Technical Memorandum

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Subject	Weller Street Concept Design		

1. Introduction

Following the submission of the Integrated Transport Assessment (ITA) of Weller Street for GTJM Property Limited on 6 December 2021, this Technical Memorandum offers design criteria achieved during the preparation of the concept design development of Weller Street, for the purposes of providing a rebuilt intersection on Portobello Road and a road connection to the proposed residential development. The intention of this concept design is to inform discussion with DCC regarding the access arrangement, future road safety audits, site investigations which forms the basis of the next design stage.

For the purposes of a concise record, the existing access arrangement and site constraints discussed in the above prior assessment should be referred to with this Technical Memorandum.

2. ITA Recommendations

The ITA assessment recorded initial recommendations for the Weller Street improvements, and these have been referenced in the table below, together with commentary on how these recommendations have been addressed in the concept design.

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Table 1 ITA Recommendation Development to Concept Design

No	ITA Recommendation	Concept Design
1	Local widening on Weller Street approach at the intersection to accommodate two-way vehicle access and ease turning movements. This area should be regraded to provide a flatter manoeuvring area and allow longitudinal drainage along Portobello Road.	Achieved. The existing combined wide intersection of Weller Street and the private access onto Portobello Road has been reconfigured to a single entry way to avoid confusion and aide with the vertical tie in. The horizontal placement of the intersection is at its existing location and due to the site constraints, a bi-directional roadway cross section on Weller Street is achieved over a short distance. The roadway just beyond the intersection is just over four metres wide. A smooth intersection rounding onto Portobello Road has been achieved with a 0.5% grade over a short distance
2	'Concealed exit' permanent warning sign (PW-26) for westbound traffic approaching the intersection on Portobello Road	To be confirmed with DCC during the next design stage.
3	The Minimum Gap Sight Distance requirements should be achieved in the intersection design, especially the 83 m for right turns from Weller Street to Portobello Road (currently not achieved). Achieving the 123 m Safe Intersection Sight Distance is ideal if practical. The design should not worsen sight distance from the existing.	Partially Achieved. The Minimum Gap Sight Distance to the east is considered achieved, depending on the treatment on top of the retaining wall and the termination of the roadside barrier (if implemented). At this stage of the design, it is assumed that the motorist would have a clear line of sight to the east over the retaining wall and the roadside barrier end treatment. Further, the improvement of this requirement from the ITA to this concept design is the angle of Weller Street onto Portobello Road, aiding the motorists sight line. As mentioned in the ITA, the 123 m Safe Intersection Sight Distance would be ideal if achievable, however due to the existing site constraints, this is not achievable, but the proposed layout has not made the existing any worse than it's current form.
4	Flag lighting could be installed at bus stops on Weller Street that are not currently lit by carriageway lighting, however no lighting was installed by the Peninsula Connection project for the new westbound bus stop at Weller Street. There may be further safety benefit for flag lighting at or near this intersection and this could be raised in discussions with DCC	To be confirmed with DCC during the next design stage.

No	ITA Recommendation	Concept Design
5	Reconstruction of Weller Street to include new pavement structure and surfacing, with associated retaining and landscaping works as required	Details to be confirmed during the next design stage.
6	Fire appliance access to be accommodated at the intersection and along Weller Street to the proposed turning head. This is considered to apply only for the turn movements from / to Dunedin.	Achieved. Tracking exercise has been undertaken during the concept design phase for a Fire appliance.
7	The cross section is assumed to be a 6 m wide carriageway and is recommended to generally allow two-way traffic flow. At constrained locations this width may be narrower to one-way flow, where: a. sight distance should be provided to allow drivers to anticipate conflicts at 30 km/h. b. clear width of at least 6 m should be provided to allow drivers to pull over to let other users pass and appropriately deal with constraints.	Partially Achieved. The typical cross sections are shown on dwg 1253736-C020. The corridor constraints from CH10 to CH60 require a one way operation to navigate this portion of the alignment and for the remainder of the alignment, a six metre wide roadway is provided. The roadway width at the constrained location is 3.3 m wide. Note that the constraint is the private property (Site 333) and Portobello Road Corridor.
8	The cross section should allow for a single 2 m path, given the potentially slow uphill speed of pedestrian and cyclist users which would conflict with vehicle users.	Not achieved. Due to the steep topography, Portobello Road Corridor and high envisaged retaining walls, a 1.3 m wide footpath has been achieved, narrowing to 0.8 m at the constrained section. It should be noted that a safety fence or roadside barrier will have to be provided at the retaining wall locations for fall protection.
9	While a 16% maximum gradient is allowed, a 10% target maximum gradient is recommended where practical, to mitigate the effects of steeper grades for cyclists or mobility devices	Not achieved. Due to the topography and adjacent land use, this maximum permissible grade has been exceeded over very short sections, with a 19% grade over 20 m. This section of the alignment matches the existing and cannot be improved without excessive earthworks and retaining walls with minimal overall benefit.

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3. Standards Referenced

The key standards and guidelines that were used as reference in the concept design development, as appropriate are listed below.

– Waka Kotahi (Transit) State Highway Geometric Design Manual (Draft), 2000. (SHGDM)
– Austroads Guide to Road Design (Parts 3 and 4A) 2021. (AGRD)
– Dunedin District Council, Dunedin Code of Subdivision and Development - August 2010
– NZS 4404:2010 Land development and subdivision infrastructure
– Waka Kotahi Pedestrian Planning and Design Guide
– Land Transport NZ Road and Traffic Standards RTS18, New Zealand on-road tracking curves for heavy motor vehicles, 2007.
– Waka Kotahi RTS14 Guidelines for facilities for blind and vision impaired pedestrians, 2015
– Waka Kotahi Planning Policy Manual, 2007. (PPM)

Note that some of these standards may not be met due to various site constraints but these represent design intent. Standards of safety will take priority.

4. Intersection

The outcomes of the intersection layout achieve a single point entry and exit configuration off Portobello Road and eliminates the confusing dual existing configuration. This improved layout will aide a safer entry and exit manoeuvre from Weller Street onto Portobello Road.

There is sufficient space at the intersection for a single car to wait out of the way of the Portobello Road traffic lane and to allow traffic to exit off Weller Street (an improvement of the existing situation). Some alignment refinement may allow the adjacent walls to be pushed out to the boundaries to improve sight lines.

Due to the intersection location and existing site constraints, the intersection sight restrictions remain largely unchanged as recorded in the ITA.

A tracking exercise has been undertaken for a fire appliance vehicle and adequately navigates the proposed roadway. A passenger vehicle tracking envelope will navigate within the fire appliance vehicle and is deemed acceptable.

5. Alignment and existing private accesses

The horizontal alignment consists of gradual right-hand curves on the initial section with reverse curve of 20 m and 25 m radii leading into a straight alignment to the cul-de-sac head.

The vertical alignment of Weller Street has been raised from CH10 to CH50 to improve the priority movement along Weller Street. This also accommodates the tie-in with the shared private property access at CH25. It is proposed that this shared access will form a priority T-access with Weller Street. Similarly, the tie-in of existing private accesses will have to be refined at CH120 and CH130, where all will be formed as access rather than an intersection (which could be less clear in terms of priority and legibility of the Weller Street alignment).

The vertical alignment consists of a 12% grade from Portobello Road up to the existing shared access at CH25 with a flat section to CH80 as the road passes an existing garage on the right-hand side with the flat alignment also limiting the height of the retaining wall required on the left-hand side, A steep gradient up to 19% is required beyond CH80 to reach natural ground level at the cul-de-sac. This gradient will require consideration in terms of surfacing treatments to be trafficable in all-weather, including wet and icy conditions.

6. Design parameters

A design speed of 20 km/h to 30 km/h is dictated by the reverse curve, steep vertical grades and road narrowing at CH30. The 20 m and 25 m radii within the reverse curve fit a design speed of 20 km/h. Considering the low volumes, terrain and steep gradients, a higher design speed is not desirable and the achieved design speeds are considered appropriate in view of the road environment.

Table 2 Weller Street Geometric Criteria

Curve	HORIZ	VERT	Note	Design Speed
CH30	-	Crest K=1.5	Tie in to access	<40 km/h
CH50	50 m radius	1.5% grade	f=0.3	45 km/h
CH70	50 m radius	3.5% grade	f=0.3	45 km/h
CH100	20 m radius	Sag K=2	f=0.35	20 km/h
CH120	25 m radius	19% grade	f=0.35	20 km/h

Super elevation on curves is not included in the concept design but will be incorporated at detailed design for the horizontal reverse curves.

7. Retaining walls

The next design phase will refine the heights and locations of the retaining walls which have been indicatively shown as timber walls. Further, the inclusion of roadside safety barriers will have to be confirmed and have nominally been shown as w-beam barriers. Sight rails and pedestrian handrails may be necessary for pedestrian safety alongside the footpaths.

8. Next Phase

Following on from this concept design, the next phase will need to consider the following:

– Confirmation of waste collection point
– Proposed signage and lighting locally on Portobello Road (including suggested PW-26 ‘concealed’ warning sign)
– Retaining wall extents and construction (nominally shown as timber)
– Access levels and drainage works
– Extent and depth of new pavement
– Street lighting along Weller Street
– Layovers for visitor parking or pull-over
– Signage and linemarking
– Road safety barrier or sight rail extents and type
– Drainage features
– Maintenance areas

A road safety audit may be required for concept design and will likely be required for detailed design.