

STAFF REPORT: ENGINEERING AND PUBLIC WORKS DEPARTMENT

REPORT TO: Infrastructure and Recreation Committee
MEETING DATE: January 17, 2012
REPORT NO.: EPW.12.004
SUBJECT: Road Corridor Standard Cross Sections
– 20m Urban, 30m Rural
PREPARED BY: Reg Russwurm, Director of Engineering and
Public Works

A. Recommendation

THAT Council endorse the 20m Urban Cross Section Option A (**or B**) and 30m Rural Cross Sections in principle as presented in Report EPW.12.004, entitled “Road Corridor Standard Cross Sections – 20m Urban, 30m Rural” including the provision of street trees within the road allowance; and,

THAT Council provide the Director of Engineering and Public Works the discretion to modify the standard road cross section drawings as warranted for a project provided the same infrastructure needs are satisfied.

B. Background

Staff endeavors to maintain the Town’s Engineering Standards (Standards) to best management practices and current materials for the design and construction of its infrastructure. The Standards are intended to inform developers and engineering consultants as to the process and minimum requirements for the installation of infrastructure within the Town. As such, the Standards are reviewed and updated as warranted.

On first glance to the general user, the road allowance is often limited to the driving surface. However, the road surface amounts to less than half the width of the public land provided for a roadway. It is better to consider the road allowance as a corridor for the provision of a myriad of services – only one of which is the road surface. The range of services that may be placed within a road corridor is the sidewalk, travelled portion, lighting, fire hydrants, sewers, overland drainage, watermain, third party utilities (gas, hydro, telecommunications, etc), and any other amenities that are in the public interest. The term road and corridor will be used interchangeably in this report. With respect to the transportation services provided by a public corridor, the order of preference is pedestrian, cyclists and vehicles balanced with safety considerations.

There are various road corridor categories within the Town but the Standards currently only depict two typical cross section drawings. These are a local rural and a local urban cross section, both within a 20.0 metre road allowance (provided as Attachment 1 and 2 respectively). The purpose of a road cross section is to dimensionally lay out the location of infrastructure within the corridor.

The proposed Windfall Development has asked the Town to consider a rural (open ditch) collector corridor standard and a revised local urban standard. Staff feel it would not be prudent to accept an one-off alternative to the Standards but instead to consider if a revised standard is warranted. Staff have taken this opportunity, with the assistance of the proponent, to consider the needs in both cross sections.

Given the tight timelines associated with the Windfall Development, Staff are presenting these two standard sections in advance of a more complete consideration of all cross sections. Other cross sections and proposed significant modifications to the Standards will be presented to Council in either a major re-write or on an as-need basis as time permits. The Director of Engineering and Public Works retains the ability as previously approved by Council to make variances from the Town's Standards provided the changes are relatively minor in nature and do not affect the underlying goals of the infrastructure.

In addition to discussion with the Windfall proponent, Staff have had discussions with the third party utility providers and internally with the area managers whose infrastructure will be affected by re-worked corridor cross sections.

This report will present the revised cross sections below by highlighting the differences from the current standards.

20m Urban Road

The 20m urban road standard is the default cross section for any new growth within the Town and as such should establish the base level of service to be provided. Two options for the proposed cross section are provided as Attachment 3 and 4 respectively. Reference should be made to the current standard provided as Attachment 2 for comparison.

Utilities:

The key change to the location of utilities is that the natural gas lines are placed on the outside of the other utilities. The primary reasons are to avoid disturbance to the road allowance when gas servicing is installed and to increase safety. Natural gas services are not provided to the property line when the mainline is installed to lessen the chance that a service line may be broken. The other utilities provide drops or service extensions to the property line, or are shallow enough to not disturb the gas main line. This arrangement also enables the gas service to be installed without crossing electrical lines.

The hydro and telecommunication trench is shown with a maximum width of 1m because there have been occurrences of the trench becoming much wider which has impacted other infrastructure.

Staff's goal is that the underground utilities be standardized to the same location on all of the Town's cross sections. Moreover, underground utilities should be standardized on both sides of road thereby creating a mirror image of the services from the centre line outwards. The Town's current standard cross sections have different offsets on each side of the road. This

change has been endorsed by the utility companies as it doesn't matter the direction of the street, the utilities will always be in the same place.

Fire Hydrants:

The location of fire hydrants has been moved from 0.3m from the property line to 1.2m behind the back of curb. The key reasons are to avoid interference with the utilities and to enhance the access to the fire hydrants for the Fire Department and for routine maintenance. When the fire hydrant is at or near the property line, access to the fire hydrant can be impaired by snow and where significant private landscaping has been installed up to and over the property line.

The amount of snow removal around fire hydrants will be lessened. Discussions with the Roads Division indicates no concern with hitting the hydrants with snow ploughs or snow storage provided the current practice of installing markers continues. The Water and Wastewater Services Division also endorses the relocation for convenience of access and maintenance.

Barrier Curb:

The current standard for curb is a rollover or mountable style. Staff have considered and are recommending a change to a barrier curb style which is about 150mm high at the gutter line.

A rollover curb permits vehicles to mount the curb at any point. The key benefit is that house builders do not have to install a curb cut once the driveway location becomes known. This method however does not provide a proper entrance. The backs of mountable curbs are supposed to be lowered at entrances but they almost never are which produces a significant bump at the back of curb. At times, residents have attempted to pad the curb which can interfere with the function of the gutter leading to ponding and ice formation. Aesthetically, a rollover curb presents a softer look from an urban design perspective.

A barrier curb, since it does not easily enable vehicles to access the boulevard, helps to reduce the amount of boulevard damage that occurs from drivers parking or entering the property not at a driveway. Vehicle drivers will typically not drive intentionally over a barrier curb. On busier roads, drivers will not be tempted to pass left hand turning vehicles on the right side – both an illegal and unsafe maneuver.

Further to the discussion of boulevard damage, the Town's snow ploughs also cause boulevard damage because the driver is not always able to discern the edge of the road. The one way (front) plough may inadvertently travel up onto the boulevard. A barrier curb provides feedback to the driver on his location. Even though damage may occur to the barrier curb by the snow plough, on balance it is felt by Staff to be the lesser problem. Residents generally expect that any boulevard damage (i.e. turned up sod) is repaired immediately in the spring while curb damage will, for the most part, be surface scratches and chips that can be monitored for years before repairs are necessary. During winging operations when snow is pushed back to create more snow storage, the driver does not intend to remove snow down to the boulevard surface and as such there is little chance of surface damage.

Another feature of barrier curbs is the enhanced safety provided to pedestrians. On slippery roads a vehicle is less likely to slide onto the boulevard and perhaps the sidewalk. Even though the vehicle may be damaged, the enhanced safety of pedestrians is the overriding

consideration. Similarly, fire hydrants, street lighting and other features are less likely to be damaged.

Sidewalk Location:

The location of the sidewalk has been moved further from the roadway to enhance separation from the travelled portion of the road and to facilitate the re-orientation of the underground utilities. Moreover, this provides an enhanced level of safety and reduces the likelihood of pedestrians getting splashed by passing motorists.

The downside of the sidewalk relocation further from the road is that the amount of illumination from the street lights has been reduced. Although not assessed by an electrical engineer, it is felt that the reduction will be marginal and manageable especially if the sidewalks are located on the same side of the road as the street light.

Street Trees:

The most dramatic departure from the current standard road cross section is the installation of street trees. For the purposes of this report, street trees are those trees planted within the public road allowance and which will be maintained by the Town. Currently, the Town minimises the amount of landscaping permitted within the road allowance and doesn't approve street trees within new developments. The Town does though encourage the Developer to install trees within privately held lands.

Two options for the location of street trees are presented in this report. Option A places the street trees near the roadway 1.5m from the back of curb and Option B considers the trees adjacent to the property line. Refer to Attachment 3 and 4 respectively.

The benefits of street trees and the urban canopy in general are numerous. In a recent article¹, the author outlined the ecological services, social benefits and aesthetic value of trees. Ecologically, street trees reduce air pollution, enhance storm water control by water uptake, provide carbon storage, improve water quality through slowing runoff and reduce energy consumption by screening properties. The social aspects of trees are harder to quantify but are accepted to be beneficial to the quality of life and sense of community. The aesthetic value of street trees is similarly hard to measure however the common sentiment is that a tree lined road is much more appealing than a street without trees. The same article referenced above states that property values can increase by as much as 20% when urban trees are present². In addition, street trees soften the look of a roadway which makes the area more welcoming and desirable. Further to the aesthetic value, street trees provide benefits to pedestrians by providing shade and a visual clue to drivers reduce their speed. This traffic calming effect is most pronounced when the trees are placed closer to the roadway as presented in Option A.

Without a doubt, the key deterrent to street trees is the ongoing direct and indirect costs. Staff have conducted research but have not been able to locate a definitive and substantiated cost of street trees. Costs quoted in literature and conversations range from \$100 - \$500 annually per tree over the life time of a tree depending on its location. The direct costs incurred include

¹ Value, Benefits and Costs of Urban Trees, Brian Kane, Assistant Professor, U of Massachusetts, Amherst, Pub 420-181, 2009

² ibid

the installation, initial establishment, inspection, pruning (5 -7 yrs best practice and as needed), health related treatments, removal, and ultimately replacement of the trees. Non-direct costs include clearing sewer services that have become infiltrated and clogged with roots, replacement of heaved sidewalks, collection of leaves, clearing of blocked drains, inconveniences with maintenance of underground utilities and settlement costs due to damaged caused by falling limbs and trees. Other concerns relate to how slippery a roadway can become with rain on accumulated leaves, sightlines reductions at entrances as trees mature and ongoing liability risks.

Another concern that has been raised is the reduced opportunity to wing back snow off the roadway to create more off-road snow storage and to ensure the drainage system works as intended during spring melt. The concern arises when street trees are spaced at roughly one per typical urban lot (15 – 20m) adjacent to the curb line such as described in Option A. By placing the tree 1.5m from the back of curb, the proposed design will ensure that there is at least 1.2m of snow storage behind the curb line when the tree is mature. Staff feel that this design is manageable although it may require closer monitoring of the snow melts and additional work at troublesome locations.

To address the concerns with street trees being placed near the roadway, Option B was prepared that placed street trees near the property line but still within the public road allowance. The consequence however is that the gas main should be relocated to avoid future complications associated with installing trees over the gas main. Staff's preferred solution is to place the gas main in an easement outside of the road allowance. A number of municipalities already use the easement concept for natural gas and is acceptable to the utility. The biggest downside is that all the private services installed when the house is constructed will need to be dug under the gas line which transfers a burden onto the house builder. Also, the lot owner's front yard is encumbered with an easement.

It is generally accepted that many street trees will not reach maturity. In fact a recent article in the Globe and Mail quoted the average life of an urban tree at thirteen years³. Although the planting of trees in the Town will be much different than in a heavily urbanized area, this fact provides an indication that there should not be the expectation that all the trees will reach full maturity because the trees live in a somewhat stressed environment. This effect can be reduced by better installation and maintenance methods.

Streets trees must be viewed as infrastructure no different than sidewalk, lighting or pavement and which will have an associated long term cost burden. Similar to other municipal infrastructure, there is currently a deficit in street tree maintenance and replacement generally in municipalities. The Town is no different and struggles to maintain the current inventory of street trees and does not achieve best practices management of street trees. Several cities and towns are currently struggling with the costs and are considering alternatives such as tree removal and/or re-assigning costs to the fronting property since that property realizes most of the value of the street tree.

The residents of the Town in a number of venues have stated a clear preference for an enhanced urban canopy – the Community Design Guidelines, the Blue Mountains

³ Globe and Mail, December 29 2011

Sustainable Path for example. The installation of Town-owned street trees has been requested several times and is considered a core Town responsibility by many. The decision of whether or not to install street trees is one that weighs the cost against the common community benefit.

As an alternative to street trees within the Town's road allowance, a requirement can be set within the Town's Standards to require the installation of urban trees on the private side of the property line. This method will achieve many of the goals of an urban canopy however will not provide the same character and intimacy of street trees within the road allowance. By placing the tree in the front yard of a property, the amount of front yard is reduced and may limit the builder's preference to move the front of the house closer to the property yard. A counter argument to asking the individual lot owner to take responsibility for the trees is that the lot owner will not be able to take advantage of the same economies of scale for tree maintenance available to the Town.

Another option open to Council if it is unwilling at this time to endorse street trees is to commission a detailed report by a landscape architect on the subject of street trees. In this report, Council could get a better understanding of the expected cost of street trees within the Town based on expert knowledge.

30m Rural Collector Road

The Town presently has a rural standard cross section for a 20m road allowance. It consists of two 3.0m lanes, 1.5m gravel shoulders, open ditches and no sidewalks or trails (attachment 1). Fire hydrants, street lights and transformers are placed on the back side of the ditch. Hydrants and transformers then require culverts for access. This standard has not been used for some time since development roads are constructed to an urban standard.

The proponent of the Windfall Development has requested that a rural cross section be considered for the collector road within the development (Street A). Staff support the consideration because there will not be house entrances onto the collector road.

Staff have based the consideration of infrastructure necessary within a collector corridor on the needs of pedestrians, cyclists and vehicles - in that order.

At a high level, the type of infrastructure that should be provided within a collector corridor over and above the Town's current 20m rural cross section is the:

- provision for pedestrians on one side of the corridor
- provision for recreational biking and hikers
- provision for commuter cyclists on the roadway to move at relatively higher rates of speed

To achieve the above goals,

- a 1.5m concrete sidewalk will be provided that Council may consider to snow plough at some time in the future
- a 3.0m multi-use soft surface trail (limestone screenings) on the opposite side of the road from the sidewalk

- 1.5m paved shoulders
- two 3.5m lanes

As an additional benefit, paved shoulders also reduce gravel shoulder and pavement edge maintenance. The proposed cross section will minimise surface restoration if the utilities are placed under the limestone trail.

The proposed 30m rural collector corridor cross section is provided as Attachment 5.

The Standards requires a 26m road allowance for urban collector roads. However the introduction of open ditches forces the road allowance to be 30m to ensure that there is sufficient capacity within the ditches for the largest storm events and to avoid placing utilities under the ditch profile to facilitate ditch maintenance. The front slopes are kept to 3:1 maximum to minimise the risk of rollover when vehicles enter the ditch. There may be some flexibility to steepen the back slope. However, this has not been considered for the standard drawing but will instead be utilised on a case specific basis if additional ditch capacity is needed or there are other constraints.

The rural collector standard will be utilised in locations where there will be no houses fronting the street. There will be fewer utilities in the road allowance as well as no driveway culverts. Without the need to service homes, there is no need for a gas main and secondary hydro or phone and cable television services on both sides of the roadway. The absence of these additional underground utilities means all utilities can be kept on one side of the road allowance to lessen the encumbrance on the corridor. Furthermore, this provides an opportunity for other uses of the available corridor for other utilities.

Similar to the revised 20m urban cross section considered above, the collector standard also proposes to relocate the fire hydrants to adjacent the roadway to facilitate access. This will also avoid the need to install access culverts.

The street lights are also brought closer to the road than the Town's current standard. This will aid in providing the Town's required lighting but will reduce the amount of lighting on the sidewalk. Staff have not determined what the lighting level will be on the sidewalk but feel that it is a reasonable compromise because it is more important to get lighting effectively onto the roadway. This problem can be minimized by ensuring the street lights are on the same side of the street as the sidewalk.

Another major change from the Town's rural Standard is the placement of street trees at the top of the back slope of the ditch. Much of the same street tree discussion as set out with respect to the 20m urban road section applies to the 30m rural collector as well. It should be noted though that some of the concerns for street trees that relate to the proximity of the trees to the travelled portion of the road are lessen because the trees are behind the ditch slope.

Implementation

With the approval by Council of the proposed cross sections in principle, Staff will finalise the drawings and incorporate them into the Town's Engineering Standards. Staff anticipate

issuing the next version of the document in mid 2012 to incorporate the road sections considered in this report plus revise the existing 20m rural cross section to adopt similar changes as approved herein. There are also small changes that Staff will include in the revised 2012 Standards that represent incremental best practices, material specifications, and general clarifications.

Furthermore should Council endorse the installation of street trees on new roads, specifications for installation, spacing and species will be developed with the assistance of a Landscape Architect. Preference will be given to native species consisting of a mix of evergreen and deciduous trees, to salt tolerant species and to trees that have demonstrated good viability in an urban setting. Key points that will be kept in mind when developing the specifications will be root growth, canopy size, sightlines and interference with other infrastructure. It is not anticipated that there will be a tree fronting every lot by default, especially if the lot is small such as townhouses. The tree spacing will have to be done considering the amount of underground infrastructure and space available for the healthy growth of the root structure and canopy. In the event that Council direct Staff to not include street trees but to enhance the urban canopy by requiring a minimum standard of tree planting on private property, Staff will develop appropriate Engineering Standards.

Windfall Development

The proposed road designs for the Windfall Development are much like that proposed in this report. The most significant modification however is the proposal to use a 26.0 metre wide road allowance for a rural cross section of the collector road (Street A) within their development. The key reason for the reduction in width is to maximize the amount of open space outside the road allowance. Attachment 6 (FIG-10A) has incorporated the municipal and public utilities within this reduced road allowance. Although the proponents manage to provide the key infrastructure, the challenge will be to create sufficient capacity to contain the design storm water run-off. Staff are awaiting the detailed technical design that demonstrates that the major storm (100yr return period) can be contained as per the Town's Standards. The maximum flooding permitted under the worst case storm event is to remain below any building openings. Staff use 300mm below openings to provide for error in design assumptions, climate change effects and detrimental field changes. Should the proponent be able to demonstrate that the major overland storm flow is adequately managed; Staff is willing to accept a reduced road allowance.

Recommendation

Staff are endorsing the proposed road cross sections in principle for the consideration of Council because several ongoing issues are being addressed. The issues around street trees have been the subject of major debate within this and other municipalities. There is no doubt that an urban forest adds to the quality of life within a community and is considered a welcome streetscape enhancement. Staff have wrestled through with the topic of street trees for several years and have weighed the benefits with the ongoing maintenance cost of street trees. The recommendation for street trees either near the street (Option A) or near the property line (Option B) described within this report has been brought forward in the

affirmative for the consideration of Council with the best information that Staff have been able to gather to date.

It is also recommended that the Director of Engineering and Public Works continue to have the discretion to modify the standard road cross section drawings as warranted for a project provided the same infrastructure needs are satisfied.

C. The Blue Mountains' Strategic Plan

This report furthers the Town's Strategic Goal #2 "Addressing the Town's municipal infrastructure needs".

D. Environmental Impacts

The implementation of proposed road cross sections will have a net benefit to the environment by lessening the potential for infrastructure damage and associated repair activities. The enhancement of the urban forest will help in removal and sequestering of pollutants and carbon plus assist with storm water quantity and quality control.

E. Financial Impact

The majority of the proposed modifications will result in little or no cost differential and are anticipated to provide long term savings. The implementation of street trees however will result in the Town assuming a sizable long term cost. The true cost of street trees has been difficult to determine especially the indirect costs, but Staff have found literature and had verbal reports which predict the costs range from \$100 to \$500 annually per tree depending on location and growth constraints. The cost may well be offset by the value added in community benefits. The decision becomes one of a value judgment, however there is no doubt that in time the cost of street tree maintenance and replacement will increase the Town's base budget and the Town will enjoy an enhanced streetscape.

F. Consultation With

Technical Review Committee consisting of key representation by all Town Departments

G. Attached

1. Dwg 16-STD-U1, Standard Cross-Section – 8.5m Road – 20m ROW (Standard Urban Road Design)
2. Dwg 16-STD-R2, Rural Standard Cross-Section – 9.0m Road – 20m ROW (Standard Rural Design)
3. 20m ROW Urban Cross-Section Option A, Draft Town Standard Drawing
4. 20m ROW Urban Cross-Section Option B, Draft Town Standard Drawing
5. 30m ROW Rural Collector Cross-Section, Draft Town Standard Drawing
6. Proposed 26m ROW Rural Cross-Section, Windfall Developments, C.C. Tatham & Associates Ltd.

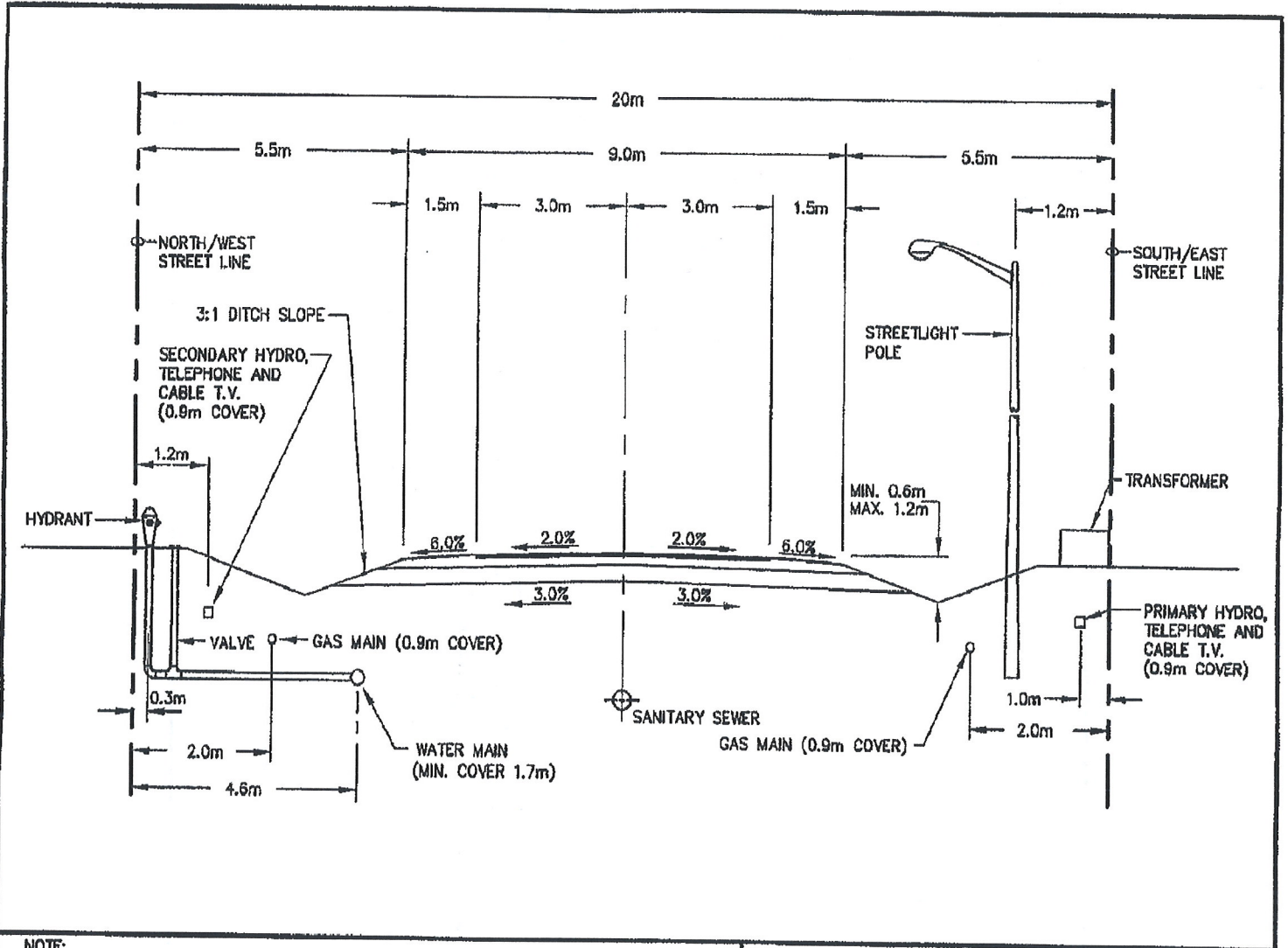
Respectfully submitted,

Reg Russwurm

Reg Russwurm
Director of Engineering & Public Works

For more information, please contact:

Reg Russwurm
russwurm@thebluemountains.ca
(519) 599-3131 x260



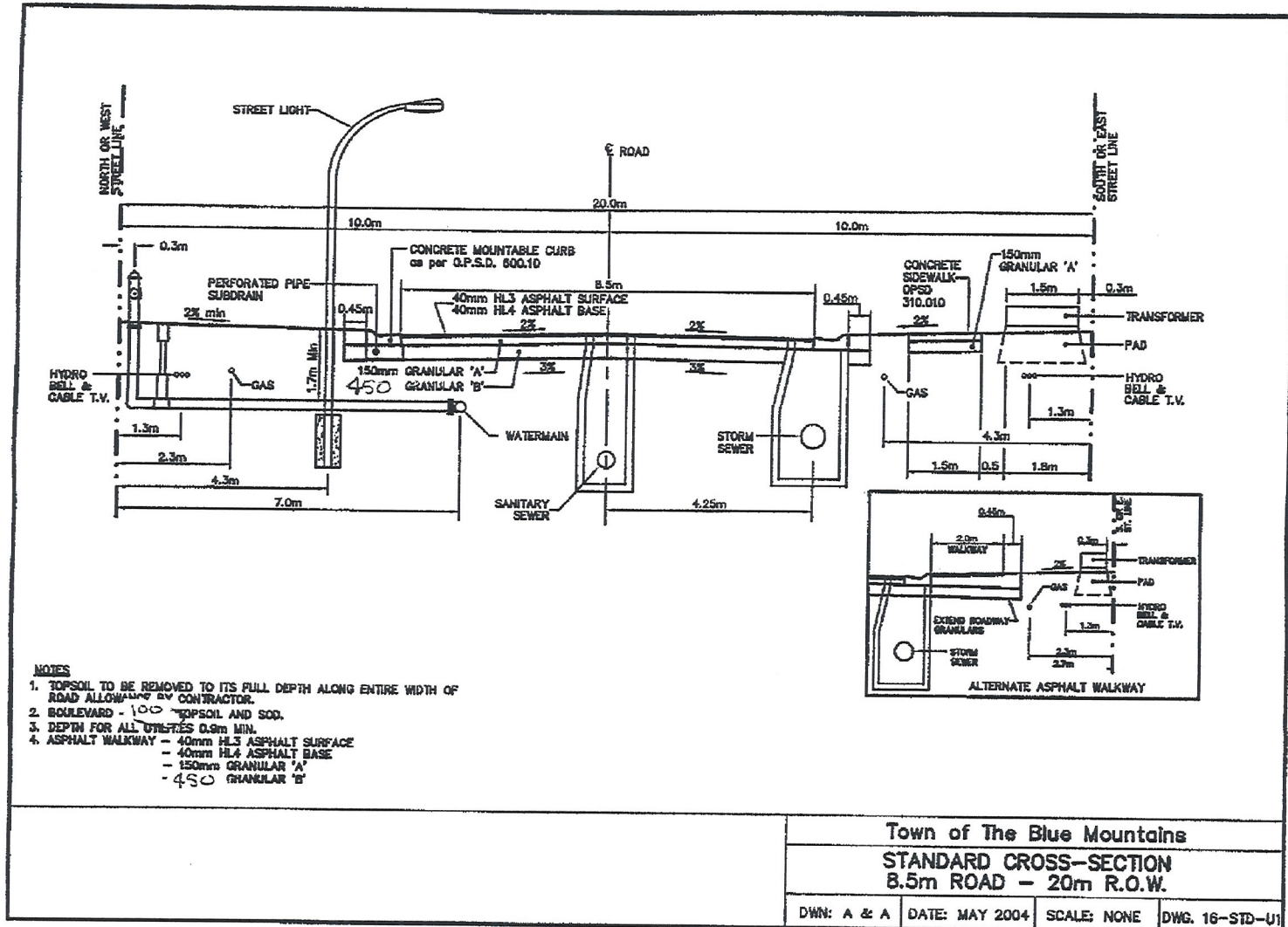
NOTE:
 ROAD - 40mm HL3 SURFACE COURSE ASPHALT
 - 40mm HL4 BASE COURSE ASPHALT
 - 150mm GRANULAR 'A'
 - 4-50 GRANULAR 'B' OR 'C'
 BOULEVARD - 150 TOPSOIL AND NURSERY SOD

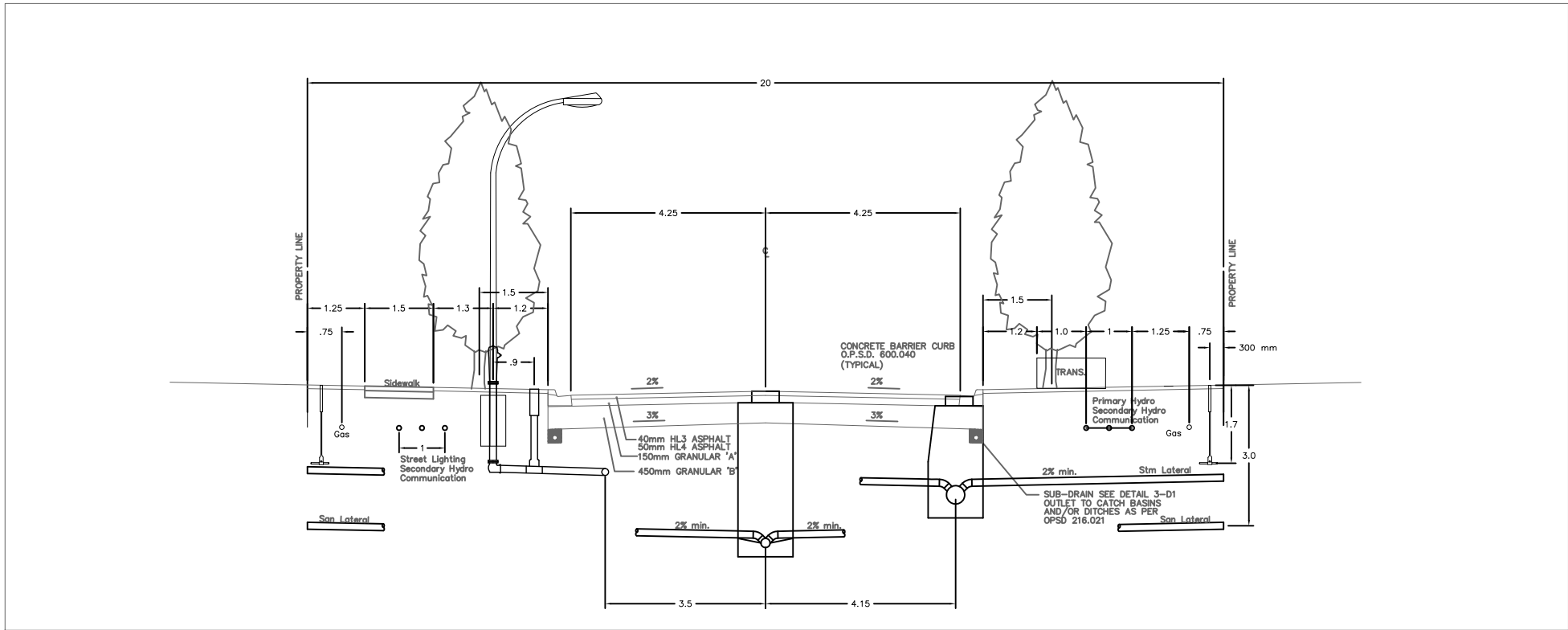
Town of The Blue Mountains			
RURAL STANDARD CROSS-SECTION			
9.0m ROAD - 20m R.O.W.			
DWN: A & A	DATE: FEB. 1998	SCALE: NONE	DWG. No. 16-STD-R2

APRIL 2009

THE BLUE MOUNTAINS

2009 ENGINEERING STANDARDS

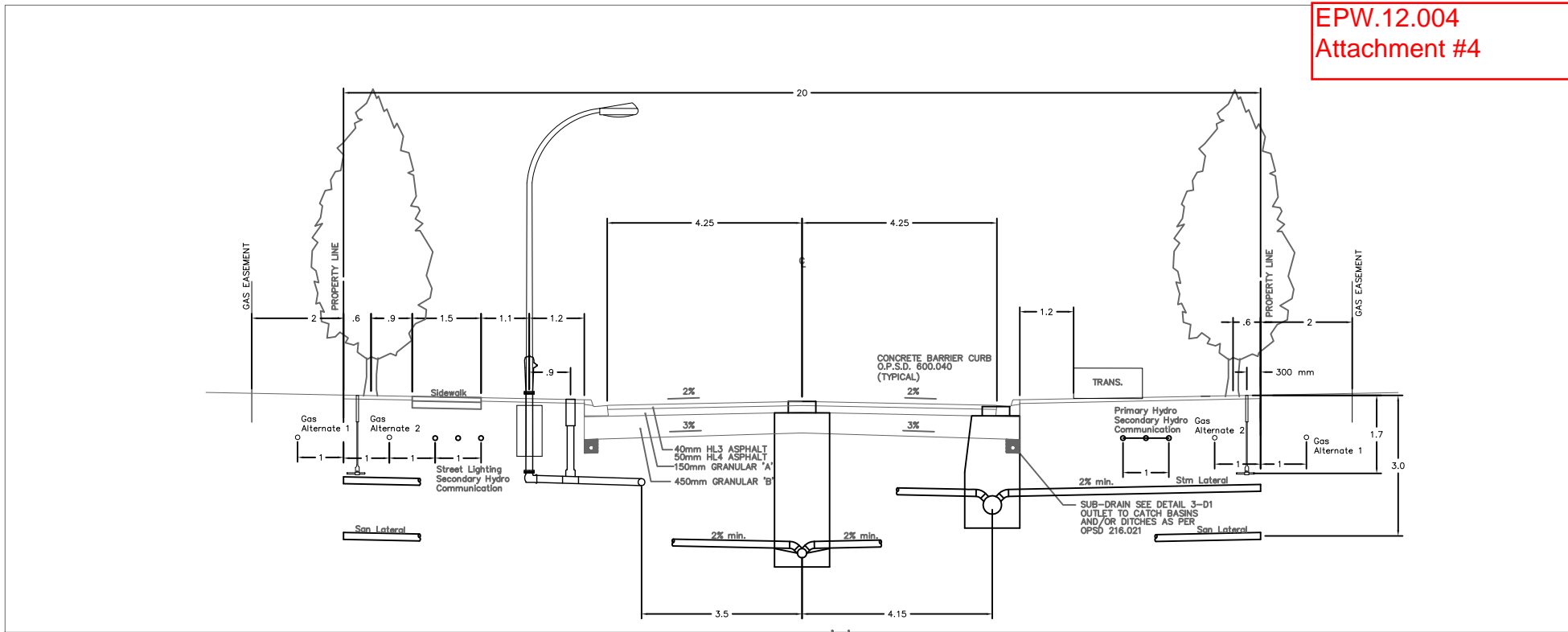




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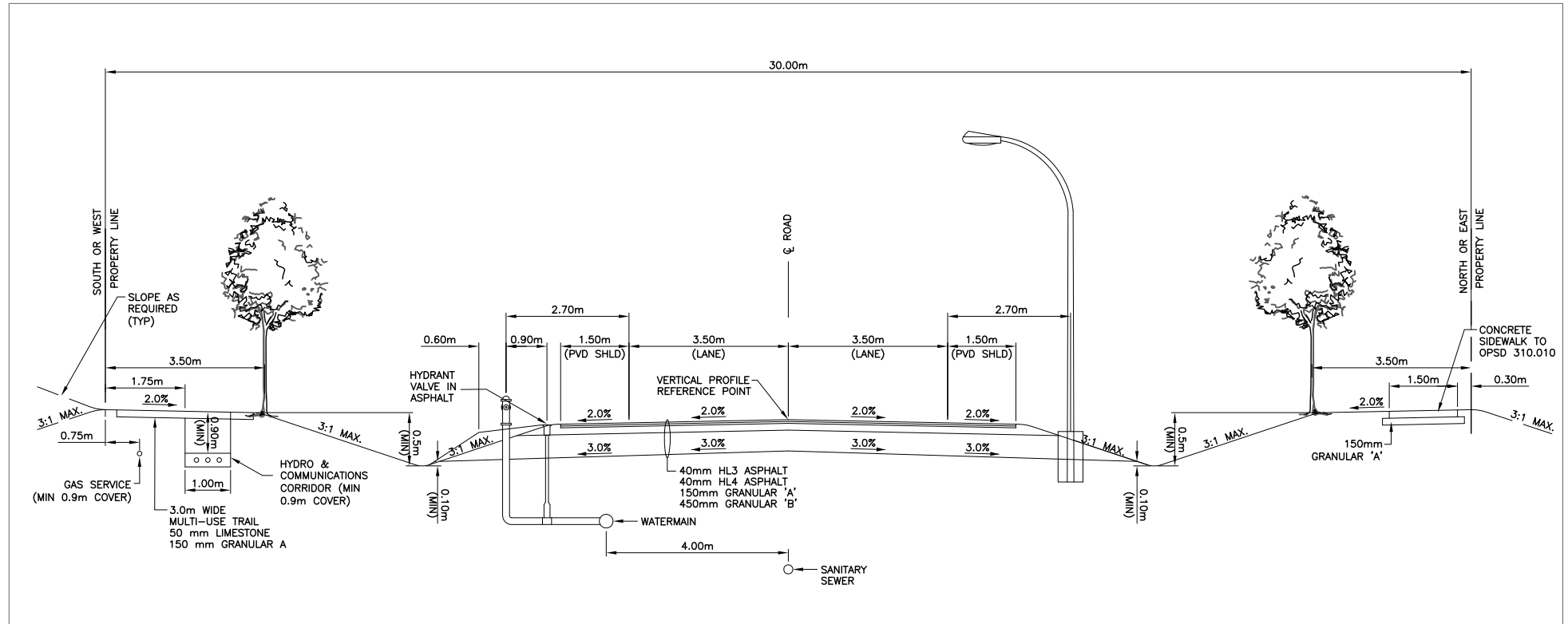
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					DESIGN:	CHECKED: RR	DWG. FIG-
NO.	REVISIONS	DATE			DRAWN: TG	DATE: JAN/12	

EPW.12.004
Attachment #4



DRAFT

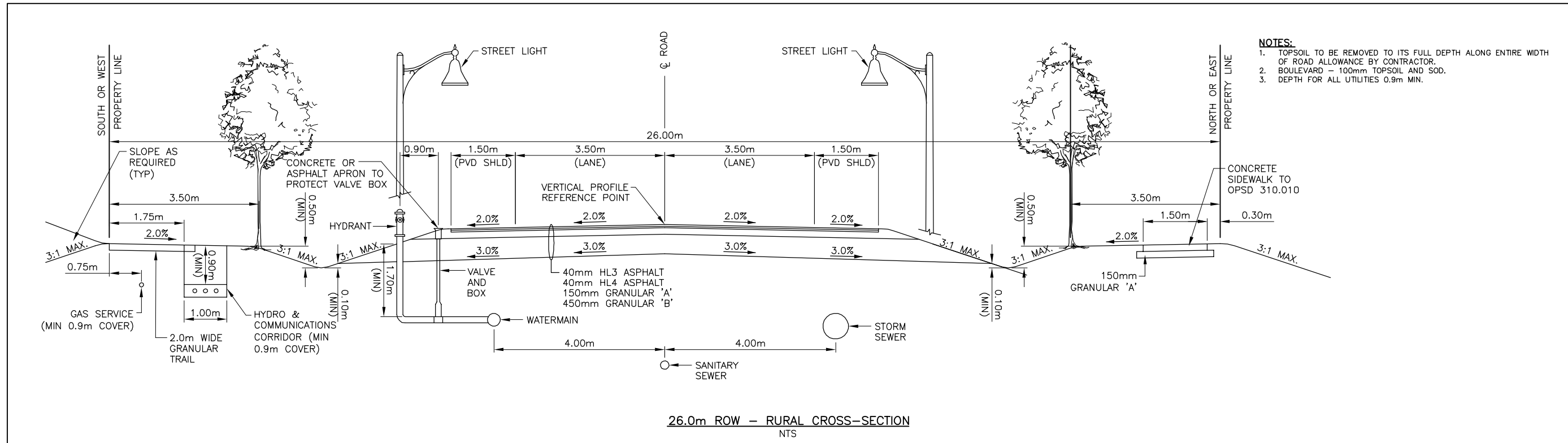
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						DESIGN:	CHECKED: RR	DWG. FIG-	
NO.	REVISIONS	DATE	DRAWN: TG	DATE: JAN/12					



DRAFT

			TOWN OF THE BLUE MOUNTAINS	30.0m ROW RURAL COLLECTOR CROSS-SECTION	SCALE: NTS		JOB NO.
					DESIGN:	CHECKED: RR	DWG. FIG-
NO.	REVISIONS	DATE			DRAWN: TG	DATE: JAN/12	

111179-2-FIG10.dwg:20120104:1445:1000:00 x111179-2-LX01 x111179-2-CX01-110 x111179-2-SX02 x111179-2-1X01



- NOTES:**
1. TOPSOIL TO BE REMOVED TO ITS FULL DEPTH ALONG ENTIRE WIDTH OF ROAD ALLOWANCE BY CONTRACTOR.
 2. BOULEVARD - 100mm TOPSOIL AND SOD.
 3. DEPTH FOR ALL UTILITIES 0.9m MIN.

CONTRACT DRAWINGS

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

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1.	TOWN COMMENTS	JAN 5/12
NO.	REVISIONS	DATE

**WINDFALL
TOWN OF THE BLUE MOUNTAINS
MASTER DEVELOPMENT REPORT**

**26.0m ROW
RURAL CROSS-SECTION**

C.C. Tatham & Associates Ltd.
Consulting Engineers

Collingwood Bracebridge Orillia Barrie

SCALE:	NTS	JOB NO.	111179-2
DESIGN:	JPA	CHECKED:	LH
DRAWN:	JPA	DATE:	DEC/11

DWG. FIG-10A