District of Peachland

ROADWAY NETWORK PLAN

Final Report

0655.0114.01 / May 2004

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1.0 INTRODUCTION

This report describes a recommended Roadway Network Plan for the District of Peachland. Key features of the plan include:

- A hierarchical system of road classifications, as used in other municipalities, which identifies the various functions of key roads within the District.
- Road design guidelines and cross-sections appropriate for conditions in Peachland, particularly hillside developments.
- Road network improvements, including new road connections and safety improvements at key intersections.
- A means of accommodating pedestrians and cyclists.

The Roadway Network Plan will reference, as well as feed back into, a number of current plans and bylaws in the District of Peachland. New road classifications developed through this project would be incorporated into a revision of the Official Community Plan (OCP) Major Street Network, and are based on future land uses identified in the OCP. Recommended revisions to roadway design guidelines (cross-sections, ROW widths, grades, etc.) would be incorporated into an amended Subdivision and Development Servicing Bylaw. Finally, the design guidelines would be utilized to determine the estimated road costs, for long-term road capital planning as part of the review of the District's Development Cost Charges (DCC).

1.1 Methodology

The project is a combination of technical analysis and transportation and land use planning principles. The methodology established to achieve the noted objectives is as follows:

- Review background literature to establish the context for the assignment, including, but not limited to:
  - Official Community Plan, 2001
  - Subdivision and Development Servicing Bylaw, 1993 with revisions
  - Master Drainage Plan, 1995
  - Beach Avenue Neighbourhood Plan, 1999
  - Ministry of Transportation – Highway 97 4-laning Preliminary Design, 1991
  - Ministry of Transportation – Peachland Downtown Development Traffic Assessment, 2003
  - Ministry of Transportation – Okanagan Investment Strategy, 2003.

- Undertake a traffic data collection exercise to effectively establish existing performance conditions and a basis for determining a future forecast scenario.
- Forecast future performance based upon known land use changes and growth in traffic volumes, and industry standard traffic trip generation rates.
- Recommend a road classification system for Peachland which takes into consideration hillside conditions, traffic, future development nodes, and pedestrian use.
- Recommend a series of road design guidelines and cross-sections to be utilized in future capital planning (e.g. roads DCC) initiatives.
- Make other recommendations including intersection improvements and pedestrian facilities where applicable.

1.2 Key Considerations

The District of Peachland maintains approximately 65 kilometres of roads in its inventory, 95% of which is paved. With such a significant asset, there are a number of issues that must be taken into consideration when developing a roadway network system which is appropriate for the community.

Growth

Like many of the communities in the Okanagan Valley, Peachland has experienced growth in recent years above the provincial average rate. The population of the District reached 4,998 in 2003 (source: BC Stats) and grew by an annual rate of 1% since 1999. With the recent introduction of sanitary sewer in the community, the population is estimated to reach nearly 7,500 by 2023 at a projected annual growth rate of 2%.

Future growth areas will be dependent on the expansion of the sanitary sewer system to service existing and new development. The Town Centre and Beach Avenue areas which have been on sewer for approximately 5 years are seeing renewed pressures to redevelop the area with a mixture of commercial and residential (medium- to high- density and infill housing) projects. Expansion of the sanitary sewer system this year to the Lower Princeton and lower Trepanier Bench area has generated subdivision and development interest in these two neighbourhoods.

Topography

Although most of the municipalities in the Okanagan Valley claim to be "hillside communities", no community is more worthy of this title than the District of Peachland. Over three-quarters of Peachland (about 78%) lies on slopes greater than 10 percent, and nearly half of the District (approximately 47%) has slopes greater than 30 percent. Compare this to the City of Kelowna with less than 15% of its lands greater than 30% slope, which has established hillside development policies within their OCP and recently incorporated design standards within their Zoning and Subdivision and Development Servicing Bylaws.

Road standards need to be developed which are sensitive to hillside environments. While such changes to the standards will have impacts on the capital and operating costs of District roads, the design must reflect the safety considerations of emergency vehicles (e.g. fire trucks) as well as the operational requirements of public works equipment (e.g. snowplows).

Drainage

The semi-arid climate of the Okanagan Valley results in relatively little average precipitation in Peachland of 24 cm (9.5 inches) annually, nearly one-fifth that of the Lower Mainland (111 cm annually). Storm events are infrequent; however they have been relatively severe when they do occur, such as in 1992, which caused local damage to public and private property.

The 1995 Master Drainage Plan for the District identified a number of priority improvements which involved restoring and/or replacing culverts, establishing major drainage routes, and protecting existing natural drainage corridors. A significant portion of the drainage will be affected by the road network system and the conveyance method used (ditches, dry wells, storm sewer). A combination of drainage improvements will likely occur, requiring a correlation between the drainage and roadway network plans.

Pedestrian Connections

The steep terrain in much of Peachland creates challenges in providing pedestrian linkages between neighbourhoods and to key destinations such as commercial centres, schools, community facilities and bus stops. Key issues and opportunities with respect to pedestrian access are discussed below.

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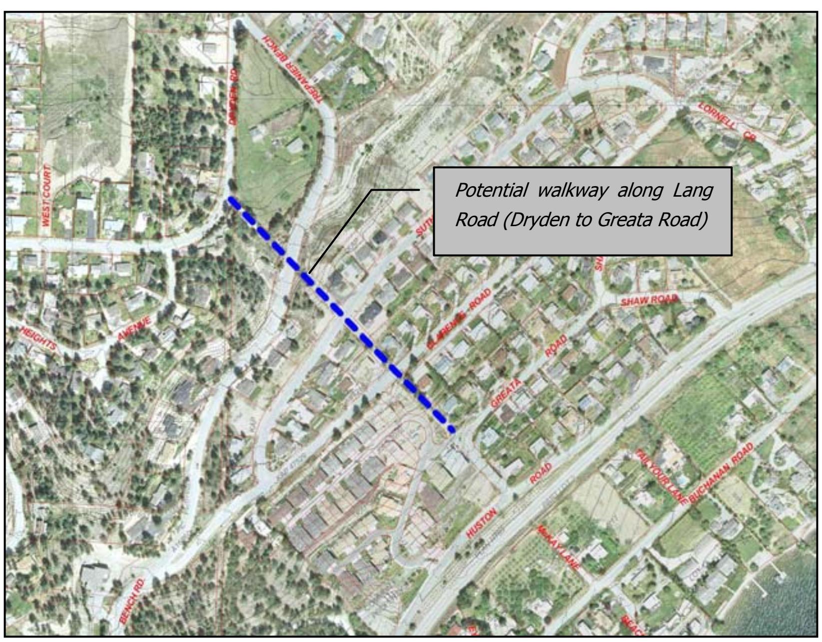
Access to Key Destinations at Lower Elevations

Generally, key destinations such as commercial centres, schools, community facilities and bus stops are located at lower elevations, closer to Highway 97. Pedestrian access to these key destinations can be facilitated in two ways – along roadways, and along separate pedestrian walkways.

Where the route leading to the destination is relatively direct and grades are not excessive, pedestrian access along roadways is preferred. On local roads where traffic volumes are low, pedestrians can share the roadway with motor vehicle traffic. Optionally, pedestrians can be accommodated on a paved shoulder or a sidewalk. On arterial and collector roads, pedestrians should be accommodated on a sidewalk.

Where it is not possible or desirable to accommodate pedestrians along a roadway, alternative access via pedestrian walkways should be provided where opportunities to do so are available. Walkways are direct pedestrian routes through a neighbourhood, which are not located along a roadway. These might include, for example, walkways connecting two cul-de-sacs, and walkways along utility corridors or other right-of-ways. To provide direct access, a walkway might follow an alignment straight up and down a hillside rather than across the hillside. An example of where such a walkway connection could be provided is Lang Road lane from Huston Road to Dryden Road, crossing Trepanier Bench Road. This corridor is an existing road right-of-way which was never constructed as a road due to the steep grade along the right-of-way. A walkway along the Lang Road right-of-way would provide direct access for pedestrians to Greata, Clarence, Sutherland and Dryden Roads, as shown in the diagram below.



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Access Across Highway 97

Highway 97 is a major barrier to pedestrian movement, bisecting the community. There are currently two pedestrian connections underneath Highway 97 – one at Todd Road (to Clements Crescent) and the other at Princeton Avenue/Beach Avenue. There are no signalized or otherwise controlled pedestrian crossings on Highway 97.

Where opportunities arise, additional pedestrian crossings of Highway 97 should be provided. The easiest way to provide a pedestrian crossing is as part of a traffic signal. For example, if Ponderosa Drive, 13th Street and Clements Crescent are consolidated into one new signalized intersection on Highway 97, this would provide an opportunity for additional pedestrian crossing.

Underpasses and overpasses are costly, and should only be considered in locations where the adjacent geography would provide for direct pedestrian connections rather than lengthy, winding access ramps. In addition, underpasses should be large, well-illuminated and visible from adjacent streets and buildings in order to minimize personal security concerns.

Alternate Transportation Choices

Topographic constraints also limit the alternatives to the automobile in Peachland. Bike lane opportunities are limited due to the steep terrain, although some opportunities do exist, such as along Beach Avenue.

BC Transit operates a limited transit service within Peachland, with services running along Huston (traveling towards Peachland), Buchanan (traveling away from Peachland), 13th Street, Beach Avenue and up Princeton Avenue as far as the public works yard. A total of 12 trips per weekday are provided in each direction.

Pedestrian access to bus stops would generally be accommodated with pedestrian routes along roadways and with walkways. Specific considerations related to access to bus stops include:

- A hard surface at the bus stop, to help prevent pedestrians from slipping and falling when boarding and alighting from a bus. Curb drops should be provided as part of the hard surface to provide access for persons with disabilities.

- A continuous pedestrian route from the bus stop to the nearest safe crossing point along the roadway, to encourage pedestrians to cross where it is safe.
- In cases where pedestrian routes along roadways are indirect, walkways connecting into adjacent neighbourhoods from bus stops reduce walking distances for pedestrians.

The Central Okanagan Regional District is currently undertaking a Smart Transit Plan, which as has four aims:

- Explore how to make more efficient use of transit services;
- Develop transit-oriented development guidelines to ensure future subdivisions would be well-covered by transit;
- Develop a long-term vision for public transit; and
- Develop a business plan and smart-transit strategy for the Central Okanagan.

As a contributor to this regional study, the District of Peachland has a vested interest in ensuring that issues of servicing an aging population in hillside communities are addressed.

Financial Impacts

An effective plan is one which considers the financial impacts on the community as well as the technical implications. Recommendations from the Roadway Network Plan are structured based on the following financial objectives:

- Optimize, maintain and maximize the use of existing resources and infrastructure;
- Ensure adequate contribution from developers (through Development Cost Charges), while providing realistic roadway design guidelines; and
- Provide the most cost-effective means of transportation.

2.3 Renfrew Road

<table>
<tr><th>Function</th><th>Characteristics</th></tr>
<tr><td>

- Mobility within neighbourhood
- Access to adjacent properties

</td><td>

- Two lanes, no centreline
- Pavement width varies from approx. 7 m to unpaved road
- Relatively level terrain with entry grades at Hwy 97 up to 8%
- No sidewalks
- Roadside ditches, overland flow to specific culverts and natural drainage channels
- Driveway accesses, some steep

</td></tr>
</table>

2.4 Heighway Lane

<table>
<tr><th>Function</th><th>Characteristics</th></tr>
<tr><td>

- Mobility within and through District
- Provides connection between Lipsett Ave. and Renfrew Road

</td><td>

- Two lanes, no centerline
- Pavement width approx. 7 m but narrows towards Renfrew due to power poles
- Grade approximately 10%
- No sidewalks
- Roadside ditches
- Driveway accesses, some steep

</td></tr>
</table>

2.5 Somerset Avenue

Function	Characteristics
• Mobility within neighbourhood • Access to adjacent properties 	• Pavement width varies from approx. 7 m to 4 m • Grades up to 10% • No sidewalks • Roadside ditches, connected to local subdivision with storm sewers (strata) • Driveway accesses, some steep

2.6 Ponderosa Drive

Function	Characteristics
• Mobility within neighbourhood • Access to adjacent properties 	• Pavement width varies from approx. 8 m to 6 m • Grades up to 12% • No sidewalks • Roadside ditches • Driveway accesses, some steep

2.7 Beach Avenue

Function	Characteristics
• Mobility within District • Access to adjacent properties 	• Two lanes with centreline • On-street parking • Level terrain • 30 km/h speed limit (between the Highway 97 intersection and 8th Avenue) • Sidewalk on north side with walking path (formal & informal) on the south side • Curb, gutter and storm sewer within Town Centre; curb and gutter along most of north side

2.8 Trepanier Bench / Cousins Road

Function	Characteristics
• Mobility within District • Access to adjacent properties 	• Two lanes with centreline • Pavement width varies from approx. 8 m to 6 m • Grades up to 10%% • No sidewalks • Roadside ditches, connected to local subdivisions with storm sewers (Sutherland Road, Clarence Road)

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2.0 EXISTING CHARACTERISTICS

As part of this study, a photo survey and inventory of the current major road characteristics was performed, and summarized in the following section:

2.1 Princeton Avenue

Function	Characteristics
• Mobility within and through District • Access to adjacent properties 	• Two lanes with centreline • Approx. 7 m pavement width • Grades up to 8% with some flatter sections • 50 km/h speed limit • Sidewalk one side plus curb/gutter/storm drainage below Columbia Avenue • Roadside ditches with culverts in specific locations • Driveway accesses

2.2 Lipsett / Bulyea Avenue

Function	Characteristics
• Mobility within neighbourhood • Access to adjacent properties 	• Two lanes, no centreline • Pavement width varies from approx. 7 m to 5 m • Grades up to 10% with some flat sections • No sidewalks • Roadside ditches, overland flow to specific culverts and natural drainage channels • Driveway accesses, some steep

2.9 Huston Road

Function	Characteristics
• Mobility within neighbourhood 	• Two lanes, no centerline • Within Highway 97 right-of-way • Relatively level terrain • Generally no sidewalks (except in front of the Terraces townhouse development) • Roadside ditch along Highway 97, storm sewer in front of Terraces development

3.0 NETWORK AND TRAFFIC ASSESSMENT

To determine future road network requirements, the District's current land use plan and population growth projections were used to forecast new traffic within Peachland. These traffic forecasts were then used to identify road network improvements that are required within the next 20 years – specifically, new road connections and intersection improvements.

Future traffic volumes were estimated by adding new traffic generated by new development to existing traffic volumes. Existing traffic volumes were determined based on traffic counts previously undertaken on Highway 97 by the Ministry of Transportation, and counts undertaken in August 2003 at key intersections within the District.

3.1 Trip Generation

The total number of new trips generated is a direct function of future land use. The summer afternoon peak hour has been used for analysis, as it represents the potential 'worst case' condition within the District. The development potential yields were used to estimate new trips based on generally accepted engineering practices by the Institute of Transportation Engineers, and are as follows:

- Retail – 96 trips/1000 m^2 of floor area
- Office – 18 trips/1000 m^2 of floor area
- Tourist Commercial (hotel/motel) – 0.64 trips/unit
- Industrial – 0.25 trips/ha
- Medium to High Density (apartments) Residential – 0.36 trips/dwelling unit
- Medium to Low Density (townhouse, duplex) multi/single family – 1.0 trips/dwelling unit
- Low Density Single Family – 1.2 trips/dwelling unit

Based on these generation rates and the future development potential yields, the total new trip generation is estimated as follows:

- 0 to 10 years – 736 new trips
- 11 to 20 years – 713 new trips

These numbers include only the traffic generated within Peachland and does not include traffic on Highway 97 that would pass through Peachland without stopping. It does, however, include traffic such as work trips to/from Kelowna.

3.2 Origins and Destinations

Every trip that is generated also has a destination. The origins and destinations of the future trips were estimated by splitting trips into the following trip purposes:

- Home to Home – trips from one residence to another
  - 3.7% of 0 to 10 year new trips
  - 7.1% of 11 to 20 year new trips

- Other to Other – trips from one non-residential land use to another, such as business delivery trips
  - 2.4% of 0 to 10 year new trips
  - 1.1% of 11 to 20 year new trips

- Home to Other – trips from a residence to another land use, such as shopping or recreation trips
  - 21.7% of 0 to 10 year new trips
  - 10.1% of 11 to 20 year new trips

- Other to Home – trips from to residence from another land use, predominantly commuting trips from work to home
  - 27.0% of 0 to 10 year new trips
  - 19.2% of 11 to 20 year new trips

- External to Home – trips from outside Peachland to a residence within Peachland
  - 33.5% of 0 to 10 year new trips
  - 40.7% of 11 to 20 year new trips

- Home to External – trips from a residence within Peachland to a destination outside Peachland
  - 11.7% of 0 to 10 year new trips
  - 21.8% of 11 to 20 year new trips

It should be noted that these trips types and percentages are assumptions for the analysis based on known land uses and existing traffic patterns. They are not based on a survey of actual origins and destinations.

In the first 10 years, the proportion of external trips (Kelowna, Westbank, Summerland, and Penticton) is expected to decrease with the addition of more employment land uses within the District (i.e. Town Centre). However, the forecast residential growth in the 11 to 20 year period will once again be substantially greater than non-residential land use growth. The significant increase in external trips represents a loss in work, shopping and other trips to outside the District.

The origins and destinations for the 0 to 10 and 11 to 20 year periods are shown in Figures 1 and 2 respectively.

Peachland Road Network Plan
Origin – Destination Pairs
0 to 10 Years

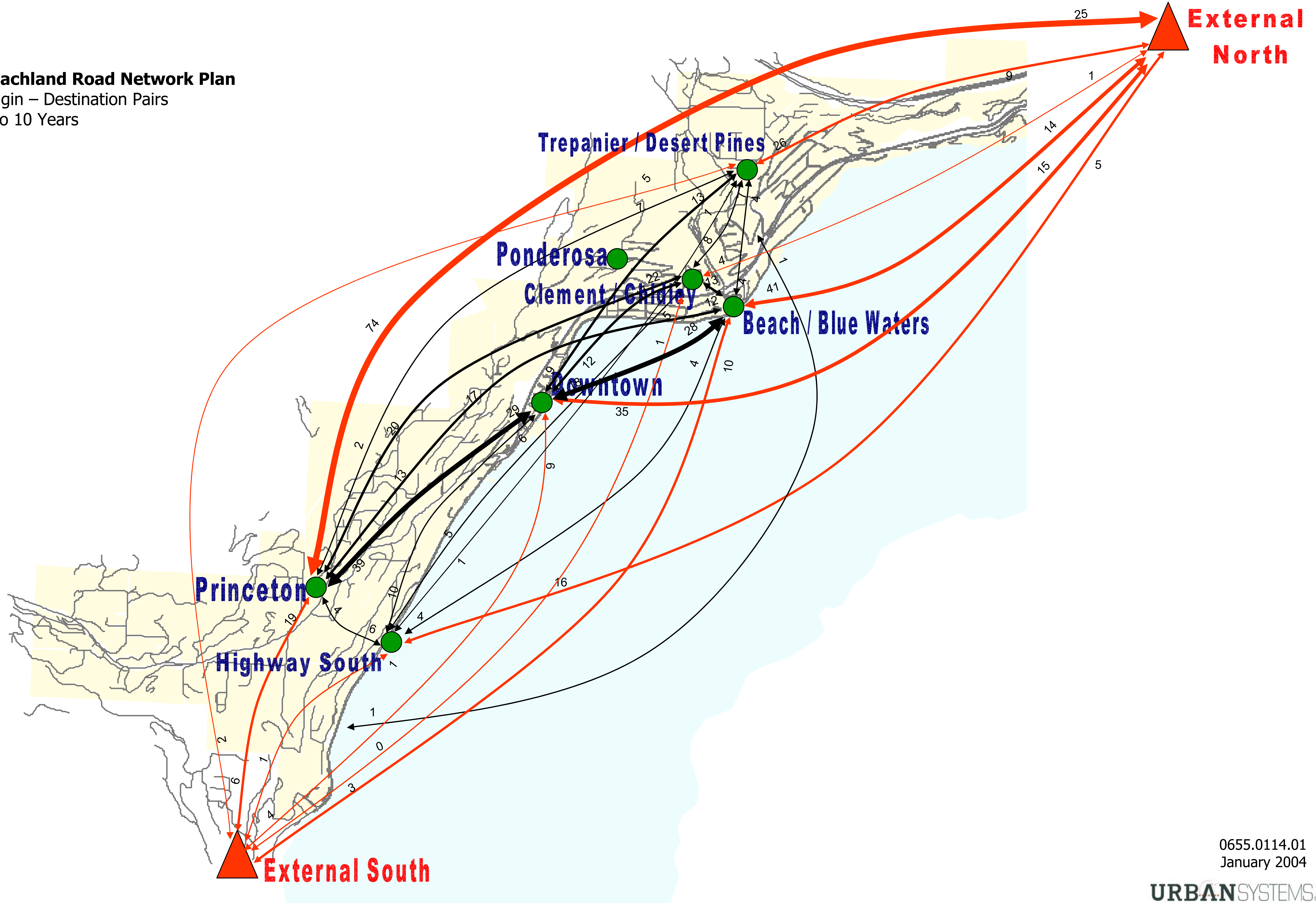

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FIGURE 1

Peachland Road Network Plan
Origin – Destination Pairs
11 to 20 Years

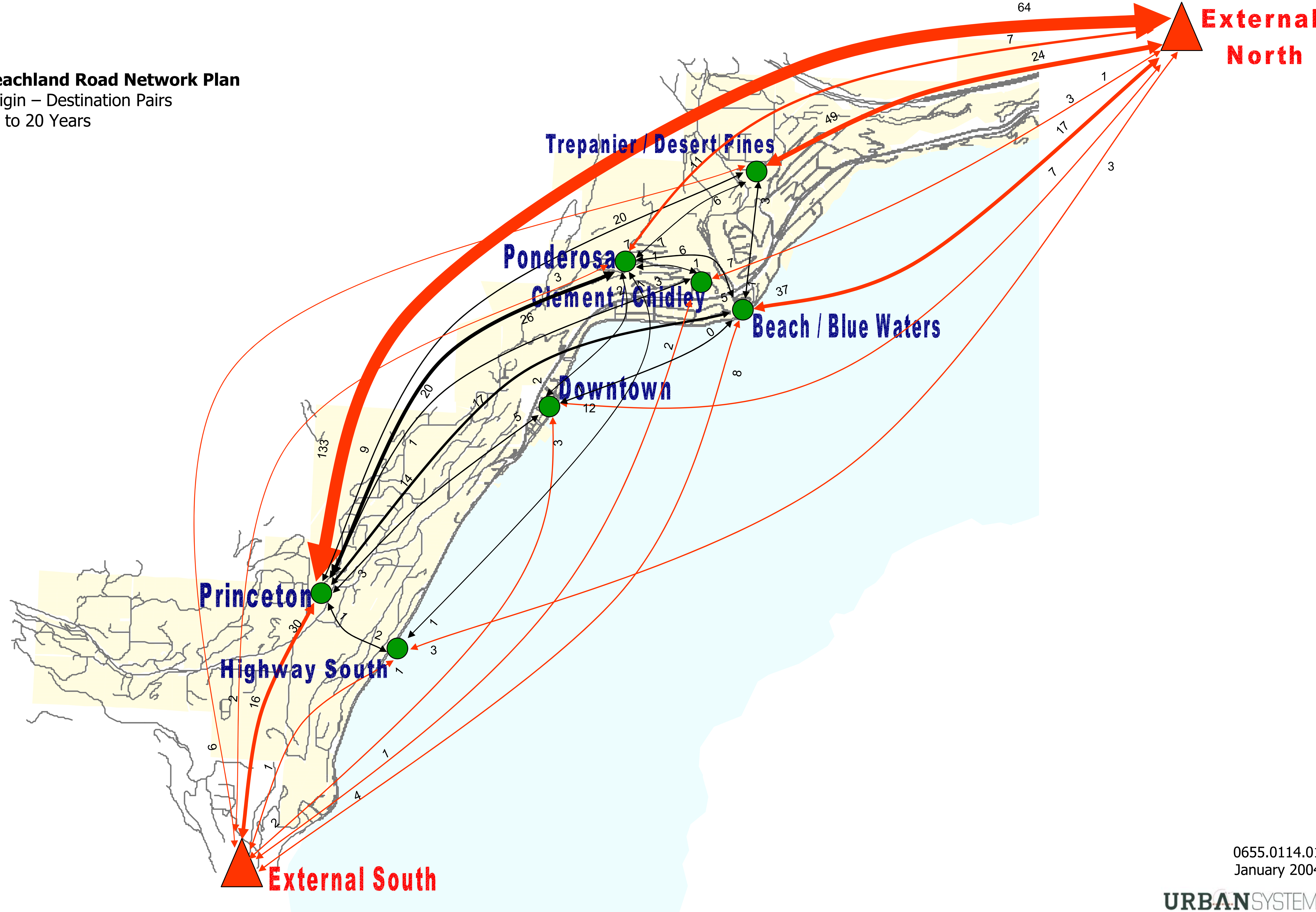

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FIGURE 2

3.3 Capacity Assessment

Using the origin-destination pairs, the forecast traffic was assigned to the street network and added to the existing traffic volumes. Existing volumes were derived from previously completed counts along the highway, new counts completed in August of 2003 at key District intersections and Ministry of Transportation count stations.

While there will be a significant increase in traffic on some local roads, most notably Princeton Avenue, all District intersections are expected to operate with an acceptable level of service (average delay in the peak hour is less than 30 seconds). The only intersections beginning to exhibit a notable delay within 20 years are the Somerset and Lipsett intersections on Princeton Avenue.

However, the intersections with Highway 97 are a significant concern. The Princeton/Beach intersection is the only signalized intersection. Within the 10 year horizon, it will continue operate reasonably well. Beyond 10 years, the delays and queues at the intersection, in all directions will become excessive, even with optimal timing and signal phasing. There will be a need for additional lanes on the highway, and/or diversion of traffic away to other routes in order to allow this intersection to function properly.

The unsignalized intersections south of Princeton will continue to operate with some delay for traffic turning left onto the highway, but the delay will generally not be excessive. North of Princeton, the left turns onto the highway at ALL intersections will be failing within 10 years, meaning the delays will be greater than would normally be tolerated by drivers. Within 20 years, the left turns onto the highway for all of the unsignalized intersections will be failing. At some intersections, the volume of traffic turning onto the highway is expected to be low; however the forecast high volumes on the highway will not allow any gaps for traffic to turn on.

3.4 Strategic Approach

There are 3 elements of the approach to addressing the barrier created by the highway:

- Additional capacity on the highway, presumably by increasing the though capacity to four lanes and/or an alternate highway route;
- Additional capacity at selected highway intersections (i.e., traffic signals); and
- Additional local road linkages to minimize reliance on the highway for trips between locations within the District.

Capacity on the highway is the direct responsibility of the Ministry of Transportation. On-going discussion with the Ministry will be necessary to ensure the District's needs are met. Similarly, the addition of new signals on the highway is also a Ministry responsibility, but the District needs to ensure its interests are met. Thus, potential partnering on strategic projects may appropriate. New local linkages are the primary interest of the District. Not only will additional links provide connection between existing neighbourhoods, but there is potential to open up additional land for development.

Some of the local connections include:

- Somerset/Princeton area to Ponderosa
- Ponderosa Avenue to Clements Crescent (adjacent to the highway)
- New Crossing of Trepanier Creek between Clements Crescent and Chidley Road

In the longer term, a high level connector between Princeton and Trepanier Bench would also be desirable. There are several other local road links that will improve connectivity at the neighbourhood level, particularly in the Princeton Avenue area not identified above.

There is also a need to improve connections across the highway so that the downtown does not become isolated from majority of the population. A single signalized intersection that collects traffic from Todd / Chidley, Clements, 13^{th} and Ponderosa would provide significantly improved access to the highway and a connection across the highway, and should still meet the Ministry of Transportation objectives for the highway. An additional signalized intersection would serve Buchanan Road and the Trepanier Bench area.

4.0 ROADWAY NETWORK CLASSIFICATION

A key feature of the Roadway Network Plan is a revised system of road classifications for Peachland. Most municipalities classify roads based on function, using a hierarchical system of road classifications ranging from local streets to collector and arterial roads, to provincial highways and freeways. A road classification system indicates the functions of various roads, identifying which roads are intended to accommodate through traffic and which are intended to accommodate local traffic only. In conjunction with a set of road design guidelines, the road classification system indicates the dimensions to which a road should be constructed, and the need for additional features such as sidewalks and access restrictions.

4.1 Recommended Road Classifications

Recommended road classifications for Peachland are illustrated in Figure 3. The functions of each of the recommended road classifications are described below, and are based on the functional descriptions published by the Transportation Association of Canada.

Highway

Highway 97, a provincial highway running north-south through the Okanagan Valley, bisects the District of Peachland from one end of the municipal boundary to the other. Highway 97C, the Coquihalla Connector, is located in the Northeast corner of the District, and provides a connection to Merritt and Highway 5. The primary function of highway is to provide mobility through the District. Traffic flows on highways are generally uninterrupted except at traffic signals, with interchanges being preferable. Direct access from highways is generally not desirable and should be discouraged and/or eliminated where possible.

Arterial Roads

The primary function of an arterial road is to provide mobility within the District – in other words, to accommodate traffic movement. Consequently, traffic flows on arterial roads are generally uninterrupted except at traffic signals – at other intersections, side-street traffic yields to traffic on the arterial road. Although arterial roads also provide access to adjacent properties, direct access from arterial roads is generally not desirable and should be discouraged where possible (access restrictions on arterial roads are discussed in detail later in this section). Roads which are recommended as arterial roads include:

- Beach Avenue south and west of 13th Street
- 13th Street from Beach Avenue to Highway 97, and
- Princeton Avenue.

Although both Princeton Avenue and Beach Avenue function as arterial roads, they are quite different roads due to the topography, and as a result require quite different design treatments. In the case of Beach Avenue, a "context-sensitive" design approach would ensure that the character of Beach Avenue is maintained and enhanced, while at the same time maintaining the important arterial function of the roadway. A separate cross-section has therefore been developed for the Beach Avenue arterial roadway.

Collector Roads

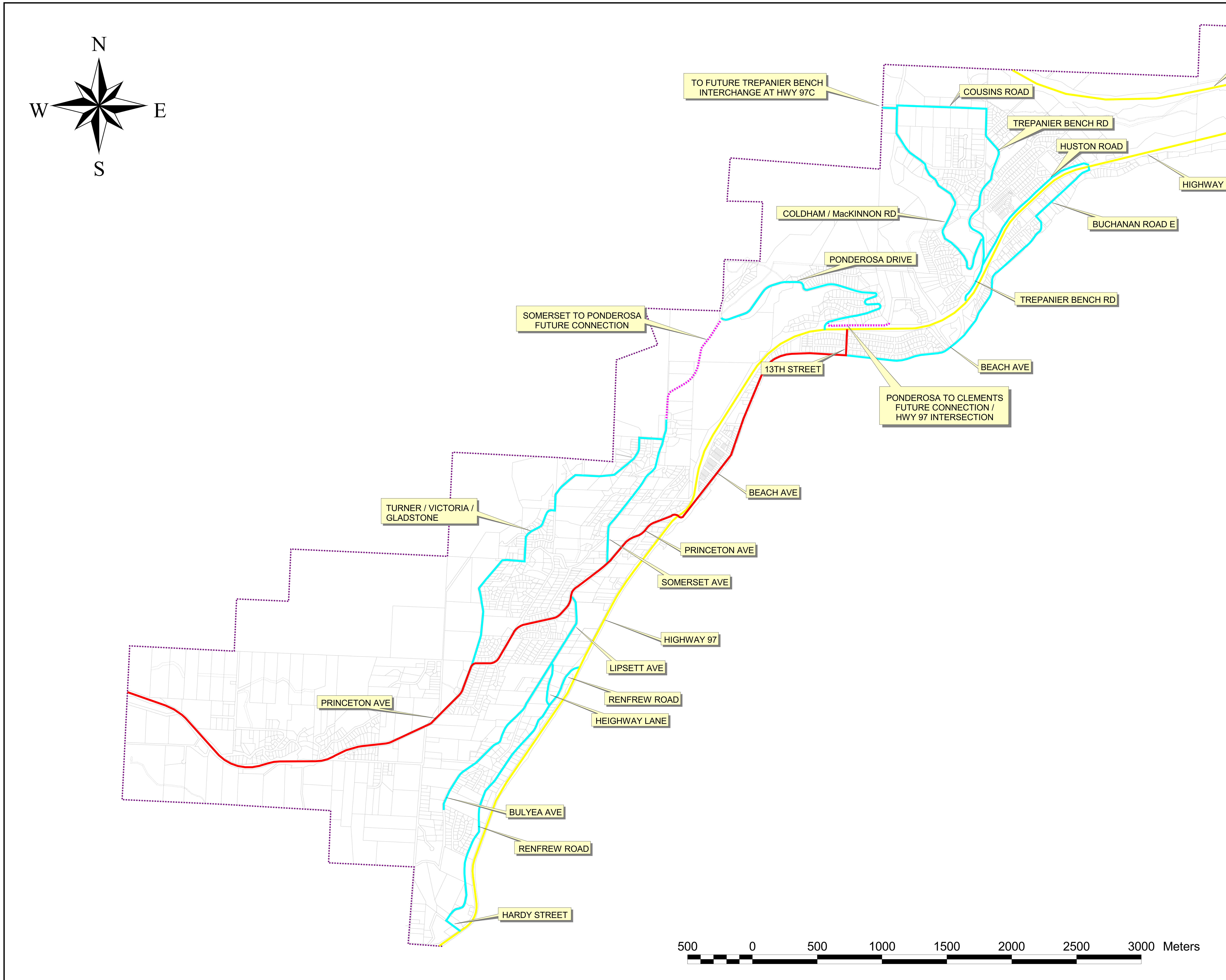
Collector roads provide two functions – mobility within an area as well as access to adjacent properties. Within Peachland, it is intended that collector roads serve as the primary route for traffic traveling into and out of an area, rather than traffic using local streets for this purpose. Collector roads are expected to carry many local trips within the District, and in some cases, provide an alternative route to Highway 97 for local trips.

Roads which are recommended as collector roads include:

- Beach Avenue east of 13th Street
- Trepanier Bench Road/Cousins Road
- Ponderosa Drive
- Somerset Avenue
- Lipsett Avenue north of Heighway Lane
- Heighway Lane
- Renfrew Road north of Heighway Lane
- Huston Road
- Coldham Road / MacKinnon Road
- Gladstone Road / Victoria Street / Turner Avenue
- Lipsett Avenue south of Heighway Lane
- Renfrew Road south of Heighway Lane, and
- Hardy Street between Renfrew Road and Highway 97.

Local Streets

All roads which are not indicated in Figure 3 as being highway, arterial, or collector roads are by default local streets. The sole function of local streets is to provide access to adjacent properties, which may be residential, commercial, institutional, industrial or other land uses. Local streets are not intended to accommodate through traffic traveling through a neighbourhood. Traffic movement on local streets is incidental, and primarily involves travel to and from a collector road or an arterial road.



Legend

- Municipal Boundary

Road Classification

- Arterial
- Collector
- Highway
- Proposed future connection

Scale = 1: 30,000 | Rev: May, 2004

ROADWAY NETWORK PLAN
Roadway Network Classification

FIGURE 3

District of Peachland
Roadway Network Plan

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5.0 ROADWAY DESIGN GUIDELINES

This section presents recommended roadway design guidelines for various classifications of roadways in Peachland. These guidelines are based on generally accepted engineering principles and reflect specific design needs for hillside areas.

An important component of the roadway design guidelines described in this section is that for each road classification, guidelines are provided for both 'full' and 'interim' conditions, which can also be described as an 'urban' and 'rural' standards respectively. New roads and roads improved as a result of development should be constructed to 'full' or 'urban' guidelines. Where appropriate, existing roads may be improved to meet 'interim' or 'rural' guidelines, with funding provided through DCC's.

The table below provides a summary of key design guidelines for the proposed road classifications within the District of Peachland. Specific cross-sections and discussion of the 'full' and 'interim' standards are provided for each individual street in the road network.

	Beach Avenue Arterial	**Arterial**	**Collector**	**Local**
Right-of-way	Min. 25 m	Min. 20 m	18 m	18 m
Travel lanes	Two	Two	Two	Two
Pavement width of travel lanes	15 (includes shared bike and parking)	8.5	8.5	6 – 7
Painted centreline	Yes	Yes	Yes	No
Design speed	30-50 km/h	50 km/h	50 km/h	30 km/h
Maximum grade	8%	8%	10%	12%
Curb and gutter	Yes	Yes	Yes	Optional
Driveway access	No (where alternate access exists)	No (where alternate access exists)	Yes	Yes
On-street parking	Yes	No	May be permitted (site-specific conditions)	Permitted, requires 1.0 m paved shoulder
Pedestrians	Sidewalk one side, optional two sides (waterfront walkway)	Sidewalk one side, optional two sides	Sidewalk one side, optional paved shoulder on other side	Sidewalk one side
Cyclists	Wider travel lanes	Wider travel lanes	Shared roadway	Shared roadway

5.1 Roadway Cross-Sections

Typical cross sections for roadway classifications in the District of Peachland are included in Appendix A. In total, eight cross-sections are included, which may be incorporated as 'standard drawings' in the District of Peachland's Subdivision and Development Servicing Bylaw (replacing the current standard drawings B-1 to B-5). The proposed cross-sections are as follows, and include both 'urban' (i.e. full) and 'rural' (i.e. interim) standards for a number of classifications:

- Highway Cross-Section, 30.0m right-of-way
- Beach Avenue Arterial Cross-Section, 25.0m right-of-way
- Arterial Cross-Section – Urban, 20.0m right-of-way
- Arterial Cross-Section – Rural, 20.0m right-of-way
- Collector Cross-Section – Urban, 18.0m right-of-way
- Collector Cross-Section – Rural, 18.0m right-of-way
- Local Cross-Section – Urban, 18.0m right-of-way
- Local Cross-Section – Rural, 18.0m right-of-way

The proposed cross-sections provide a basic standard for development, and may be adjusted at time of development applications due to site-specific conditions (e.g. parking provisions, geotechnical and drainage considerations, etc.).

5.2 Other Key Considerations

Cul-de-sacs

In areas of difficult terrain, some local streets will take the form of a cul-de-sac. Generally, cul-de-sac streets are used where street connectivity is not possible (because of steep terrain, for example) or not warranted (because the street serves few homes, for example). Although the local street design guidelines apply to cul-de-sac streets, two additional guidelines also apply to cul-de-sacs – the maximum length of the cul-de-sac and the design of the street turnaround. The maximum permitted length of a cul-de-sac should be 150 m.

The typical design of a street turnaround on a cul-de-sac is a circular "bulb" at the end of the roadway. The minimum radius of this "bulb" should be 11.5 m to the curb face, requiring a minimum right-of-way of 15 m radius. Alternative types of street turnarounds may be considered based on site specific conditions. In certain circumstances reduced cul-de-sac radii or hammer head type turnarounds may be permitted.

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Secondary emergency access routes

In areas where cul-de-sacs are provided – particularly lengthy cul-de-sacs – it is desirable to provide secondary emergency accesses. The right-of-way provided for a secondary emergency access should be a minimum of 4.0 m wide, and the maximum grade of a secondary emergency access should not exceed 15%. A pedestrian walkway may be integrated into the access, and non-emergency vehicle access should be restricted through the use of removable bollards or other devices.

6.0 NEW ROAD CONNECTIONS AND INTERSECTION IMPROVEMENTS

6.1 New Road Connections

The following section describes potential new road connections within the District, and represents a coordinated effort between the municipality, private developers, and senior government agencies (i.e. Ministry of Transportation).

Somerset to Ponderosa Connection

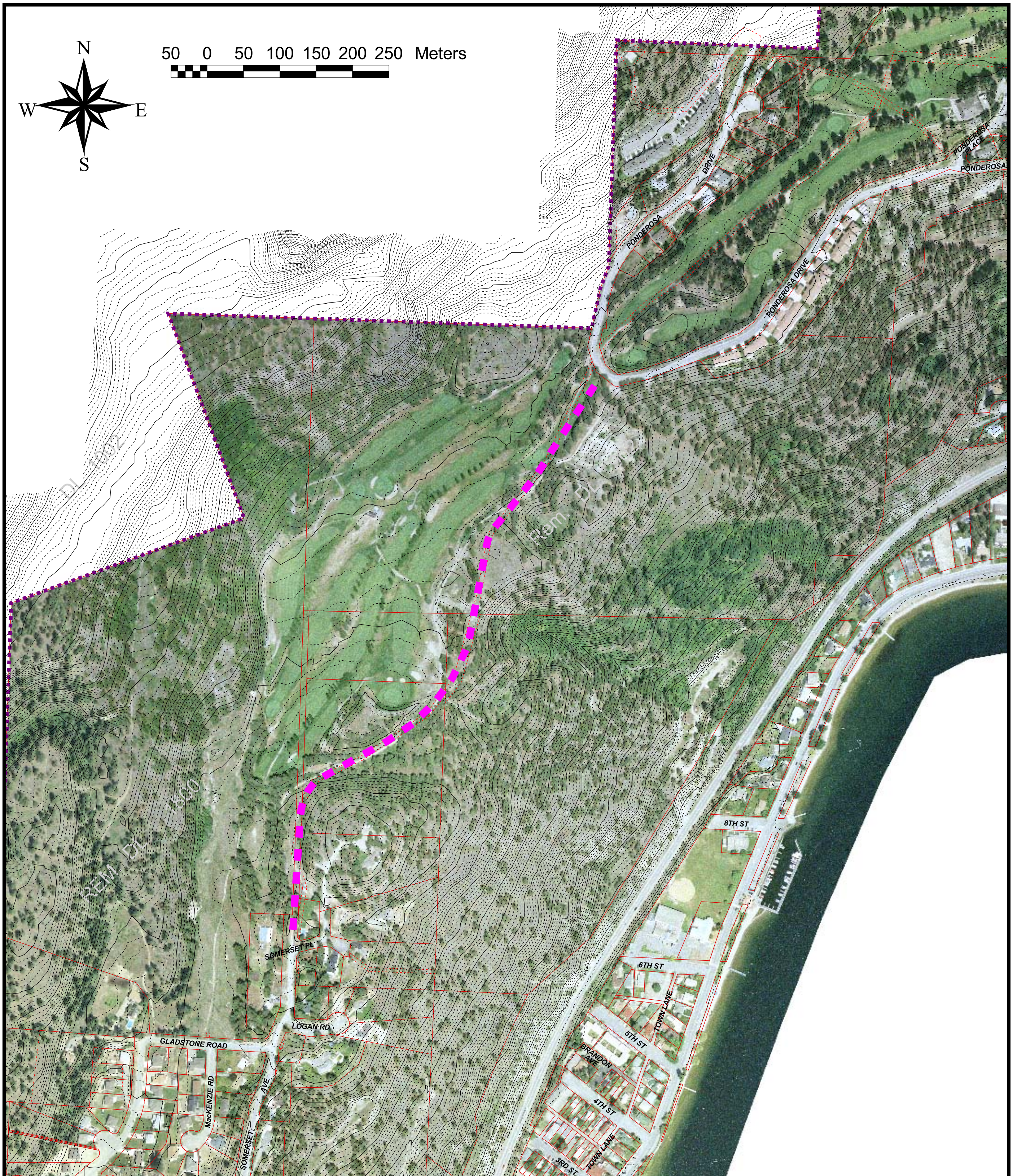
To accommodate trips within the District and provide a local alternative to Highway 97, Somerset Avenue and Ponderosa Drive should be connected. Figure 4 illustrates the approximate alignment of such a connection. This will also provide a secondary emergency access route to the Somerset Avenue and Ponderosa Drive areas.

Renfrew to Hardy Connection

Through the development of properties in the area, Renfrew Road should be extended to the south (road realignment and improvement of existing gravel road) to provide a connection to Hardy Street, and access to Highway 97 (shown in Figure 5). This will also provide a secondary emergency access route to the area.

Ponderosa to Clements (and Chidley) Connection

Figure 6 identifies the potential to realign Ponderosa Drive, a collector road, in order to connect it to Clements Crescent, a local road servicing the commercial, institutional and residential land uses. This new road could also serve to connect to a potential 4-leg intersection with Highway 97 at 13th Street. In addition, Chidley Road traffic could be closed to the highway by providing a local road connection to Clements Crescent, across Trepanier Creek.



Legend

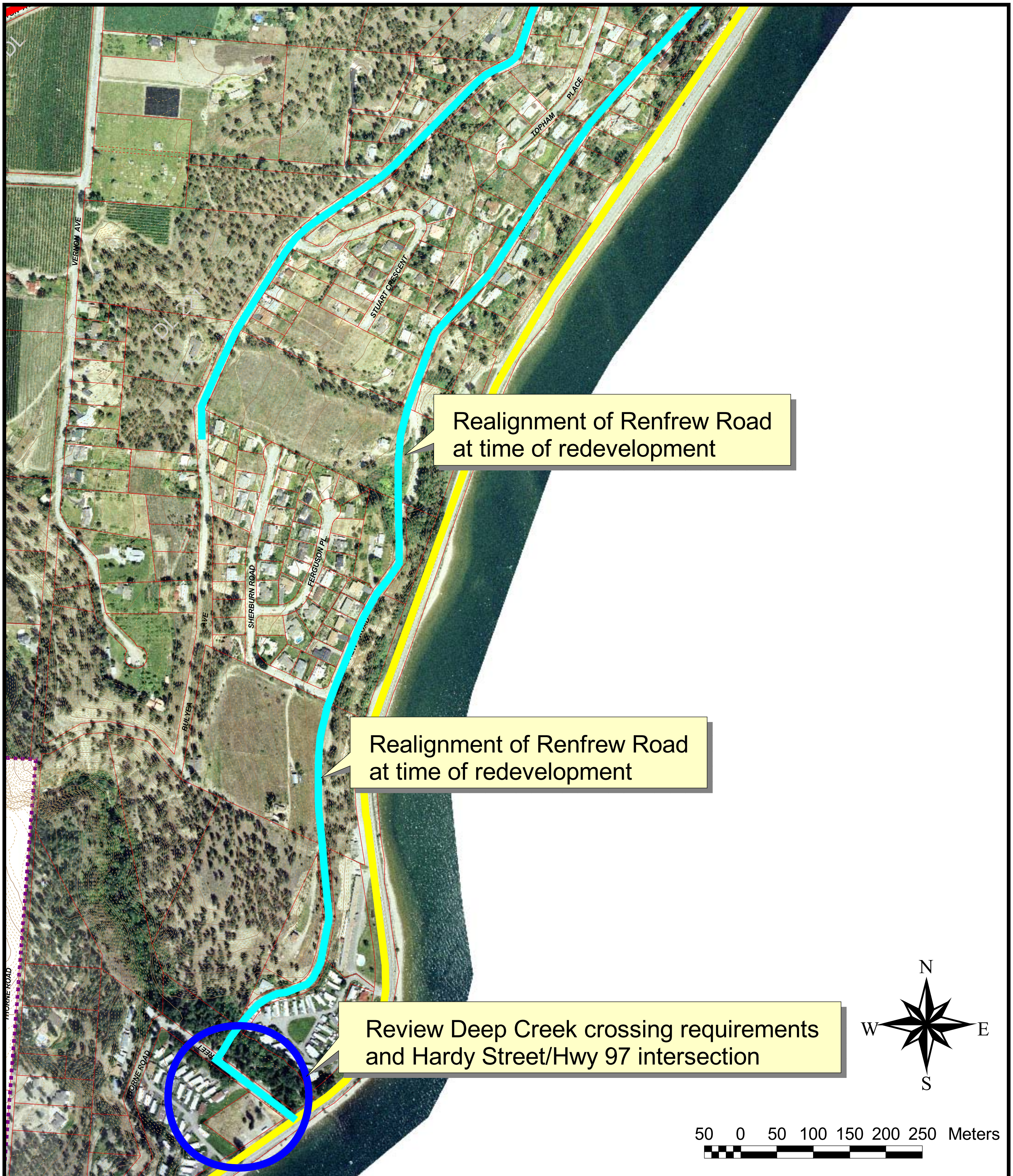
- Proposed Road
- 2 metre contour
- 10 metre contour
- Municipal Boundary
- Lot Lines

PEACHLAND
ON THE LAKE

Scale = 1: 7,500 | Rev: May, 2004

Roadway Network Plan
Proposed Future Roads
Ponderosa to Somerset

FIGURE 4



Legend

- Collector
- Highway 97
- 2 metre contour
- 10 metre contour
- Municipal Boundary
- Lot Lines

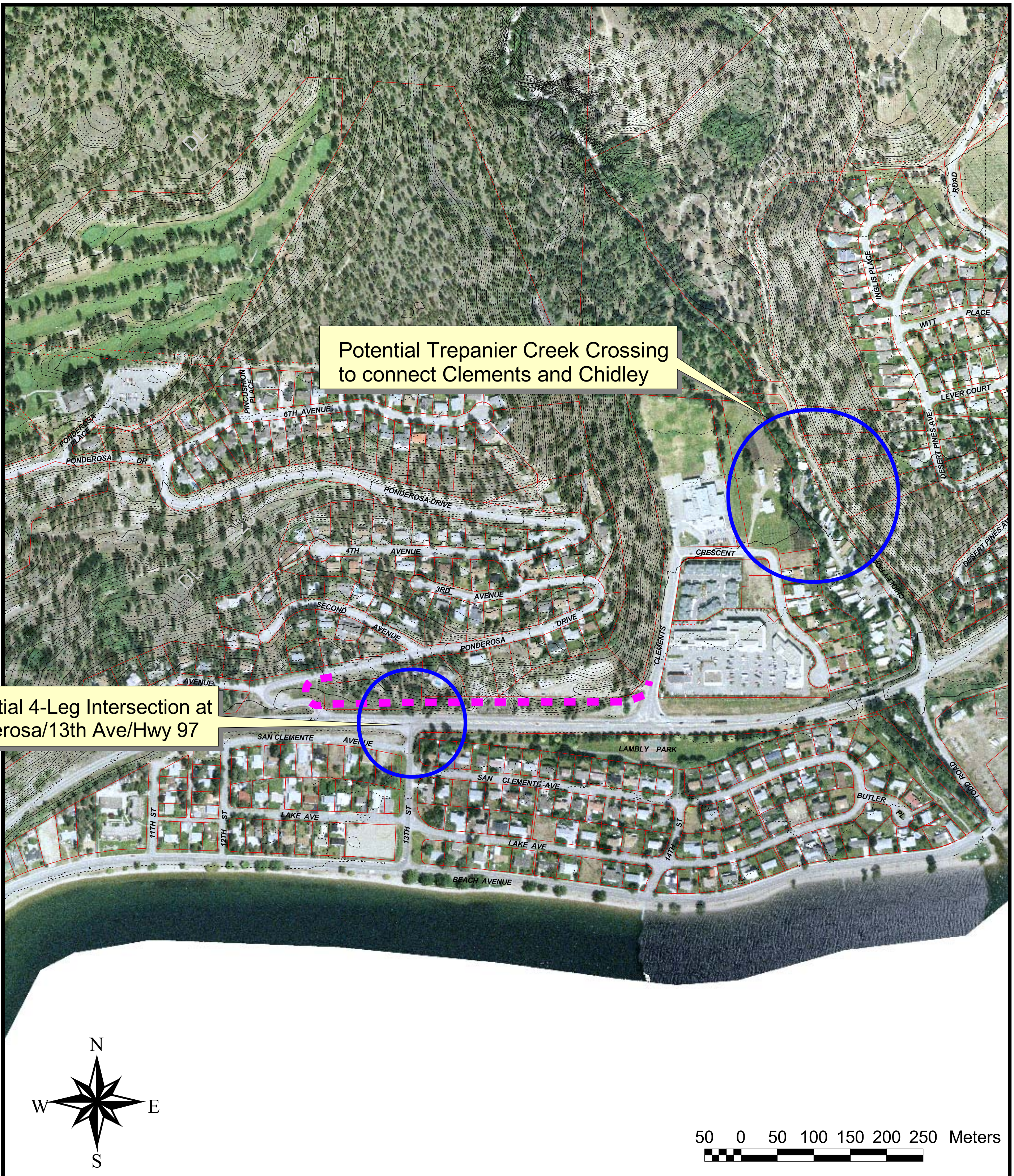
PEACHLAND ON THE LAKE

Scale = 1: 7,500

Rev: May, 2004

Roadway Network Plan
Proposed Road Upgrade
Renfrew to Hardy

FIGURE 5



Legend

- Proposed Road
- 2 metre contour
- 10 metre contour
- Municipal Boundary
- Lot Lines

PEACHLAND ON THE LAKE

Scale = 1: 7,500

Rev: May, 2004

Roadway Network Plan
Potential Road Connections
- Ponderosa to Clements
to Chidley Road

FIGURE 6

Local Street Connections

An important issue for the District is whether or not local streets should be connected to one another, rather than creating cul-de-sacs. The recommended approach is that local streets should be connected if possible – in other words, where right-of-way is available or can be made available through the development process, and where road design guidelines regarding grades and cross-sections can be achieved on connecting streets. A similar approach should be used for a secondary emergency access routes. In cases where it is neither possible nor practical to connect local streets or provide a secondary emergency access route, alternatives should be considered, such as pedestrian walkways to ensure that connectivity through the neighbourhood for pedestrians, and possibly emergency vehicles, is achieved. Opportunities to implement off-street pedestrian walkways are addressed in Section 7.

The issue of connecting local streets highlights the need for land use and road network planning in new development areas, in advance of development. Several municipalities in BC have addressed this need by developing "neighbourhood concept plans" for all residentially-zoned greenfield development areas, even in cases where development will not likely happen for many years. The benefit of developing neighbourhood concept plans is that future road alignments – including all local streets – can be determined well in advance. This means that residents know which streets will be connected in future and which ones will remain cul-de-sacs. Landowners and developers know where they can locate buildings and other infrastructure on their properties and where they need to leave space for a future street. The municipality can identify future collector and arterial roads for DCC purposes.

6.2 Access Restrictions

As noted earlier, the primary function of an arterial road is to accommodate traffic movement. To ensure that sufficient road capacity is maintained, and to avoid potential safety issues, direct access to arterial roads from adjacent properties should be avoided where possible. This means, for example, that access to a property which abuts an arterial road as well as a local street should be provided from the local street, not the arterial road. Only in the case where a property is only accessible from the arterial road – where it is otherwise landlocked – should direct access to the arterial road be permitted.

Existing driveways and other direct accesses on arterial roads may be maintained as "existing non-conforming" access. However, if a property with a direct access to an arterial road is redeveloped, as a condition of the development approval the access should be redirected to an adjacent local street or collector road.

It is particularly important that direct access to an arterial road should not be permitted where the access would be located within 50 m of a signalized intersection or an intersection which is planned to be signalized in the future.

6.3 Intersection improvements

Analysis of forecast future traffic volumes indicates that although there will be a significant increase in traffic on some District roads – most notably Princeton Avenue – all intersections on District roads are forecast to operate at acceptable levels of service during the next 20 years. Only at the Somerset Avenue and Lipsett Avenue intersections on Princeton Avenue will traffic delays approach unacceptable levels. Means of improving these intersections to increase safety and reduce delays are described later in this section.

Highway 97

Although the majority of the District roads are expected to function at acceptable levels in the planning horizon, several intersections on Highway 97 are forecast to reach unacceptable levels of service within the next 20 years – in some cases, within only a few years. Intersections on Highway 97 are the jurisdiction of the Ministry of Transportation, and consequently any intersection improvements – such as signalization and reconfiguration – would be undertaken by the Ministry.

The Princeton/Beach intersection is the only signalized intersection on Highway 97 within Peachland. As previously mentioned, it will continue to operate at acceptable levels of service within ten years. Beyond ten years, however, vehicle delays at the intersection on all approaches will reach unacceptable levels of service, even with optimal signal phasing and timing. The only means of improving the level of service at the Princeton/Beach intersection will be to provide additional through lanes on Highway 97, either as part of a continuous four-lane highway, or only at the intersection. Unsignalized intersections on Highway 97 south of Princeton Avenue will continue to operate at acceptable levels of service during the next ten years.

Intersections on Highway 97 north of Princeton Avenue are projected to reach unacceptable levels of service within ten years. This could produce delays for traffic turning left onto Highway 97 which may become excessive. As a result, motorists turning onto the highway may turn into gaps in traffic which are too small, creating the potential for conflicts.

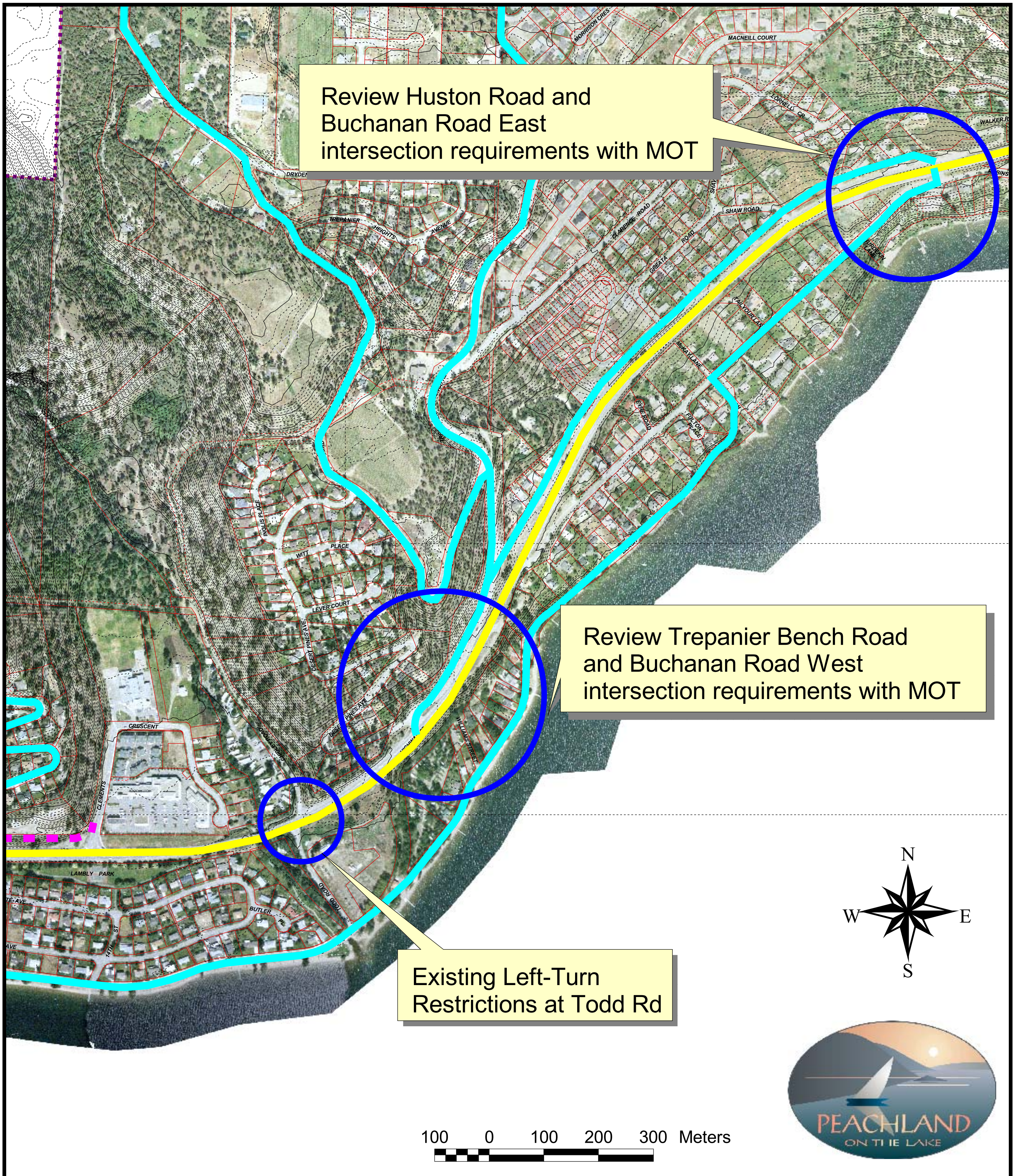
One means of improving levels of service at these intersections would be to signalize the intersections. As noted earlier, intersection improvements along Highway 97 would be undertaken by the Ministry of Transportation. Given the senior government's mandate to accommodate Provincial and Regional transportation needs, the Ministry would likely be reluctant to signalize any more intersections along Highway 97 than necessary. To accommodate the needs of traffic traveling to and from the District without unduly compromising the needs of Provincial traffic, the optimum solution would be to consolidate two or more unsignalized access on Highway 97 into one signalized access. An example of where this approach could be implemented would be to consolidate Ponderosa Drive, 13th Street and Clements Crescent into one signalized intersection, with a frontage road connecting Ponderosa Drive and Clements Crescent. Other areas to improve highway intersections are shown Figure 7, including Todd Road (where left-turns were restricted in 2003), Trepanier Bench Road, Buchanan Road (both West and East intersections) and Huston Road.

It should be noted that the analysis of future traffic conditions along Highway 97 is based on the assumption that the proposed high level connector by-passing Peachland would not be constructed. Previous analysis conducted via the Okanagan Valley Transportation Plan (OVTP) determined that the high level by-pass of Peachland was unnecessary and not financially viable.

Somerset and Lipsett to Princeton Alignment

The current Major Street Network Plan in the Official Community Plan identified the future realignment of Lipsett Avenue (a collector road) to the east, in order to accommodate a future four-leg intersection with Somerset Avenue (another collector road) at Princeton Avenue. As part of this study, a site visit was performed and combined with preliminary data regarding capacity and trip assessment for these intersections. Review of the data suggests that the cost to realign and reconstruct Lipsett Avenue to meet with Somerset would not produce the significant capacity or time savings to warrant its construction, as the majority of the traffic on Lipsett and Somerset are seeking to travel down Princeton Avenue, and not across the two streets (i.e. from Lipsett to Princeton or Somerset to Princeton and vice versa, but not Lipsett to Somerset).

Therefore, it is recommended that the future Lipsett Avenue realignment currently outlined in the OCP Major Street Network be removed, as highlighted in the map below. It is further recommended that improvements to the current intersection



Legend

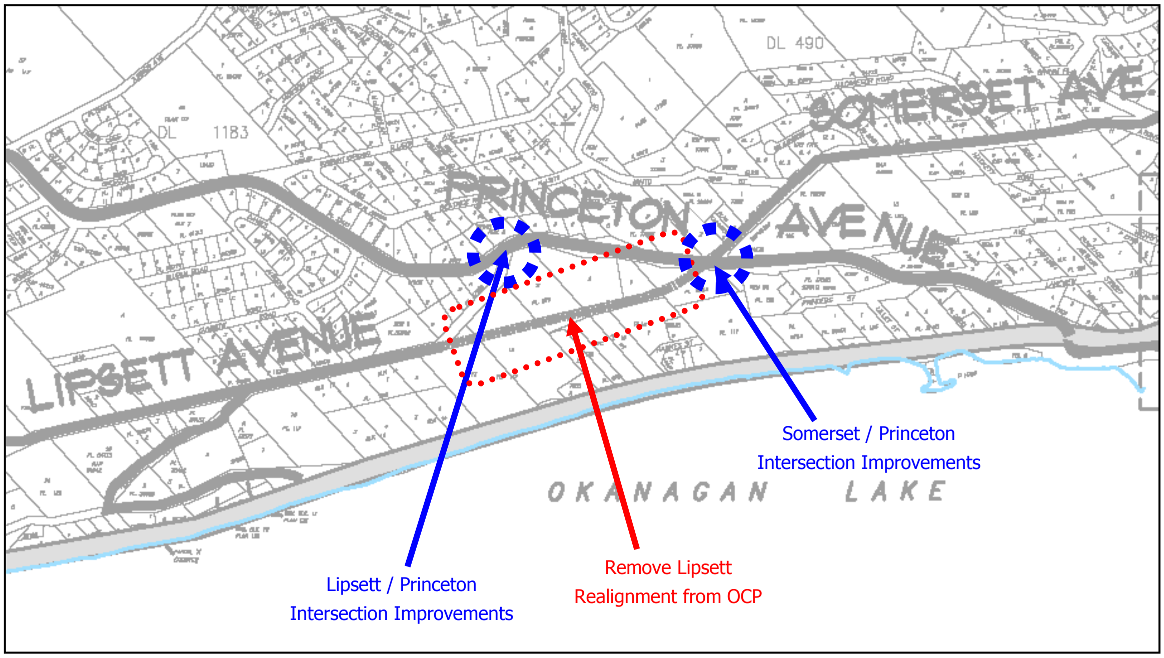
- Arterial
- Highway
- Collector
- Proposed Road
- 2 metre contour
- 10 metre contour
- Municipal Boundary
- Lot Lines

Scale = 1:10,000	Rev: May, 2004

Roadway Network Plan
Highway 97 Intersection Improvements
Trepanier Bench / Huston Rd

FIGURE 7

alignments and other sight lines on Princeton Avenue be undertaken at both Lipsett and Somerset Avenues. The widening of Princeton Avenue is also recommended, from its current approximate 4.0 metre width to 6.5 metres (the proposed arterial standard). A brief synopsis of improvements to the two intersections is provided in the following paragraphs.



Somerset/Princeton Intersection

At this intersection Somerset Avenue is divided into two separate travel lanes by a large tree, with northbound traffic on Somerset being diverted to the east of the tree, and southbound traffic diverted to the west. The key issue at this intersection is limited sight distance to the west, for anticipating traffic on Princeton Avenue. The intersection east of the tree has better sight distance, but more challenging grades on the Somerset portion. The intersection west of the tree currently has lower grades but poorer sight distance characteristics. A detailed intersection design should be performed to determine the safest alignment. This could be carried out by the District as part of its long-term capital roadway planning, or in advance by a developer as part of any development application on Somerset Avenue which has potentially significant traffic impacts on the intersection.

Lipsett/Princeton Intersection

Key issues at this intersection include limited sight distances to the west and a sharp eastbound-to-southbound right turn which is difficult for larger vehicles to negotiate. Addressing these issues will require reconfiguring the intersection to increase the intersection angle and corner radius for the eastbound-to-southbound right turn, and potentially reconstructing the driveways (and reducing the number) driveway on the north side of Princeton west of Lipsett. As well, the northbound approach lane should be at least 5 m wide at the intersection, so that left-turning vehicles do not impede right-turning vehicles.

7.0 PEDESTRIAN FACILITIES

Wherever possible, pedestrians will be accommodated within roadways on sidewalks, which are required by bylaw for new construction on arterial, collector and some local roads depending on zoning. In some cases, no sidewalks are provided on District roads. These cases include:

- Existing collector and arterial roads. Over time, it is intended that collector and arterial roads be upgraded to meet "interim" and "full" road design guidelines, either developer-built or with funds generated through DCC's. Options to accommodate pedestrians in the interim include walkways and traffic calming measures, as described below.
- Existing local streets. Road design guidelines for local streets generally do not include sidewalks.
- New roads in difficult terrain. In some cases, steep terrain and other constraints may mean that it is not possible to provide a continuous sidewalk along a new road. In these cases, to accommodate pedestrians should be considered, including walkways and traffic calming measures, as described below.

7.1 Off-Street Walkways

Other means of accommodating pedestrians include off-street walkways. Walkways are pedestrian facilities which are not located along a roadway. These might include, for example, walkways connecting two cul-de-sacs, and walkways along utility corridors or other right-of-ways that provide direct access for pedestrians. Walkways may incorporate stairs in steep areas.

As introduced in a previous section of this report, one location where a walkway could be provided is the Lang Road lane from Huston Road to Dryden Road, crossing Trepanier Bench Road. Lang Road is an existing road right-of-way which was never constructed as a road due to the steep grade along the right-of-way. A walkway along the Lang Road right-of-way would provide direct access for pedestrians to Greata, Clarence, Sutherland and Dryden Roads.

Other walkway opportunities in the District (as identified in OCP) include:

- Additional access to Crown Lands from Victoria Street (in addition to the current stairway)
- Vernon Street to Renfrew (through cemetery through park dedicated area on Unearth development)
- Access to Sanderson Park from Turner Avenue
- Somerset to Ponderosa (i.e. Pincushion development)
- Trepanier to Ponderosa – over Trepanier Creek

7.2 Traffic Calming Measures

Traffic calming measures – such as curb extensions, speed humps and other measures – can be used to improve pedestrian safety on roads where pedestrians walk in the roadway. On local streets and collector roads, the primary purpose in using traffic calming measures would be to discourage speeding, thereby reducing the likelihood and severity of collisions with pedestrians. On arterial roads, the use of traffic calming measures should be limited to curb extensions and median islands, which improve the safety of pedestrians crossing the roadway – speed humps, traffic circles other devices which deflect vehicles should not be used on arterial roads. All traffic calming measures should be implemented in accordance with the guidelines in the *Canadian Guide to Neighbourhood Traffic Calming* published by Transportation Association of Canada and the Canadian Institute of Transportation Engineers.

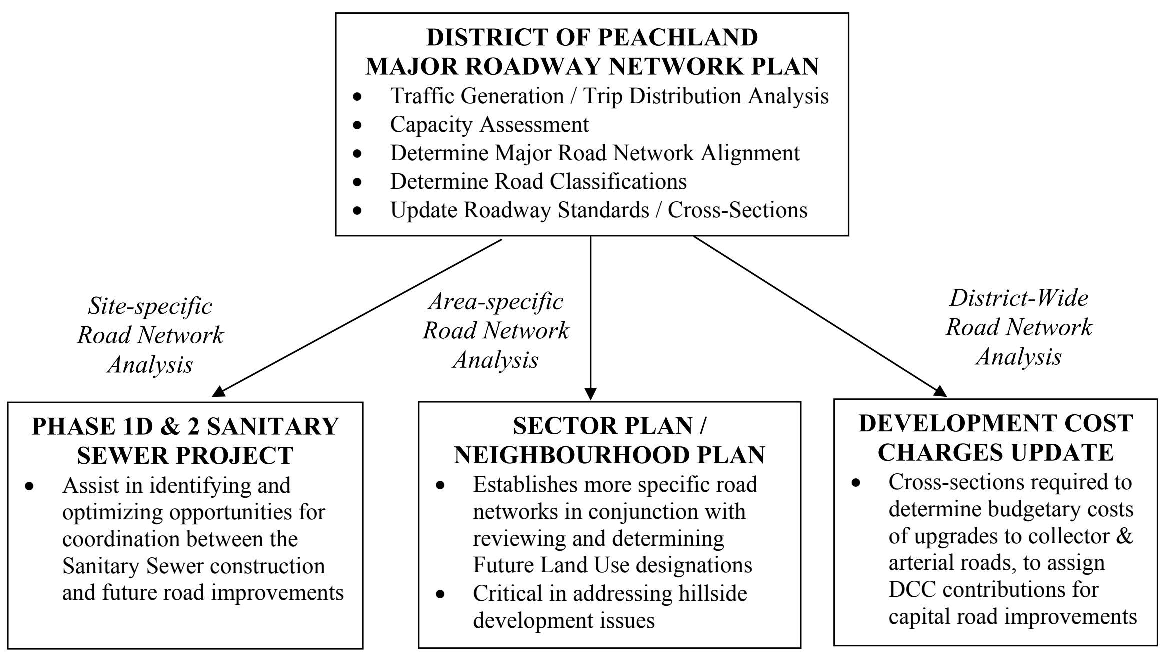
8.0 SUMMARY AND RECOMMENDATIONS

The purpose of the Roadway Network Plan for the District of Peachland was to:

- identify the current and projected traffic generation and trip distribution analysis;
- determine the major road network alignment and road classifications; and
- develop / update current road standards and cross-sections.

To this end, this report outlines all of the above and introduces opportunities for revised road standards with respect to hillside development, as well as for pedestrian connections, off-street walkways, and future discussions and negotiations required with the Ministry of Transportation.

The scope of this exercise did not allow for more functional design of specific intersections (i.e. Lipsett / Princeton), nor did it allow for detailed cost estimates. The work introduced by this report is meant to feed into further area-specific and district-wide road analysis, an example of which is shown in the diagram below.



8.1 Recommendations

Based on the ideas and components presented in this report, the recommendations of the Roadway Network Plan are as follows:

- Adopt the Roadway Classification map as provide in Figure 3 of this report, to define Highway, Arterial, and Collector roads within the District of Peachland.

- Incorporate major roads identified in Figure 3 into the Major Street Network map of the Official Community Plan. Remove the future realignment of Lipsett Avenue, and replace with improvements to the existing Lipsett / Princeton and Somerset / Princeton intersections.

- Review the District of Peachland Subdivision and Development Servicing Bylaw with an aim at amending or replacing major roadway cross-sections and roadway design guidelines where appropriate.

- Perform Level "D" construction cost estimates for major roads identified in this plan, for the purposes of long-term roads capital planning and as part of a review of the District's Development Cost Charges.

- Incorporate potential off-street walkways and pedestrian connections identified in this plan into the District's Parks Master Plan. In addition, identify the Lang Road walkway, from Greata Road to Dryden Road as a future Trail/Walkway on Schedule "B" – Land Use Designations of the Official Community Plan.

District of Peachland
Roadway Network Plan

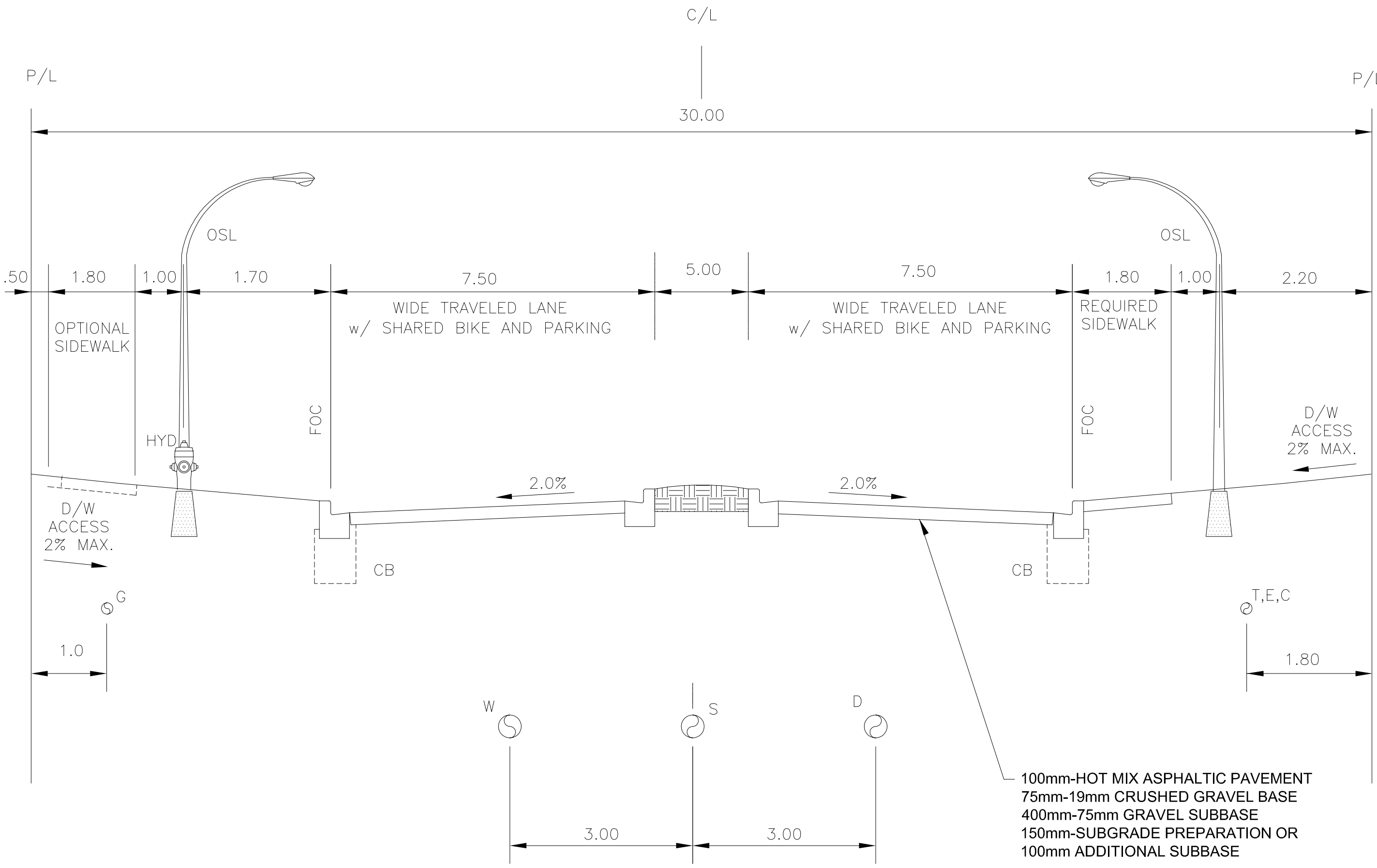
Final Report

APPENDIX A

ROADWAY CROSS-SECTIONS

The CORPORATION of the
DISTRICT of PEACHLAND

ROADWAY NETWORK PLAN



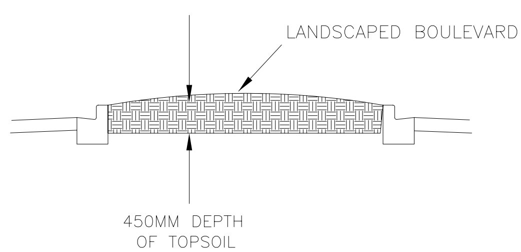
LEGEND

C – CABLEVISION
T – TELEPHONE
G – GAS
E – ELECTRICAL
W – WATER
S – SANITARY SEWER
D – STORM SEWER

HYD – HYDRANT
P/L – PROPERTY LINE
C/L – CENTER LINE
R/W – RIGHT–OF–WAY
SWK – SIDEWALK
C – CURB
FOC – FACE OF CURB
CB – CATCH BASIN
OSL – STREET LIGHT

NOTES:

1) HYDRANT VALVES ON TEE.
2) WATER SERVICE VALVES 0.3 FROM P/L.
3) STREET LIGHTS ON BOTH SIDES ALTERNATING.



MEDIAN DETAIL

DIVIDED HIGHWAY CROSS-SECTION
30.0m RIGHT OF WAY

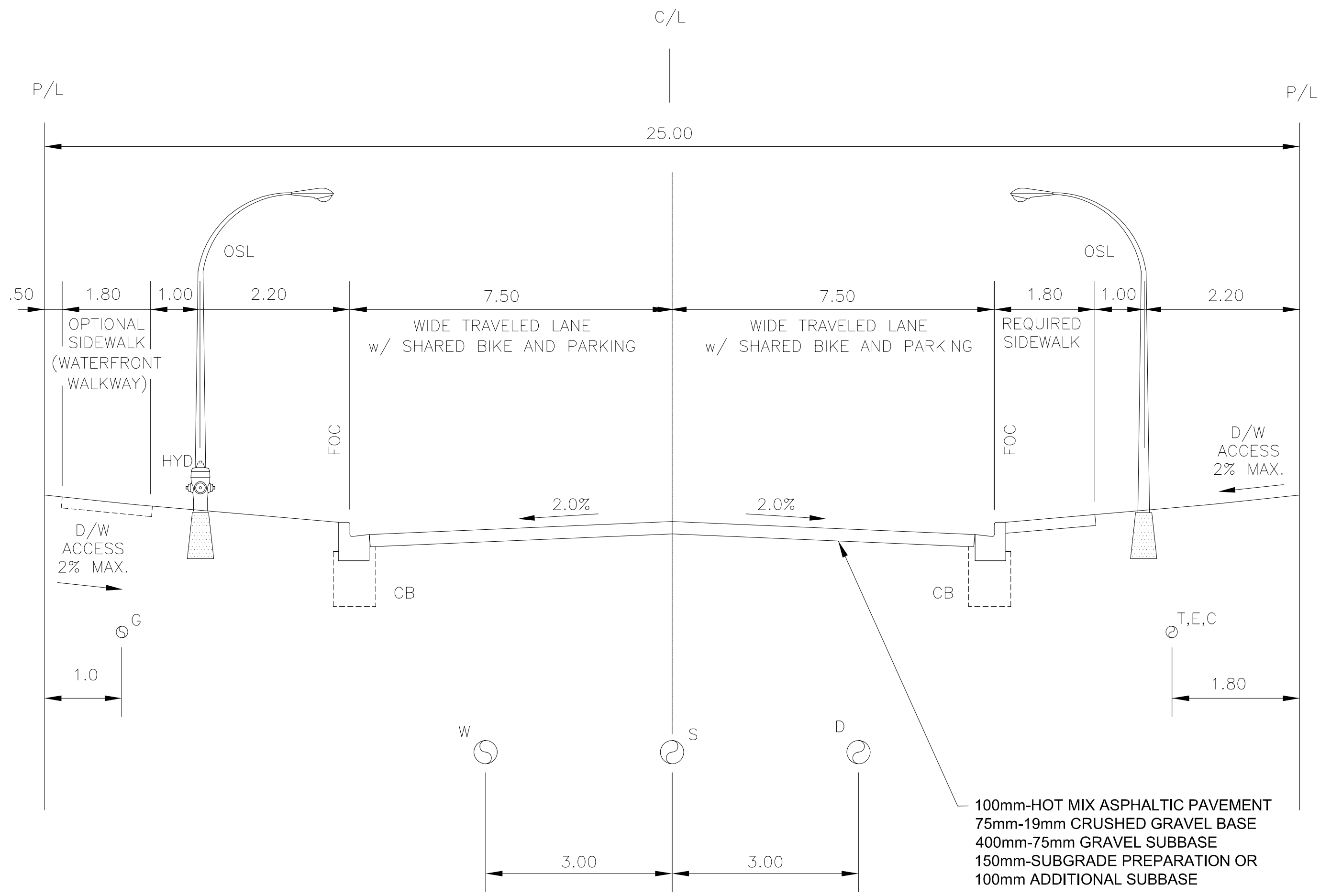
SCALE: NOT TO SCALE

REVISED: MAY 2004

DRAWING NUMBER: B–1

The CORPORATION of the
DISTRICT of PEACHLAND

ROADWAY NETWORK PLAN



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NOTES:

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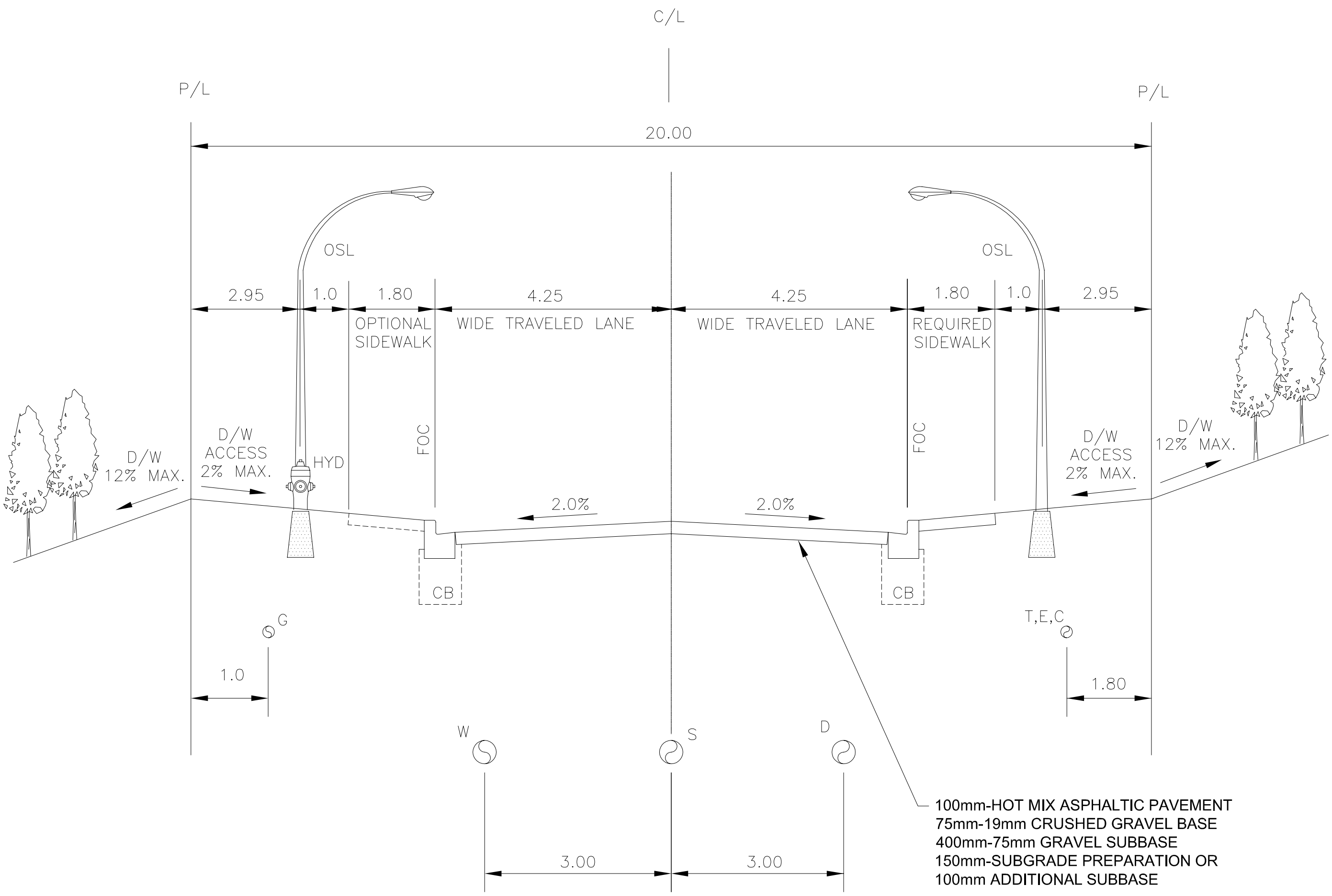
2) WATER SERVICE VALVES 0.3 FROM P/L.
3) STREET LIGHTS ON BOTH SIDES ALTERNATING.

BEACH AVE. ARTERIAL CROSS-SECTION
25.0m RIGHT OF WAY

SCALE:	DRAWING NUMBER:
NOT TO SCALE	B-2
REVISED: MAY 2004	

The CORPORATION of the
DISTRICT of PEACHLAND

ROADWAY NETWORK PLAN



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NOTES:

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3) STREET LIGHTS ON BOTH SIDES ALTERNATING.

ARTERIAL CROSS-SECTION - URBAN
20.0m RIGHT OF WAY

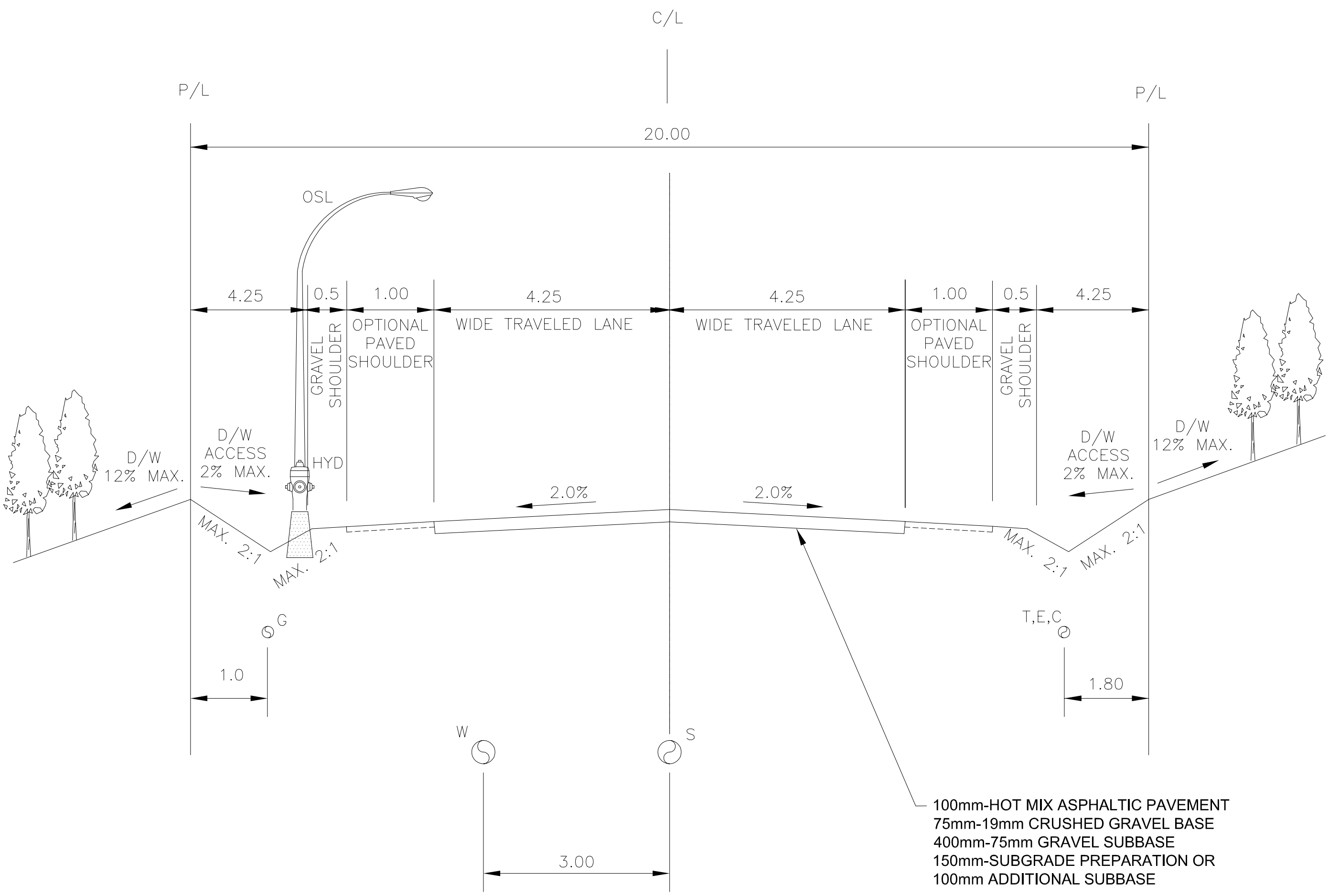
SCALE: NOT TO SCALE

REVISED: MAY 2004

DRAWING NUMBER: B-3

The CORPORATION of the
DISTRICT of PEACHLAND

ROADWAY NETWORK PLAN



LEGEND

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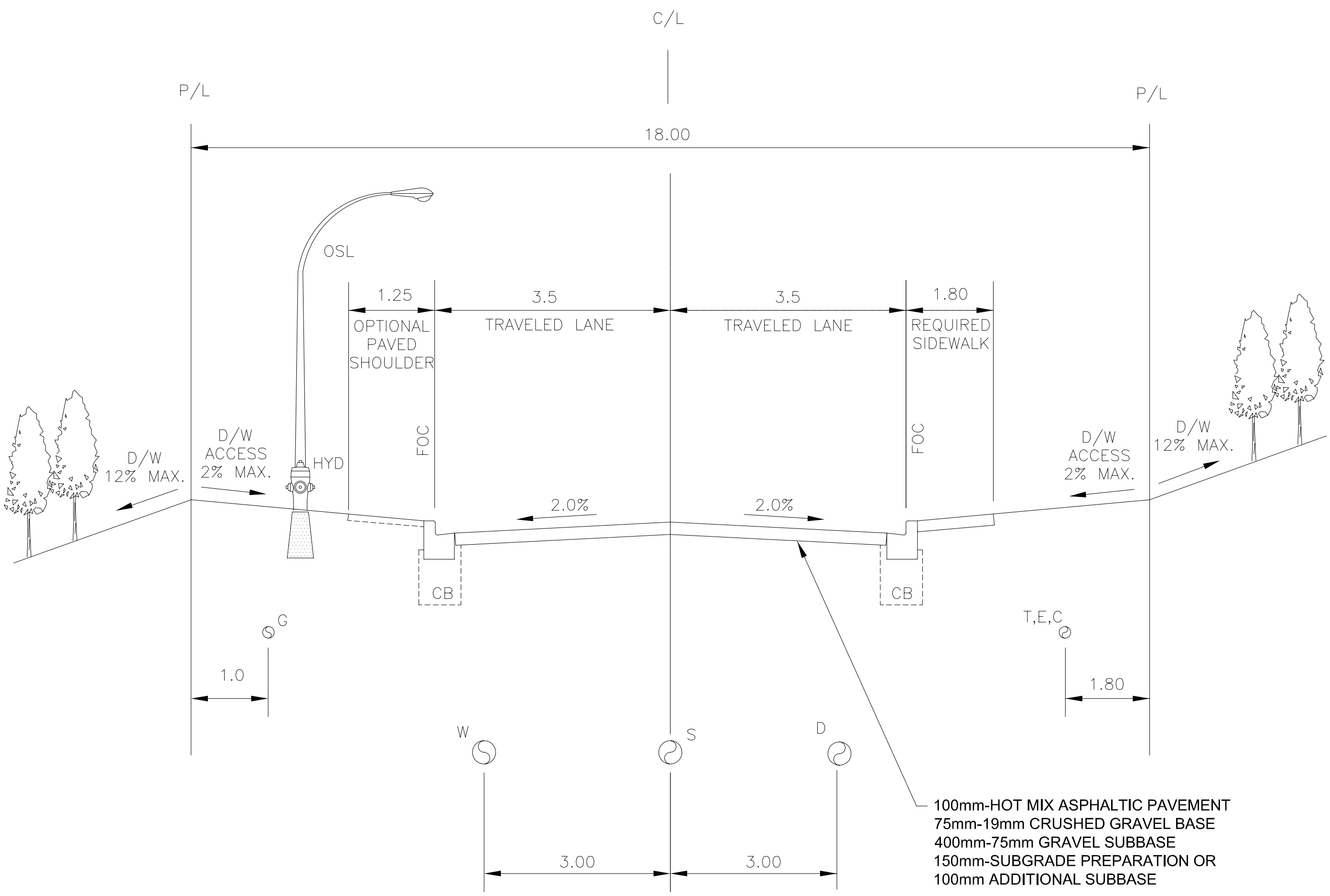
OSL – STREET LIGHT

NOTES:

1) HYDRANT VALVES ON TEE.
2) WATER SERVICE VALVES 0.3 FROM P/L.
3) DRAINAGE TREATMENT VARIES DEPENDING ON SITE SPECIFIC GROUND CONDITIONS.

ARTERIAL CROSS-SECTION - RURAL
20.0m RIGHT OF WAY

SCALE:	DRAWING NUMBER:
NOT TO SCALE	B-4
REVISED: MAY 2004	



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OSL – STREET LIGHT

NOTES:

1) HYDRANT VALVES ON TEE.
2) WATER SERVICE VALVES 0.3 FROM P/L.
3) OFF-STREET POCKET PARKING OPPORTUNITIES MAY INCREASE ROW REQUIREMENTS TO 20.0m

COLLECTOR CROSS-SECTION - URBAN
18.0m RIGHT OF WAY

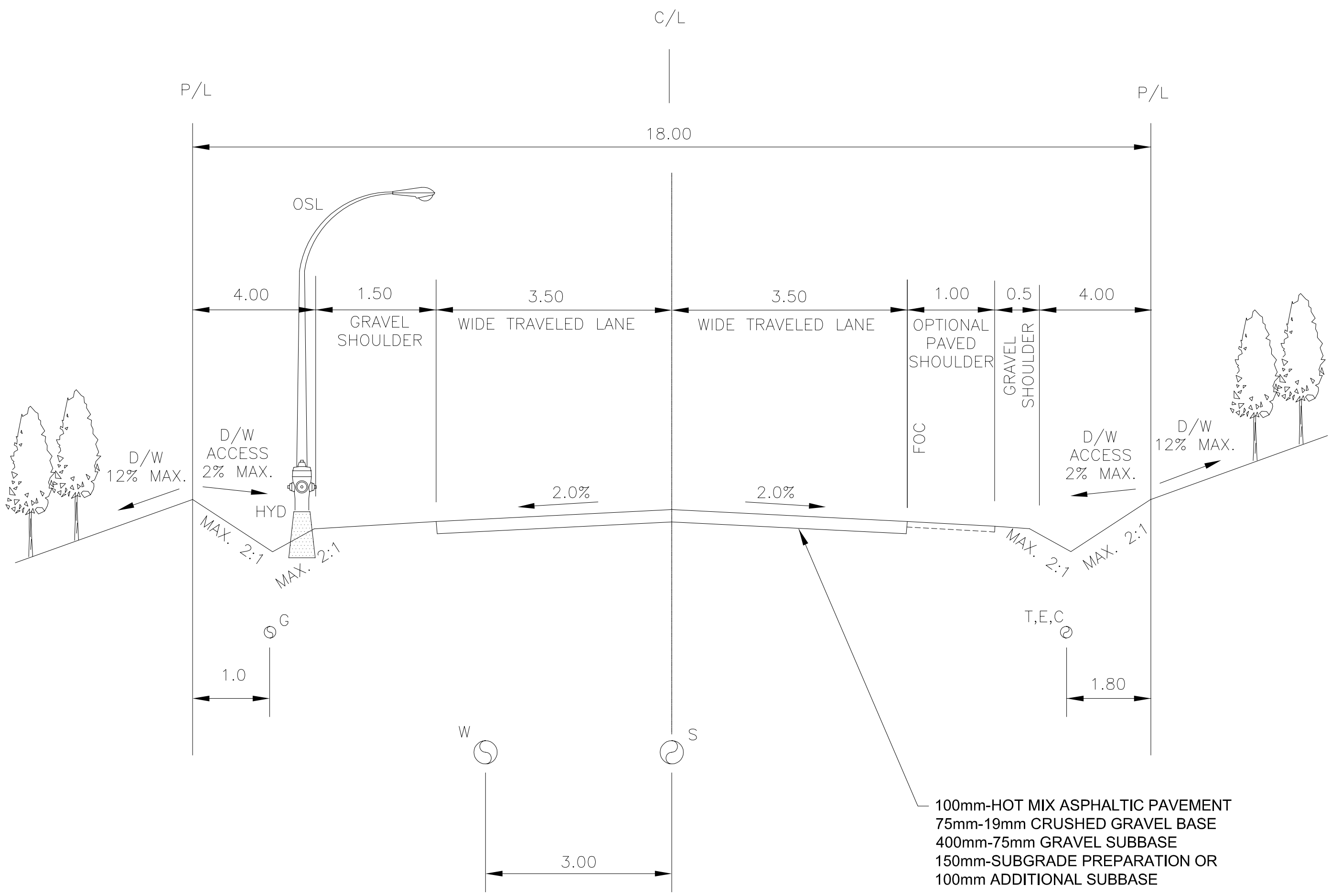
SCALE: NOT TO SCALE

DRAWING NUMBER: B-5

REVISED: MAY 2004

The CORPORATION of the
DISTRICT of PEACHLAND

ROADWAY NETWORK PLAN



LEGEND

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NOTES:

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2) WATER SERVICE VALVES 0.3 FROM P/L.
3) DRAINAGE TREATMENT VARIES DEPENDING ON SITE SPECIFIC GROUND CONDITIONS.
4) OFF-STREET POCKET PARKING OPPORTUNITIES MAY INCREASE ROW REQUIREMENTS TO 20.0m

COLLECTOR CROSS-SECTION - RURAL
18.0m RIGHT OF WAY

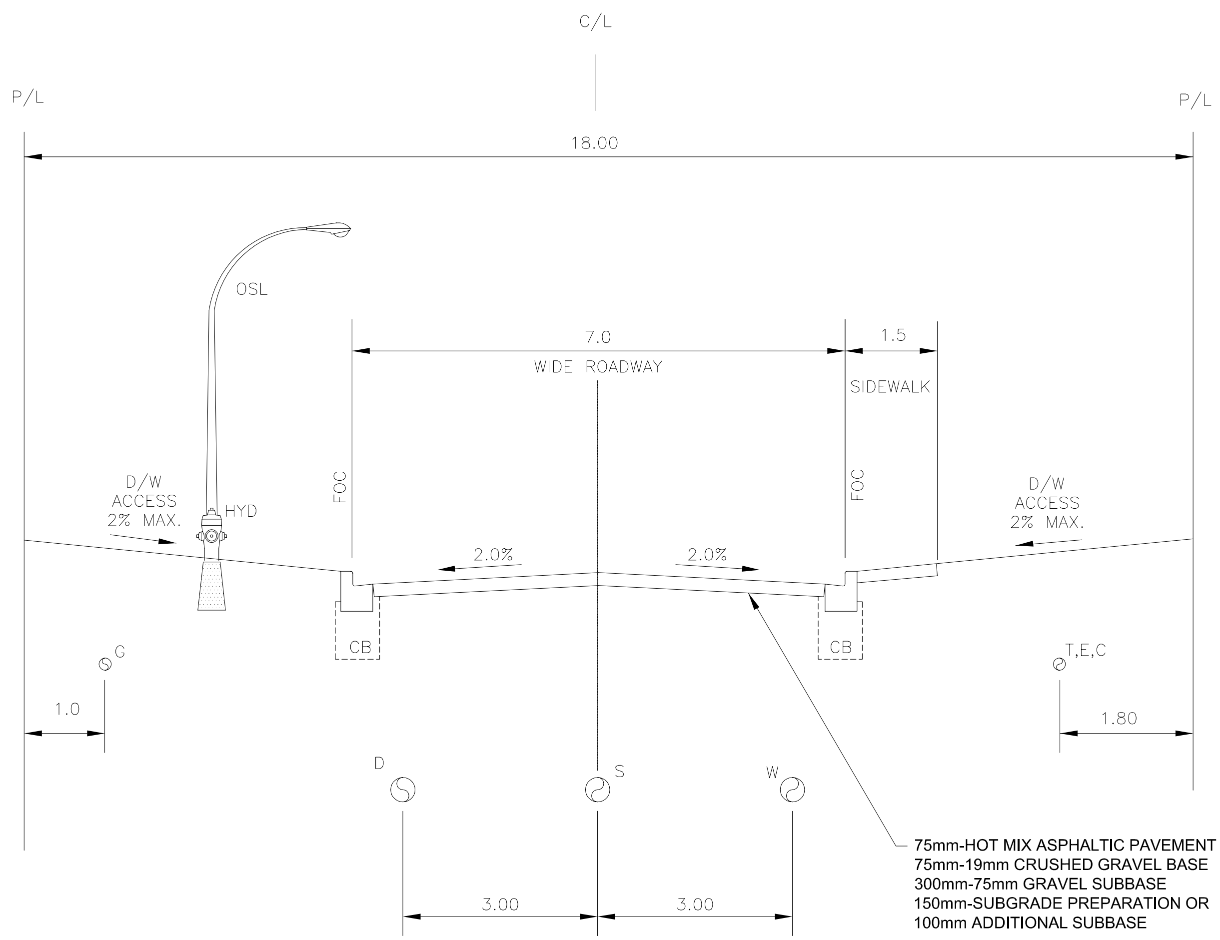
SCALE: NOT TO SCALE

REVISED: MAY 2004

DRAWING NUMBER: B-6

The CORPORATION of the
DISTRICT of PEACHLAND

ROADWAY NETWORK PLAN



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G – GAS
E – ELECTRICAL
W – WATER
S – SANITARY SEWER
D – STORM SEWER

HYD – HYDRANT
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C/L – CENTER LINE
R/W – RIGHT-OF-WAY
SWK – SIDEWALK
C – CURB
FOC – FACE OF CURB
CB – CATCH BASIN
OSL – STREET LIGHT

NOTES:

1) HYDRANT VALVES ON TEE.
2) WATER SERVICE VALVES 0.3 FROM P/L.
3) RIGHT OF WAY MAY BE REDUCED TO 15.0m DEPENDING ON GEOTECHNICAL CONSIDERATIONS, SLOPE ANALYSIS, OR CUL-DE-SAC DESIGN.

LOCAL CROSS-SECTION - URBAN
18.0m RIGHT OF WAY

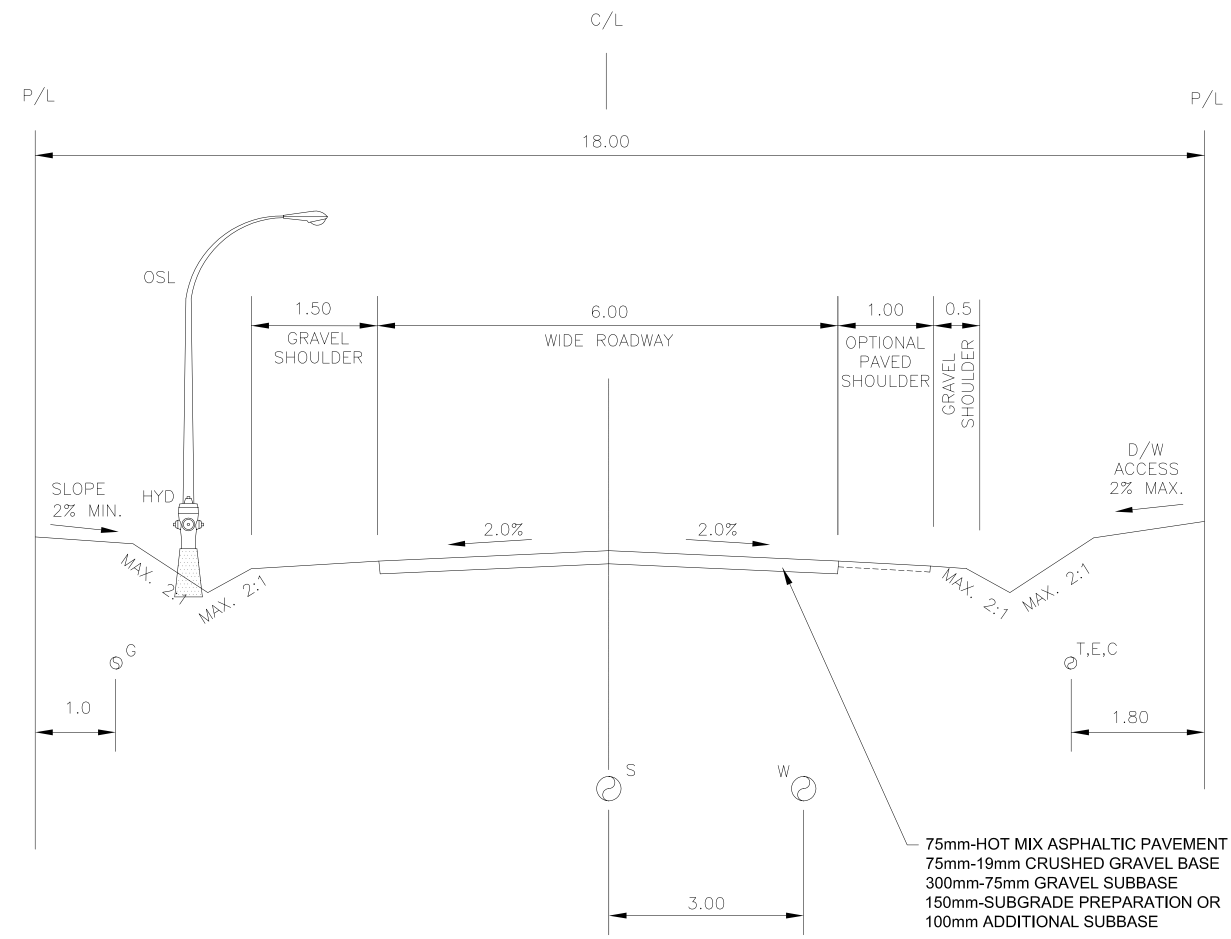
SCALE: NOT TO SCALE

REVISED: MAY 2004

DRAWING NUMBER: B-7

The CORPORATION of the
DISTRICT of PEACHLAND

ROADWAY NETWORK PLAN



LEGEND

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4) RIGHT OF WAY MAY BE REDUCED TO 15.0m DEPENDING ON GEOTECHNICAL CONSIDERATIONS, SLOPE ANALYSIS, OR CUL-DE-SAC DESIGN.

LOCAL CROSS-SECTION - RURAL
18.0m RIGHT OF WAY

SCALE: NOT TO SCALE

REVISED: MAY 2004

DRAWING NUMBER: B-8