Appendix H:
Traffic Noise Impact Report

TRAFFIC NOISE IMPACT STUDY

Proposed Road Widening
Municipal Class Environmental Assessment

"Bayview Drive / Big Bay Point Road"

Bayview Drive from Little Avenue to Big Bay Point Road, and
Big Bay Point Road from Bayview Drive to Huronia Road
City of Barrie

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EXECUTIVE SUMMARY

R. BOUWMEESTER & ASSOCIATES has been retained by C.C. Tatham & Associates Ltd. to assess the impact of future traffic noise on existing properties resulting from the proposed widening of Bayview Drive from Little Avenue to Big Bay Point Road, and Big Bay Point Road from Bayview Drive to Huronia Road.

The project is subject to a Municipal Class Environmental Assessment (EA).

The goals and objectives of this study are five-fold, namely:

1. Establish noise criteria.
2. Identify noise sources and existing noise-sensitive receptors.
3. Estimate the impact of increasing traffic noise levels at existing noise-sensitive receptors due to the proposed road improvements.
4. Determine the need for mitigation to protect existing noise-sensitive receptors.
5. Recommend mitigation measures if, and where, required.

The noise concern for this project is increased traffic noise resulting from future traffic increases on Bayview Drive and Big Bay Point Road due to the proposed road improvements.

This assessment has been carried in accordance with noise criteria derived from MOECC and MTO policies as described herein.

Although traffic noise levels are expected to increase in some locations as a result of the proposed widening, the predicted noise levels and noise level increases are not sufficient to warrant noise mitigation under the noise policies and protocol established by the MOECC and MTO for provincial highway and freeway (re-)construction projects.

We have reviewed the acoustic implications of all the proposed alternatives and find that all are acoustically acceptable. The alternatives that maintain existing centreline are the most equitable in terms of distributing the potential noise impacts.

In summary, noise mitigation measures are not required for any of the alternatives.

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1. INTRODUCTION

R. BOUWMEESTER & ASSOCIATES has been retained by C.C. Tatham & Associates Ltd. to assess the impact of future traffic noise on existing properties resulting from the proposed widening of Bayview Drive from Little Avenue to Big Bay Point Road, and Big Bay Point Road from Bayview Drive to Huronia Road ("Study Area"). The project is subject to a Municipal Class Environmental Assessment (EA). The Study Area includes the lands on either side of the subject roads. See Figures and Appendices for key maps.

The Bayview Drive leg is approximately 1.4 km in length; Big Bay Point Road is 1.3 km.

The noise concern for this project is increased traffic noise resulting from future traffic increases on Bayview Drive and Big Bay Point Road due to the proposed improvements.

Properties zoned to permit residential uses and used as principal residences are the focus of this noise assessment. This ensures that mitigation efforts and funds are directed to areas of greatest need (i.e. principal residences). Notwithstanding the above, existing residential uses within other zones also considered. The noise impact on lands zoned and used for non-residential purposes is not addressed in this analysis.

It is noted that there are no provincial noise criteria that apply to the (re-)construction of municipal roads. This is unlike the (re-)construction of provincial highways and freeways, and it is unlike new residential development along existing or planned future roads. As a result, this review is based on the MTO Environmental Guide for Noise (Oct 2006 – v1.1 rev July 2008).

2. GOALS AND OBJECTIVES

The goals and objectives of this study are five-fold, namely:

1. Establish noise criteria.
2. Identify noise sources and existing noise-sensitive receptors.
3. Estimate the impact of increasing traffic noise levels at existing noise-sensitive receptors due to the proposed road improvements.
4. Determine the need for mitigation to protect existing noise-sensitive receptors.
5. Recommend mitigation measures if, and where, required.

3. GUIDELINES AND CRITERIA

As noted above, there are no specific noise criteria that apply in the case of a municipal road (re-)construction project adjacent to existing noise-sensitive land uses. The Ministry of the Environment and Climate Change (MOECC) noise guideline (Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning Publication NPC-300) relates to the assessment of traffic noise in new developments and new sources of stationary noise (e.g. commercial/industrial operations) that may impact existing (or zoned) noise-sensitive land uses. Neither apply in this case.

The MOECC and the Ontario Ministry of Transportation (MTO) developed a protocol (A Protocol for Dealing With Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments, February 1986) for assessing and dealing with the impact of noise from new or improved provincial highways and freeways on existing noise-sensitive land uses. This protocol does not apply in this case since it does not apply to municipal road projects. It is noted that the protocol requires noise controls only if the predicted noise level, due to the proposed road improvements and based on ten-year traffic projections, increases by more than 5 dBA.

The MTO issued Ministry Directive A-1 (Noise Policy and Acoustic Standards for Provincial Highways, July 1978) which was revised in August 1987 to reflect the requirements of the 1986 MOECC/MTO protocol. This directive documents the MTO policy for investigating and controlling provincial highway noise and its effect on adjacent residential areas. It also establishes warrants for noise control measures.

In October 2006, the MTO issued an updated policy entitled, Environmental Guide for Noise, as part of its Environmental Standards and Practices series. Referred to simply as the *Noise Guide*, it updates, improves, and supersedes the MTO/MOECC Noise Protocol and MTO Noise Policy referred to above.

According to the Noise Guide, the mitigation effort required is a function of the noise level and the noise level increase.

TABLE 1 - Mitigation Effort Required for the Projected Noise Level with the Proposed Improvements above the Ambient [1]

Change in Noise Level Above Ambient / Projected Noise Levels with Proposed Improvements	Mitigation Effort Required
< 5 dBA change + < 65 dBA	None
≥ 5 dBA change OR ≥ 65 dBA	• Investigate noise control measures on right-of-way • Introduce noise control measures within right-of-way and mitigate to ambient if technically, economically and administratively feasible • Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers

[1] Environmental Guide for Noise, MTO October 2006

Mitigation must attempt to achieve levels as close to, or lower than, the objective level (i.e. future predicted ambient without the proposed improvements) as is technically, economically, and administratively feasible.

The technical, economic, and administrative feasibility of providing mitigation is required by the Noise Guide to be reviewed as follows[2]:

Technical Feasibility	Review the constructability of the noise mitigation (i.e. design of wall, roadside safety, shadow effect, topography, achieve a 5 dBA reduction, ability to provide a continuous barrier, etc.).
Economic Feasibility	Carry out a cost/benefit assessment of the noise mitigation (i.e., determine cost per benefited receiver).
Administrative Feasibility	Determine the ability to locate the noise mitigation on lands within public ownership (i.e., provincial or municipal right-of-way).

The main differences between the new Noise Guide and the earlier policies are:

- in addition to the test for a "5 dBA increase", an upper noise level limit of 65 dBA has been set at which point noise control measures must be investigated within the right-of-way. The previous policies had no upper limit.
- in addition to evaluating sound levels in outdoor living areas (OLAs) associated with noise sensitive areas (NSAs), a new concept has been introduced which evaluates noise impacts along the "most exposed side" (i.e. closest side) of existing dwellings.

While the future development of existing vacant lands (and the re-development of non-vacant lands) will have to comply with MOECC Publication NPC-300 referred to above, we note that the subject assessment applies only to existing NSAs. As indicated earlier, this study is intended to determine both the increase in traffic noise levels and the resultant traffic noise levels at existing NSAs directly due to the proposed improvements.

We note that in the case of existing dwellings there is no opportunity to require central air conditioning, special building component design, or warning clauses on title as would be the case in developments proceeding under NPC-300. Where warranted, however, OLAs exposed to proposed road improvements can be protected by installing acoustic barriers.

In the absence of specific guidelines governing the noise impacts of municipal road improvement projects, this study is based on the requirements of the MTO Noise Guide which includes general provisions, and provisions related to construction noise as summarized below. Although these relate to provincial highway projects, they are used in this analysis as a guide in assessing the potential noise impacts from this project.

[2] Environmental Guide for Noise, MTO October 2006

3.1 MTO Noise Guide - General Provisions

Some of the key provisions of the Noise Guide are summarized below. We have added project-specific commentary *(in italics)* where applicable.

a) In order to determine a noise impact, a comparison is made of future sound levels with and without the proposed improvements. An apples-to-apples comparison can only be done by prediction modeling; future sound levels cannot be measured today, and as such, existing sound levels are not part of the impact analysis where an existing road is improved.
b) Noise prediction calculations must only be undertaken using noise prediction methodologies approved by MOECC and MTO (e.g. ORNAMENT[3] (Ontario Road Noise Analysis Method for Environment and Transportation) or STAMINA 2.0 (computer program based on US Federal Highway Administration Highway Noise Prediction Model)).
c) The sound level objective for OLAs is 55 dBA *(similar to NPC-300 objective for new residential development)* or the ambient, whichever is higher.
d) In addition to OLAs, the most exposed sides of existing dwellings are now included (under the new Noise Guide) in the assessment of noise impacts.
e) Mitigation requirements, if any, are based on OLA noise levels which, unlike noise levels at the 'most exposed side', take advantage of shielding from the dwelling unit.
f) The significance of the noise impact is quantified by the change in sound level as well as the actual sound level.
g) If the change in sound level is less than 5 dBA and the predicted sound level with road improvements is less than 65 dBA, then no mitigation is required.
h) If the change is 5 dBA or more or if the sound level is 65 dBA or more, then noise control measures within the right-of-way should be investigated.
i) Mitigation measures, if required, must be investigated within the right-of-way.
j) Mitigation measures, if required, must be capable of reducing sound levels by at least 5 dBA averaged over the first row receivers.
k) NSAs include all noise-sensitive land uses.
l) To qualify as an NSA, an NSA must have an OLA associated with a dwelling unit. OLAs must be at ground level adjacent to a residential unit.
m) NSAs are defined to include:
    - Private homes such as single family residences (owned or rental)
    - Townhouses (owned or rental)
    - Multi-unit buildings, e.g. apartments, with OLAs for use by all occupants
    - Hospitals, nursing homes for the aged, where there are OLAs for patients
n) Where retrofit is considered, NSAs can also include:
    - residential lands adjacent to an existing freeway *(roadway in our case)* if the lands were approved for residential use prior to February 8, 1977
    - residential lands adjacent to a new freeway *(roadway)* if the lands were approved for residential use before the route was designated

[3] Used in this study.

- residential lands adjacent to an expanding freeway *(roadway)* if the lands were approved for residential use before the expansion and where noise controls were not originally required.

o) Where a new freeway/highway *(roadway)* is planned, the following land uses would quality as NSAs in addition to those listed above:
- Educational facilities and day care centres if there are OLAs for students
- Overnight campgrounds
- Hotels/motels if there are OLAs (e.g. pool area, etc.) for guests.

p) The following do not necessarily qualify as NSAs:
- Apartment balconies above ground floor
- Educational facilities (except dorms with OLAs for students)
- Churches
- Cemeteries
- Parks and picnic areas
- Day care centres
- All commercial
- All industrial.

q) The majority of residences in the area must be zoned Residential and taxed as principal residences. This ensures that funds for retrofit are directed to areas of greatest need.

r) Caution should be taken in situations where there is potential for zoning to be changed from noise-sensitive land uses to non-sensitive uses.

s) Noise levels for arterial roads are to be calculated for the 16-hour day-time period (7:00 am to 11:00 pm). *(Arterial roads generally carry 90% of the daily traffic volume during this period).*

t) Commercial vehicle percentages should be based on data provided by a traffic analyst. If no data is available, the Noise Guide makes recommendations for assumed percentages that vary by type of road. *(Our analysis is based on truck percentages recommended by Tatham. See Section 4.4.)*

u) Noise level calculations must be carried out using the posted speed limits. *(The current posted speed limits have been used for all scenarios.)*

v) Receiver heights are to be set at 1.2 m above grade 3 m from the house. *(We used a height of 1.5 m as per the MOECC guidelines for new housing; this is more conservative since it does not allow as much of a sound level reduction due to ground attenuation and it renders noise barriers slightly less effective.)*

3.2 MTO Noise Guide - Construction Noise

The Noise Guide recommends the following with respect to construction noise:

a) Identify noise-sensitive areas.

b) Identify and obey municipal noise control by-law. If the by-law causes hardship or timing issues for the contractor, then the contractor may apply directly to the municipality for an exemption to the by-law.

c) Include general noise control measures (not sound level limits) in the construction contract. In response to noise complaints from the public, check for compliance with the noise control measures stipulated in the contract. If public complaints

continue even if the required noise control measures are in effect, then enforce the sound level limits as per MOECC construction noise guideline NPC-115.

3.3 Project-Specific Noise Criteria

The noise criteria developed for this project are derived from the MOECC and MTO policies described earlier. In summary, this assessment focuses on the following:

- NSAs including:
  - 1st priority - lands zoned Residential and used as such
  - 2nd priority - lands used as residential but zoned non-residential
- OLAs where noise levels are predicted to increase by 5 dBA or more as a result of the proposed road realignment
- OLAs where future sound levels are predicted to increase to 65 dBA or more as a result of the proposed road realignment.

4. ANALYSIS PROCEDURES

4.1 Surroundings and Study Area Characteristics

Approximately 83% of the frontage within the Study Area is zoned Industrial (81% EM4 (General Industrial) and 2% EM3 (Service Industrial)). The remaining 17% is comprised of 5% C4 (General Commercial), 5% I-M (Major Institution), 6% EP (Environmental Protection), and 1% RM2 (Multiple Residential 2nd Density)). See Appendices for map.

All of the lands along Big Bay Point Road and about ½ to ¾ of the lands along Bayview Drive from Big Bay Point northerly are zoned EM4. Based on site visits and a review of air photos, the existing uses are industrial in nature.

A professional office building is located on the C4 lands on the east side of Bayview Drive midway between Big Bay Point Road and Little Avenue. A townhouse development (RM2) is located at the south-east corner of Bayview Drive and Little Avenue. EP lands separate the two.

The Allandale Recreation Centre is located at the south-west corner of Bayview Drive and Little Avenue at the north end of the Study Area. It lies opposite the townhouse site.

The configuration of the properties within the Study Area and the locations of existing NSAs and associated OLAs were derived from topographic surveys, air photos, and zoning mapping, all as supplemented by site visits.

Bayview Drive, a major collector in the City's Official Plan, and Big Bay Point Road, an arterial, are both two-lane roads with localized turning lanes at major intersections. The posted speed limit on both is 50 kph. Road grades along Bayview Drive are relatively flat, generally <2%, while Big Bay Point Road has grades up to about 3.5%.

4.2 Noise Sources

The primary noise source of concern for this project is future traffic noise resulting from the proposed improvements to Bayview Drive and Big Bay Point Road.

Roadway noise from both cars and trucks (medium and heavy) have been accounted for in this analysis, and the noise source heights have been established in accordance with MOECC criteria.

We note that traffic noise levels are influenced by a number of factors including the amount of traffic, traffic speed, percent trucks, road grades, source-receiver heights above grade, source-receiver separation distance, changes in terrain type (e.g. asphalt vs. vegetation), and the removal/addition of intervening structures. In this analysis, the only factors expected to change as a result of the proposed works are the daily traffic volume and the road alignment (i.e. location of centreline).

It is noted that separation distance is defined as the distance between centreline of travel and receptor. In cases where the separation distance increases, sound levels will reduce; in cases where the distance decreases, sound levels will increase. Higher noise levels from traffic on the near side of centreline are generally offset by lower levels from the far side. Assuming an even directional split in traffic, average noise levels are assumed to originate from traffic along the centreline of road. The MOECC allows this approach for roads with up to four lanes of through traffic. For roads with more than four through lanes, separate analyses must be carried out for each direction of travel (in sets of up to four lanes each). This applies to the 7-lane alternatives (Alternatives A and B) for Big Bay Point Road (see lane descriptions following).

In this analysis we have assumed an even directional split in traffic (unless noted otherwise) with noise originating from centreline. Depending on which of the alternatives is selected, however, centreline may shift as follows:

Bayview Drive
- **Alternative 1** - 3 lanes, no centreline shift
- **Alternative 2** - 3 lanes, in some sections centreline shifts west by about 1 m

Big Bay Point Road
- **Alternative A** - 7 lanes, no centreline shift
- **Alternative B** - 7 lanes, centreline shifts south by about 5.2 m

(We note that the worst-case scenarios for Big Bay Point Road are the 7-lane alternatives, A and B. Accordingly, Alternatives C and D, as described below, are not discussed further.) Detailed descriptions of each alternative, as provided by Tatham, follow.

"Bayview Drive
Alternative 1 - 3-lane cross section with bicycle lanes (sidewalk on west side only) :
This alternative considers the urbanization and widening of Bayview Drive to 3-lanes

of vehicular traffic from Little Avenue to Big Bay Point Road. Regular bike lanes are recommended along the entire length of road with a sidewalk proposed along the west side of the road. The road would be widened to a 14.8 metre width (measured curb face to curb face) consisting of two 3.5 metre vehicular travel lanes (one per direction), a 4.2 metre continuous two-way left turn lane and 1.8 metre bicycle lanes. A 2.0 metre sidewalk is included on the west side of the road. The existing centreline is maintained.

Alternative 2 - Reduced 3-lane cross section with bicycle lanes (sidewalks on both sides of road): *Design Alternative 2 is similar to Alternative 1 but considers reduced vehicular lane, bike lane and boulevard widths. In this alternative the existing centre line of the road is shifted to the west to allow for 2.0 metre sidewalks on both sides of the road. The road would be widened to a 13.8 metre width (measured curb face to curb face) consisting of two 3.3 metre vehicular travel lanes (one per direction), a 4.2 metre continuous two way left turn lane and 1.5 metre bicycle lanes.*

Big Bay Point Road

Alternative A - 7-lane cross section with buffered bicycle lanes (sidewalks on both sides): *This alternative considers urbanization and widening of Big Bay Point Road to a 7-lane profile with buffered bike lanes, a raised median proposed with left turn lanes provided at the signalized intersections and some driveways and sidewalks on both sides of the road. Big Bay Point Road would be widened to a width of 29.8 metres (measured curb face to curb face) consisting of six 3.5 metre vehicular travel lanes (three per direction), a 4.2 metre raised median with left turn lanes provided at the main intersections, 1.8 metre bicycle lanes with 0.5 metre buffer lanes. Other infrastructure improvements include 2.9 metre boulevards (measured from back of curb to front of sidewalk) and 2.0 metre sidewalks on both sides of the road.*

Alternative B - Reduced 7-lane cross section with buffered bicycle lanes (sidewalk on south side only)*: This alternative assumes that the rail line spur abutting Big Bay Point Road to the north will remain, thus recognizing and protecting for the potential re-introduction of rail service along the spur line. As such, all of the proposed widening required to incorporate the 7-lane cross section with buffered bike lanes will occur to the south. In recognition of this and to reduce the property impacts to the south, Alternative B considers reduced bike lane and boulevard widths and does not include provision of a sidewalk on the north side of Big Bay Point Road. Under Design Alternative B, the existing centre line of the road will shift approximately 5.2 metres to the south.*

Alternative C - 5-lane cross section with buffered bicycle lanes (sidewalks on both sides of road): *Design Alternative C considers the widening of Big Bay Point Road to a 5-lane cross section (as per the recommendations of the traffic operations assessment) with a continuous two-way left turn lane and buffered bicycle lanes. This alternative assumes that the existing rail corridor to the north will remain in place.*

Thus the north property line is respected and all proposed widening occurs to the south.

Alternative D - Reduced 5-lane cross section with buffered bicycle lanes (sidewalk on south side only): *This design alternative is similar to Design Alternative C in that it considers a 5-lane cross section with buffered bicycle lanes and assumes that the existing rail corridor is to remain in place. However, Design Alternative D further considers reduced boulevard widths and does not provide a sidewalk on the north side of Big Bay Point Road.*"

In all cases, the roads will be widened from their current two-lane configurations.

The terrain between the proposed roads and the noise-sensitive receptors is non-reflective for the purpose of this analysis. Shielding by intervening vegetation and buildings has not been accounted for unless noted otherwise.

Noise levels along a wall on the far (shielded) side of a building are typically 15 dBA less than those not shielded, and noise levels along a side wall, that is, in areas exposed to one-half of the road length, are typically 3 dBA less than those in fully exposed areas.

The MOECC traffic noise model is based on vehicles equipped with mufflers in good working condition. It does not account for car stereos, squealing tires, honking horns, etc. The model assumes a steady flow of traffic at the speed limit, and vehicles equally spaced throughout the study period.

It is noted that there are other noise sources in the area (e.g. Highway 400, industrial operations, railway traffic, etc.) which contribute to the ambient noise level. These are not accounted for in this study since the focus of this assessment is the potential increase in traffic noise resulting from the proposed road improvements.

4.3 Noise-Sensitive Areas

Potential noise-sensitive areas were identified from zoning maps and air photos, and from observed land uses based on site visits.

Based on the above, and the noise criteria summarized in Section 3.3, the following qualify as noise-sensitive areas that warrant further investigation:

- The most exposed side of the RM2-zoned townhouse units at Bayview/Little
- OLAs at the above-noted townhouse units.

There are no NSAs along the remainder of Bayview Drive nor along Big Bay Point Road, therefore, these need not be evaluated further. Notwithstanding this, we have provided some future sound level predictions for information purposes only.

4.4 Traffic Data

Existing road capacities and existing and future traffic volumes were provided by C.C. Tatham & Associates Ltd. The data includes current traffic volumes (i.e. for Year 2015) together with Year 2021 and 2031 projections under both existing (i.e. "do nothing") and proposed conditions. See Appendix 'A' for a summary of the traffic data used.

According to data provided by Tatham, the AADT traffic volumes are projected to grow between Year 2015 and Year 2031 as follows:

- Bayview Drive (worst case, north of Mollard) – 8,060 to 10,225 vpd
- Big Bay Point Road (worst case, east of Welham) – 12,275 to 27,365 vpd

The 15-year time frame (current to Year 2031) used in this analysis exceeds the MOECC requirement for a 10-year projection window.

The current carrying capacities of the roads are 13,000 vpd for Bayview Drive and 15,000 vpd for Big Bay Point Road.

It is noted that the traffic volume increase for Bayview Drive can be accommodated by the existing road configuration, therefore, the increase in traffic is predicted to occur with or without the improvements. The improvements on Big Bay Point Road, however, are necessary in order to accommodate the predicted growth.

The percentage of truck traffic is assumed to remain constant at the current level for the duration of the study period (i.e. 5% for Big Bay Point Road and for Bayview Drive between Big Bay Point Road and Mollard Court, 2% for Bayview Drive between Mollard Court and Little Avenue – with the split between medium/ heavy trucks assumed 50/50).

Noise calculations in this study are based on infinite road lengths unless indicated otherwise. And since noise from heavy trucks increases on uphill climbs, adjustments were applied where road grades exceed 2% and the grade change exceeds 6 m. This applies to portions of Big Bay Point Road only.

Day/night traffic volumes were split 90/10 as per MOECC guide for arterial roads.

The current posted speed limits are not expected to change during the 16-year study period, therefore, the current limits were used for the "do nothing" and the "proposed" scenarios. Speed limits are 50 kph throughout the Study Area.

4.5 Study Period

The key study period, as per the Noise Guide, is day-time from 7:00 am to 11:00 pm.

4.6 Sound Level Prediction Model

Noise level predictions were carried out in accordance with Environmental Noise Assessment in Land Use Planning (MOECC Training Manual 1987) and through the use of the MOECC roadway noise model ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) as implemented by the MOECC roadway noise computer program Stamson 5.04.

Sample noise level calculations are provided in the Appendices.

4.7 Correction Factors

Typical corrections required by the MOECC to be applied to the noise levels have been taken into account where applicable. These include corrections for such things as:

a) Road grade
b) Roadway segment lengths
c) Ground surface type
d) Source - receiver distance
e) Height of elevated source/receiver, and
f) Day/night split in traffic volumes.

5. CALCULATED EQUIVALENT SOUND LEVELS

Outdoor living area sound levels are typically calculated for receivers located 3.0 m from the rear wall of a house, with a receiver height of 1.5 m above finished grade. It is noted that noise barriers may not protect against noise levels where decks, balconies, or roof-top terraces are provided. Resultant noise levels in these locations may, therefore, be higher than the allowable limit. (We note that decks and balconies are exempt from the NPC-300 outdoor noise limits unless they are the only outdoor living area available to the resident, and they are at least 4.0 m deep, outside the building façade, and unenclosed.)

5.1 Noise Levels

In order to put the traffic noise levels into perspective, we have predicted sound levels for Year 2031 under the ‘do nothing’ and ‘proposed’ scenarios. This allows for a direct comparison of the sound levels, highlighting the impact of the improvements.

Resultant noise levels in OLAs are subject to a limit of 65 dBA.

5.2 Sound Level Increases

In order to quantify the noise impact of the proposed road improvements, we have compared the proposed Year 2031 sound levels (i.e. with the proposed improvements in place) to those assuming the status quo, that is, assuming no road improvements (i.e. “do nothing”) and allowing for normal growth limited only by the physical road capacity.

This approach compares future proposed noise levels to future ambient noise levels as stipulated in the MTO Noise Guide (see Section 3.1).

Increases of less than 5 dBA do not warrant noise mitigation according to the Noise Guide, and even if they exceed 5 dBA, mitigation options are typically investigated only within the right-of-way. According to the Noise Guide, noise levels in OLAs must be examined in further detail in cases where day-time outdoor sound levels along the most exposed side of a dwelling increase by more than 5 dBA or where they exceed 65 dBA. Noise controls for highway improvement projects typically relate to noise levels only in OLAs (at ground level) of residential properties, not at the building face.

Based on our analysis, we have found that noise level increases are not expected to exceed 5 dBA at any of the NSA receptor locations. The traffic volumes and the shifts in road alignment, or the addition of turning lanes, are simply not sufficient to cause a 5 dBA noise level increase. See later sections.

5.3 Predicted Year 2031 Sound Levels

As indicated in the previous section, an impact is deemed to occur only if noise levels increase as a direct result of the proposed improvements, not simply as a result of normal traffic growth. Hence the need to compare future sound levels under the 'do nothing' and 'proposed' scenarios. Generally speaking, there is no impact if the number of lanes and centreline alignment remain unchanged.

Bayview Drive
The Year 2015 capacity of Bayview Drive exceeds both the current and future (Year 2031) traffic volumes (see Section 4.4), and the future traffic volume is projected to be the same with or without the improvements. From that we can conclude that there is no impact from traffic volume alone; however, the addition of a right-turn lane at the Bayview/Little intersection means that some of the northbound Bayview Drive traffic will shift closer to the townhouse site on the east side of the road. The potential noise impact on the townhouse site is summarized below.

The Bayview Drive Year 2031 traffic volumes by lane are as follows:

TABLE 2 – Daily Traffic Volumes with and without Proposed Undertaking
Bayview Drive at Little Avenue – Year 2031

Lane	'do nothing'	proposed
NB left	1739	1739
NB thru	-	2325
NB thru/right	3239	-
NB right	-	914
SB	5249	5249

Based on the above, we carried out a detailed analysis of future traffic noise levels in the

enclosed backyard of the northernmost townhouse unit backing onto Bayview Drive.

The Year 2031 'do nothing' daytime noise level in the OLA of the northernmost townhouse unit backing onto Bayview Drive is estimated to be 55.7 dBA; the corresponding noise level with the addition of the dedicated right-turn lane (as per Bayview Drive Alternatives 1 and 2) increases to 56.0 dBA. A negligible difference.

The predicted noise levels are well below the allowable 5 dBA increase and the 65 dBA threshold for noise barriers; therefore, no barriers are required.

(Note: The slight differences in the road component widths between Alternatives 1 and 2 are acoustically insignificant. In addition, the proposed 1 m westerly shift in centreline under Alternative 2 as described in Section 4.2 applies further south along Bayview Drive. Future centreline generally matches existing in the vicinity of the townhouse site.)

We have also estimated that the future (Year 2031) 65 dBA noise contour falls within the Bayview Drive right-of-way between Little Avenue and Big Bay Point Road; therefore, noise levels on the abutting properties will be below 65 dBA.

For reference, 60 dBA occurs at about 16.5 m from centreline, 55 dBA at 33 m, and 50 dBA at 66 m under both the 'do nothing' and proposed scenarios in Year 2031.

Big Bay Point Road

In the case of Big Bay Point Road, no noise-sensitive receptors have been identified; therefore, no noise assessment is required. We have nevertheless, for information purposes only, estimated future sound levels and sound level increases.

The future (Year 2031) 'do nothing' 65 dBA noise contour lies at about 15 m from centreline, i.e. within the existing 31 m right-of-way. Assuming only a traffic increase, and no additional lanes or centreline shift, this increases to just under 22 m by Year 2031. The corresponding noise level increase is about 2.6 dBA.

Increasing the number of lanes from 2 to 7 without shifting centreline (e.g. Alternative A) changes the noise modeling procedures (see Section 4.2) and results in slightly higher noise levels at locations close to the road; the effect decreases with distance. Under this scenario, the Year 2031 65 dBA contour lies at just under 24 m from centreline.

In addition to the above, Alternative B includes a centerline shift of 5.2 m south. Accordingly, this will increase noise levels along the south side of the road (and decrease them along the north). The noise level increases along the south side are estimated to be in the order of 3.3 dBA at 60 m from existing centreline and 4.6 dBA at 30 m. These are acceptable increases even for NSAs – which these are not.

6. NOISE IMPACT SUMMARY

As indicated herein, there are no NSA sound level increases greater than 5 dBA and no OLA sound levels greater than 65 dBA for any of the proposed alternatives. The predicted noise levels in OLAs will remain below the 65 dBA threshold at which the feasibility of providing noise barriers is investigated for provincial highways.

Based on the perceived impact of sound level increases as summarized below, the noise impact of the proposed alternatives is nil to slight. This is acceptable.

TABLE 3 – Perceived Noise Impact Due to Sound Level Increases

Sound Level Increase (dBA)	Change in Subjective Loudness	Perceived Noise Impact
0 - 3	barely noticeable	nil
4 - 5	noticeably louder	slight
6 - 10	almost twice as loud	definite
11 - 15	almost three times as loud	serious
>16	almost four times as loud	very serious

7. CONCLUSIONS

The proposed improvements will result in future sound levels in OLAs and sound level increases in NSAs that do not warrant noise mitigation under the noise policies and protocol established by the MOECC and MTO for provincial highway and freeway (re-) construction projects.

We have reviewed the acoustic implications of all the alternatives (Bayview Avenue Alternatives 1 and 2, and Big Bay Point Road (worst-case) Alternatives A and B) and find that all are acoustically acceptable. However, it is worth pointing out that maintaining existing centreline (i.e. no shift) results in a more equitable distribution of noise along both sides of a road where there are noise-sensitive receptors.

In summary, noise mitigation measures are not required for any of the alternatives.

Respectfully submitted,

R. BOUWMEESTER & ASSOCIATES

Ralph Bouwmeester, P. Eng.
Principal

REFERENCES

1. Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (MOE Publication NPC-300, Aug 2013 ver. #22)
2. Sound Levels due to Road Traffic (MOE, Publication NPC-206, October 1995)
3. Environmental Noise Assessment in Land Use Planning, MOE Training Manual, (1987)
4. Road and Rail Noise: Effects on Housing (CMHC, Rev. 1981)
5. ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) (MOE, October 1989)
6. A Protocol for Dealing With Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments (MOE and MTO, February 1986)
7. Noise Policy and Acoustic Standards for Provincial Highways (MTO, Ministry Directive A-1, July 1978)
8. MTO Environmental Guide for Noise (Oct 2006 – v1.1 rev July 2008)

FIGURES

STUDY AREA

Location Plan

Scale: NTS

FIG. 1

December 2016

R. Bouwmeester & Associates

Base map source: C.C. Tatham & Associates

914 DAILY TRAFFIC VOLUME (Year 2031)

Noise Source / Receptor Plan

Scale: 1 : 500

FIG. 2

Base plan source: C.C. Tatham & Associates

December 2016

R. Bouwmeester & Associates

APPENDICES

A. Traffic Data
B. Zoning Map
C. Sample Noise Level Calculations
D. Road Improvement Alternatives (source: C.C. Tatham and Associates)

APPENDIX 'A'

TRAFFIC DATA

2015 Traffic Data - "Existing" Scenario

Existing 2015	Traffic Volume (AADT)	Posted Speed Limit (kph)	Truck % M / H	Day/Night Split (%)	Road Grade (%)
Bayview	8060*	50	1 / 1	90 / 10	0
BBPR	12275**	50	2.5 / 2.5	90 / 10	3.5

2031 Traffic Data - "Do Nothing" and "Proposed" Scenarios

Alternative	Traffic Volume (AADT)	Posted Speed Limit (kph)	Truck % M / H	Day/Night Split (%)	Road Grade (%)
Bayview					
do nothing	10225*	50	1 / 1	90 / 10	0
Alt 1	10225	50	1 / 1	90 / 10	0
Alt 2	10225	50	1 / 1	90 / 10	0
BBPR					
do nothing	15000**	50	2.5 / 2.5	90 / 10	3.5
Alt A	27365	50	2.5 / 2.5	90 / 10	3.5
Alt B	27365	50	2.5 / 2.5	90 / 10	3.5
Alt C	27365	50	2.5 / 2.5	90 / 10	3.5
Alt D	27365	50	2.5 / 2.5	90 / 10	3.5

BBPR denotes Big Bay Point Road

* Bayview capacity is 13000

** BBPR capacity is 15000

Bayview Drive - Little Avenue to Big Bay Point Road

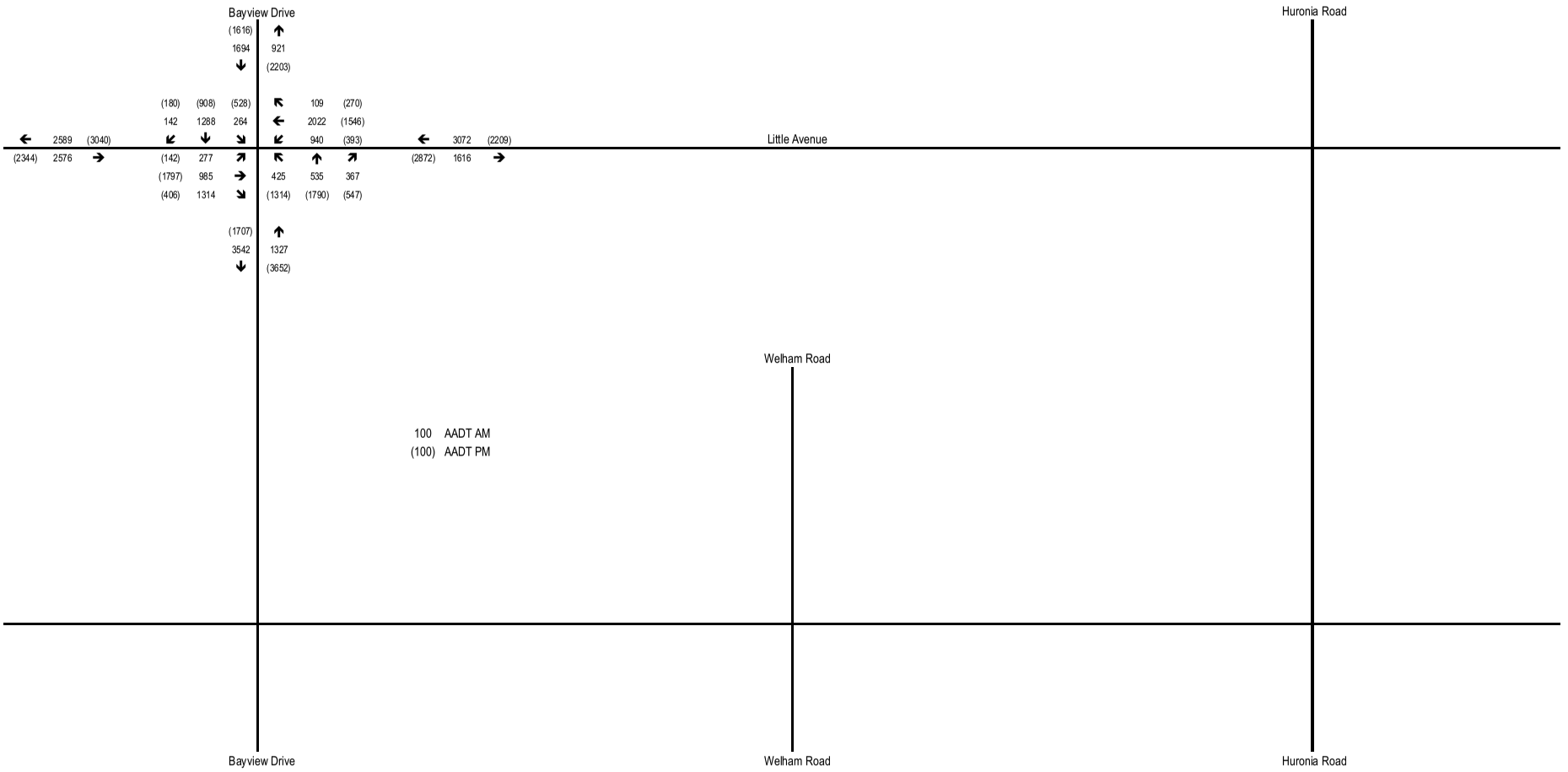
Existing Capacity			
Capacity (vehicles/h	Number of Lanes	Road Capacity	
		Hourly	Daily
650	2	1300	13000

Traffic Volumes - Existing & Projected			
Year	Road Section	Peak Hour Volumes (AM + PM)	Daily Volume
2015	Little Ave. to Mollard Ct.	1612	8060
	Mollard Ct. to Big Bay Point Rd.	1541	7705
2021	Little Ave. to Mollard Ct.	1762	8810
	Mollard Ct. to Big Bay Point Rd.	1737	8685
2031	Little Ave. to Mollard Ct.	2045	10225
	Mollard Ct. to Big Bay Point Rd.	2013	10065

Big Bay Point Road - Bayview Drive to Huronia Road

Existing Capacity			
Capacity (vehicles/h	Number of Lanes	Road Capacity	
		Hourly	Daily
750	2	1500	15000

Traffic Volumes - Existing & Projected			
Year	Road Section	Peak Hour Volumes (AM + PM)	Daily Volume
2015	Bayview Dr. to Welham Rd.	2453	12265
	Welham Rd. to Huronia Rd.	2455	12275
2021	Bayview Dr. to Welham Rd.	4713	23565
	Welham Rd. to Huronia Rd.	4716	23580
2031	Bayview Dr. to Welham Rd.	5470	27350
	Welham Rd. to Huronia Rd.	5473	27365



C.C. Tatham & Associates Ltd.
Consulting Engineers

2031 Volumes

Figure

1

Ralph Bouwmeester

Subject: Re: 415375 - Bayview Drive / Big Bay Point Road, City of Barrie RFP - success
From: "David Perks" <DPERKS@cctatham.com>
Date: 1/11/2016 5:29 PM
To: "Ralph Bouwmeester" <rbouwmeester@rogers.com>

Hi Ralph,

The % of commercial vehicles is approximately 5% on Big Bay Point Road. On Bayview Drive, the % is 5% from Big Bay Point Road to Mollard Court and then reduces to 2% between Mollard Court and Little Avenue.

Hopefully this helps.

Thanks,
David

David Perks, M.Sc., PTP
Transportation Planner

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Barrie, Ontario L4N 6B5
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Fax: (705) 733-1520
www.cctatham.com

Ralph Bouwmeester

Subject: Re: Fwd: Re: Bayview Drive / Big Bay Point Road EA - RBA noise report drfat
From: "David Perks" <DPERKS@cctatham.com>
Date: 12/12/2016 11:50 AM
To: "Ralph Bouwmeester" <rbouwmeester@rogers.com>
Attachments: Appendix K - Design Alternatives - Concept Drawings.pdf (330 bytes)

Hi Ralph,

A PDF of the alternatives is attached. As description for each is as follows:

Bayview Drive:

Alternative 1 - 3-lane cross section with bicycle lanes (sidewalk on west side only) : This alternative considers the urbanization and widening of Bayview Drive to 3-lanes of vehicular traffic from Little Avenue to Big Bay Point Road. Regular bike lanes are recommended along the entire length of road with a sidewalk proposed along the west side of the road. The road would be widened to a 14.8 metre width (measured curb face to curb face) consisting of two 3.5 metre vehicular travel lanes (one per direction), a 4.2 metre continuous two-way left turn lane and 1.8 metre bicycle lanes. A 2.0 metre sidewalk is included on the west side of the road. The existing centreline is maintained.

Alternative 2 - Reduced 3-lane cross section with bicycle lanes (sidewalks on both sides of road): Design Alternative 2 is similar to Alternative 1 but considers reduced vehicular lane, bike lane and boulevard widths. In this alternative the existing centre line of the road is shifted to the west to allow for 2.0 metre sidewalks on both sides of the road. The road would be widened to a 13.8 metre width (measured curb face to curb face) consisting of two 3.3 metre vehicular travel lanes (one per direction), a 4.2 metre continuous two way left turn lane and 1.5 metre bicycle lanes.

Big Bay Point Road:

Alternative A - 7-lane cross section with buffered bicycle lanes (sidewalks on both sides): This alternative considers urbanization and widening of Big Bay Point Road to a 7-lane profile with buffered bike lanes, a raised median proposed with left turn lanes provided at the signalized intersections and some driveways and sidewalks on both sides of the road. Big Bay Point Road would be widened to a width of 29.8 metres (measured curb face to curb face) consisting of six 3.5 metre vehicular travel lanes (three per direction), a 4.2 metre raised median with left turn lanes provided at the main intersections, 1.8 metre bicycle lanes with 0.5 metre buffer lanes. Other infrastructure improvements include 2.9 metre boulevards (measured from back of curb to front of sidewalk) and 2.0 metre sidewalks on both sides of the road.

Alternative B - Reduced 7-lane cross section with buffered bicycle lanes (sidewalk on south side only): This alternative assumes that the rail line spur abutting Big Bay Point Road to the north will remain, thus recognizing and protecting for the potential re-introduction of rail service along the spur line. As such, all of the proposed widening required to incorporate the 7-lane cross section with buffered bike lanes will occur to the south. In recognition of this and to reduce the property impacts to the south, Alternative B considers reduced bike lane and boulevard widths and does not include provision of a sidewalk on the north side of Big Bay Point Road. Under Design Alternative B, the existing centre line of the road will shift approximately 5.2 metres to the south.

Alternative C - 5-lane cross section with buffered bicycle lanes (sidewalks on both sides of road): Design Alternative C considers the widening of Big Bay Point Road to a 5-lane cross section (as per the recommendations of the traffic operations assessment) with a continuous two-way left turn lane and buffered bicycle lanes. This alternative assumes that the existing rail corridor to the north will remain in place. Thus the north property line is respected and all proposed widening occurs to the south.

Alternative D - Reduced 5-lane cross section with buffered bicycle lanes (sidewalk on south side only): This design alternative is similar to Design Alternative C in that it considers a 5-lane cross section with buffered bicycle lanes and assumes that the existing rail corridor is to remain in place. However, Design Alternative D further considers reduced boulevard widths and does not provide a sidewalk on the north side of Big Bay Point Road.

Let me know if you have any questions.

Regards,

David

David Perks, M.Sc., PTP
Transportation Planner

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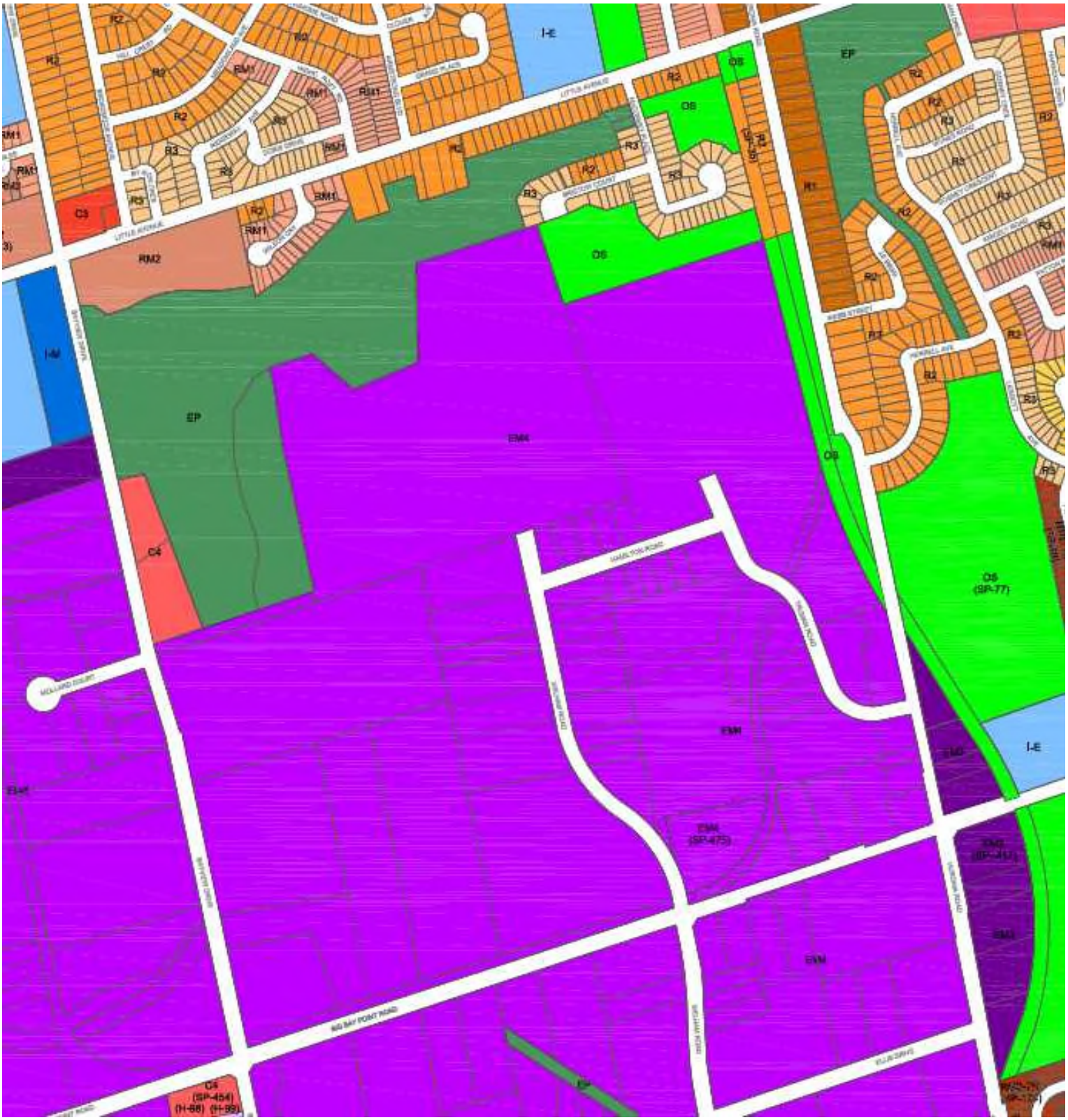
APPENDIX ‘B’

ZONING MAP


I-E
EP
OS
R2
R3
RM1
RM2
C3
I-W
EM
C4
OS (SP-77)
EM (SP-475)
C4 (SP-454) (H-68) (H-99)

APPENDIX 'C'

SAMPLE NOISE LEVEL CALCULATIONS

```
STAMSON 5.0        NORMAL REPORT        Date: 15-12-2016 21:00:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bb30a.te             Time Period: 16 hours
Description: Big Bay Alt A at 30m South


Road data, segment # 1: BBPR e/b
---------------------------------
Car traffic volume  : 11699 veh/TimePeriod  *
Medium truck volume :   308 veh/TimePeriod  *
Heavy truck volume  :   308 veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: BBPR e/b
-------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  22.65 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: BBPR w/b
---------------------------------
Car traffic volume  : 11699 veh/TimePeriod  *
Medium truck volume :   308 veh/TimePeriod  *
Heavy truck volume  :   308 veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     3 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: BBPR w/b
-------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  37.35 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Results segment # 1: BBPR e/b

Source height = 1.26 m

ROAD (0.00 + 61.13 + 0.00) = 61.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.56	0.00	-2.97	-1.46	0.00	0.00	0.00	61.13

Segment Leq : 61.13 dBA

Results segment # 2: BBPR w/b

Source height = 1.26 m

ROAD (0.00 + 58.57 + 0.00) = 58.57 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	66.61	0.00	-6.58	-1.46	0.00	0.00	0.00	58.57

Segment Leq : 58.57 dBA

Total Leq All Segments: 63.05 dBA

TOTAL Leq FROM ALL SOURCES: 63.05

Filename: bb60a.te Time Period: 16 hours
Description: Big Bay Alt A at 60m South

Road data, segment # 1: BBPR e/b

Car traffic volume : 11699 veh/TimePeriod *
Medium truck volume : 308 veh/TimePeriod *
Heavy truck volume : 308 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: BBPR e/b

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 52.65 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: BBPR w/b

Car traffic volume : 11699 veh/TimePeriod *
Medium truck volume : 308 veh/TimePeriod *
Heavy truck volume : 308 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: BBPR w/b

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 67.35 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: BBPR e/b

Source height = 1.26 m

ROAD (0.00 + 55.05 + 0.00) = 55.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.56	0.00	-9.05	-1.46	0.00	0.00	0.00	55.05

Segment Leq : 55.05 dBA

Results segment # 2: BBPR w/b

Source height = 1.26 m

ROAD (0.00 + 54.32 + 0.00) = 54.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	66.61	0.00	-10.83	-1.46	0.00	0.00	0.00	54.32

Segment Leq : 54.32 dBA

Total Leq All Segments: 57.71 dBA

TOTAL Leq FROM ALL SOURCES: 57.71

Filename: bb30b.te Time Period: 16 hours
Description: Big Bay Alt B at 30m South

Road data, segment # 1: BBPR e/b

Car traffic volume : 11699 veh/TimePeriod *
Medium truck volume : 308 veh/TimePeriod *
Heavy truck volume : 308 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: BBPR e/b

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 17.45 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: BBPR w/b

Car traffic volume : 11699 veh/TimePeriod *
Medium truck volume : 308 veh/TimePeriod *
Heavy truck volume : 308 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: BBPR w/b

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 32.15 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: BBPR e/b

Source height = 1.26 m

ROAD (0.00 + 63.01 + 0.00) = 63.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.56	0.00	-1.09	-1.46	0.00	0.00	0.00	63.01

Segment Leq : 63.01 dBA

Results segment # 2: BBPR w/b

Source height = 1.26 m

ROAD (0.00 + 59.65 + 0.00) = 59.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	66.61	0.00	-5.50	-1.46	0.00	0.00	0.00	59.65

Segment Leq : 59.65 dBA

Total Leq All Segments: 64.66 dBA

TOTAL Leq FROM ALL SOURCES: 64.66

Filename: bb60b.te Time Period: 16 hours
Description: Big Bay Alt B at 60m South

Road data, segment # 1: BBPR e/b

Car traffic volume : 11699 veh/TimePeriod *
Medium truck volume : 308 veh/TimePeriod *
Heavy truck volume : 308 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: BBPR e/b

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 47.45 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: BBPR w/b

Car traffic volume : 11699 veh/TimePeriod *
Medium truck volume : 308 veh/TimePeriod *
Heavy truck volume : 308 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: BBPR w/b

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 62.15 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Segment # 1: BBPR e/b

Source height = 1.26 m

ROAD (0.00 + 55.80 + 0.00) = 55.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.56	0.00	-8.30	-1.46	0.00	0.00	0.00	55.80

Segment Leq : 55.80 dBA

Segment # 2: BBPR w/b

Source height = 1.26 m

ROAD (0.00 + 54.90 + 0.00) = 54.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	66.61	0.00	-10.25	-1.46	0.00	0.00	0.00	54.90

Segment Leq : 54.90 dBA

Total Leq All Segments: 58.38 dBA

TOTAL Leq FROM ALL SOURCES: 58.38

STAMSON 5.0 NORMAL REPORT Date: 15-12-2016 20:57:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bbprcap.te Time Period: 16 hours
Description: Big Bay Point 65 dBA

Road data, segment # 1: BBPR

Car traffic volume : 12825 veh/TimePeriod *
Medium truck volume : 338 veh/TimePeriod *
Heavy truck volume : 338 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: BBPR

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.12 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: BBPR

Source height = 1.26 m

ROAD (0.00 + 65.00 + 0.00) = 65.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	66.52	0.00	-0.06	-1.46	0.00	0.00	0.00	65.00

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

TOTAL Leq FROM ALL SOURCES: 65.00

STAMSON 5.0 NORMAL REPORT Date: 15-12-2016 20:52:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bv2031.te Time Period: 16 hours
Description: Bayview 60 dBA

Road data, segment # 1: Bayview

Car traffic volume : 9018 veh/TimePeriod *
Medium truck volume : 92 veh/TimePeriod *
Heavy truck volume : 92 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Bayview

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 16.48 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Bayview

Source height = 1.00 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	62.14	0.00	-0.68	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES: 60.00

Filename: bv2031dn.te Time Period: 16 hours
Description: Bayview/Little 2031 do nothing

Road data, segment # 1: BV NB Left

Car traffic volume : 1534 veh/TimePeriod *
Medium truck volume : 16 veh/TimePeriod *
Heavy truck volume : 16 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: BV NB Left

Angle1 Angle2 : -90.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 26.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: BV NB Thru

Car traffic volume : 2857 veh/TimePeriod *
Medium truck volume : 29 veh/TimePeriod *
Heavy truck volume : 29 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: BV NB Thru

Angle1 Angle2 : -90.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 22.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: BV SB

Car traffic volume : 4630 veh/TimePeriod *
Medium truck volume : 47 veh/TimePeriod *
Heavy truck volume : 47 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: BV SB

```
---------------------------
Angle1   Angle2           : -90.00 deg   38.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  30.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: BV NB Left
------------------------------

Source height = 1.01 m

ROAD (0.00 + 48.06 + 0.00) = 48.06 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     40   0.66  54.49   0.00  -3.97  -2.46   0.00   0.00   0.00  48.06
-------------------------------------------------------------------------------

Segment Leq : 48.06 dBA

Results segment # 2: BV NB Thru
------------------------------

Source height = 1.00 m

ROAD (0.00 + 52.09 + 0.00) = 52.09 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     45   0.66  57.13   0.00  -2.76  -2.29   0.00   0.00   0.00  52.09
-------------------------------------------------------------------------------

Segment Leq : 52.09 dBA

Results segment # 3: BV SB
--------------------------

Source height = 1.00 m

ROAD (0.00 + 51.70 + 0.00) = 51.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     38   0.66  59.23   0.00  -5.00  -2.53   0.00   0.00   0.00  51.70
-------------------------------------------------------------------------------

Segment Leq : 51.70 dBA

Total Leq All Segments: 55.73 dBA

TOTAL Leq FROM ALL SOURCES:       55.73
```

Filename: bv2031pr.te Time Period: 16 hours
Description: Bayview/Little 2031 proposed

Road data, segment # 1: BV NB Left

Car traffic volume : 1534 veh/TimePeriod *
Medium truck volume : 16 veh/TimePeriod *
Heavy truck volume : 16 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: BV NB Left

Angle1 Angle2 : -90.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 26.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: BV NB Thru

Car traffic volume : 2051 veh/TimePeriod *
Medium truck volume : 21 veh/TimePeriod *
Heavy truck volume : 21 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: BV NB Thru

Angle1 Angle2 : -90.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 22.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: BV NB Right

Car traffic volume : 806 veh/TimePeriod *
Medium truck volume : 8 veh/TimePeriod *
Heavy truck volume : 8 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: BV NB Right

```
--------------------------------
Angle1   Angle2           : -90.00 deg   53.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  18.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 4: BV SB
-----------------------------
Car traffic volume  :  4630 veh/TimePeriod  *
Medium truck volume :    47 veh/TimePeriod  *
Heavy truck volume  :    47 veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: BV SB
---------------------------
Angle1   Angle2           : -90.00 deg   38.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  30.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: BV NB Left
-------------------------------

Source height = 1.01 m

ROAD (0.00 + 48.06 + 0.00) = 48.06 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     40   0.66  54.49   0.00  -3.97  -2.46   0.00   0.00   0.00  48.06
-------------------------------------------------------------------------------

Segment Leq : 48.06 dBA

Results segment # 2: BV NB Thru
-------------------------------

Source height = 1.00 m

ROAD (0.00 + 50.66 + 0.00) = 50.66 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     45   0.66  55.71   0.00  -2.76  -2.29   0.00   0.00   0.00  50.66
-------------------------------------------------------------------------------

Segment Leq : 50.66 dBA

Results segment # 3: BV NB Right
```

```
-------------------------------

Source height = 0.99 m

ROAD (0.00 + 48.23 + 0.00) = 48.23 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     53   0.66  51.60   0.00  -1.31  -2.05   0.00   0.00   0.00  48.23
-------------------------------------------------------------------------------

Segment Leq : 48.23 dBA

Results segment # 4: BV SB
--------------------------

Source height = 1.00 m

ROAD (0.00 + 51.70 + 0.00) = 51.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     38   0.66  59.23   0.00  -5.00  -2.53   0.00   0.00   0.00  51.70
-------------------------------------------------------------------------------

Segment Leq : 51.70 dBA

Total Leq All Segments: 55.96 dBA

TOTAL Leq FROM ALL SOURCES:       55.96
```

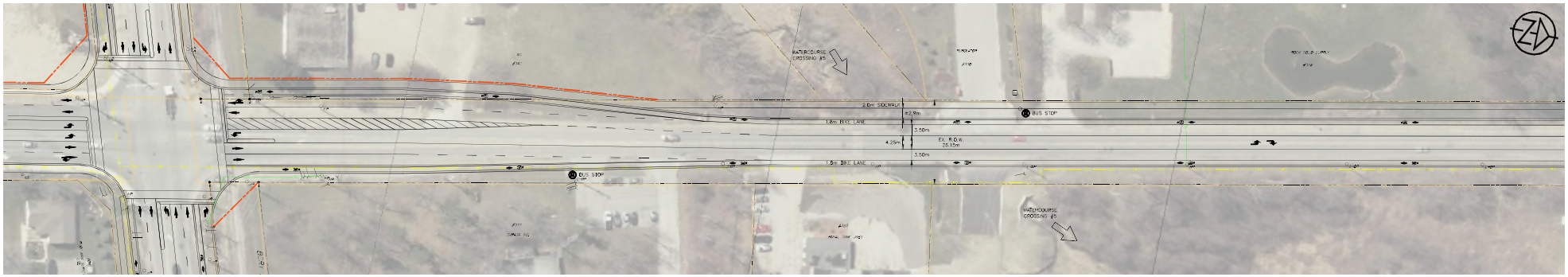
APPENDIX 'D'

ROAD IMPROVEMENT ALTERNATIVES

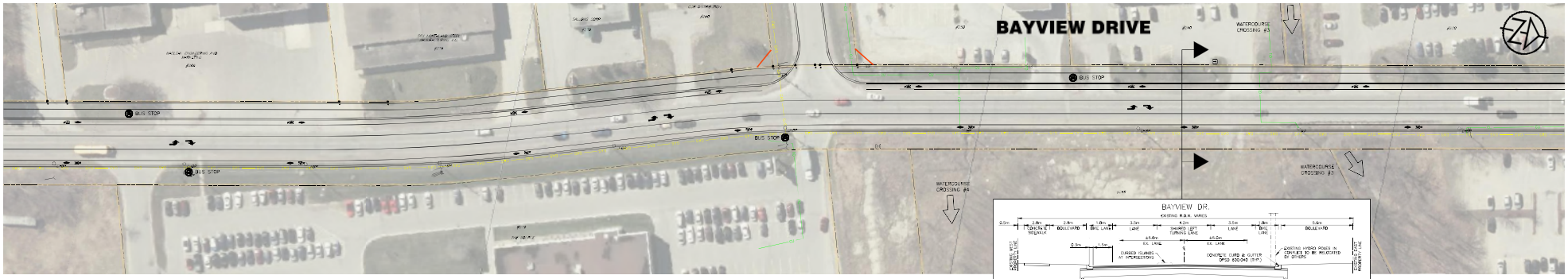
(source: C.C. Tatham and Associates)

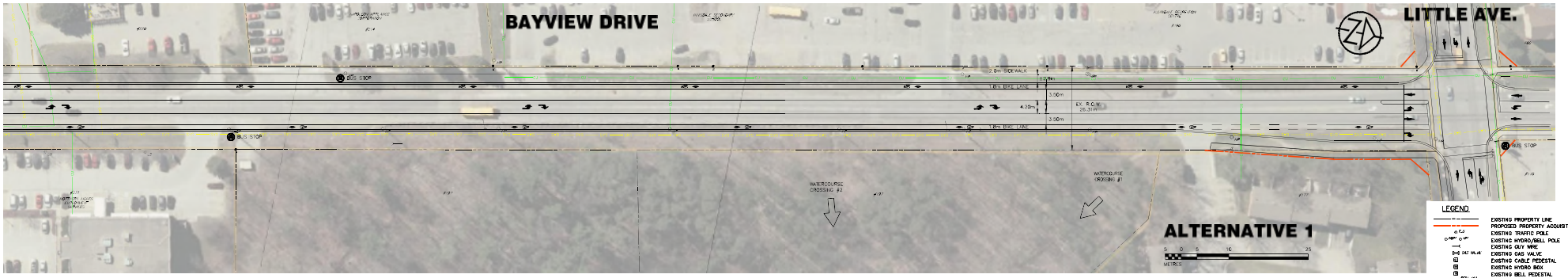
BIG BAY POINT RD.

BAYVIEW DRIVE



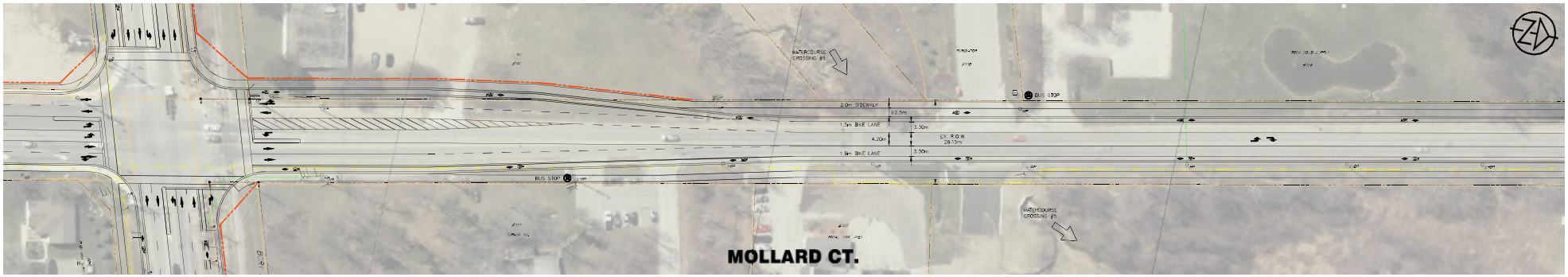
MOLLARD CT.

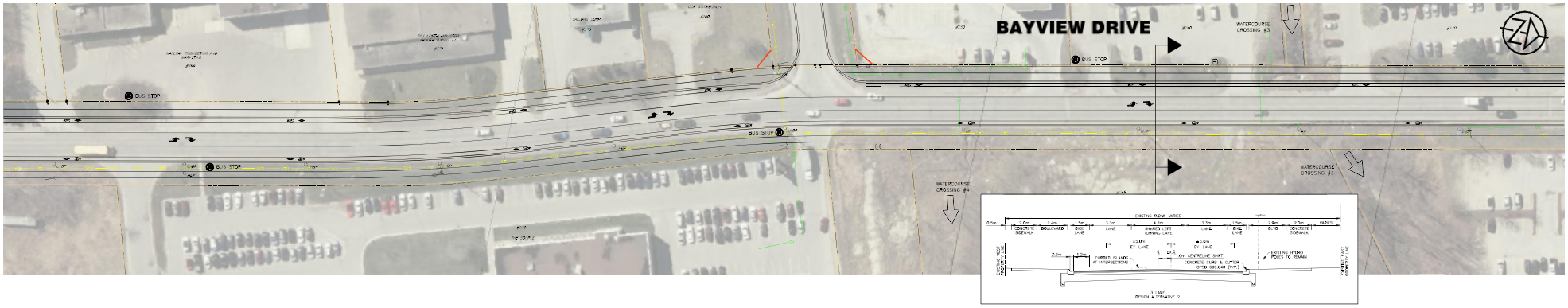


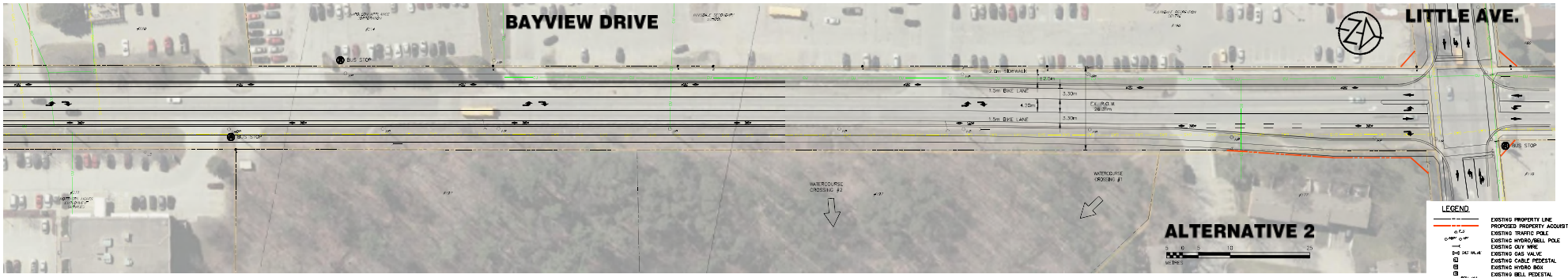


BIG BAY POINT RD.

BAYVIEW DRIVE

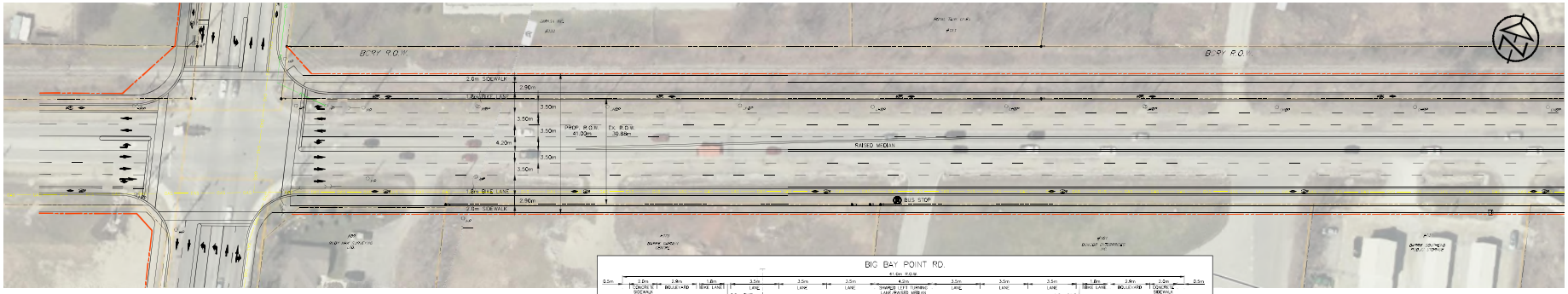


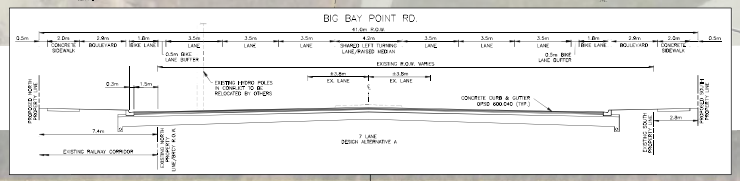




BAYVIEW DR.

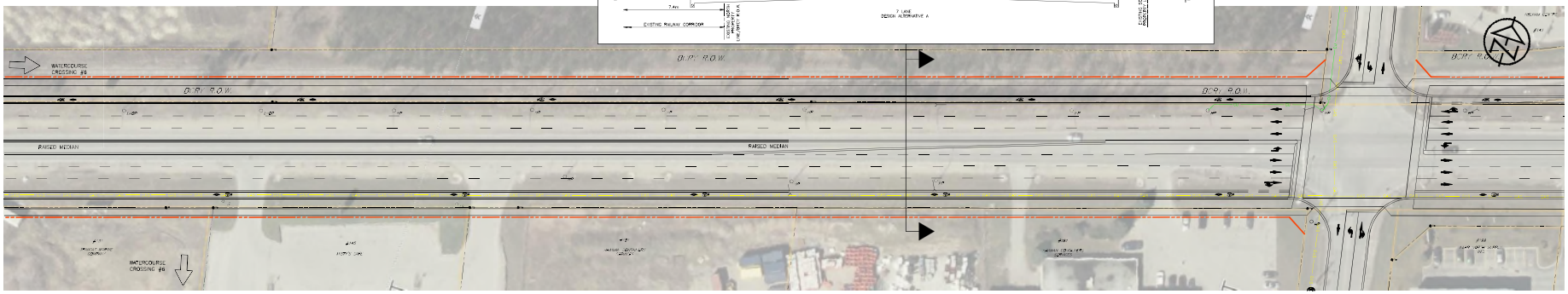
BIG BAY POINT ROAD



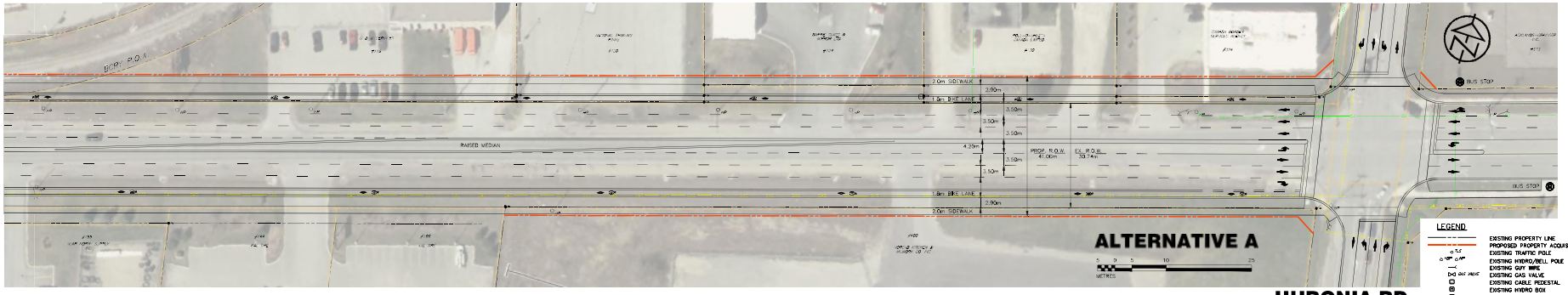


BIG BAY POINT ROAD

WELHAM RD.



BIG BAY POINT ROAD



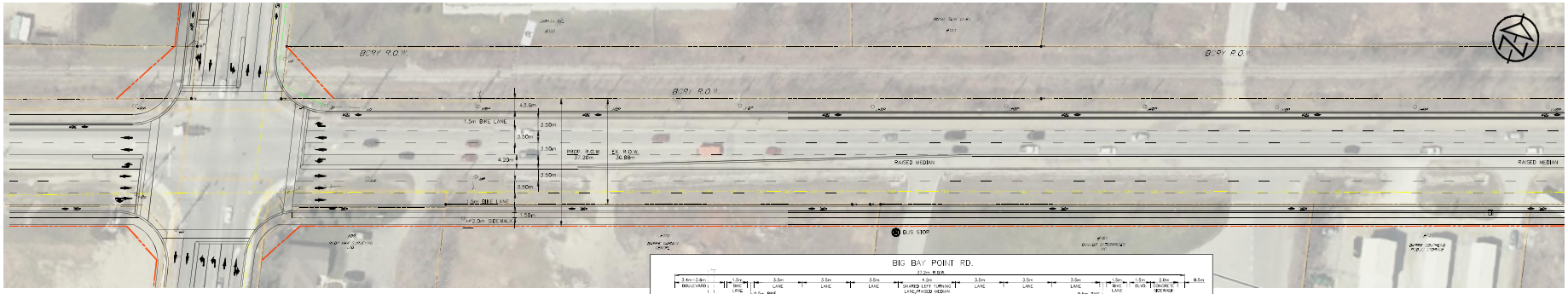
HURONIA RD.

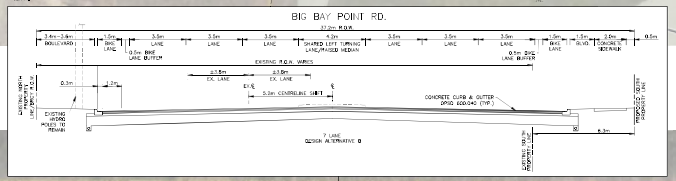
LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY ACQUISITION
- EXISTING TRAFFIC POLE
- EXISTING HYDRO/BELL POLE
- EXISTING GUY WIRE
- EXISTING GAS VALVE
- EXISTING CABLE PEDESTAL
- EXISTING HYDRO BOX
- EXISTING BELL PEDESTAL
- EXISTING BELL MANTENANCE HOLE
- EXISTING ELECTRICAL MANDWELL

BAYVIEW DR.

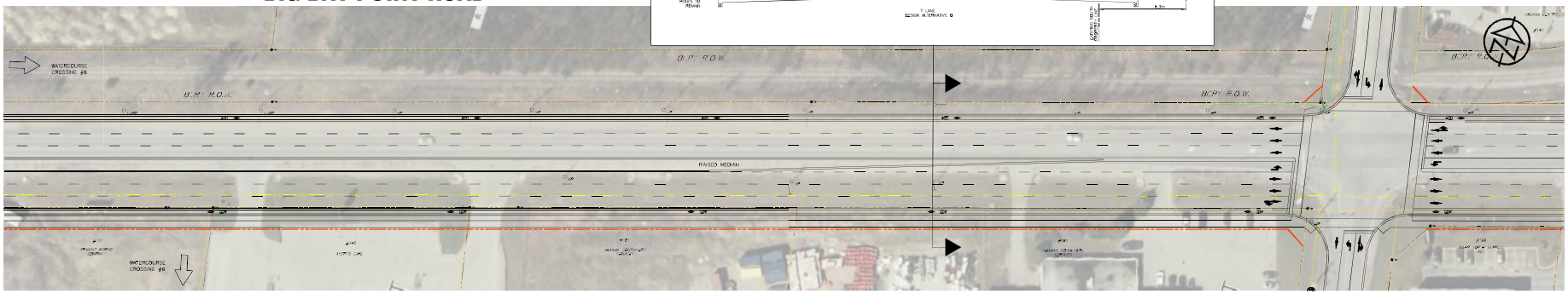
BIG BAY POINT ROAD



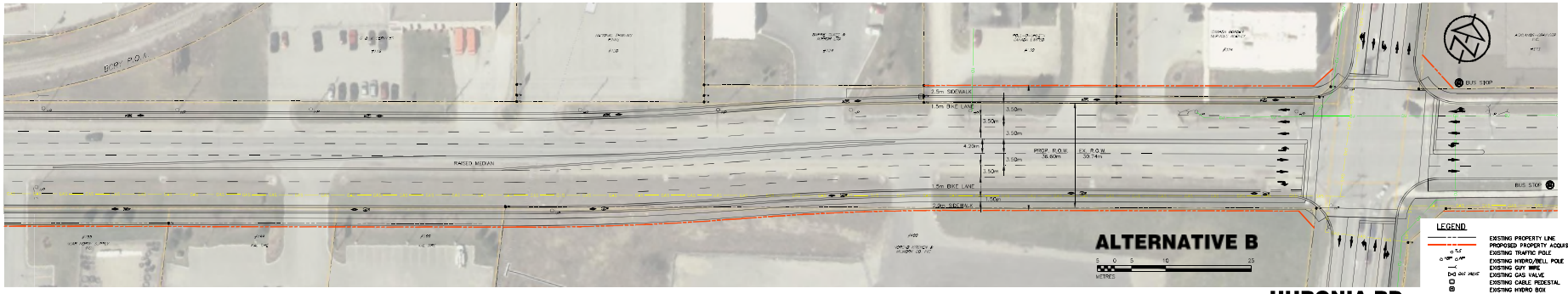


BIG BAY POINT ROAD

WELHAM RD.



BIG BAY POINT ROAD



ALTERNATIVE B

5 0 5 10 25
METRES

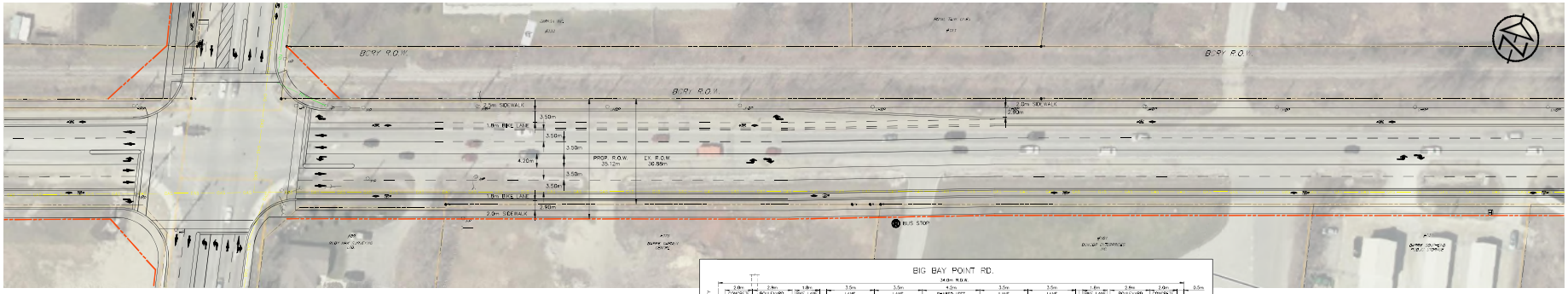
HURONIA RD.

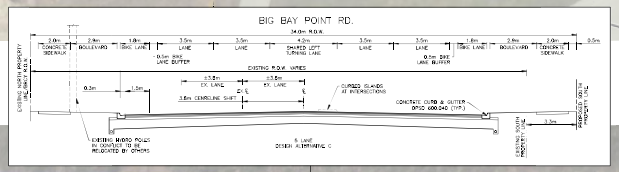
LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY ACQUISITION
- EXISTING TRAFFIC POLE
- EXISTING HYDRO/BELL POLE
- EXISTING GUY WIRE
- EXISTING GAS VALVE
- EXISTING CABLE PEDESTAL
- EXISTING HYDRO BOX
- EXISTING BELL PEDESTAL
- EXISTING BELL MAINTENANCE HOLE
- EXISTING ELECTRICAL MANDWELL

BAYVIEW DR.

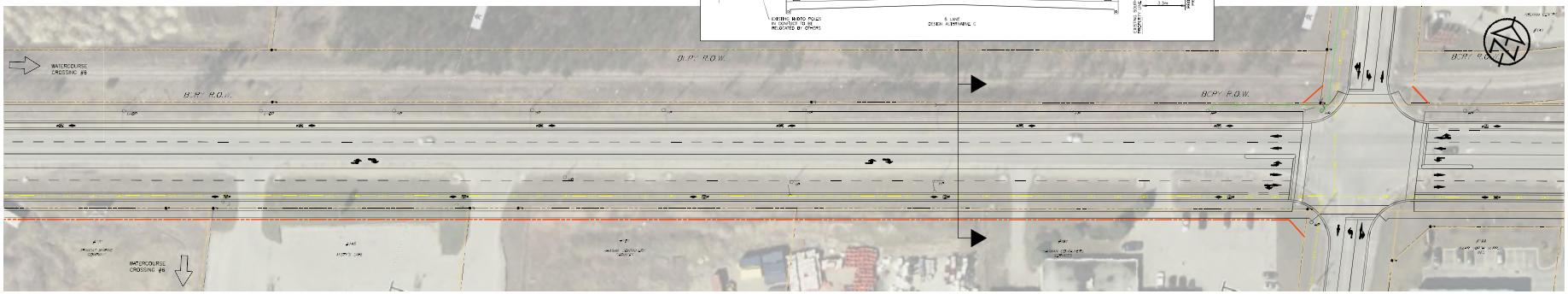
BIG BAY POINT ROAD



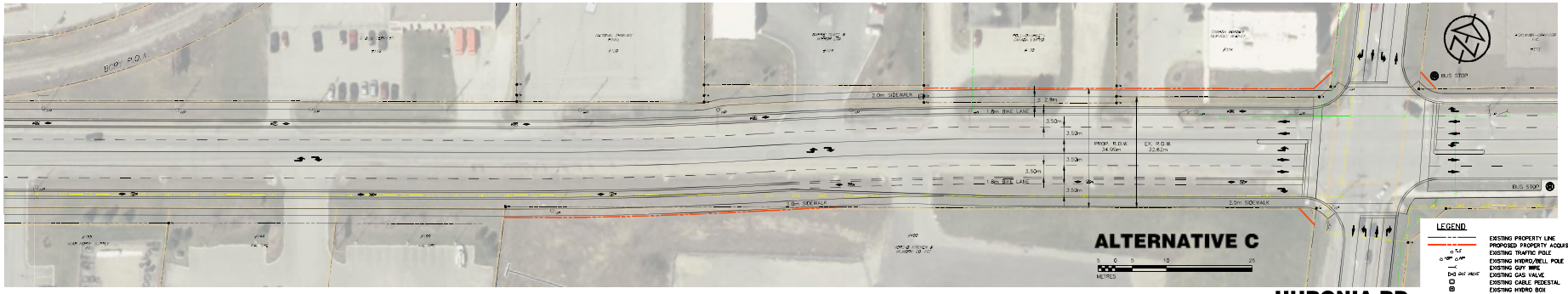


BIG BAY POINT ROAD

WELHAM RD.



BIG BAY POINT ROAD



ALTERNATIVE C

METRES 5 0 5 10 25

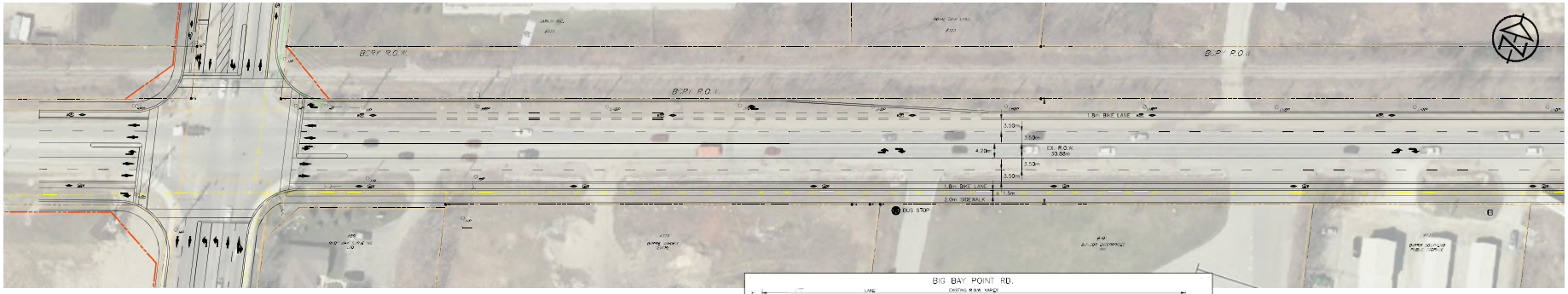
HURONIA RD.

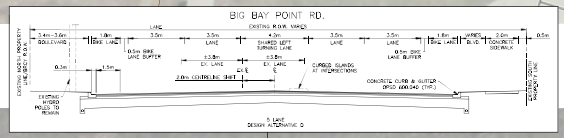
LEGEND

EXISTING PROPERTY LINE
PROPOSED PROPERTY ACQUISITION
EXISTING TRAFFIC POLE
EXISTING HYDRO/BELL POLE
EXISTING GUY WIRE
EXISTING GAS VALVE
EXISTING CABLE PEDESTAL
EXISTING HYDRO BOX
EXISTING BELL PEDESTAL
EXISTING BELL MAINTENANCE HOLE
EXISTING ELECTRICAL MANDWELL

BAYVIEW DR.

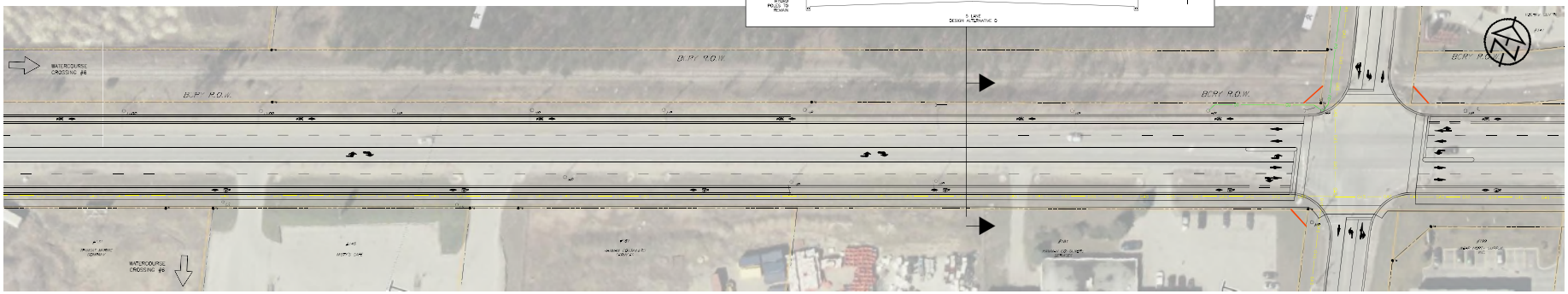
BIG BAY POINT ROAD



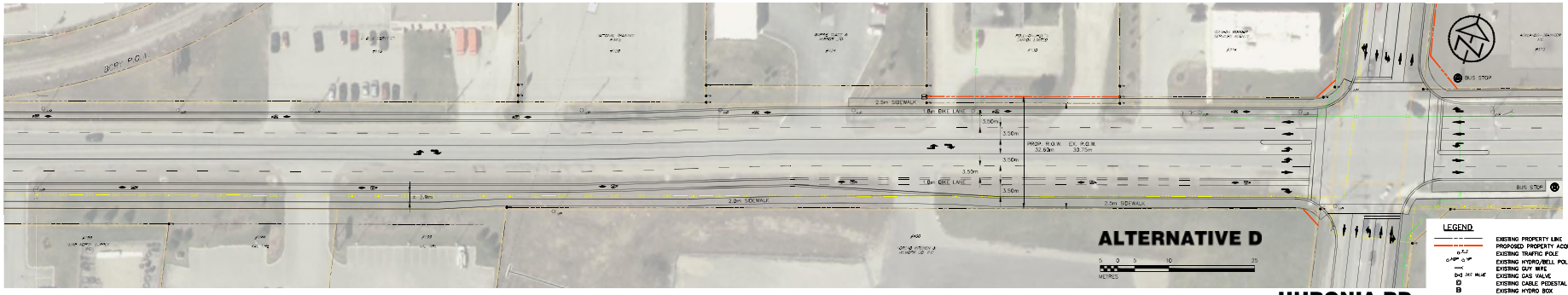


BIG BAY POINT ROAD

WELHAM RD.



BIG BAY POINT ROAD



HURONIA RD.

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY ACQUISITION
- EXISTING TRAFFIC POLE
- EXISTING HYDRO/BELL POLE
- EXISTING GUY WIRE
- EXISTING GAS VALVE
- EXISTING CABLE PEDESTAL
- EXISTING HYDRO BOX
- EXISTING BELL PEDESTAL
- EXISTING BELL MAINTENANCE HOLE
- EXISTING ELECTRICAL HANDWELL