEPS
12	TWIN TOWNS ENTRY STATEMENT	24	FEATURE SCULPTURE



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Project and Client
TWIN TOWNS - FORESHORE

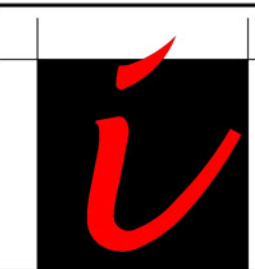
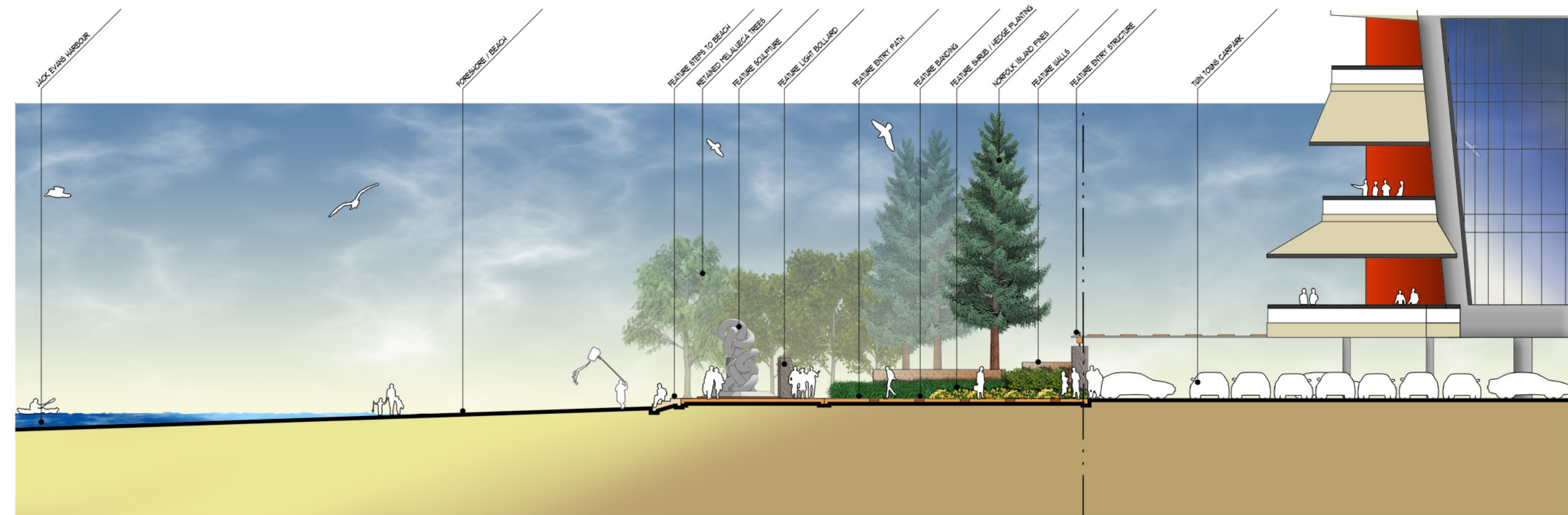
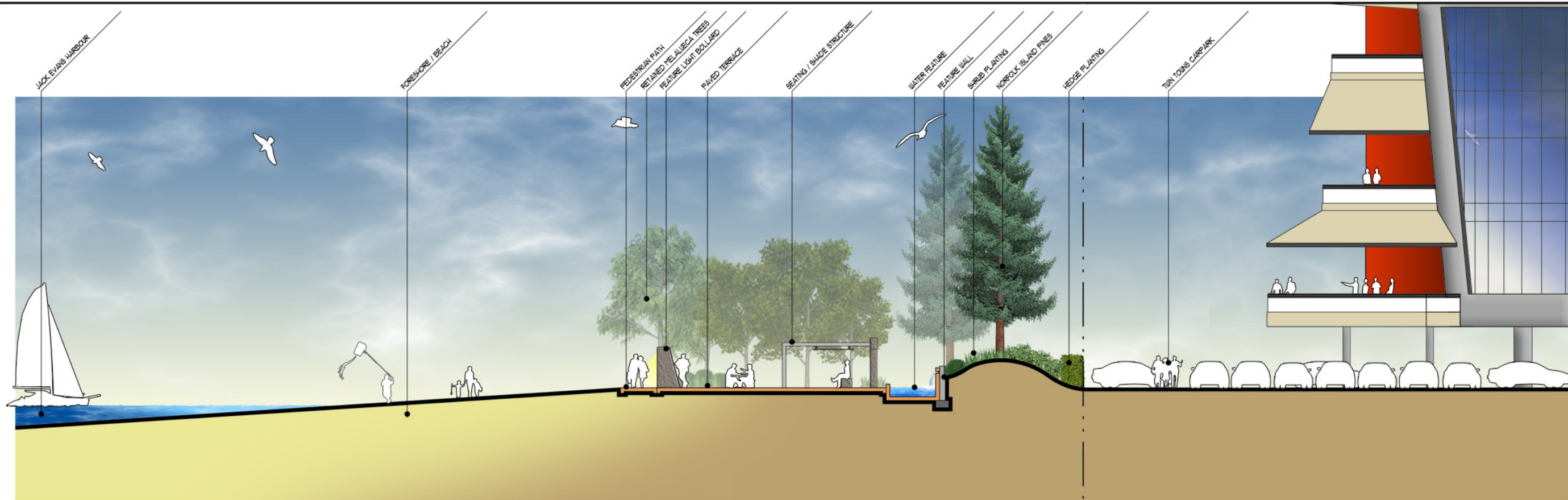
Revisions

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LANDSCAPE
CONCEPT
PLAN



Scale 1:200 @ A1 EXT
Date FEB 2001
Drawn AB
Chk DB

Sheet No.
LCP-01



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Project and Client
TWIN TOWNS - FORESHORE

Revisions

Title

LANDSCAPE
SECTIONS &
ELEVATIONS

Scale 1:100 @ A1 EXT

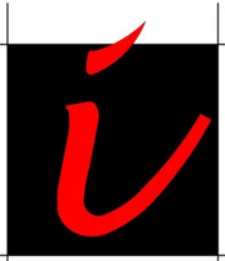
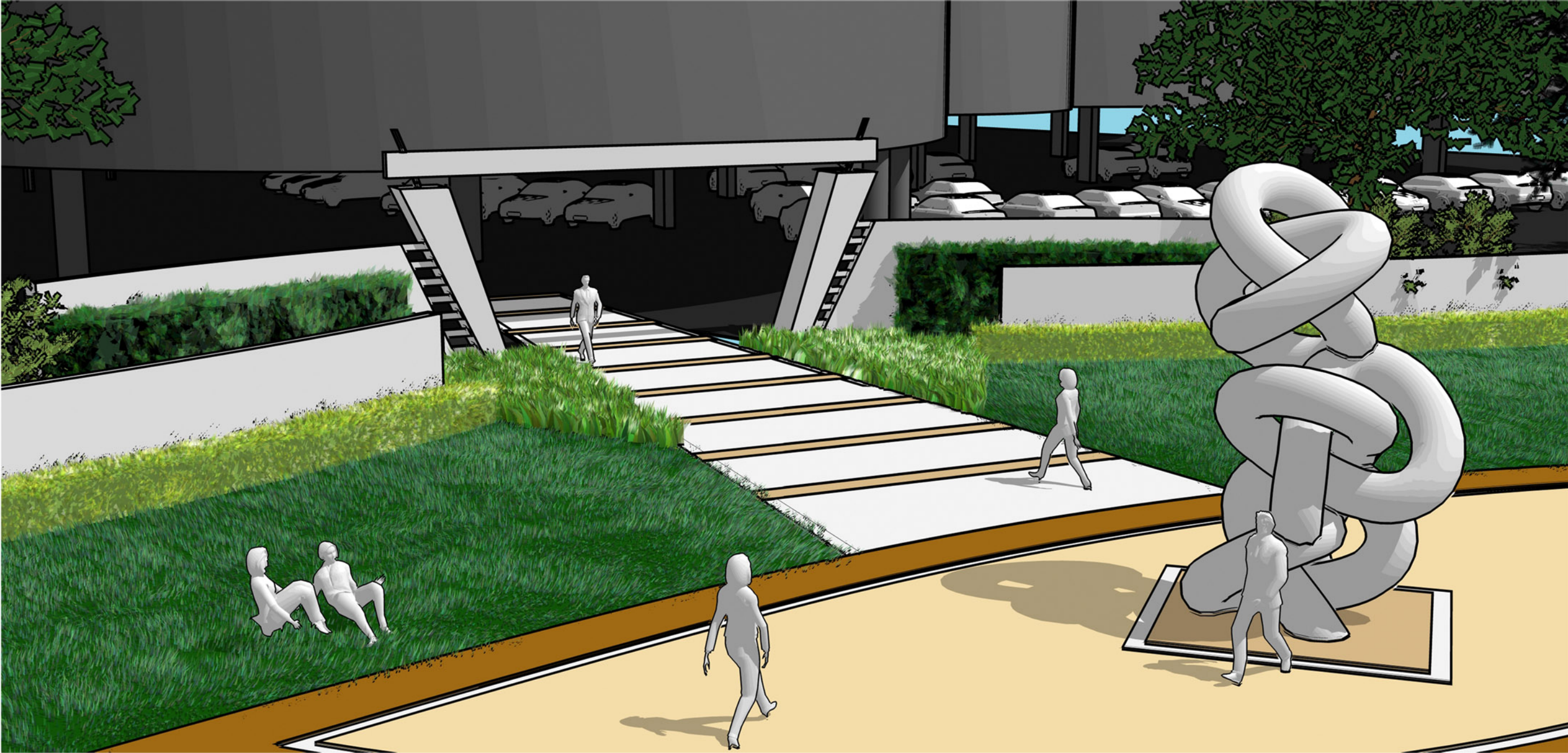
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TWIN TOWNS - FORESHORE

Revisions	
Title	
LANDSCAPE	
PERSPECTIVE	
STUDY	

Scale	N/A
Date	FEB 2001
Drawn	AB
Chk	DB
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