Mr. Tim Van Hinte, MCIP, RPP
Director of Planning
Township of Wellesley
4639 Lobsinger Line
St. Clements, Ontario, N0B 2M0

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Phone: 519 585 2255
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Date: August 21, 2023
Our Ref: 141040
Subject: Zoning By-Law Amendment ZBA 02-23
1060 Queen's Bush Road, Wellesley

Dear Mr. Van Hinte:

On behalf of our client, please accept the following as our detailed response to the post-circulation comments detailed in your letter dated May 4, 2023, and the comments received through the Public Meeting held on Tuesday, May 16, 2023.

Based on technical comments received, we provide the following:

- Revised Site Plan.
- Revised Functional Servicing Study.
- Water Supply for Fire Fighting Design Brief (Strik Baldinelli Moniz (July 27, 2023).

The comment matrix is based upon the comments that you earlier provided and are based on what we heard and our response.

Zoning

Comment	Response
Township - The applicant's proposed zoning category of Urban Residential Two (UR2) is appropriate for the proposed land use in this case. The UR2 zone is intended to apply to townhouses in the Wellesley Urban Area.	The proposed UR2 zone category is appropriate for the proposed development and was recommended to be utilized by Wellesley planning staff. Noting that the approved Township Zoning By-Law does not currently provide a zoning category nor does the By-Law provide for specific regulations for Stacked Townhouse dwellings.
Township - Minimum Lot Area – Please provide further justification for the request to reduce the minimum lot area requirement in the UR2 zone. It would appear that this requirement could be met if the proposed development was revised from 12 units to 9 units. Please explain.	The approved Township Zoning By-Law does not provide a zoning category nor specific regulations for Stacked Townhouse dwellings. The Township planning staff recommended that the UR2 Zone be requested for this application. It is our opinion that given the UR2 Zone doesn't have specific regulations for stacked townhouses dwellings that the regulations of the zone could be modified.

Comment	Response
	It is our opinion that it is not appropriate to apply the UR2 regulation of minimum lot area to determine the number of units. In the interim, although not the same, the closet zoning category would be the UR2 zone. This zone provides for permitted uses and regulations intended for traditional Townhouse dwellings. Traditional Townhouse dwellings are divided vertically and therefore minimum lot area is a function of lot width and depth for each unit. Each dwelling unit would require private front and rear yards which would be included in the area per unit calculation. The front yard would also provide space for the driveway for the parking of a vehicle and the rear yard for amenity space. With a Stacked Townhouse form the units are divided vertically and horizontally. Therefore, within the same area there could be two units within the Stacked Townhouse form whereas in the traditional Townhouse form only one unit. The purpose and use of the front/rear yard is not the same as it does for a traditional townhouse unit. The front yard parking is provided in a 'communal' parking lot and the landscaped space is provided separately from the residential units. It is noted that other residential zones within the approved Zoning By-Law provide for different approaches to this matter. While not the same, the Stacked Townhouse Dwelling is similar in form and function of Triples, Fourplex and Apartment and less with Townhouse Dwelling. This is partially based upon the number of units and 'stacking' of units in multiple floors. The UR2 zone also permits Triplex and Fourplex Dwellings, and the minimum lot area is defined by a specific lot area for each type: • Triplex - 750 square metres • Fourplex - 850 square metres We note that the area is not based on the providing an area per unit.

Comment	Response
	The UR3 zones permits Apartment Dwellings, and the minimum lot area is determined through 700 metres square for the first unit plus 90 square metres for each additional dwelling. While the stacked townhouse dwelling is not an apartment, it is similar in form and function. It is our opinion that when the Township develops a zoning category for Stacked Townhouse Dwellings that it should include an approach like the UR3 zone for apartment where there is a minimum lot area required for the first unit and a reduce lot area for each additional unit. In addition, the use of maximum building coverage and minimum landscaped space will add additional guidance to the number of units to be proposed. It is our opinion that the Zoning By-Law request followed the direction from the planning staff to amend the UR2 Zone but that it is not appropriate to calculate the number units mathematically by dividing the subject property lot area by the UR2 minimum lot area for a traditional Townhouse Dwelling.
Township - Front Yard and Exterior Side Yard Depths – Please provide further justification for the request to reduce the required minimum front and exterior side yards depths in the UR2 zone. It appears that these reductions are generally inconsistent with existing building setbacks for properties along Queen's Bush Road.	It is acknowledged that the proposed front yard setback from Queens Bush Road is not the same as existing dwellings. The township does not require a road widening from either Queens Bush Road or Village Road. Therefore, the existing road allowance is of a sufficient width to accommodate existing and future requirements of the township. The township is undertaking a project for the modernization of Queens Bush Road. The sidewalk on Queens Bush Raid is located on the opposite side of the street. The sidewalk on Village Road is located on the opposite side of the street. The sight visibility is not impeded. This property is at the corner; this is new development and there is an opportunity for good urban design to 'frame' the corner which results in the setback reduction. The height and massing of the building does not require stepping back. Often when redevelopment is

Comment	Response
	considered the buildings are moved forward even if other buildings are not. Once the development is built from the street a pedestrian would not be able to visualize the reduction in the front yard or side yard setback. It is equally important to ensure that the proposed residential units are of sufficient width and area to ensure usability by the residents. Making the proposed building smaller would impede the functionality/livability of the residential units. It is our opinion that it was more important to maintain the rear yard setback to address anticipated neighborhood concerns. The proposed building is setback further than the existing garage was on the site. The interior side yard exceeds the Zoning By-Law requirements to provide for parking. It is our opinion that the evaluation of the proposed reductions of the front and side yard should be evaluated holistically on the entire development and thus are justified.
Township - Landscaped Open Space – While the proposed development meets minimum landscape open space requirements (30%), no private outdoor space associated with the units has been provided. As a general design consideration, including such spaces would make for a better quality of life for residents. Please explain how this can be included in the proposed development.	We agree that the proposed development meets the zoning requirement for Landscaped Open Space. Outdoor space is proposed within the rear yard and will serve as a dual purpose to address stormwater management. We do not believe that the dual purpose will impede the opportunity for amenity space. The final design of the building will be determined during Site Plan Approval and private balcony areas could be considered.
Public – Concern that a reduced front and exterior side yard will impact the safety of pedestrians.	The public sidewalks are located on the opposite side of Queens Bush Road and Village Roads. Sight visibility is not impeded by the minimal reduction in front and side yard setbacks. Pedestrian sidewalks are built withing the proposed development for each of the units.
Public – Questioned if the re-zoning of this property is in breach of the Townships Community Plan	The proposed Zoning By-Law amendment is in conformity with the approved Township of Wellesley

Comment	Response
	Official Plan and the approved Region of Waterloo Official Plan. We are not aware of a Community Plan for the Township.
Public – questioning possible future Zoning By-Laws, including Affordable Housing, specific guidelines for Stacked Townhouses	This comment should be directed to the Township.

Engineering

Comment	Response
Matthew Colley, Senior Planner at the Region asked for further detail in order to complete review of proposal.	The further detail is provided within the resubmission material to the Township of Wellesley.
GM Blue Plan – deferred water & sanitary supply to the Region	
GM Blue Plan – driveway entrance does not intersect the Queens Bush Road right-of-way at 90 degrees	Driveway has been revised to intersect Queen's Bush Road at 90 degrees. Please see revised Site Plan.
GM Blue Plan - Update storm sewer pipe sizing to reflect Queens Bush Issued for Tender Drawings.	Please review the revised FSR and supporting materials submission provided by Arcadis.
GM Blue Plan – Revise storm section paragraph three to reflect the Township requirement for Enhanced quality control	Please review the revised FSR and supporting materials submission provided by Arcadis.
GM Blue Plan – Revise storm section quantity control criteria to match pre-development peak flow rates for the 2 to 100 year design storm events per Township of Wellesley Development Standards	Please review the revised FSR and supporting materials submission provided by Arcadis.
GM Blue Plan – Review location of proposed storm sewer terminus on Queens Bush Road as the proposed drawings do not match the tender drawing set.	Please review the revised FSR and supporting materials submission provided by Arcadis.
GM Blue Plan – Storm, sanitary and water servicing for the site (including the removal of existing services) shall be coordinated with the Queens Bush Road reconstruction project and any required services to support the proposed development be installed as part of the reconstruction works (at 100% of the Developer's cost) to minimize the level of disturbance to the newly constructed road.	Please review the revised FSR and supporting materials submission provided by Arcadis.

Comment	Response
GM Blue Plan – As part of the Site Plan Submission (detail design) additional details regarding the retaining wall shall be provided	Please review the revised FSR and supporting materials submission provided by Arcadis.
Public – Concern regarding drainage over / from the property and a possible increase of 50% site run-off onto abutting properties	Please review the revised FSR and supporting materials submission provided by Arcadis.
Public – Request that the Township employ an Environmental Planner (maybe shared with other Townships) to have input on applications and effects on the Environment.	This comment should be directed to the Township.
Public – Concern over snow removal, snow storage and snow melt	To be determined. Snow storage areas may be defined on the future Site Plan or will be trucked off or a combination thereof.

Neighbourhood Context

Comment	Response
Township - It is understood that the detailed design of the proposed development will occur through the site plan control application process. However, please provide further detail as to how the proposed development will be designed to respect the scale, physical character and context of the existing neighbourhood (OP Policy 2.7.1.2 (f) and 6.1.1 (a)). In your responses, please reference why you feel the proposed density is suitable for the site and the neighbourhood.	It is our opinion that the existing, condition of a large municipally serviced lot with a smaller older home is not efficient use of the land use designation and municipal servicing. We believe that the orientation of the proposed building to Queens Bush Road and across from the public school is appropriate and compatible. We believe that moving the vehicular access further away from the intersection is appropriate, provides for greater vehicle and pedestrian safety. With respect to Official Plan Policy 2.7.1.2 (f) which states: "*respects the scale, physical character and context of established neighbourhoods in areas where reurbanization is planned to occur*;" It is our opinion that there is a distinction between the residential lots located on the south side of Queens Bush Road and the residential lots within the Welwood Avenue area for lot width, lot depth and lot area. We believe that there is an opportunity to consider redevelopment within this area that doesn't exist within the Welwood Avenue area. We believe the planned function of Queens Bush Road is different than Village Road or Welwood

Comment	Response
	Avenue and is more supportive of redevelopment opportunities. It is important to note that compatible which in my opinion the policy implies mean that it doesn't have to be the same. The existing zoning would permit a higher building height than the proposed zoning and the proposed building. The orientation of the proposed building is towards Queen Bush Road and Village Road away from the residential development on Welwood Avenue. Noting that the existing house at 1072 Queens Bush Road is a corner lot and thus provides for a larger side yard. The proposed dwelling is located across from the public school. It is, therefore, my opinion that the proposed Zoning By-Law is in conformity with Official Plan Policy 2.7.1.2 (f). With respect to Official Plan Policy 6.1.1.(a) which states: "*the density, scale, height, massing and visual impact of surrounding buildings and the proposed development;*" The Official Plan designation provides for and encourages a wide diversity of permitted residential which the proposed land use conforms with. It is important to note that compatible which in my opinion the policy implies mean that it doesn't have to be the same. The existing zoning would permit a higher building height than the proposed zoning and the proposed building. It is a traditional and acceptable approach that the potential impacts of massing can be limited through architectural design. This would be addressed at the Site Plan stage. The orientation of the proposed building is toward Queen Bush Road and Village Road away from the

Comment	Response
	residential development on Welwood Avenue. Noting that the existing house at 1072 Queens Bush Road is a corner lot and thus provides for a larger side yard. It is important that the rear yard setback of the Zoning By-Law where feasible be maintained as proposed. It is, therefore, my opinion that the proposed Zoning By-Law is in conformity with OP Policy 6.1.1.(a).
Public – Concern about the aesthetic of the proposed building	The planning process sets out an incremental approach to the evaluation of development approvals. The applicant is requesting a Zoning By-Law Amendment to implement the Official Plan. The applicant has provided a detailed plan illustrating the relationship between the proposed building, access, parking, and landscaped space to guide the Zoning By-Law Amendment. The applicant has provided an example from another development to illustrate what the proposed building could look like. The images are to assist with understanding scale and massing. Once the Zoning By-Law amendment is approved the applicant will proceed to the Site Plan Approval process. Noting that this process does not require public engagement. While recent changes to the Planning Act would apply which limit architecture design through the approval process, the applicant will work with the municipal staff to prepare detailed building elevations. The finished design and materials are yet to be determined and will be finalized during the Site Plan process.
Public – Concern about that approval of this development will set precedent for more similar developments	The public policy framework (provincial, regional and Township) provides the opportunity for diverse forms of housing. It is acknowledged that the stacked townhouse concept has not been previously introduced to Wellesley. The stacked townhouse form provides the opportunity to appropriately add density in a form of height and scale that is compatible with adjacent development and efficiently utilize municipality infrastructure and community resources. The stacked townhouse development is in conformity with the approved Official Plan. However, each application is to be judged on their own merit. It is anticipated that other requests for stacked townhouse developments will be considered in the future,

Comment	Response
Public – Concern about the availability of Affordable Housing in Wellesley	There is a concern across Canada, in all provinces and communities for Affordable and Attainable Housing. There are many and complex factors that influence achieving this form of housing. The responsibility for achieving is shared across public and private groups. The proposed development will contribute to the availability of housing in a form that hasn't been provided or available to this community. The intent for this development is to provide for home ownership through a future Draft Plan of Condominium.
Public – Concern about the amenities that the new residents would have access to.	The new residents will have access to all the amenities that existing residents have access to.
Public – Concern about the view from the residential rear yards backing onto the proposed development, and their privacy from the new units.	The proposed development for building height and rear yard setback complies with the Zoning By-Law. Noting that current UR zoning permits a maximum building height of 10.5 metres and the rezoning request to UR2 permits a maximum building height of 9.0 metres. A privacy fence to the maximum height permitted under the By-Law is proposed along the abutting property boundary. The proposed building orientation is that the side of the building will face the abutting rear yards. Generally, any windows in this façade will be from in-habitable rooms such as bathrooms and hallways.
Public – Concern at one dwelling being replaced by 12 units and that increase in density is too great	The proposed development is consistent with the Provincial Policy Statement, conforms with the Growth Plan for the Greater Golden Horseshoe, the Regional Official Plan, and the Township of Wellesley Official Plan. The scale and height of proposed development is consistent and compatible with low rise residential.
Public – Concern that if the units are Affordable, the area will be poorly 'supervised' and maintained, creating risks to children at the school.	The proposed residential units do not meet the definition of Affordable Housing within the Provincial Policy Statement. The "area will be poorly 'supervised' and maintained, creating risks to children at the school" is not a land use or Planning Act consideration.

Comment	Response
Public – Concern that a main access into Wellesley village will lose its character and beauty.	The proposed development can help contribute to maintaining or enhancing the character and beauty of Queens Bush Road.
Public – suggestions that this development would be better suited elsewhere in the Village – for example within one of the new proposed subdivisions.	The proposed development is consistent with the Provincial Policy Statement, conforms with the Growth Plan for the Greater Golden Horseshoe, the Regional Official Plan and the Township of Wellesley Official Plan. The public policy direction requires the consideration of infill development and redevelopment within the built boundary which this development provides for.

Parking

Comment	Response
Township - Visitor Parking – No street parking is permitted on Queen's Bush Road or Village Road at this location. Is there any opportunity to provide additional parking over and above By-Law requirements?	The proposed Site Plan provides for the required number of parking spaces required by the Zoning By-Law. The parking requirements include visitor parking. Based upon the proposed Site Plan there is insufficient area to provide additional parking spaces. It is unreasonable to ask for further parking above and beyond the By-Law requirements.
Public – Concern about the number of parking spaces provided	The proposed Site Plan provides for the required number of parking spaces required by the Zoning By-Law.
Public – Concern that the parking requirement under the By-Law does not reflect the lack of public transportation in Wellesley	The parking requirements are defined within the approved Zoning By-Law to which the proposed development complies with. Any modification to the Zoning By-Law should be discussed with the Township.
Public – questioning the required parking rates stated in the ZBL – that 2 spaces are required for regular Townhouses, but only 1.5 for Stacked Townhouse	The Zoning By-Law require 1.5 spaces per dwelling unit for multi-unit dwellings which the Stacked Townhouse is considered.

Mr. Tim Van Hinte, MCIP, RPP
Township of Wellesley
August 21, 2023

Traffic

Comment	Response
Transportation and Public Works Staff advise that access to the property from Queen's Bush Road is preferred in this case, however access from Village Road could be considered with adequate justification. The developer will be required to apply for an entrance permit from the Township for any proposed entrance, to be reviewed by the Director of Public Works. In addition, this section of Queen's Bush Road is scheduled for reconstruction in 2024 and the applicant is advised to contact the Director of Public Works for more information.	As preferred by the Township, the proposed driveway access will remain on Queen's Bush Road; but will be re-located further away from the intersection with Village Road. Contact has been made with the Director of Public Works, and GM Blue Plan who are undertaking the reconstruction of Queen's Bush Road to coordinate servicing and access.
WRDSB - Given the close proximity to the primary access point of Wellesley PS, WRDSB asks that construction related vehicle traffic be scheduled to avoid peak drop-off and pick-up times. If needed, WRDSB can provide bell times for consideration.	This can be considered through Building Permit process.
WRDSB - asks that the appropriate debris containment and noise considerations are enacted to avoid negative school site impacts.	This can be considered through the Building Permit process.
WRDSB - would be interested in a discussion with the developer and the Township regarding alternative access along Village Road rather than Queen's Bush Rd to minimize conflict between peak period school traffic and future residents of the proposed development.	The Township prefer the access to remain onto Queen's Bush Road. Traffic generated from the development is minimal. The proposed development functions better with the access to Queens Bush Road.
Public – Concern about the increased traffic from new residents	The amount of additional traffic generated from the proposed development is minimal. A traffic study is not required nor warranted for a development of this scale.
Public – Concern about increased danger to children going to / from school from increased traffic	As shown on the Site Plan, the driveway access has been re-located to be further away from the intersection and the school crossing.
Public – Concern about the speed of traffic in the area	This is not a Planning Act concern. This is a matter of enforcement. We not that a speed camera has been installed outside the school to deter speeding and police are still monitoring traffic outside of school on occasions.

Comment	Response
Public – Concern that a traffic study has not been conducted	A traffic study is not required nor warranted for a development of this scale.
Public – Concern about decreased sight-lines	The proposed access complies with the required Sight Lines as shown on the site plan at both the corner intersection and proposed driveway. The reduction of the front yard setback does not limit the required sight-lines.
Public – Concern that residents and visitors will use Wellwood Avenue as a detour to by-pass the speed camera.	This is not a Planning Act matter. It is anticipated that traffic will utilize either Queens Bush Road or Village Road and not Wellwood Avenue. Wellwood Avenue could add drive time and length of journey.

Environmental

Comment	Response
Township - Climate Change/ GHG Emissions – The planning justification report indicates that the mitigation of greenhouse gas emissions and adaptation to a changing climate are not matters of provincial interest applicable to this application (p. 10). Please elaborate on the rationale for this comment and indicate how this criterion will be taken into account in the design of the proposed development.	In our opinion: • The proposed development represents an energy efficient improvement to the existing development. There will be twelve units where there is currently one unit. • An older building will be replaced with a building designed and constructed to at minimum the Building Code standards which require a higher energy efficiency. • The stormwater management approach will address the technical requirements of today related to climate change. • The proposed development will provide for bicycle parking as an alternative to the automobile. • The proposed development is located within reasonable walking distance of community amenities and shopping. • Any children living within building can walk to school (across the road) and not require busing. • As more infill development is approved, this could improve the viability of the GRT being

Comment	Response
	extended to Wellesley as it is to other rural urban communities of the region.
Public – Concern about the number of trees that will be removed	This is a Site Plan matter. It is anticipated that some trees will be removed to address building and engineering matters. Where required by the municipality through the Site Plan process additional landscaping including tree planting will be considered.
Public – Concern if greenhouse gas mitigation has been considered, such as charging for electric vehicles; non-fossil fuel heating & cooling or appliances; and also during construction of the building	Through the Site Plan process it will be determined if an electrical charging station is required
Public – Concern over increased vehicle emissions from increased number of vehicles	The Zoning By-Law provides a regulation to determine the number of parking spaces to be provided. Bicycling parking spaces will also be provided. Vehicle emissions is not a Planning Act matter.
Public – Concern over noise and light pollution from this development	Through the Site Plan process the proposed lighting would be evaluated in accordance with Township requirements. Lighting would be directed away from adjacent properties.

Miscellaneous Comments

Comment	Response
Township - Snow Storage – Please explain how snow storage will be accommodated on-site as this was not indicated on the proposed site plan.	Through the Site Plan process, snow storage areas would be defined, or snow would be trucked from the site.
Canada Post has reviewed the proposal for the above noted Development and has determined that the completed project will be serviced by centralized mail delivery provided through Canada Post Community Mailboxes.	A community mailbox will be located onsite, location to be approved by Canada Post through the Site Plan approval process.
Public – Concern regarding the distance of the notice mailing	The Planning Act sets out the regulations for notices related to Zoning By-Law Amendments and the Township was responsible for the issuance of the notice.
Public – Concern about the accessibility of the units	Where feasible, the ground floor residential units would be accessible.

Comment	Response
Public – Concern over how well the building will be maintained	The builder/developer would be responsible for maintenance of the building until such time as the Condominium is registered. When registered, the condominium corporation would be responsible.
Public – Concern that the developer just wants to make money with zero concern for the village. Would the developer contribute to Community projects?	This is not a Planning Act matter. The developer/builder is a resident of Wellesley.
Public – Concern over noise and disruption caused by construction	The construction of the proposed development will have to meet all municipal requirements. Given the municipality is modernizing Queens Bush Road a request has been made to provide for the appropriate lateral servicing and road access to avoid disruption in the future.
Public – Concern that if the units are initially sold as Affordable houses, they will soon be re-sold to make a huge profit and become yet again un-affordable.	This development does not meet the Affordable housing definition.
Public – Concern that this development will de-value their house prices	This is not a Planning Act matter
Public – Concern that the current Council does not listen to the constituents.	The Planning Act sets out requirements and process for community consultation prior to a decision by council. Planning Act decisions are based on legal principles and take into consideration many competing interests
Public – questioning if units will be sold, rental or condo? And how many people per unit?	Currently, the intent is to apply for a Draft Plan of Condominium. Two bedrooms are proposed per residential unit.
Public – requesting further information on the Developers past projects.	This is not a Planning Act matter and has no bearing on the conformity of the proposed development.
Public – Neighbor at 76 Welwood requests a wooden privacy fence be constructed at developers expense along interior Lot line.	The subject property is adjacent to a non-residential use along this boundary, a privacy fence is not traditionally required. Based on the number of proposed residential units, the proposed development is subject to Site Plan Control (Section 41 of the Planning Act, as amended) and through that process the Township will determine if any fencing is required and if required, the form and height of the fencing.

Mr. Tim Van Hinte, MCIP, RPP
Township of Wellesley
August 21, 2023

We understand through the consultation for the proposed Zoning By-Law there were several comments related to the illustrations that were provided with the initial submission. The purpose and the intent of the initial illustrations was to demonstrate the masing of the proposed building and to illustrate the scale of the building and not to represent the proposed design, building materials and colour.

Recognizing the proposed development approvals is currently at the Zoning By-Law stage, and through the Site Plan Review stage is where building design, materials and colours are considered.

In the interim, other examples for consideration related to building elevations and exterior finishes are provided A specific design would be submitted through the Site Plan Review process. If the Township has some suggestions for consideration, please provide.

Mr. Tim Van Hinte, MCIP, RPP
Township of Wellesley
August 21, 2023

We request that you circulate the letter and supporting documents appropriately. We believe that upon your review of this letter and supporting documents that all matters identified through the technical review and comments received through the public consultation have been considered and, in our opinion, have been appropriately addressed.

Therefore, we request that the Township advise when the proposed Zoning By-Law Report and 3rd reading can be brought forward to the Committee of the Whole and Council for a decision. Please advise of that timing. We look forward to working with the township, agencies and the community.

Should you have any questions, do not hesitate to contact our office.

Sincerely,

ARCADIS PROFESSIONAL SERVICES (CANADA) INC.

Douglas W. Stewart

Douglas W. Stewart, MCIP, RPP
Associate - Manager, Urban & Regional Planning

Email: douglas.stewart@arcadis.com
Direct Line: 519-585-2255 ext. 63212

DWS/baw
Enclosures: Revised Site Plan
Revised Functional Servicing Study
Water Supply for Fire Fighting Design Brief (Strik Baldinelli Moniz, July 27, 2023).

cc Bradley & Co.

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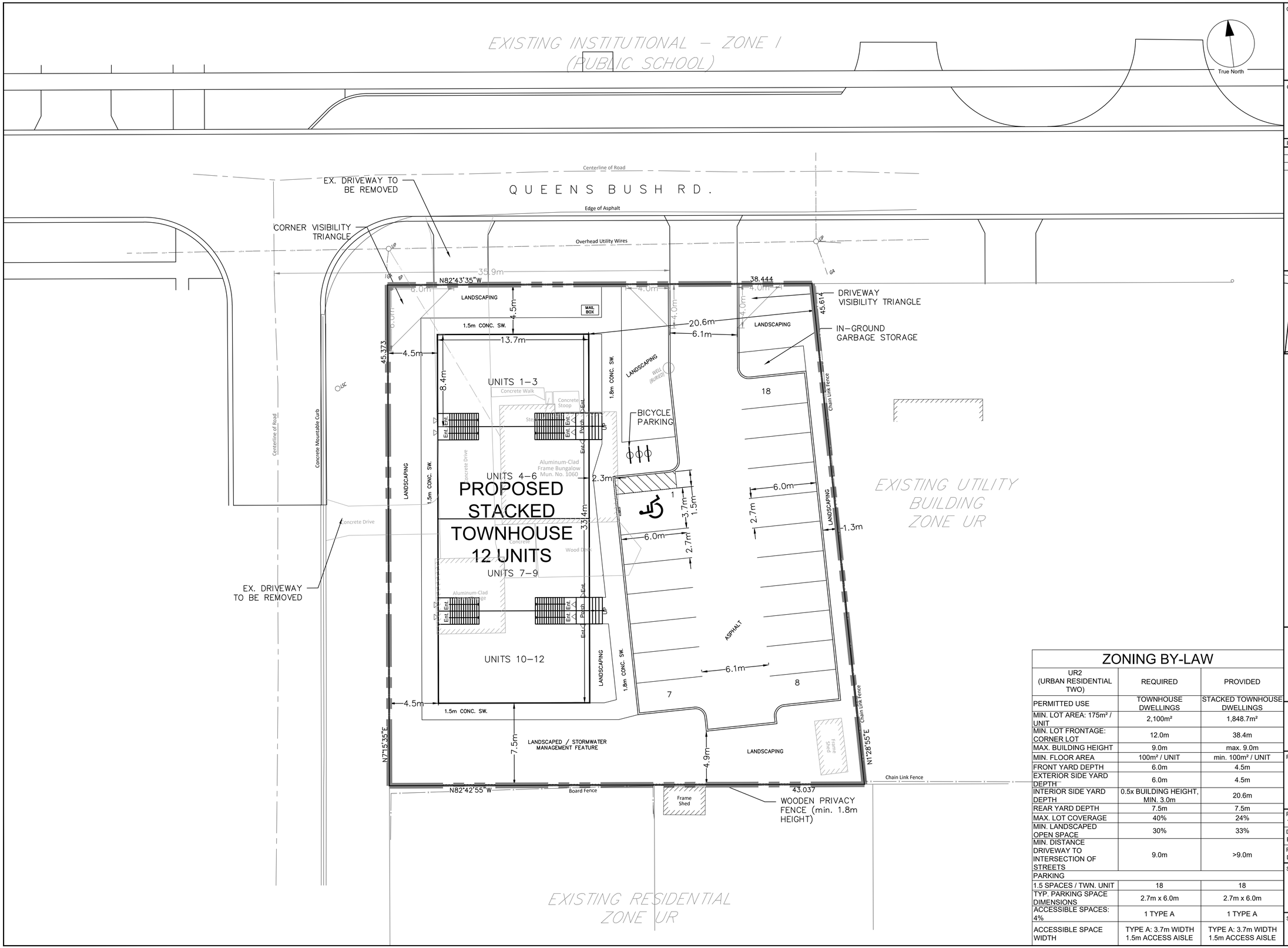


ZONING BY-LAW

UR2 (URBAN RESIDENTIAL TWO)	REQUIRED	PROVIDED
PERMITTED USE	TOWNHOUSE DWELLINGS	STACKED TOWNHOUSE DWELLINGS
MIN. LOT AREA: 175m² / UNIT	2,100m²	1,848.7m²
MIN. LOT FRONTAGE: CORNER LOT	12.0m	38.4m
MAX. BUILDING HEIGHT	9.0m	max. 9.0m
MIN. FLOOR AREA	100m² / UNIT	min. 100m² / UNIT
FRONT YARD DEPTH	6.0m	4.5m
EXTERIOR SIDE YARD DEPTH	6.0m	4.5m
INTERIOR SIDE YARD DEPTH	0.5x BUILDING HEIGHT, MIN. 3.0m	20.6m
REAR YARD DEPTH	7.5m	7.5m
MAX. LOT COVERAGE	40%	24%
MIN. LANDSCAPED OPEN SPACE	30%	33%
MIN. DISTANCE DRIVEWAY TO INTERSECTION OF STREETS	9.0m	>9.0m
PARKING		
1.5 SPACES / TWN. UNIT	18	18
TYP. PARKING SPACE DIMENSIONS	2.7m x 6.0m	2.7m x 6.0m
ACCESSIBLE SPACES: 4%	1 TYPE A	1 TYPE A
ACCESSIBLE SPACE WIDTH	TYPE A: 3.7m WIDTH 1.5m ACCESS AISLE	TYPE A: 3.7m WIDTH 1.5m ACCESS AISLE

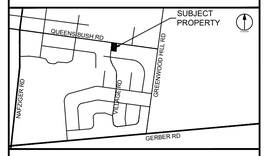
CLIENT

BRADLEY & CO

1060 QUEENS BUSH ROAD

ISSUES

No.	DESCRIPTION	DATE
1	SITE PLAN SUBMISION	2023-01-26
2	REVISED - TOWNSHIP COMMENTS	2023-06-09



IBI GROUP
Suite 101 - 410 Albert Street
Waterloo ON N2L 3V3 Canada
tel 519 585 2255
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PROJECT

1060 QUEENS BUSH ROAD

TOWNSHIP OF WELLESLEY

PROJECT NO: 141040	SCALE: 1 : 150
DRAWN BY: E.T.	CHECKED BY: C.T.
PROJECT MGR: D.W.S.	APPROVED BY: D.W.S.

SHEET TITLE

SITE PLAN

SHEET NUMBER SP1

ISSUE 01

SCALE CHECK 10mm 1 in

July 31, 2023

Attention: Adam Corvari
Bradley and Co.
150 Shade Street
Wellesley ON N3A 4J2

Via email: adamcorvari@gmail.com

Dear Adam Corvari:

REFERENCE: 1060 QUEENS BUSH ROAD - SERVICING BRIEF

This preliminary servicing overview has been prepared for the proposed redevelopment of the property located at the municipal address 1060 Queens Bush Road. The proposed redevelopment consists of 12 residential stacked townhouse units, 18 parking spaces, a common amenity area, an associated concrete sidewalk, and landscaped areas, herein referred to as the site. Refer to **Appendix A** for the proposed concept plan.

The site encompasses an area of 0.18 ha with an existing single-family detached residential house. The property is bounded by Queens Bush Road to the north, Village Road to the west, existing residential developments to the south, and an existing Bell utility building to the east. For the exact location of the site refer to the figure below.

The purpose of this brief is to provide an inventory of the existing storm, sanitary, and water servicing infrastructure for the feasibility of developing this site as proposed.

Based on the appended record drawings obtained from the Township of Wellesley, the site at 1060 Queens Bush Road has servicing infrastructure available at Queens Bush Road and Village Road.

GRADING

Existing topographic information was obtained from a detailed survey completed by J.D. Barnes Limited in January 2023. In the existing condition, surface runoff from the majority of the site drains southwest toward Village Road. The site generally falls from the northeast corner from an elevation of about 367.0m toward the southwest corner to an elevation of about 365.6m. The average slope of the site under existing conditions is approximately 2.4%.

The proposed grading of the site will generally direct drainage from the proposed parking area and landscaped area to a proposed stormwater management LID swale on the south boundary, with the grading matching adjacent property line elevations. Drainage from the majority of the site will be directed to the existing storm sewer on Village Road. The existing storm sewer on Village Road is proposed to be extended to provide a storm service connection for the proposed site.

A minimum of 0.5% and a maximum of 10% slope will be used on all hard surfaces for vehicular and pedestrian access routes to ensure accessibility. A minimum of 2% (50:1) and a maximum of 33% (3:1) slope will be used for landscaped areas.

SANITARY

Arcadis IBI Group has obtained and reviewed the latest Issued Tender drawings prepared by GM BluePlan with the latest revision on March 2023 (attached in **Appendix A**). The plan shows that there is an existing 200mm diameter sanitary sewer on Queens Bush Road draining west. Under the existing conditions of the site, sanitary service is provided via the sanitary on Queens Bush Road. Under the proposed conditions of the site, it is proposed that the sanitary service is provided via connection to the existing sanitary sewer on Queens Bush Road.

The existing sewage flow from the site is estimated at approximately 0.04 L/s and directed to the sanitary sewer on Queens Bush Road. The development is proposed to have 12 residential units. Using the Region of Waterloo's population density per unit type (2.44 people per townhouse unit), the calculated total population for the proposed development is 29.3 people and the total sewage design flow is estimated to be 0.41 L/s which is proposed to be directed to the sanitary sewer on Queens Bush Road.

Arcadis IBI Group proposes to utilize one connection on Queens Bush Road. The theoretical capacity of the receiving 200mm diameter sanitary sewer on Queens Bush Road, at its existing 0.27% slope is 17.044 L/s. The sanitary capacity of the downstream system will need to be confirmed to have the surplus capacity to provide sanitary service.

Due to the reconstruction of Queens Bush Road sections adjacent to the site, it is proposed that collaboration with the Township and the Township's Consultant be completed to coordinate the construction of a sanitary service connection to service the proposed development.

Refer to **Appendix B** for the Functional Site Servicing and Grading plan.

WATER

The subject site has existing watermains on the two adjacent streets as follows:

- An existing 200mm diameter watermain on Queens Bush Road; and,
- An existing 200mm diameter watermain on Village Road.

One municipal hydrant is located in the boulevard on the north side of Queens Bush Road at the intersection with Village Road connected to the existing 200mm watermain on Queens Bush Road.

As per the domestic water loading provided by Rombald Inc., the proposed development has the following water demand (refer to **Appendix C** for calculations):

- Daily average water demand of 21.2 gpm (0.67 L/s);
- Peak hour water demand of 37 gpm (2.33 L/s);
- Maximum daily water demand of 21.2 gpm (1.34 L/s).

The Region of Waterloo has presented modelling simulation outcomes relating to boundary conditions for the property at 1060 Queens Bush Road. These results encompass a visual depiction indicating the precise location of the node within the Region's model. Furthermore, a set of spreadsheets has been enclosed, encompassing data pertaining to Average Day demands, Maximum Day demands, and available fire flow for node JCT_10165 situated at the intersection of Queens Bush Road and Village Road. The diurnal 24-hour demand distribution has been considered, accounting for both the minimum hour and peak hour peaking factors. The maximum pressure recorded during the average day represents the minimum hour scenario, while the minimum pressure observed on the maximum day represents the peak hour situation. The analysis results in a fire flow design of 72.2 L/s at a design pressure of 14.9 m. For more information, refer to Appendix C for the fire flow analysis letter provided by the Region.

A fire flow analysis was also completed by SBM to determine the required fire flow for the proposed development. SBM determined that the maximum fire flow requirement for the proposed townhouse development is anticipated to be 167 L/s.

SBM calculated and obtained the total flow required during firefighting plus the maximum daily demand of 168 L/s. For the Water Supply for Fire Fighting Design Brief prepared by SBM, refer to Appendix C.

As the total flow required is greater than the available 72.2 L/s, SBM considered and provided calculations for seven different options.

- Option 1a – Wood frame construction with three (3) firewalls – 85 L/s
- **Option 1b – Ordinary construction with three (3) firewalls – 68 L/s**
- **Option 1c – Non-Combustible construction with one (1) firewall – 68 L/s**
- Option 2a – Wood frame construction without firewall but with NFPA Standard Sprinkler – 135 L/s
- Option 2b – Ordinary construction without firewall but with NFPA Standard Sprinkler – 85 L/s
- **Option 2c – Ordinary construction without firewall but with NFPA Standard Sprinkler (fully supervised) – 68 L/s**
- **Option 3a – Wood frame construction with three (3) firewalls and NFPA Standard Sprinkler – 68 L/s**

As per the fire flow calculations provided in the brief prepared by SBM for all seven options, the required flow rates below the available maximum of 72.2 L/s can be achieved with options 1b, 1c, 2c, and 3a (68 L/s). Please refer to the detailed calculations of all options in the brief prepared by SBM provided in **Appendix C**.

The fire flow analysis by SBM was undertaken using the maximum 72.2 L/s provided by the Region. If the watermain infrastructure construction is completed prior to a later planning or permitting stage, a hydrant flow test could be undertaken which may result in a different maximum available water supply and subsequent recommendations.

Arcadis IBI Group proposes to utilize one connection on Queens Bush Road. Due to the reconstruction of Queens Bush Road sections adjacent to the site, it is proposed that collaboration with the Township and the Township's Consultant be completed to coordinate the construction of a water service connection to service the proposed development.

STORM

Arcadis IBI Group has obtained and reviewed the latest Issued for Tender drawings prepared by GM BluePlan. The design of the proposed storm sewer on Queens Bush Road does not have an allocation for the proposed site.

Arcadis IBI Group has obtained and reviewed the record drawings for Village Road. We have completed our proposed storm servicing based on these drawings (attached in **Appendix A**).

An existing 250mm diameter storm sewer on Village Road flows south from an upstream catch basin on the west curb of Village Road. It is proposed to provide a 250mm diameter storm service for the development connecting to the existing 250mm storm sewer on Village Road.

The 0.18ha site has an existing impervious level of 18 percent. A 0.03ha part of the site drains north toward Queen Bush Road. A 0.15ha part of the site drains south toward Village Road. For the proposed site redevelopment, the imperviousness of the site will be increased to 63 percent. Since the increased imperviousness will result in the proposed peak flows exceeding the existing conditions levels, quantity control will be required to attenuate flows.

Stormwater quantity control will be proposed to provide controls from post-development to pre-development flows for all events from the 2-year through to the 100-year storms. A total surface storage of 50 m^3 will be provided in an Enhanced Grass Swale at the south part of the property to provide attenuation for events up to the 100-year storm event for the proposed 0.17ha area draining toward the south. Flow control will be provided at the outlet of the Enhanced Grass Swale prior to flow discharging to the Village Road storm sewer. A 0.01ha portion of the site will continue to drain toward the north.

The existing and proposed conditions peak flows are summarized in Table 1 and the Visual OTTHYMO output is included in **Appendix C**.

Table 1: Peak Discharges

Return Event	Existing Conditions	Proposed Conditions
	PEAK DISCHARGE (M^3/S)	PEAK DISCHARGE (M^3/S)
Draining to North		
2 Year	0.001	0.001
5 Year	0.002	0.002
10 Year	0.003	0.003
25 Year	0.003	0.003
50 Year	0.005	0.004

100 Year	0.006	0.004
Draining to South		
2 Year	0.010	0.007
5 Year	0.015	0.012
10 Year	0.020	0.018
25 Year	0.024	0.024
50 Year	0.029	0.029
100 Year	0.034	0.034

As shown in Table 1, proposed conditions attenuated peak flows will not exceed existing conditions levels.

Stormwater quality is required to an Enhanced Protection Level (80 percent TSS removal). A treatment-train consisting of an Enhanced Grass Swale at the south part of the site (which will also provide quantity control storage), and a Stormceptor OGS unit (EFO4) to be installed at the outlet of the site storm sewer. The OGS unit has the capacity to treat a 0.14ha area (75 percent impervious) from the roof and parking lot areas. Based on the output from the Stormceptor Sizing Program included in **Appendix C**, the EFO4 unit will provide a TSS removal efficiency of 96 percent for greater than 90 percent of annual flows generated by lands tributary to the unit, based on the fine particle size distribution (with a maximum allotted removal efficiency of 50 percent).

The Enhanced Grass Swale and OGS unit will provide an Enhanced Protection Level for suspended solids (80% TSS removal). The following equation has been utilized for calculating the total TSS removal efficiency for BMPs in series:

$$R = A + B - [(A \times B) / 100]$$

where:

- A is the TSS removal rate of the first BMP (Enhanced Grass Swale, TSS removal efficiency of 70%);
- B is the TSS removal rate of the second BMP (OGS unit, TSS removal efficiency of 50%); and
- R is the Total TSS removal rate.

$$R = 70\% + 50\% - [(70\% \times 50\%) / 100] = 85\%.$$

EROSION AND SEDIMENT CONTROL

During construction, erosion and sediment control measures will be required for the site area and will be designed and provided by others. The flowing is required during construction:

- Protect adjacent areas from the migration of sediment in overland flow;
- Minimize the amount of sediment transported off-site via construction vehicles; and
- Stabilize all disturbed areas as quickly as possible to minimize erosion.

We trust this meets your requirements at this time for the inventory of the existing storm, sanitary, and water servicing infrastructure for the feasibility of developing this site at 1060 Queens Bush Road. Should there be any questions or if further information is required, please do not hesitate to contact the undersigned.

UTILITIES

Electric, natural gas, and telecommunication services exist within close proximity to the subject development on Queens Bush Road. Servicing of the proposed development by the various utilities will be provided by the extension of these facilities. It is anticipated that each of these utilities will, as required, identify its specific requirements through the standard application circulation, review, and design process.

All of which is respectfully submitted.

Yours truly

ARCADIS IBI GROUP

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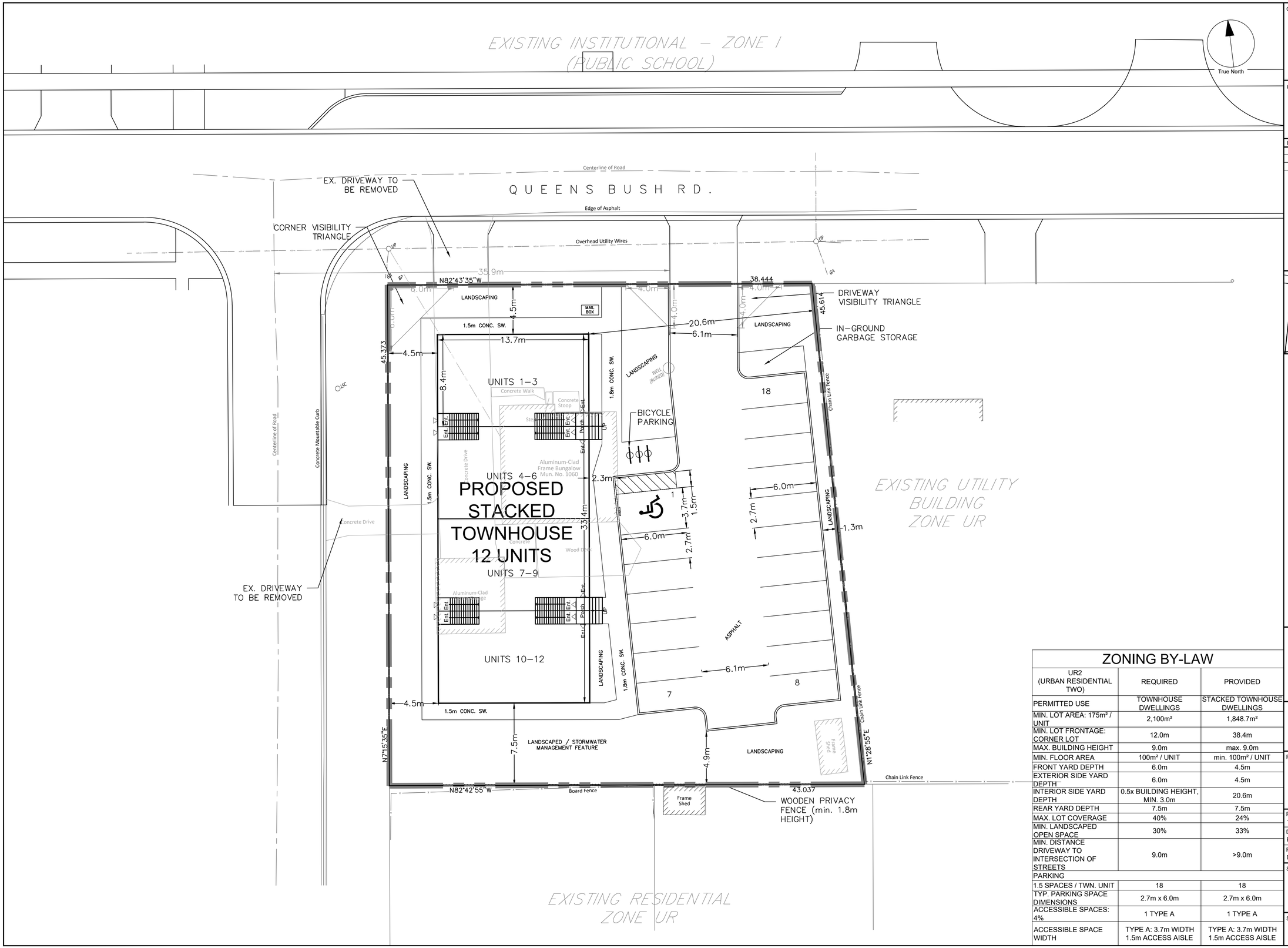
Email: Andy.Kroess@ibigroup.com

Mohammad Meqdad, P.Eng.
Project Manager
Tel: 519-585-2255 ext 63018
Email: Mohammad.Meqdad@ibigroup.com

LIST OF ATTACHMENTS:

- **Appendix A**
  - Site Plan
  - Plan of Topographic Features
  - Record Drawings
- **Appendix B**
  - Functional Site Servicing and Grading Plan
- **Appendix C**
  - Domestic Water Loading by Rombald Inc.
  - Modelling simulation by the Region of Waterloo
  - Water Supply for Fire-Fighting Design Brief by SBM Ltd.
  - SWM Visual OTTHYMO model schematic
  - SWM Visual OTTHYMO output
  - SWM Stormceptor Sizing Program

APPENDIX A



ZONING BY-LAW

UR2 (URBAN RESIDENTIAL TWO)	REQUIRED	PROVIDED
PERMITTED USE	TOWNHOUSE DWELLINGS	STACKED TOWNHOUSE DWELLINGS
MIN. LOT AREA: 175m² / UNIT	2,100m²	1,848.7m²
MIN. LOT FRONTAGE: CORNER LOT	12.0m	38.4m
MAX. BUILDING HEIGHT	9.0m	max. 9.0m
MIN. FLOOR AREA	100m² / UNIT	min. 100m² / UNIT
FRONT YARD DEPTH	6.0m	4.5m
EXTERIOR SIDE YARD DEPTH	6.0m	4.5m
INTERIOR SIDE YARD DEPTH	0.5x BUILDING HEIGHT, MIN. 3.0m	20.6m
REAR YARD DEPTH	7.5m	7.5m
MAX. LOT COVERAGE	40%	24%
MIN. LANDSCAPED OPEN SPACE	30%	33%
MIN. DISTANCE DRIVEWAY TO INTERSECTION OF STREETS	9.0m	>9.0m
PARKING		
1.5 SPACES / TWN. UNIT	18	18
TYP. PARKING SPACE DIMENSIONS	2.7m x 6.0m	2.7m x 6.0m
ACCESSIBLE SPACES: 4%	1 TYPE A	1 TYPE A
ACCESSIBLE SPACE WIDTH	TYPE A: 3.7m WIDTH 1.5m ACCESS AISLE	TYPE A: 3.7m WIDTH 1.5m ACCESS AISLE

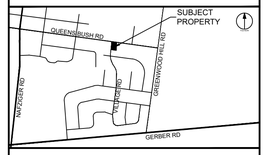
CLIENT

BRADLEY & CO

1060 QUEENS BUSH ROAD

ISSUES

No.	DESCRIPTION	DATE
1	SITE PLAN SUBMISION	2023-01-26
2	REVISED - TOWNSHIP COMMENTS	2023-06-09



IBI GROUP
Suite 101 - 410 Albert Street
Waterloo ON N2L 3V3 Canada
tel 519 585 2255
ibigroup.com

PROJECT

1060 QUEENS BUSH ROAD

TOWNSHIP OF WELLESLEY

PROJECT NO:	SCALE:
141040	1 : 150
DRAWN BY: E.T.	CHECKED BY: C.T.
PROJECT MGR: D.W.S.	APPROVED BY: D.W.S.

SHEET TITLE

SITE PLAN

SHEET NUMBER

SP1

ISSUE

01

SCALE CHECK 10mm 1 in

File Location: J:\141040_1060_Queens_\7.0_Production\7.03_Design\17_Planning\Sheets\141040_SP.dwg Last Saved: July 5, 2023, by emma.tillery Plotted: Tuesday, July 11, 2023 1:21:43 PM by Emma Tillery

KNOWN AS QUEEN'S BUSH ROAD
(FORMERLY QUEEN STREET (R.C.P. 1148, FORMERLY WILLIAM STREET (R.C.P. 622))

Centerline of Road

Edge of Asphalt

Overhead Utility Wires

Bottom of Ditch

CULVERT
INV.: 366.20
OBV.: 366.52

CULVERT
INV.: 366.24
OBV.: 366.56

N82°43'35"W

38.444

45.373

45.614

Concrete Stoop

Concrete Walk

Steps

Aluminum-Clad
Frame Bungalow
Mun. No. 1060

Concrete Drive

Concrete

Wood Deck

Aluminum-Clad
Frame Garage

Concrete Mountable Curb

Chain Link Fence

WELL (BURIED)

SECTION

EAST

CONCESSION

1

VILLAGE ROAD
(R.P. 1148)

PART 4,
58R-1024
PIN 22170-0198 (LT)

LOT 12

PART OF

N7°15'35"E

N1°28'55"E

Board Fence

Frame Shed

Frame Shed

Chain Link Fence

N82°42'55"W

43.037

LOT 1

LOT 2

LOT 3

PLAN 58M – 312

PLAN OF TOPOGRAPHIC FEATURES

PART OF LOT 12
CONCESSION 1, EAST SECTION
IN THE
TOWNSHIP OF WELLESLEY
REGIONAL MUNICIPALITY OF WATERLOO

SCALE 1 : 200

5 0 5 10 metres

METRIC DISTANCES AND/OR COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

LEGEND

UP	DENOTES	UTILITY POLE
GA	DENOTES	GUY ANCHOR
LSC	DENOTES	CONCRETE LIGHT STANDARD
CB	DENOTES	CATCHBASIN
MH	DENOTES	MANHOLE
FH	DENOTES	HYDRANT
WV	DENOTES	WATER VALVE
NP	DENOTES	'NO PARKING' SIGN
SS	DENOTES	'STOP' SIGN

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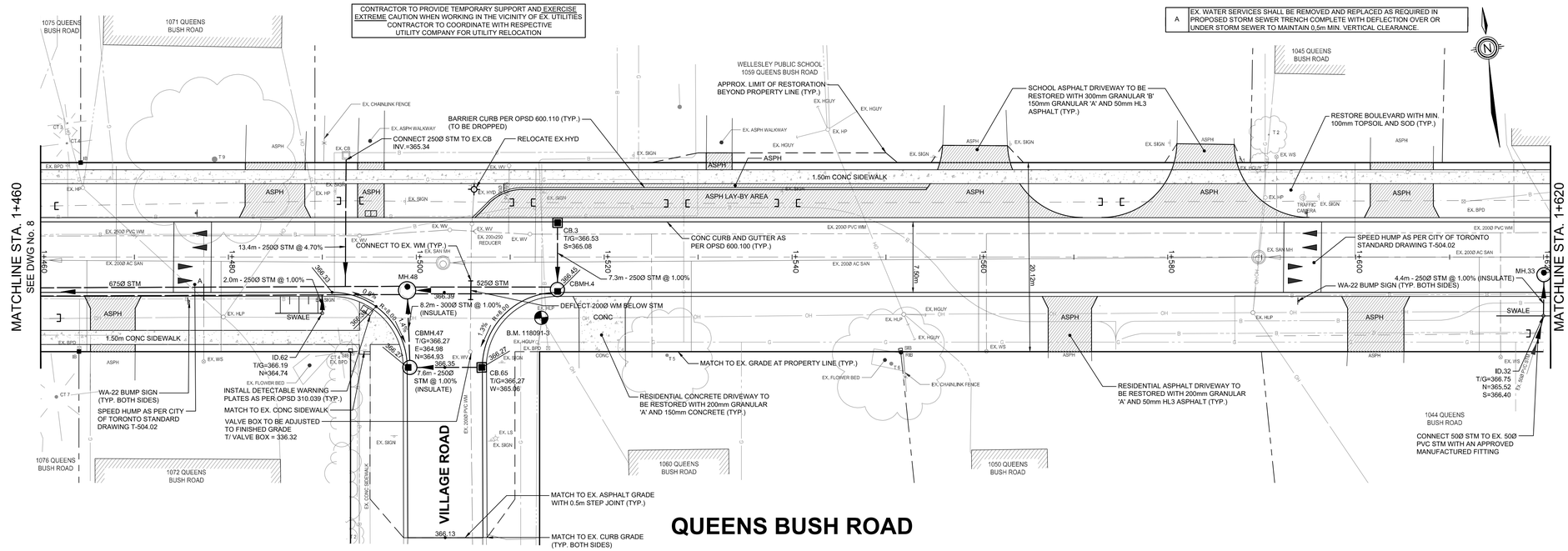
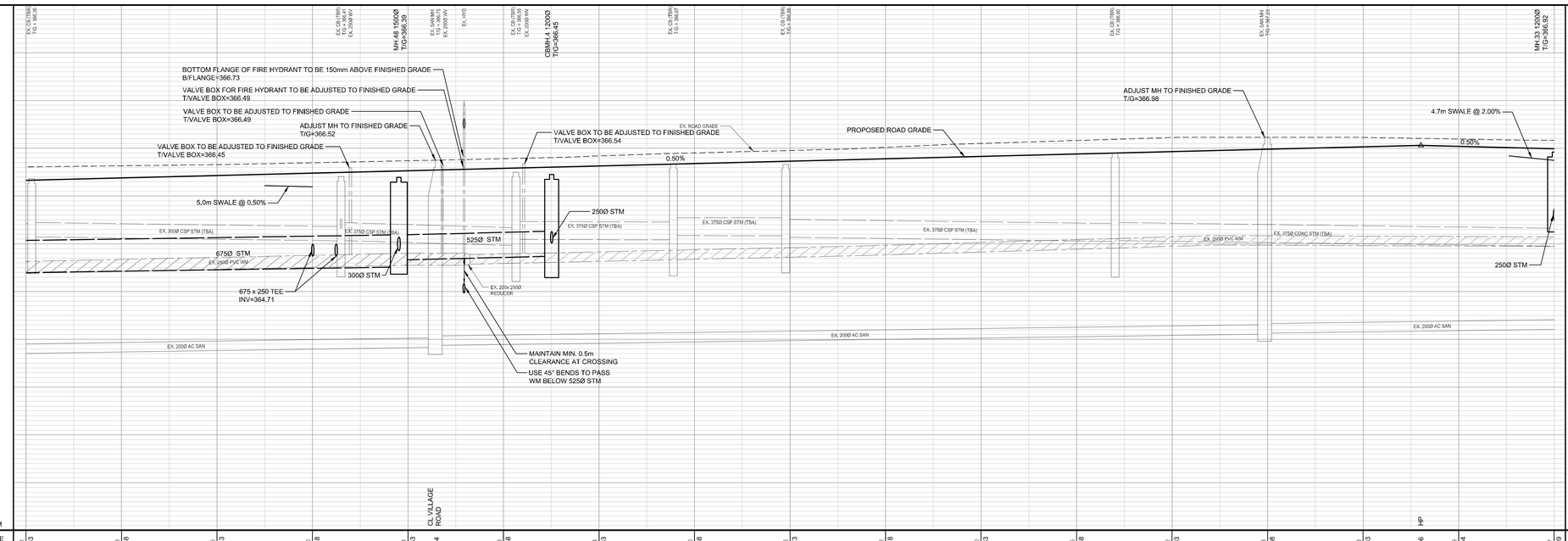
4273 KING ST. E, #100, KITCHENER, ON, N2P 2E9
T: (519) 578-2220 F: (519) 650-5625 www.jdbarnes.com

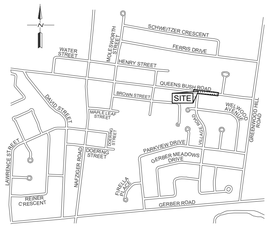
DRAWN BY:	CHECKED BY:	REFERENCE NO.:
HvW	JPH	22-40-676-00
		DATED: 01/16/2023

CONTRACTOR TO PROVIDE TEMPORARY SUPPORT AND EXERCISE EXTREME CAUTION WHEN WORKING IN THE VICINITY OF EX. UTILITIES
CONTRACTOR TO COORDINATE WITH RESPECTIVE UTILITY COMPANY FOR UTILITY RELOCATION

A EX. WATER SERVICES SHALL BE REMOVED AND REPLACED AS REQUIRED IN PROPOSED STORM SEWER TRENCH COMPLETE WITH DEFLECTION OVER OR UNDER STORM SEWER TO MAINTAIN 0.5m MIN. VERTICAL CLEARANCE.







TOWNSHIP OF WELLESLEY (WELLESLEY)
KEY PLAN
NOT TO SCALE

NOTES :

1. TOPOGRAPHIC AND EXISTING FEATURES SURVEY COMPLETED BY GM BLUEPLAN ENGINEERING LIMITED, DATED JUNE 6, 14, AND 19, 2018 AND OCTOBER 19, 2021.
2. LEGAL PROPERTY LINES SHOWN ON THIS DRAWING WERE INTERPRETED FROM LEGAL SURVEY BARS FOUND DURING THE TOPOGRAPHICAL SURVEY AND ONLINE GIS MAPPING. THE ACCURACY OF ANY LEGAL PROPERTY LINE SHOWN ON THIS DRAWING AS TO THEIR LOCATION IS NOT GUARANTEED.

LEGEND:

- BENCHMARK
- BOREHOLES
- LOT LINE
- R.O.W. LIMITS
- EX. SANITARY SEWER
- EX. STORM SEWER
- EX. WATERMAIN
- PR. SANITARY SEWER
- PR. STORM SEWER
- PR. WATERMAIN
- EX. STORM SEWER (TO BE PLUGGED AND ABANDONED)
- PROPOSED PLUG

BENCH MARKS :

B.M. WE-20, ELV. = 354.125m
TABLET SET IN THE CONCRETE BRIDGE ON QUEEN STREET (REGIONAL ROAD 5) IN WELLESLEY. TABLET IS SET VERTICALLY IN THE SOUTH FACE OF THE SOUTHWEST CORNER OF THE EAST ABUTMENT OF THE BRIDGE AT THE NORTH END OF THE MILL POND

B.M. 118091-3, ELV. = 366.575m
NAIL IN HYDRO LIGHT POLE LOCATED ON THE SOUTHEAST CORNER OF THE QUEENS BUSH ROAD AND VILLAGE ROAD INTERSECTION

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

PRELIMINARY

NO.	MM/DD/YY	REVISION DESCRIPTION	CHKD
4	03/28/23	ISSED PER GRCA COMMENTS	B.J.F.
3	02/15/23	ISSUED FOR TENDER	B.J.F.
2	01/[illegible]/22	ISSUED FOR 90% DESIGN	--
1	[illegible]/22	ISSUED FOR 60% DESIGN	--
0	06/18/18	PRELIMINARY	--

GM BluePlan ENGINEERING
GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | LONDON | HAMILTON | GTA
650 WOODLAWN ROAD WEST, BLOCK C, UNIT 2, GUELPH, ON. N1K 1B8
TEL. 519-824-8150
www.gmblueplan.ca

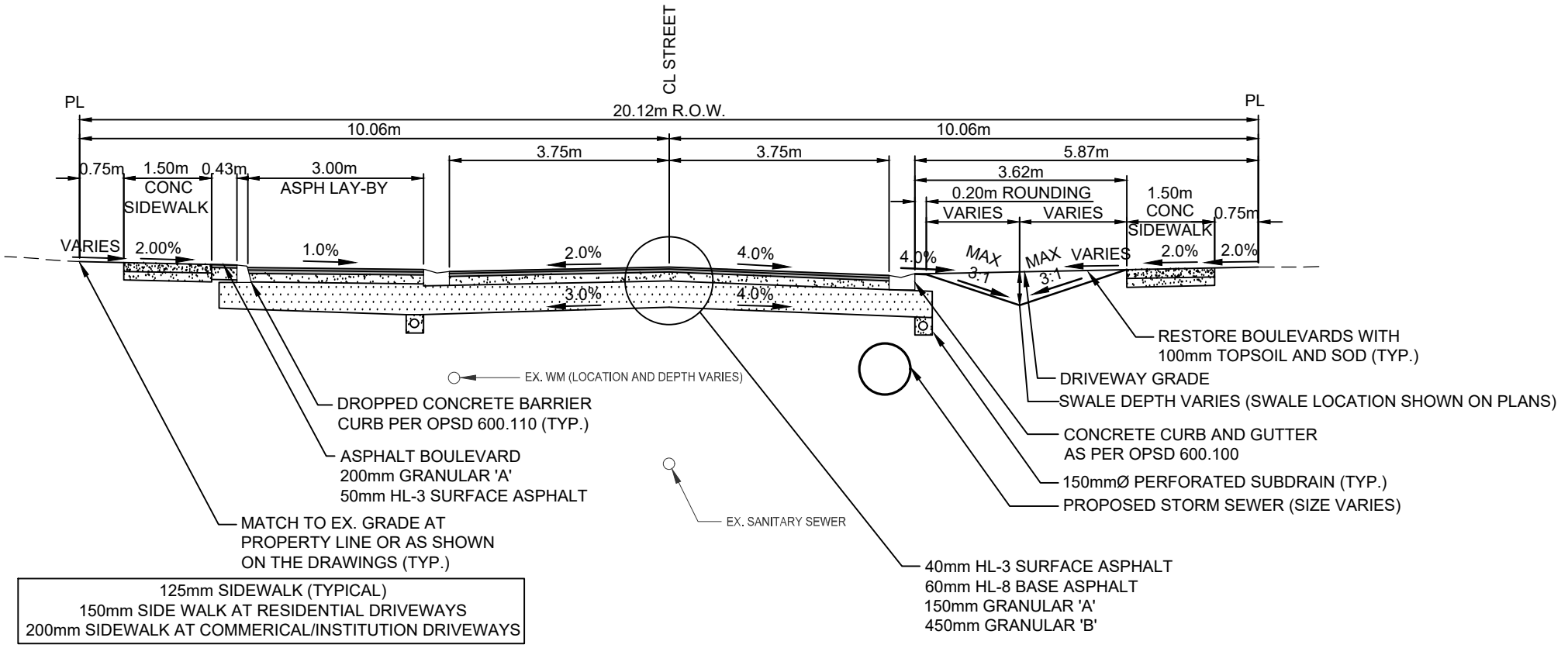
QUEENS BUSH ROAD, WELLESLEY

TOWNSHIP OF WELLESLEY

QUEENS BUSH ROAD

STA. 1+460 TO STA. 1+620 PROPOSED

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
W.A.B.	--	118091	9
DESIGNED BY :	DATE :	SCALE :	
W.A.B.	JULY 2018	H=1:250 V=1:50	



TYPICAL CROSS SECTION - QUEENS BUSH ROAD ASPH LAY-BY

STA. 1+505.9 TO STA. 1+553.7

N.T.S.

NORTH

VILLAGE ROAD

VILLAGE PLACE

WELWOOD AVENUE

N82°48'15"W 81.120

N82°43'30"W 121.92

N82°46'10"W 104.474

N7°15'00"E 35.588

RELOCATED EXISTING FIRE

150mm SUBDRAIN

DCB1

DCBMH1

CBMH7

MH6A

CB6

MH5A

MH4A

MH5

CB5a

CB5b

MH4

MH3A

CB4

150mm WATERMAIN

7.5m–200mm SAN @ 1.45%

61.4m–200mm SAN @ 1.25%

62m–200mm SAN @ 0.50%

57m–200mm STM @ 2.50%

79m–200mm STM @ 1.15%

59.6m–300mm STM @ 0.80%

41m–300mm STM @ 0.60%

35.2m–375mm STM @ 0.50%

6.6m–450mm STM @ 0.60%

2.5m STORM EASEMENT

REMOVED EXISTING PLUG AND BLOCKING. CONNECT NEW WATERMAIN.

REMOVED EXISTING PLUG AND CONNECT NEW SANITARY SEWER

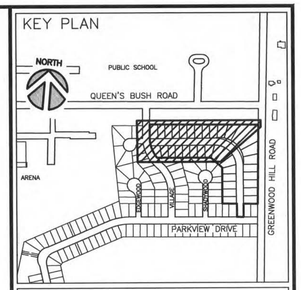
REMOVED EXISTING PLUG AND CONNECT NEW STORM SEWER

Rail Fence

MATCH LINE

STA. 0+260.000

KEY PLAN



GENERAL NOTES

1. SANITARY SEWER ARE P.V.C. SDR35 UNLESS NOTED WITH GRANULAR 'A' EMBEDMENT MATERIAL PLACED IN ACCORDANCE WITH OPSD 802.010. SANITARY SERVICE CONNECTIONS ARE 125mm P.V.C. DR28 PLACED IN ACCORDANCE WITH OPSD 1006.02. SERVICE DEPTH AT PROPERTY LINE IS 2.50m MINIMUM AND 3.00m MAXIMUM. SANITARY MANHOLES ARE OPSD 701.010 PRECAST CONCRETE AND BENCHED IN ACCORDANCE WITH OPSD 701.021. MANHOLE COVERS ARE OPSD 401.01 TYPE 'A'.
2. WATERMAIN – P.V.C. SDR18 CERTIFIED TO CSA B137.3–M (AWWA C900 CLASS 150) WITH RUBBER GASKET BELL AND SPIGOT JOINTS PLACED AT A MINIMUM DEPTH OF 2.00m c/w THW#8ga. STRANDED COPPER TRACER WIRE LOOPED TO GRADE AT ALL VALVE BOXES. FITTINGS ARE DUCTILE IRON c/w MECHANICAL JOINTS PLACED WITH OPSD 1103.01 THRUST BLOCKING. BEDDING AS TO OPSD 802.010 WITH GRANULAR 'A' EMBEDMENT MATERIAL. ZINC ANODES CONFORM TO ASTM B418–73 TYPE II AND INSTALLED AS PER REGION OF WATERLOO STANDARD DRAWING SSMS E2–15 (JAN. 2003). SERVICES ARE 25mm TYPE K COPPER TUBE PLACED AT A MINIMUM DEPTH OF COVER OF 1.80m IN ACCORDANCE WITH OPSD 1104.01. SERVICE FITTINGS ARE MUELLER OR CAMBRIDGE BRASS COMPRESSION TYPE. HYDRANT LEADS AND VALVES ARE 150mm#. HYDRANTS ARE CANADA VALVE CENTURY OR DARLING WITH 2–65mm AND 1–100mm STORZ CONNECTION. HYDRANTS ARE PAINTED YELLOW WITH THE STORZ CONNECTION PAINTED BLACK. VALVES ARE RESILIENT WEDGE TYPE BY MUELLER (SERIES A–2360), AVK (SERIES 25) CLOW (SERIES F6100) OR APPROVED EQUIVALENT. CAST IRON VALVE BOXES ARE SCREW TYPE BOX WITH A No. 6 BASE AS SUPPLIED BY BIBBY, MUELLER OR APPROVED EQUIVALENT.
3. STORM SEWERS 300mm TO 600mm DIAMETER ARE CSA B182.4 ULTRA–RIB P.V.C. WITH RUBBER GASKET JOINTS IN OPSD 802.010 BEDDING. STORM SEWERS GREATER THAN 600mm DIAMETER ARE CSA A257.2 CLASS 65–D CONCRETE STORM SEWER WITH RUBBER GASKET JOINTS IN OPSD 802.030 BEDDING. CATCHBASIN LEADS ARE ULTRA–RIB P.V.C. OR P.V.C. SDR35 PLACED AT 1.00% SLOPE MINIMUM IN OPSD 802.010 BEDDING. SINGLE CATCHBASIN LEADS ARE 250mm DIAMETER. DOUBLE CATCHBASIN LEADS ARE 300mm DIAMETER. ALL BEDDING, COVER MATERIAL AND EMBEDMENT MATERIAL IS COMPACTED GRANULAR 'A'. STORM MANHOLES ARE OPSD 710.010 PRECAST CONCRETE AND ARE BENCHED IN ACCORDANCE WITH OPSD 701.021. SINGLE CATCHBASINS ARE OPSD 705.010. DOUBLE CATCHBASINS ARE OPSD 705.020. MANHOLE COVERS ARE OPSD 401.01 TYPE 'B'. CATCHBASIN GRATES AND CATCHBASIN MANHOLE GRATES IN CURB ARE OPSD 400.01. STORM SEWER SERVICE MAINS ARE 200mm PVC SDR35. SERVICE CONNECTIONS ARE 100mm PVC SDR28 PLACED IN ACCORDANCE WITH OPSD 1006.02 IN OPSD 802.010 BEDDING. SERVICE DEPTH AT PROPERTY LINE IS 1.20m MIN. TO 1.50m MAX.
4. TOPS WITHIN ASPHALT AREAS ARE SET FLUSH WITH BASE COURSE ASPHALT AND WILL BE RAISED IMMEDIATELY PRIOR TO SURFACE COURSE PLACEMENT.
5. ALL WORK AND MATERIALS ARE IN ACCORDANCE WITH THE TOWNSHIP OF WELLESLEY DEVELOPMENT STANDARDS OR APPLICABLE ONTARIO PROVINCIAL STANDARD SPECIFICATIONS AND STANDARD DRAWINGS.
6. ALL BEDDING, GRANULAR BASE AND THRUST BLOCKING ARE FOUNDED ON COMPETENT SOIL.

BENCHMARK

BM 01 – TOP OF STANDARD IRON BAR AT SOUTH EAST CORNER OF QUEEN'S BUSH ROAD AND VILLAGE ROAD.
GEODETIC ELEV. 366.367

BM 02 – TABLET IN SOUTH CORNER OF NORTHEAST WINGWALL OF CONCRETE BRIDGE OVER FIRELLA CREEK ON GERBER ROAD.
GEODETIC ELEV. 347.110

No.	DATE	REVISIONS
5.	Nov./2003	As Recorded
4.	JULY15/03	ISSUED FOR CONSTRUCTION
3.	JUNE27/03	ISSUED FOR MOE APPROVAL
2.	JUNE17/03	ISSUED FOR APPROVAL
1.	JUNE10/03	ISSUED FOR REVIEW

engineers
architects
planners

72 Victoria Street South
Kitchener, Ontario N2G 4Y9
PH: 519–886–2180
FAX: 519–886–1697
E–Mail: waterloo@tsh.on.ca

VILLAGE ESTATES SUBDIVISION

WELWOOD AVENUE

WELLESLEY ONTARIO

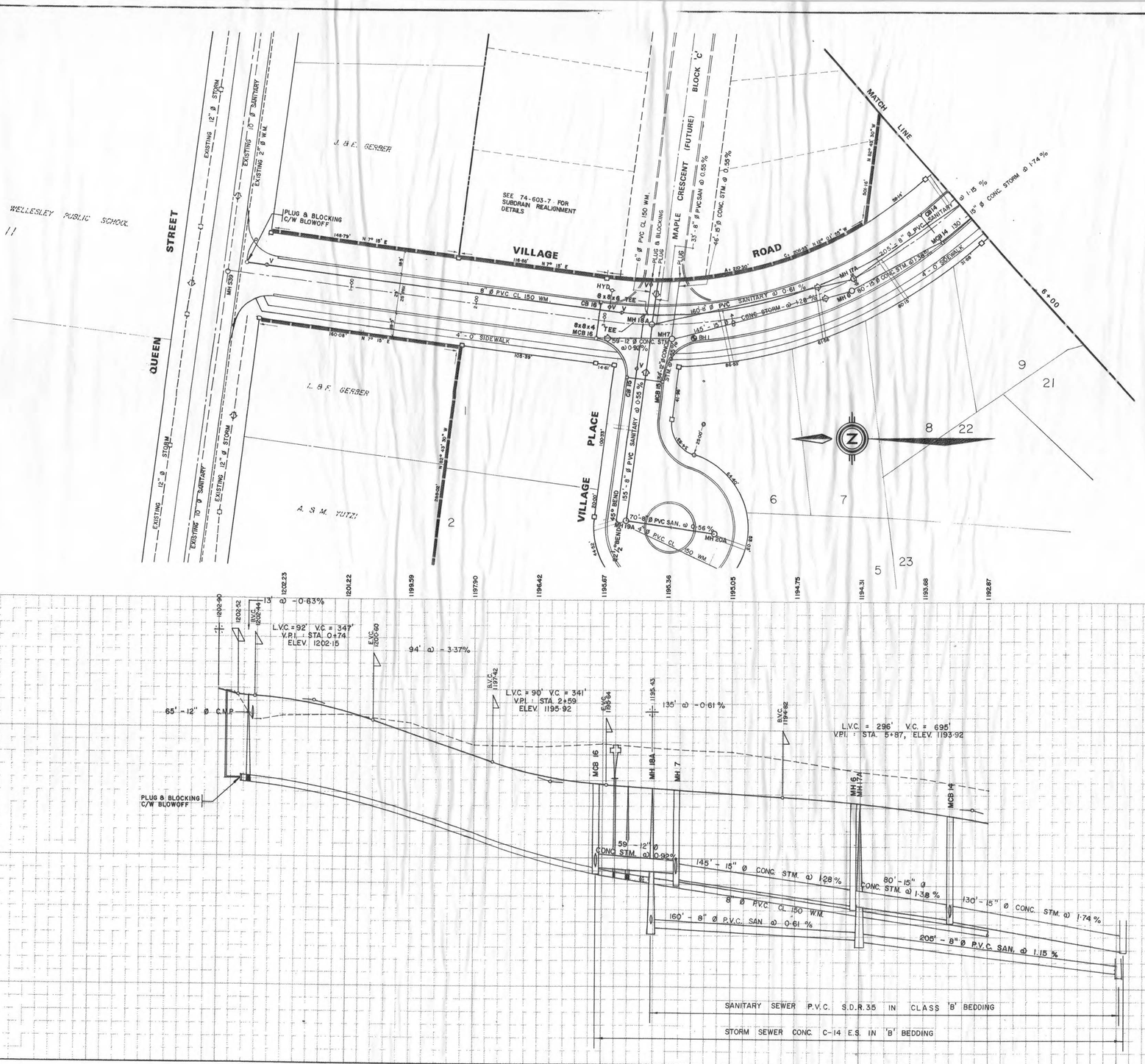
Wm. J. GIES CONSTRUCTION LTD.

PLAN & PROFILE

0+000.000 TO 0+260.000

DRAWN BY	DESIGNED BY	DATE
DM	DM	JUNE 2003
CHECKED BY	APPROVED BY	PROJECT No.
RFC	RFC	22033–01
SCALE: Horiz. 1 : 500, Vert. 1 : 50	DRAWING No.	22033–01–06

22033P1.DWG Plot Scale: 1=0.47 11/17/05 09:25



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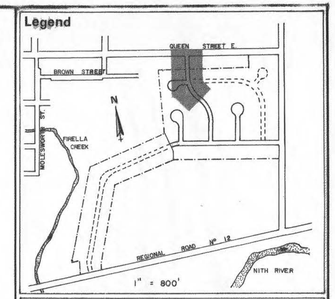


Notes

1) BENCHMARK: MONUMENT N° 028 ON N.E. ABUTMENT OF BRIDGE OVER FIRELLA CREEK ON REGIONAL ROAD N° 12. ELEVATION : 1138.85
2) SANITARY HOUSE CONNECTIONS TO BE 4" ø P.V.C. DR28 IN 8" BEDDING, TO CENTRE OF LOT, WITH MIN 7'-6" DEPTH OF COVER AT PROPERTY LINE.
3) WATERMAIN SERVICE CONNECTIONS TO BE 3/4" ø TYPE K COPPER TUBE, TO 3' RIGHT OF CENTRE OF LOT, WITH 5'-6" COVER AT PROPERTY LINE.
4) ALL WATERMAINS TO BE PVC CLASS 150, WITH MIN. 6'-0" DEPTH OF COVER, UNLESS OTHERWISE NOTED.
5) TRENCH WIDTH SHALL BE O.D. OF PIPE + 16", BUT NOT LESS THAN 30" FOR SAN. AND STM. SEWERS.
6) BOREHOLE INFORMATION - SEE WILLIAM TROW ASSOC. REPORT JUNE 18, 1976.

N°	REVISION	BY	DATE
3	AS BUILT	SM	OCT./93
2	AS BUILT INVERTS	E.M.	AUG/89
1	GENERAL REVISIONS FOR 1986 CONTRACT	LMK	OCT/86

Village Estates

Subdivision

Wellesley Ontario

for

Wm. J. Gies Construction Ltd.

VILLAGE ROAD

PLAN and PROFILE

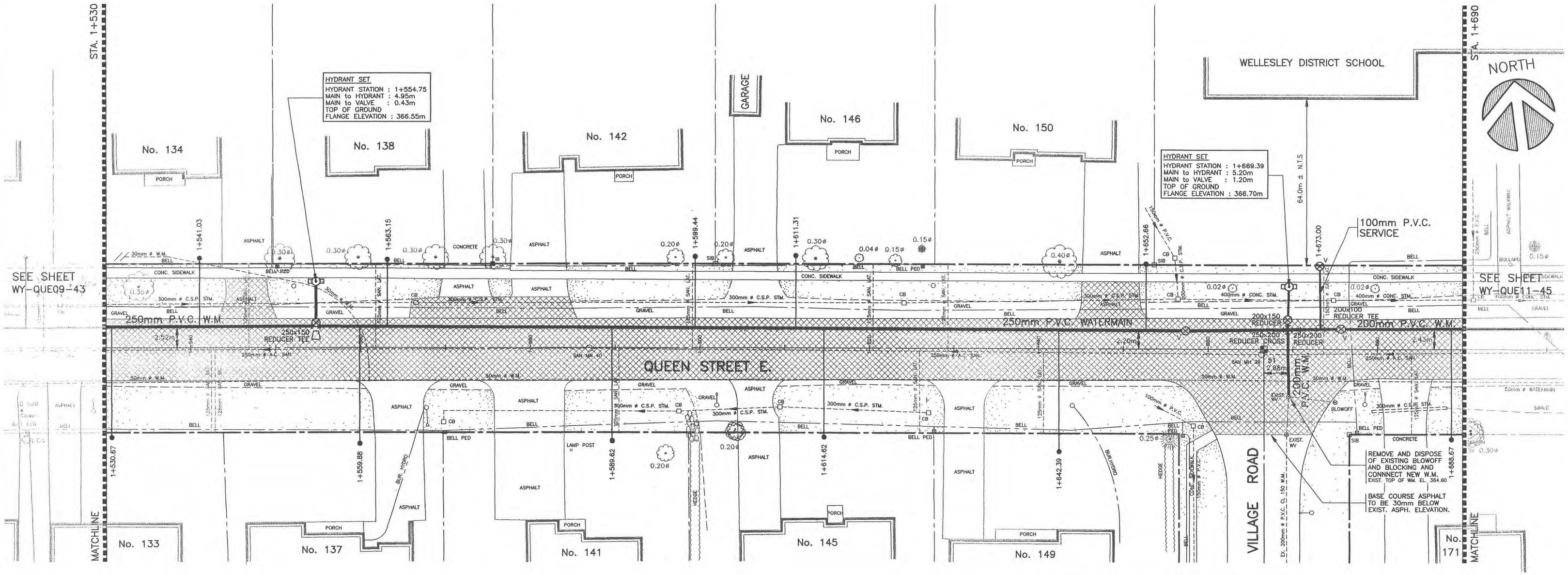
STATION 0+00 to 6+00

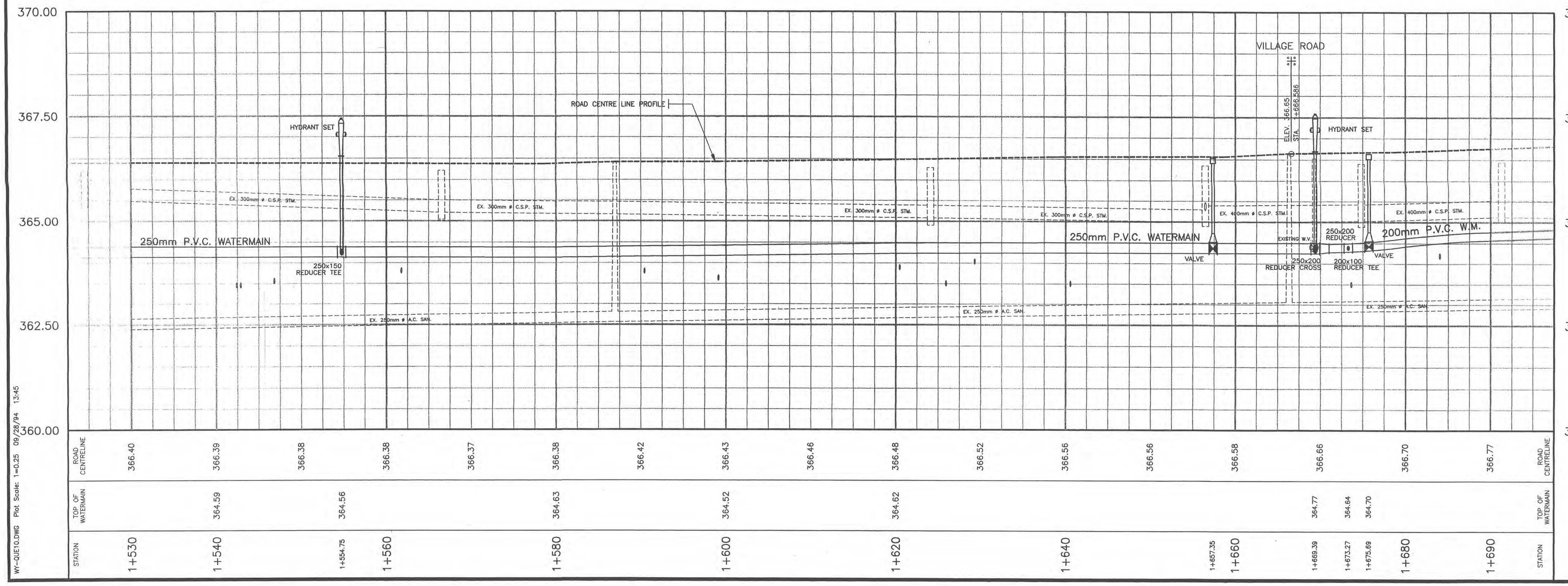
H.R. DENHAM — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

W.R. SWAIN — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

SWAIN and RUPNOW Ltd CONSULTING ENGINEERS Waterloo Ontario

PROJECT N° 74-603	DATE OCTOBER / 76
DRAWN BY D.M.	CHECKED BY R.D.
SCALE HORIZ : 1" = 40'-0" VERT : 1" = 4'-0"	DRAWING N° 74-603-5





GENERAL NOTES:

1. WATERMAIN TO BE P.V.C. DR18 CERTIFIED TO CSA B137.3–M (AWWA C900 CLASS 150) WITH RUBBER GASKET BELL AND SPIGOT JOINTS AND TWU #10 ga. (3.2mm) STRANDED COPPER TRACER WIRE. BEDDING AND COVER MATERIAL SHALL BE GRANULAR 'A'.
2. FITTINGS TO BE INJECTION MOULDED P.V.C. DR18 (CLASS 150) CERTIFIED TO CSA B137.2 FOR P.V.C. WATERMAINS UP TO AND INCLUDING 200mm DIAMETER FITTINGS FOR LARGER DIAMETER MAINS TO BE GRAY OR DUCTILE IRON COMPLETE WITH DENSO ANTI–CORROSION PROTECTION.
3. SERVICE CONNECTIONS TO BE 25mm DIAMETER, OR LARGER AS NOTED, TYPE 'K' COPPER INSTALLED WITH A MINIMUM DEPTH OF COVER OF 1.8m COMPLETE WITH MAINSTOP AND CURBSTOP AND BOX AT PROPERTY LINE. CONNECTION TO NEW P.V.C. WATERMAIN UP TO AND INCLUDING 200mm DIAMETER SHALL BE MADE WITH INJECTION MOULDED P.V.C. TAP TEE. CONNECTION TO LARGER P.V.C. WATERMAINS AND EXISTING WATERMAINS SHALL BE MADE WITH SERVICE SADDLES.
4. LIMITS OF ASPHALT REMOVAL SHOWN SHADED. ASPHALT TO BE SAWCUT FULL DEPTH IN STRAIGHT LINES ALONG REMOVAL LIMITS PRIOR TO REMOVAL. CONTRACTOR TO PROVIDE SHORING/SHEETING/TRENCH BOX AS REQUIRED TO LIMIT AREAS REQUIRING RESTORATION AND TO SATISFY MINISTRY OF LABOUR REQUIREMENTS.
5. ALL BEDDING AND THRUST BLOCKING TO BE FOUNDED ON COMPETENT SOIL.
6. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH APPLICABLE ONTARIO PROVINCIAL STANDARD SPECIFICATIONS AND DRAWINGS.
7. CONTRACTOR TO ENSURE THAT EXISTING WATER SUPPLY TO ALL RESIDENCES AND OTHER FACILITIES IS MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.
8. SEE SHEET WY–DET01–56 FOR RESTORATION NOTES

AREA OF ASPHALT PAVEMENT REMOVAL

No.	DATE	REVISIONS
2	12/15/93	AS–CONSTRUCTED
1	06/11/93	ISSUED FOR CONSTRUCTION
0	11/30/92	ISSUED FOR APPROVAL

totten sims hubicki associates
ENGINEERS ARCHITECTS AND PLANNERS
30 Dupont Street East, Waterloo, Ontario N2J 2G9

WELLESLEY WATER DISTRIBUTION

CORPORATION OF THE TOWNSHIP OF WELLESLEY

PLAN & PROFILE

QUEEN STREET E.

STATION 1+530.00 to 1+690.00

DRAWN BY WSM/AK/BM	DESIGNED BY DM/RFC	DATE NOV. 30/92	
CHECKED BY RFC	APPROVED BY RFC	PROJECT No. 21110–01	
SCALE Horiz. 1 : 250 Vert. 1 : 50	DRAWING No. WY–QUE10–44		

WY–QUE10.DWG Plot Scale: 1=0.25 06/28/94 13:45

APPENDIX B

QUEENS BUSH ROAD

VILLAGE ROAD

UNITS 1–3

UNITS 4–6

PROPOSED STACKED TOWNHOUSE 12 UNITS

UNITS 7–9

UNITS 10–12

200mm x 50mm TAPPING SLEEVE AND VALVE

MH2A
T/G=364.170
S. INV.=363.364
E.INV.=362.970
W.INV.=362.973

PROPOSED 50mmØ WATER SERVICE

WATER METER CHAMBER c/w BACKFLOW

100mmØ SANITARY SERVICE @ 1.0%(TYP.)

19mmØ WATER SERVICE (TYP.)

41.56m - 200mmØ PVC SAN @ 1.00%

MH1A
T/G=366.836
N. INV.=363.780

MATCH EXISTING GRADES AT PL AT 3:1 SLOPE MAX

DROP CURB

RIPRAP TREATMENT

LID SWALE

MH3
T/G=365.512
E. INV.=363.740
S. INV.=363.790

15.02m - 250mmØ STM @ 1.00%

39.67m - 250mmØ STM @ 3.00%

CB1
c/w XXmm ORIFICE
T/G=365.931
W. INV.=363.957

3.70m - 250mmØ STM @ 1.00%

MH2
(OGS-Stormceptor EFO4.)
T/G=365.923
E. INV.=363.920
W. INV.=363.890

CONNECT TO EXISTING CBMH WITH NEW 250mm Ø STM

INV=362.600

SEE 74-603-7 FOR SUBDRAIN REALIGNMENT DETAILS

NOTE:
ROAD AND STORM SEWER DESIGN BY GM BLUE PLAN MUST BE COMPLETED PRIOR TO SITE PLAN CONSTRUCTION START. STORM INFRASTRUCTURE SHOWN ON THIS PLAN AS "FUT." IS BASED ON ISSUED FOR TENDER DESIGN BY GM BLUE PLAN DATED 02/15/2023

LEGEND:

- EXISTING GROUND CONTOURS
- EXISTING GROUND ELEVATION
- EXISTING SLOPE LABEL
- PROPOSED GROUND ELEVATION
- PROPOSED SLOPE LABEL
- DRAINAGE DIVIDE
- MAJOR OVERLAND FLOW
- FUTURE STORM SEWER
- EXISTING SANITARY
- EXISTING WATERMAIN / VALVE / CS
- EXISTING FIRE HYDRANT
- EXISTING WMC / PLUG
- PROP. STORM SEWER
- PROP. SANITARY
- PROP. WATERMAIN / VALVE / CS
- PROP. WMC / PLUG

True North

CLIENT
BRADLEY & CO.

150 SHADE STREET,
WELLESLEY, ON N3A 4J2

ISSUES

No.	DESCRIPTION	DATE
1	ISSUED FOR SERVICING REPORT	2023-03-10
2	ISSUED FOR ZBA SUBMISSION	2023-05-16

DRAFT

KEY PLAN

LOCAL BENCHMARK
TOP NUT OF FIRE HYDRANT ON THE NORTH SIDE OF THE INTERSECTION OF QUEEN'S BUSH ROAD AND VILLAGE ROAD LOCATED NORTH WEST OF THE SUBJECT PROPERTY AS SHOWN ON THE FACE OF PLAN.
ELEVATION= 367.38m

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

IBI GROUP
Suite 101 - 410 Albert Street
Waterloo ON N2L 3V3 Canada
tel 519 585 2255
ibigroup.com

PROJECT
PROPOSED TOWNHOUSES

1060 QUEENS BUSH ROAD, WELLESLEY

PROJECT NO:	SCALE:
141040	1:200
DRAWN BY: S.FILIPPOV	CHECKED BY: M. MEQDAD
PROJECT MGR: D. GALBRAITH	APPROVED BY: M. MEQDAD

SHEET TITLE
FUNCTIONAL SITE SERVICING AND GRADING PLAN

SHEET NUMBER	ISSUE
C01	2

SCALE CHECK 10cm 1 m

File Location: J:\141040_1060_Queens_\7.0_Production\07.03_Design\04_Civil\Sheets\141040-C-FDP.dwg Last Saved: July 5, 2023, by rein.comley Plotted: Wednesday, July 5, 2023 10:51:09 AM by Rein Comley

APPENDIX C

Common water meter chamber on site with individual service lines to each suite.

Domestic Water Loading:

Entire Building

Fixture	Quantity	Supply Fixture Units	
2.5 bath suite	12 suites at 17 FU each	205	
Hose Bibb	4	10	
Exterior hose bibb	1	2.2	
	Total:	217.2 FU	37 GPM, 2" water main for domestic water

Peak Hour (3.5 times average day demand): approximately 37gpm
Average day demand (peak hour/3.5): approximately 10.6gpm
Maximum day demand (2 times average day): approximately 21.2 gpm

Individual service for each suite:

Fixture	Quantity	Supply Fixture Units	
2.5 bath suite	1 suite at 17 FU each	17	
Hose Bibb	1	2.5	
	Total:	19.5 FU	9 GPM, 3/4" water main for domestic water

826 King St. North Unit 23 • Waterloo, ON • N2J 4G8 • Ph: (519) 570-5002 • Fx: (519) 888-1915 • Website: www.rombald.com

Sanitary Loading:

Entire Building:

Fixture	Quantity	Drain Fixture Units	
2.5 bath suite	12 suites at 21.5 FU each suite	258	
Floor Drain	24	72	
	Total:	330	6" Sanitary at 1%

Individual Suite san service:

Fixture	Quantity	Drain Fixture Units	
2.5 bath suite	1 suites at 21.5 FU each suite	21.5	
Floor Drain	2	6	
	Total:	27.5	4" Sanitary at 1%

Storm Loading for whole building:

Roof Area	Area (Including Vertical Projections)	15-min rainfall (mm)	Storm water loading (L)	
Roof	456 m2	28mm	12,774	
		Total:		6" Storm main at 2%, or 8" at 1%

826 King St. North Unit 23 • Waterloo, ON • N2J 4G8 • Ph: (519) 570-5002 • Fx: (519) 888-1915 • Website: www.rombald.com

Region of Waterloo

ENGINEERING AND ENVIRONMENTAL SERVICES
Water and Wastewater Services
150 Frederick Street 7th Floor
Kitchener Ontario N2G 4J3 Canada
Telephone: 519-575-4400; TTY: 519-575-4608
Email: waterservices@regionofwaterloo.ca
www.regionofwaterloo.ca/water

Mohammad Meqdad, P.Eng.
Arcadis/IBI Group
410 Albert St, Suite 101
Waterloo, ON N2L 3V3
mohammad.meqdad@ibigroup.com

Date: April 13, 2023

Dear: Mohammad

Re: 1060 Queens Bush Road, Wellesley

Please find the results of the modeling simulations for boundary conditions for 1060 Queens Bush Road in lieu of a hydrant flow test. The results include a figure showing the location of the node from the Region's model. Attached are a series of spreadsheets containing results for Average Day, Maximum Day demands and available fire flows for node JCT_10165 located Queens Bush Rd and Village Rd. The diurnal 24-hour demand distribution accounts for the minimum hour and peak hour peaking factors. The maximum pressure on the average day represents the minimum hour, and the minimum pressure on the maximum day represents the peak hour.

Table 1 – Modeling Results

Node	Elevation (mASL)	Demand		Fire Flow Results	
		Ave Day (L/s)	Max Day (L/s)	Design Flow (L/s)	Design Pressure (m)
JCT_10165	366.0	0.0	0.0	72.2	14.9

A fire flow analysis shows the maximum flow available at a node with an associated design pressure during the maximum day scenario while maintaining the minimum design pressure of 14 m (140 kPa) at all nodes within the pressure zone.

If you have any questions, please contact me

Kevin Dolishny P.Eng.
Senior Engineer, Water Services
c. 226.751.4551
e. kdolishny@regionofwaterloo.ca

c. Jeff Hayhurst, Stumpf Fire Protection Limited

Wellesley\

JCT_10165 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.02	419.93	53.93
01:00 hrs	0.02	420.07	54.07
02:00 hrs	0.02	419.97	53.97
03:00 hrs	0.02	419.77	53.77
04:00 hrs	0.02	419.79	53.79
05:00 hrs	0.02	419.88	53.88
06:00 hrs	0.03	419.59	53.59
07:00 hrs	0.03	419.02	53.02
08:00 hrs	0.04	418.79	52.79
09:00 hrs	0.04	418.72	52.72
10:00 hrs	0.04	418.79	52.79
11:00 hrs	0.04	418.86	52.86
12:00 hrs	0.03	418.93	52.93
13:00 hrs	0.03	419.01	53.01
14:00 hrs	0.03	419.18	53.18
15:00 hrs	0.03	419.24	53.24
16:00 hrs	0.03	419.09	53.09
17:00 hrs	0.03	418.95	52.95
18:00 hrs	0.04	418.77	52.77
19:00 hrs	0.04	418.38	52.38
20:00 hrs	0.05	418.00	52.00
21:00 hrs	0.05	417.97	51.97
22:00 hrs	0.04	418.77	52.77
23:00 hrs	0.03	419.42	53.42

Average Day HGL:	419.12
Minimum Hour:	420.07

JCT_10165 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.04	426.42	60.42
01:00 hrs	0.03	412.24	46.24
02:00 hrs	0.04	411.62	45.62
03:00 hrs	0.04	409.87	43.87
04:00 hrs	0.04	409.49	43.49
05:00 hrs	0.04	409.24	43.24
06:00 hrs	0.05	407.29	41.29
07:00 hrs	0.07	422.73	56.73
08:00 hrs	0.08	421.84	55.84
09:00 hrs	0.08	421.23	55.23
10:00 hrs	0.08	421.18	55.18
11:00 hrs	0.08	421.61	55.61
12:00 hrs	0.07	422.30	56.30
13:00 hrs	0.07	422.38	56.38
14:00 hrs	0.07	422.73	56.73
15:00 hrs	0.07	422.98	56.98
16:00 hrs	0.07	422.73	56.73
17:00 hrs	0.07	422.19	56.19
18:00 hrs	0.08	421.09	55.09
19:00 hrs	0.09	419.93	53.93
20:00 hrs	0.10	419.49	53.49
21:00 hrs	0.10	419.62	53.62
22:00 hrs	0.08	421.57	55.57
23:00 hrs	0.06	423.97	57.97

Maximum Day HGL:	418.99
Peak Hour:	407.29

Available Flow (L/s)	Residual Pressure (m)
0.0	56.3
5.0	54.0
10.0	52.3
15.0	50.7
20.0	49.2
25.0	47.5
30.0	45.8
35.0	44.3
40.0	42.1
45.0	39.6
50.0	36.2
55.0	32.2
60.0	28.2
65.0	23.9
70.0	17.7
72.2	14.9

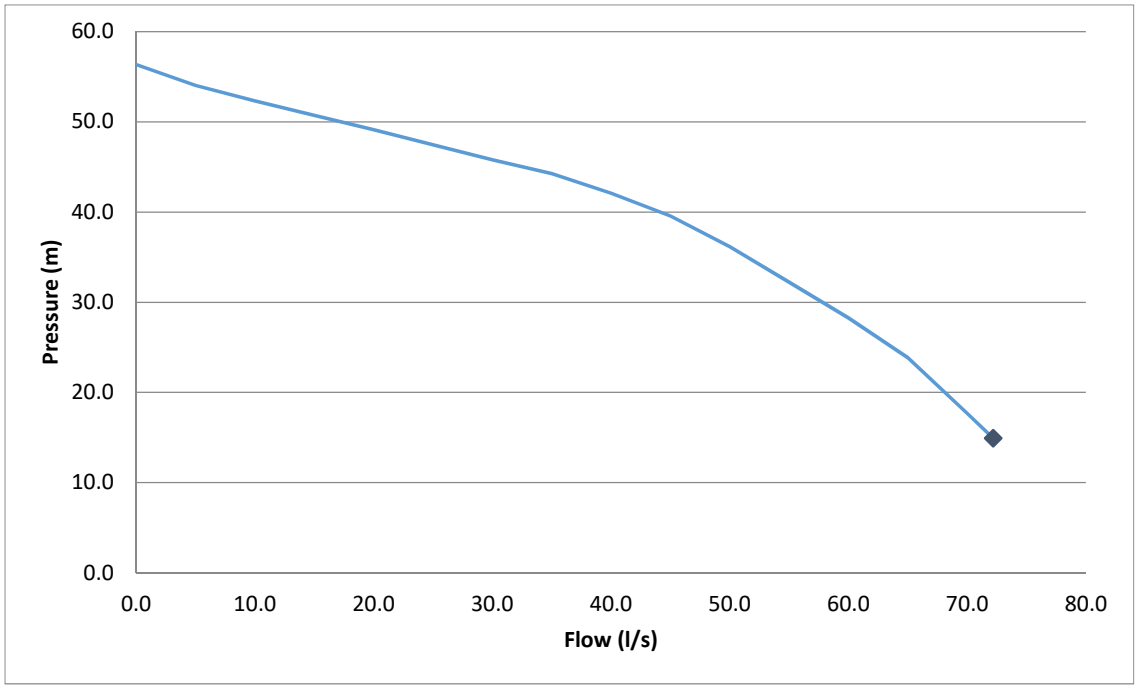
Fire Flow Analysis

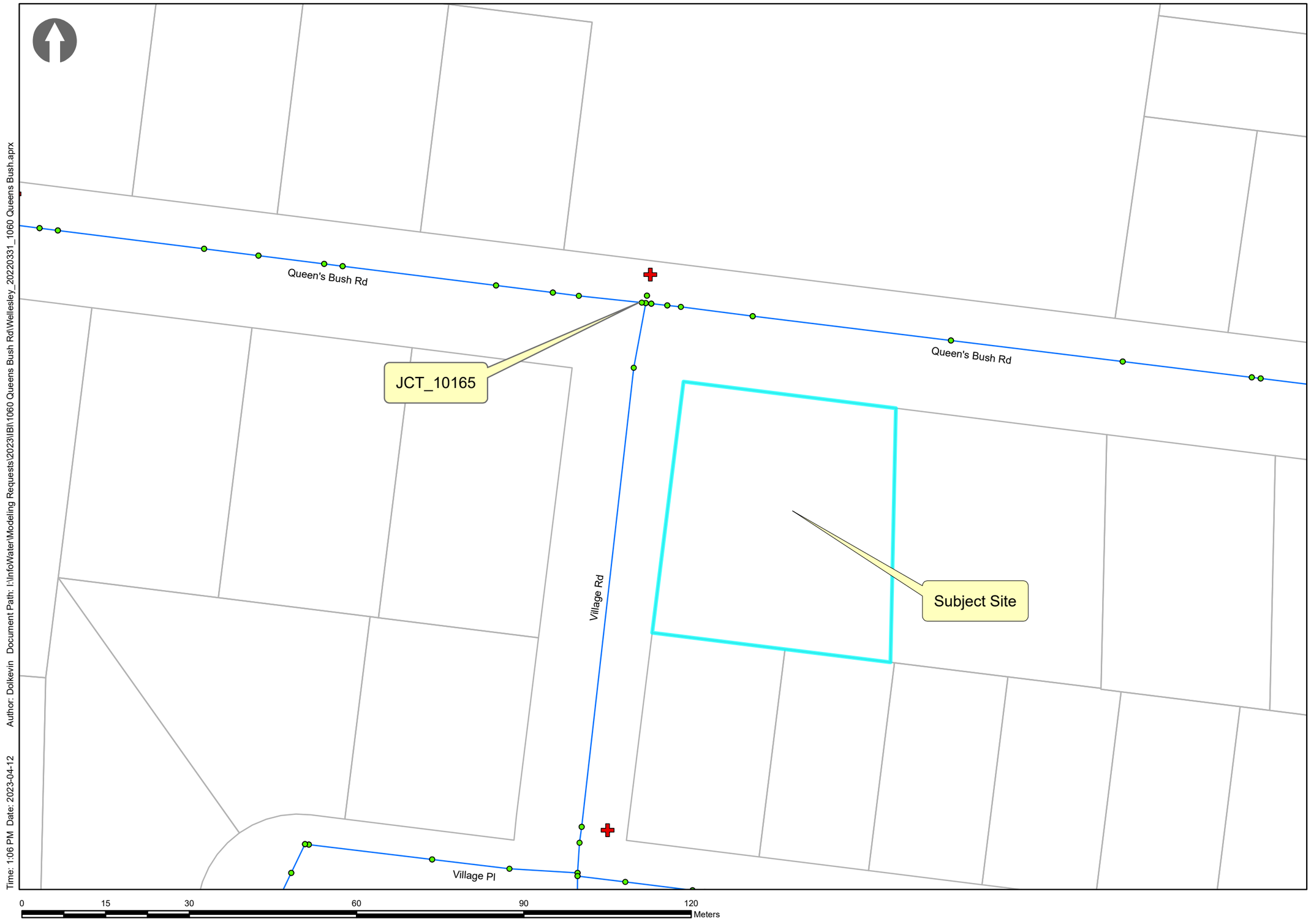
Fire Flow Node:	JCT_10165
Design Flow (L/s):	72.2
Design Pressure (m):	14.9

Design Flow: *The final adjusted flow at the node to maintain the minimum desigr pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Design Pressure: *The lowest allowable pressure at the node to maintain the minimum desigr pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Critical Node ID: *The constraining node within the pressure zone that drops to the minimum desigr pressure of (14m (140 kPa)) during the design flow.*





Author: Dolkevin Document Path: I:\InfoWater\Modeling Requests\2023\IBI\1060 Queens Bush Rd\Wellesley_20220331_1060 Queens Bush.aprx
Time: 1:06 PM Date: 2023-04-12

Region of Waterloo

TRANSPORTATION AND ENVIRONMENTAL SERVICES

Water Services

150 Frederick Street
Kitchener ON Canada N2G 4J3
Telephone: (519) 575-4426
Fax: (519) 575-4452
www.regionofwaterloo.ca

Legend

Junction
TYPE
- Active
- Domain

Tank
TYPE
- Active
- Domain

Reservoir
TYPE
- Active
- Domain

Pump
TYPE
- Active
- Domain

Valve
TYPE
- Active
- Domain

Pipe
TYPE
- Active
- Domain

Roads
- Highway
- Arterial/Collector
- Local
- Private

- Assessment Parcels (MPAC)
- Hydrants (Water)
- Junctions (Water)
- Mains (Water)
- Valves (Water)

1060 Queens Bush Rd
Wellesley

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KITCHENER LOCATION
1415 Huron Rd., Unit 225
Kitchener, ON N2R 0L3
P: 519-725-8093

www.sbmltd.ca

sbm@sbmltd.ca

27 July 2023

SBM-23-0925

Water and Wastewater Services
Region of Waterloo

Attn: Kevin Dolishny, P. Eng.
Senior Engineer

Re: Water Supply for Fire-Fighting Design Brief
Bradley & Company
Proposed Stacked Townhouse – 12 units
1060 Queens Bush Road, Wellesley, Ontario

1. INTRODUCTION

This Water Supply for Fire-Fighting Design Brief (Brief) has been prepared by Strik, Baldinelli, Moniz Ltd. (SBM) to address the water supply for fire-fighting for the proposed redevelopment which consists of a 12-unit residential stacked townhouse building with associated surface parking and landscaped areas, in the Township of Wellesley (Township), Region of Waterloo (Region), Ontario. This Brief is intended to represent a component of the overall planning application package to be submitted to the Township and Region and should be read in conjunction with all other submitted documents.

2. WATER SUPPLY FOR FIRE-FIGHTING

2.1 General Considerations

Based on the email communication from the Region of Waterloo provided in Appendix A, the Region's water distribution infrastructure model indicates a maximum flow of 72.2 L/s can be provided while maintaining the minimum design pressure of 14 m (140 kPa, 20 psi) at all nodes within the pressure zone. We understand the Region's model was used instead of a hydrant flow test due to ongoing construction which would impact the reliability of the hydrant flow testing results. Fire flow calculations were conducted based on Water Supply for Public Fire Protection (WSPFP) (Fire Underwriters Survey, 2020) and Site information is based on the Site Plan prepared by IBI Group, Project No 141040 dated 2023-06-09, provided in Appendix A.

The maximum day domestic water demand of 0.89 L/s was calculated based on average day demand of 225 L/day/cap as per Region of Waterloo and Area Municipalities – Design Guidelines and Supplemental Specifications for Municipal Services (February 2023) (DGSSMS) and population and maximum day peaking factor from Table 3-3 of Ministry of Environment, Conservation and Parks (MECP) – Design Guidelines for Drinking-Water Systems (DSDWS). Please refer to Domestic Water Demand Calculation provided in Appendix B for details.

As the bounding capacity of the system was confirmed by the Region, different design options were reviewed to reduce the required flow rate during fight fighting condition. These options include changes to the type of construction (whereas wood frame construction (Type V) is the typical construction type for stacked townhomes) and subdividing the building by providing vertical firewall(s) with a fire resistance rating of not less than 2 hours between units. This method of determining the total effective area is outlined on page 22 of WSPFP. Please find except of the FUS – WSPFP 2020 where different types of constructions are listed and defined as well as Total Effective Area (A), provided in Appendix A.

2.2 Fire Fighting Flow

Using the method outlined in WSPFP, an initial fire-fighting demand calculation was undertaken which assumed the townhouse building to be of wood frame (Type V) construction, no fire walls, limited combustible contents, no sprinkler system, and exposure adjustment charges based on separation distance from adjacent buildings. Based on the above criteria, total flow required during fire-fighting plus maximum daily demand of 168 L/s was calculated.

As this is greater than the available 72.2 L/s, seven different options were considered. Please refer to definition of construction types within the excerpt of WSPFP provided in Appendix A.

- Option 1a – Wood frame construction with three (3) fire walls
- Option 1b – Ordinary construction with three (3) fire walls
- Option 1c – Non-Combustible construction with one (1) fire wall

- Option 2a – Wood frame construction without fire wall but with NFPA Standard Sprinkler
- Option 2b – Ordinary construction without fire wall but with NFPA Standard Sprinkler
- Option 2c – Ordinary construction without fire wall but with NFPA Standard Sprinkler (fully supervised)

- Option 3a – Wood frame construction with three (3) fire walls and NFPA Standard Sprinkler

As per the fire flow calculations provided in Appendix B for all seven options, the required flow rates below the available maximum 72.2 L/s can be achieved with options 1b, 1c, 2C, and 3a (68 L/s). Please refer to detailed calculations of all options provided in Appendix B.

This analysis was undertaken using the maximum 72.2 L/s provided by the Region. If the watermain infrastructure construction is completed prior to a later planning or permitting stage, a hydrant flow test could be undertaken which may result in a different maximum available water supply and subsequent recommendations.

3. LIMITATIONS

This Brief was prepared by SBM for the Township of Wellesley, Region of Waterloo, and Bradley & Company. Use of this Brief by any third party, or any reliance upon its findings, is solely the responsibility of that party. SBM accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions undertaken as a result of this Brief. Third party use of this Brief, without the express written consent of the Consultant, denies any claims, whether in contract, tort, and/or any other cause of action in law, against the Consultant.

All findings and conclusions presented in this Brief are based on site conditions as they appeared during the period of the investigation. This Brief is not intended to be exhaustive in scope, or to imply a risk-free facility. It should be recognized that the passage of time may alter the opinions, conclusions, and recommendations provided herein.

The design was limited to the documents referenced above. SBM accepts no responsibility for the accuracy of the information provided by others. All designs and recommendations presented in this Brief are based on the information available at the time of the review.

4. CLOSURE

We trust this Brief meets your satisfaction. Should you have any questions or require further information, please do not hesitate to contact us.

Respectfully submitted,

Strik, Baldinelli, Moniz Ltd.

Planning • Civil • Structural • Mechanical • Electrical

Ben Hyland, P.Eng., PMP
Civil Project & Team Lead, Eng. III
Associate I

Juduk Lee, EIT
Civil Engineering Trainee III

Cloe Maw, EIT
Civil Engineering Trainee I

APPENDIX A

Email Communication from Region of Waterloo – Available Capacity 72.2 L/s
Site Plan prepared by IBI Group, Project No 141040 dated 2023-06-09
Excerpt of FUS – WSPFP 2020

Region of Waterloo

ENGINEERING AND ENVIRONMENTAL SERVICES
Water and Wastewater Services
150 Frederick Street 7th Floor
Kitchener Ontario N2G 4J3 Canada
Telephone: 519-575-4400; TTY: 519-575-4608
Email: waterservices@regionofwaterloo.ca
www.regionofwaterloo.ca/water

Mohammad Meqdad, P.Eng.
Arcadis/IBI Group
410 Albert St, Suite 101
Waterloo, ON N2L 3V3
mohammad.meqdad@ibigroup.com

Date: April 13, 2023

Dear: Mohammad

Re: 1060 Queens Bush Road, Wellesley

Please find the results of the modeling simulations for boundary conditions for 1060 Queens Bush Road in lieu of a hydrant flow test. The results include a figure showing the location of the node from the Region's model. Attached are a series of spreadsheets containing results for Average Day, Maximum Day demands and available fire flows for node JCT_10165 located Queens Bush Rd and Village Rd. The diurnal 24-hour demand distribution accounts for the minimum hour and peak hour peaking factors. The maximum pressure on the average day represents the minimum hour, and the minimum pressure on the maximum day represents the peak hour.

Table 1 – Modeling Results

Node	Elevation (mASL)	Demand		Fire Flow Results	
		Ave Day (L/s)	Max Day (L/s)	Design Flow (L/s)	Design Pressure (m)
JCT_10165	366.0	0.0	0.0	72.2	14.9

A fire flow analysis shows the maximum flow available at a node with an associated design pressure during the maximum day scenario while maintaining the minimum design pressure of 14 m (140 kPa) at all nodes within the pressure zone.

If you have any questions, please contact me

Kevin Dolishny P.Eng.
Senior Engineer, Water Services
c. 226.751.4551
e. kdolishny@regionofwaterloo.ca

c. Jeff Hayhurst, Stumpf Fire Protection Limited

Wellesley\

JCT_10165 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.02	419.93	53.93
01:00 hrs	0.02	420.07	54.07
02:00 hrs	0.02	419.97	53.97
03:00 hrs	0.02	419.77	53.77
04:00 hrs	0.02	419.79	53.79
05:00 hrs	0.02	419.88	53.88
06:00 hrs	0.03	419.59	53.59
07:00 hrs	0.03	419.02	53.02
08:00 hrs	0.04	418.79	52.79
09:00 hrs	0.04	418.72	52.72
10:00 hrs	0.04	418.79	52.79
11:00 hrs	0.04	418.86	52.86
12:00 hrs	0.03	418.93	52.93
13:00 hrs	0.03	419.01	53.01
14:00 hrs	0.03	419.18	53.18
15:00 hrs	0.03	419.24	53.24
16:00 hrs	0.03	419.09	53.09
17:00 hrs	0.03	418.95	52.95
18:00 hrs	0.04	418.77	52.77
19:00 hrs	0.04	418.38	52.38
20:00 hrs	0.05	418.00	52.00
21:00 hrs	0.05	417.97	51.97
22:00 hrs	0.04	418.77	52.77
23:00 hrs	0.03	419.42	53.42

Average Day HGL:	419.12
Minimum Hour:	420.07

JCT_10165 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.04	426.42	60.42
01:00 hrs	0.03	412.24	46.24
02:00 hrs	0.04	411.62	45.62
03:00 hrs	0.04	409.87	43.87
04:00 hrs	0.04	409.49	43.49
05:00 hrs	0.04	409.24	43.24
06:00 hrs	0.05	407.29	41.29
07:00 hrs	0.07	422.73	56.73
08:00 hrs	0.08	421.84	55.84
09:00 hrs	0.08	421.23	55.23
10:00 hrs	0.08	421.18	55.18
11:00 hrs	0.08	421.61	55.61
12:00 hrs	0.07	422.30	56.30
13:00 hrs	0.07	422.38	56.38
14:00 hrs	0.07	422.73	56.73
15:00 hrs	0.07	422.98	56.98
16:00 hrs	0.07	422.73	56.73
17:00 hrs	0.07	422.19	56.19
18:00 hrs	0.08	421.09	55.09
19:00 hrs	0.09	419.93	53.93
20:00 hrs	0.10	419.49	53.49
21:00 hrs	0.10	419.62	53.62
22:00 hrs	0.08	421.57	55.57
23:00 hrs	0.06	423.97	57.97

Maximum Day HGL:	418.99
Peak Hour:	407.29

Available Flow (L/s)	Residual Pressure (m)
0.0	56.3
5.0	54.0
10.0	52.3
15.0	50.7
20.0	49.2
25.0	47.5
30.0	45.8
35.0	44.3
40.0	42.1
45.0	39.6
50.0	36.2
55.0	32.2
60.0	28.2
65.0	23.9
70.0	17.7
72.2	14.9

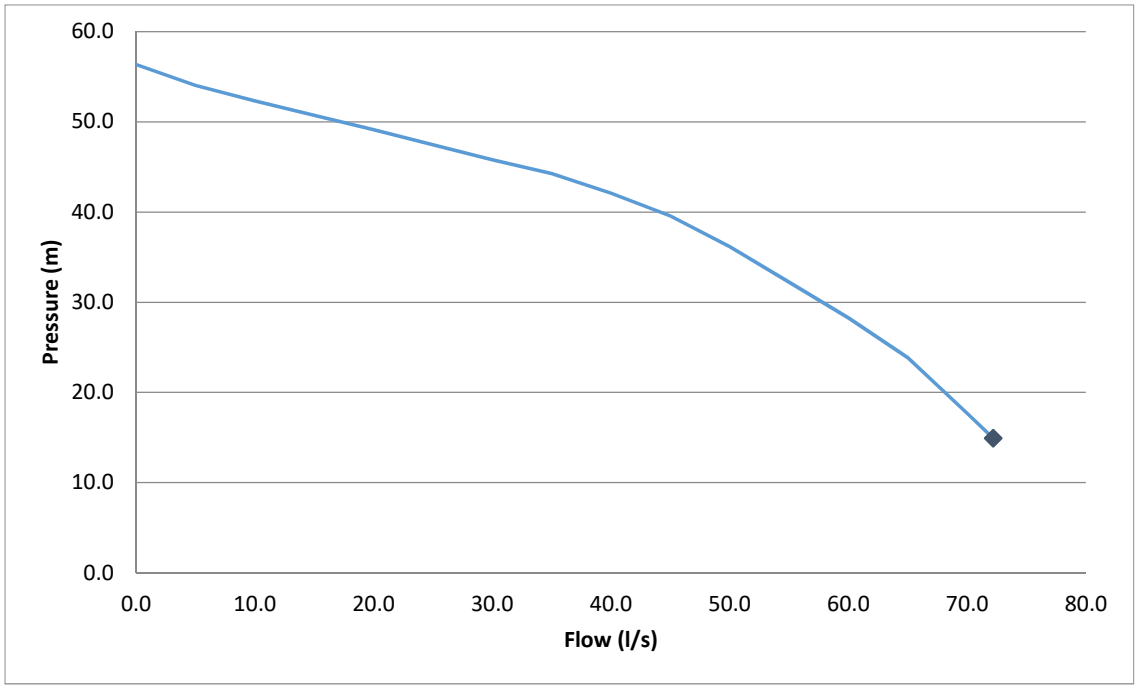
Fire Flow Analysis

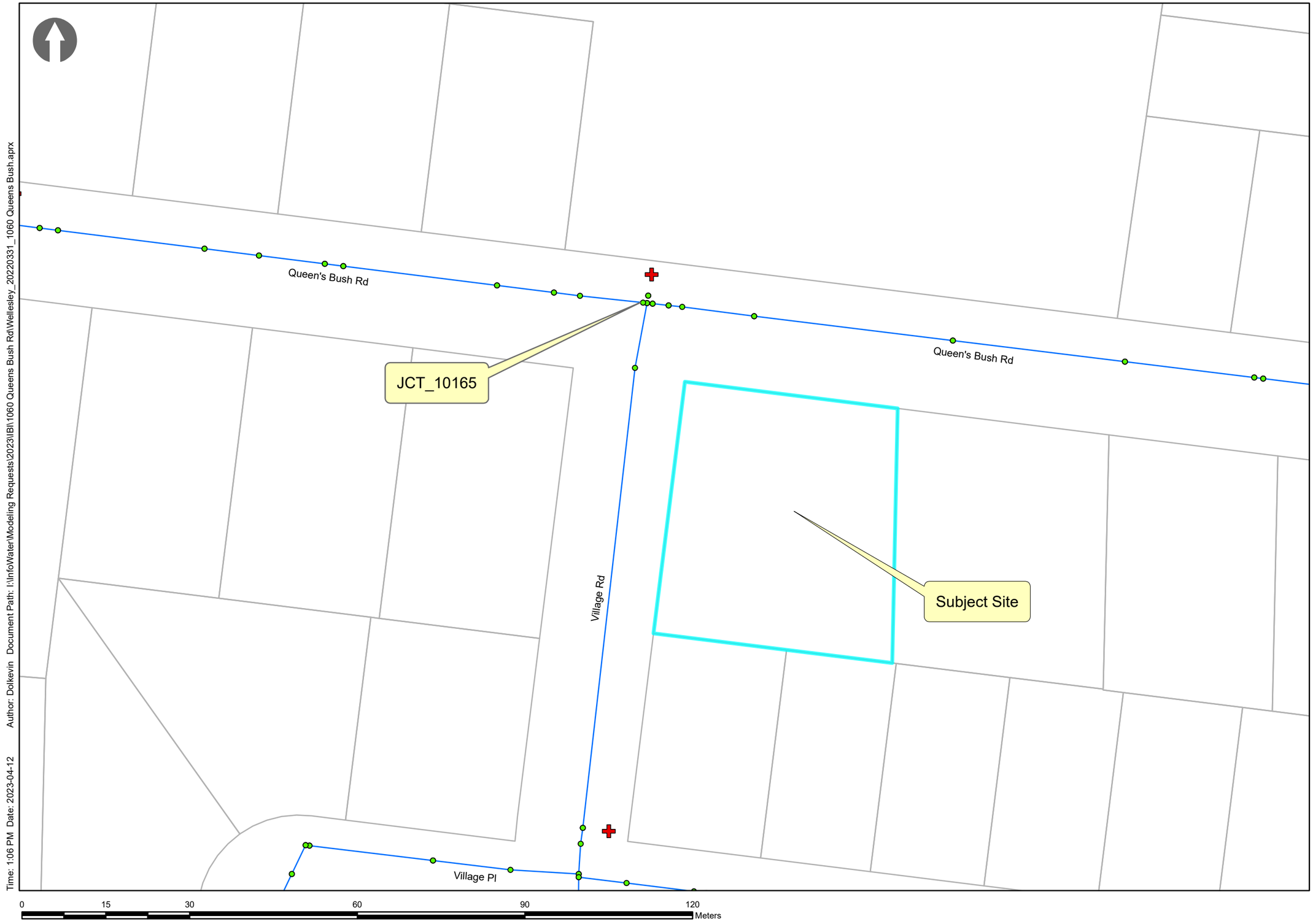
Fire Flow Node:	JCT_10165
Design Flow (L/s):	72.2
Design Pressure (m):	14.9

Design Flow: *The final adjusted flow at the node to maintain the minimum desigr pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Design Pressure: *The lowest allowable pressure at the node to maintain the minimum desigr pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Critical Node ID: *The constraining node within the pressure zone that drops to the minimum desigr pressure of (14m (140 kPa)) during the design flow.*





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Region of Waterloo

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Legend

Junction
TYPE
- Active
- Domain

Tank
TYPE
- Active
- Domain

Reservoir
TYPE
- Active
- Domain

Pump
TYPE
- Active
- Domain

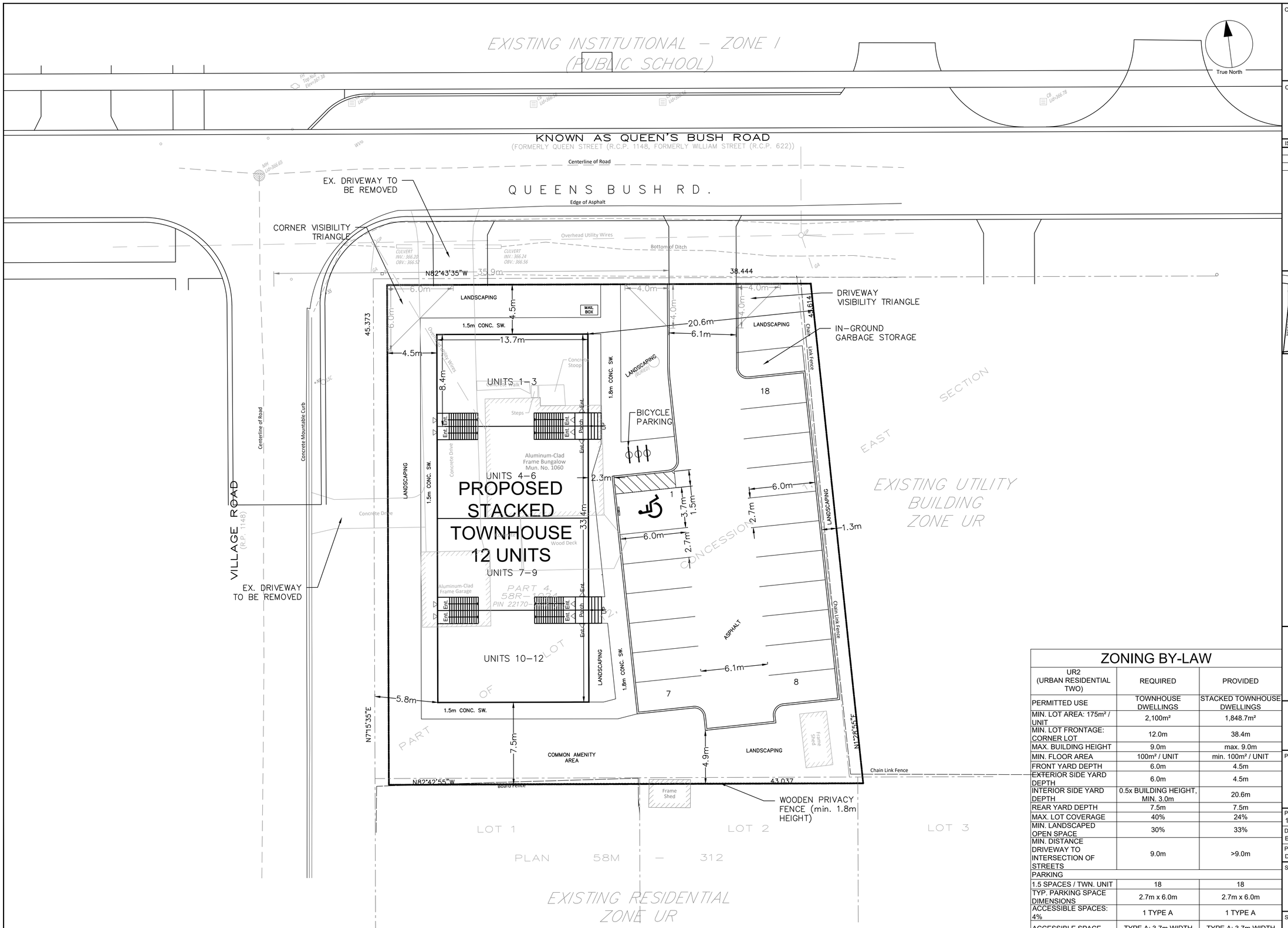
Valve
TYPE
- Active
- Domain

Pipe
TYPE
- Active
- Domain

Roads
- Highway
- Arterial/Collector
- Local
- Private

- Assessment Parcels (MPAC)
- Hydrants (Water)
- Junctions (Water)
- Mains (Water)
- Valves (Water)

1060 Queens Bush Rd
Wellesley



ZONING BY-LAW

UR2 (URBAN RESIDENTIAL TWO)	REQUIRED	PROVIDED
PERMITTED USE	TOWNHOUSE DWELLINGS	STACKED TOWNHOUSE DWELLINGS
MIN. LOT AREA: 175m² / UNIT	2,100m²	1,848.7m²
MIN. LOT FRONTAGE: CORNER LOT	12.0m	38.4m
MAX. BUILDING HEIGHT	9.0m	max. 9.0m
MIN. FLOOR AREA	100m² / UNIT	min. 100m² / UNIT
FRONT YARD DEPTH	6.0m	4.5m
EXTERIOR SIDE YARD DEPTH	6.0m	4.5m
INTERIOR SIDE YARD DEPTH	0.5x BUILDING HEIGHT, MIN. 3.0m	20.6m
REAR YARD DEPTH	7.5m	7.5m
MAX. LOT COVERAGE	40%	24%
MIN. LANDSCAPED OPEN SPACE	30%	33%
MIN. DISTANCE DRIVEWAY TO INTERSECTION OF STREETS	9.0m	>9.0m
PARKING		
1.5 SPACES / TWN. UNIT	18	18
TYP. PARKING SPACE DIMENSIONS	2.7m x 6.0m	2.7m x 6.0m
ACCESSIBLE SPACES: 4%	1 TYPE A	1 TYPE A
ACCESSIBLE SPACE WIDTH	TYPE A: 3.7m WIDTH 1.5m ACCESS AISLE	TYPE A: 3.7m WIDTH 1.5m ACCESS AISLE

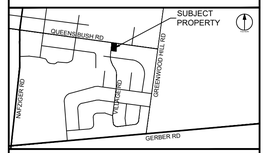
CLIENT

BRADLEY & CO

1060 QUEENS BUSH ROAD

ISSUES

No.	DESCRIPTION	DATE
1	SITE PLAN SUBMISION	2023-01-26
2	REVISED - TOWNSHIP COMMENTS	2023-06-09



IBI GROUP
Suite 101 - 410 Albert Street
Waterloo ON N2L 3V3 Canada
tel 519 585 2255
ibigroup.com

PROJECT

1060 QUEENS BUSH ROAD

TOWNSHIP OF WELLESLEY

PROJECT NO:	SCALE:
141040	1 : 150
DRAWN BY: E.T.	CHECKED BY: C.T.
PROJECT MGR: D.W.S.	APPROVED BY: D.W.S.

SHEET TITLE

SITE PLAN

SHEET NUMBER	ISSUE
SP1	01

SCALE CHECK 1 in 10mm

File Location: J:\141040_1060_Queens_\7.0_Production\7.03_Design\17_Planning\Sheets\141040_SP.dwg Last Saved: June 9, 2023, by emma.tilley Plotted: Friday, June 9, 2023 10:17:13 AM by Emma Tilley

Construction Coefficient (C)

Note that the construction typology used by the insurance industry and public fire protection differs from the terms of reference in the National Building Code of Canada (NBC).

The following Construction Types and Coefficients are used in the required fire flow formula:

C	=	1.5 for **Type V** Wood Frame Construction
	=	0.8 for **Type IV-A** Mass Timber Construction
	=	0.9 for **Type IV-B** Mass Timber Construction
	=	1.0 for **Type IV-C** Mass Timber Construction
	=	1.5 for **Type IV-D** Mass Timber Construction
	=	1.0 for **Type III** Ordinary Construction
	=	0.8 for **Type II** Noncombustible Construction
	=	0.6 for **Type I** Fire Resistive Construction

When determining the predominate Construction Coefficient of a building, the following reference terms are used by fire underwriters and fire departments.

Wood Frame Construction (Type V)
A building is considered to be of Wood Frame construction (Type V) when structural elements, walls, arches, floors, and roofs are constructed entirely or partially of wood or other material.

Note: Includes buildings with exterior wall assemblies that are constructed with any materials that do not have a fire resistance rating that meets the acceptance criteria of CAN/ULC-S114. May include exterior surface brick, stone, or other masonry materials where they do not meet the acceptance criteria.

Mass Timber (Type IV)
Mass timber construction, including Encapsulated Mass Timber, Heavy Timber and other forms of Mass Timber are considered as one of the following sub-types relating to the fire resistance ratings of assemblies as follows:

- Type IV-A (Encapsulated Mass Timber)
    - A building is considered to be of Mass Timber Type IV-A (Encapsulated Mass Timber) construction when structural elements, walls, arches, and floors have a minimum 2-hour fire resistance rating and the roof has a minimum 1 hour fire resistance rating. Additionally all elements of the building must meet the requirements set out for Encapsulated Mass Timber Construction within the 2020 National Building Code of Canada . For types of mass timber construction that do not fully meet these criteria, treat as Type IV-B, Type IV-C or Type IV-D.
- Type IV-B (Rated Mass Timber)
    - A building is considered to be of Mass Timber Type IV-B (Rated Mass Timber) construction when the building assemblies include mass timber construction elements and all structural elements, exterior walls, interior bearing walls and roof have a minimum 1-hour fire resistance rating.

- Type IV-C (Ordinary Mass Timber)
    - A building is considered to be of Mass Timber Type IV-C (Partially Rated Mass Timber) construction when exterior walls are of Mass Timber construction with a minimum 1-hour fire resistance rating. Other structural elements, interior bearing walls and the roof may not have a fire resistance rating.
- Type IV-D (Un-Rated Mass Timber)
    - A building is considered to be of Mass Timber Type IV-D (Un-Rated Mass Timber) construction when exterior walls do not have a minimum 1-hour fire resistance rating, regardless of the fire resistance rating of other structural elements, interior bearing walls and the roof.

Ordinary Construction (Type III also known as joisted masonry)

A building is considered to be of Ordinary construction (Type III) when exterior walls are of masonry construction (or other approved material) with a minimum 1-hour fire resistance rating, but where other elements such as interior walls, arches, floors and/or roof do not have a minimum 1 hour fire resistance rating.

Noncombustible Construction (Type II)

A building is considered to be of Noncombustible construction (Type II) when all structural elements, walls, arches, floors, and roofs are constructed with a minimum 1-hour fire resistance rating and are constructed with noncombustible materials.

Fire-Resistive Construction (Type I)

A building is considered to be of Fire-resistive construction (Type I) when all structural elements, walls, arches, floors, and roofs are constructed with a minimum 2-hour fire resistance rating, and all materials used in the construction of the structural elements, walls, arches, floors, and roofs are constructed with noncombustible materials.

Items of Note Regarding Construction Coefficients

i. Unprotected noncombustible construction (example unprotected steel) should be considered within ordinary construction or noncombustible construction based on the minimum fire resistance rating of the structural elements, exterior walls, and interior bearing walls;
    - If minimum fire resistance rating of exterior walls is 1 hr, apply Ordinary Construction Coefficient (1.0)
    - If minimum fire resistance rating of all structural elements, walls, arches, floors, and roofs is 1 hr, apply Noncombustible Construction Coefficient (0.8).

ii. If a building cannot be defined within a single Construction Coefficient, the Construction Coefficient is determined by the predominate Construction Coefficient that makes up more than 66% or over of the Total Floor Area.

Total Effective Area (A)

To determine a required fire flow for an individual building, the Total Effective Area that would be affected during the design fire must be determined. The Total Effective Area is the largest Floor Area (in square metres) plus the following percentages of the total area of the other floors:

1) For a building classified with a Construction Coefficient from 1.0 to 1.5:
   a) 100% of all Floor Areas are considered in determining the Total Effective Area to be used in the formula.
2) For a building classified with a Construction Coefficient below 1.0:
   a) if any vertical openings in the building (ex. interconnected floor spaces, atria, elevators, escalators, etc.) are unprotected, consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight; or
   b) if all vertical openings and exterior vertical communications are properly protected in accordance with the National Building Code, consider only the single largest Floor Area plus 25% of each of the two immediately adjoining floors.

Protection requirements:

The protection requirements for vertical openings are only applicable in buildings with a Construction Coefficient below 1.0. The type of protection for vertical openings shall be based on the construction of the enclosure walls and the type of opening or other device used for the protection of openings in the enclosure. See also NBC Division B, Section 3.5. Vertical Transportation.

Protected openings:

i. Enclosures shall have walls of masonry or other limited or noncombustible construction with a fire resistance rating of not less than one hour.
ii. Openings including doors shall be provided with automatic closing devices
iii. Elevator doors shall be of metal or metal-covered construction, so arranged that the doors must normally be closed for operation of the elevator.

Unprotected openings:

i. Any opening through horizontal separations that are unprotected or otherwise have closures that do not meet the minimum requirements for protected openings, above.

High One Storey Buildings

When a building has large single storey spaces (ex. warehouses, atria, etc.) exceeding 3 m in height, the number of storeys to be used in determining the total effective area depends upon the use being made of the building. For example, consider a 1=3 storey building. If the building is being used for high piled stock, or for rack storage, the building would be considered as 3 storeys. However, if the building is being used for steel fabrication and the extra height is provided only to facilitate movement of objects by a crane, the building should be considered as a one storey.

Each normal height (3m) storey included in the formula provides for additional fire loading. In the case of normal height storeys this fire loading comes from the structure, walls, floors, ceilings/roofs as well as the contents.

Subdividing Buildings (Vertical Firewalls)

In determining Total Effective Area, a building may be subdivided if a vertical firewall with a fire-resistance rating of not less than 2 hours, and meeting the requirements of the National Building Code exists. If the firewall is properly constructed and all openings are properly protected in accordance with the NBC, then the boundary can be treated as protected with no exposure charge.

Notes:

1. If there is a severe risk of fire on the exposed side of the firewall due to hazard conditions, a charge of up to 10% may be applied at the discretion of the Authority Having Jurisdiction or design engineer determining required fire flows.
2. If there are unprotected openings (or improperly protected) in the firewall, then the severity of the exposure in relation to the subject building should be considered (ex. percentage of openings, distance to exposure, combustibility of exposure, etc.) and an exposure charge of up to 10% may be applied.

Basements

Basement floor area is excluded from the Total Effective Area when the basement is at least 50% below grade in the building being considered.

Open Parking Garages

For open parking garages, use the area of the largest floor as the Total Effective Area.

APPENDIX B

Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Typical
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 1a
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 1b
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 1c
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 2a
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 2b
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 2c
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 3a

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Kitchener, ON N2R 0L3
P: 519-725-8093

www.sbmltd.ca

sbm@sbmltd.ca

Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Typical

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Typical Building Design

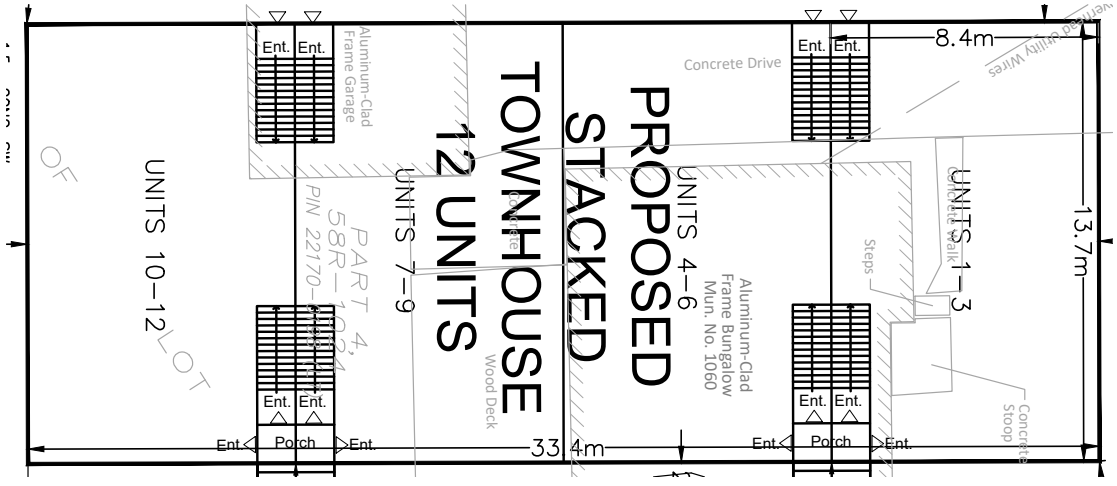
$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Wood-Frame**	**1.5**		
Total Effective Floor Area, m^2:	Area of all subdivided floors =	915.24	m^2	
		915.24		
	Baseline Fire Flow, L/min	9983		
	***Baseline Fire Flow to the nearest 1,000 L/min**	**10000**		
Fire Hazard of Contents:	**Limited Combustible**	**0.85**		
		8500.0		
Sprinkler Modification:	**No**	**0.0**		
		0.0		

Separation, Side 1 (North):	**> 30m**	0%
Separation, Side 2 (East):	**20.1 to 30m**	10%
Separation, Side 3 (South):	**20.1 to 30m**	10%
Separation, Side 4 (West):	**> 30m**	0%

Sum of Separation Coefficients (Shall Not Exceed 75%:)	**20%**			
	1700.0			
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)	10200			
***Required Supply Flow Rate, L/min =**	**10000**	=	167	L/s
Plus Maximum Daily Water Demand		=	1.34	L/s
Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**168**	L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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KITCHENER LOCATION
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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 1a

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

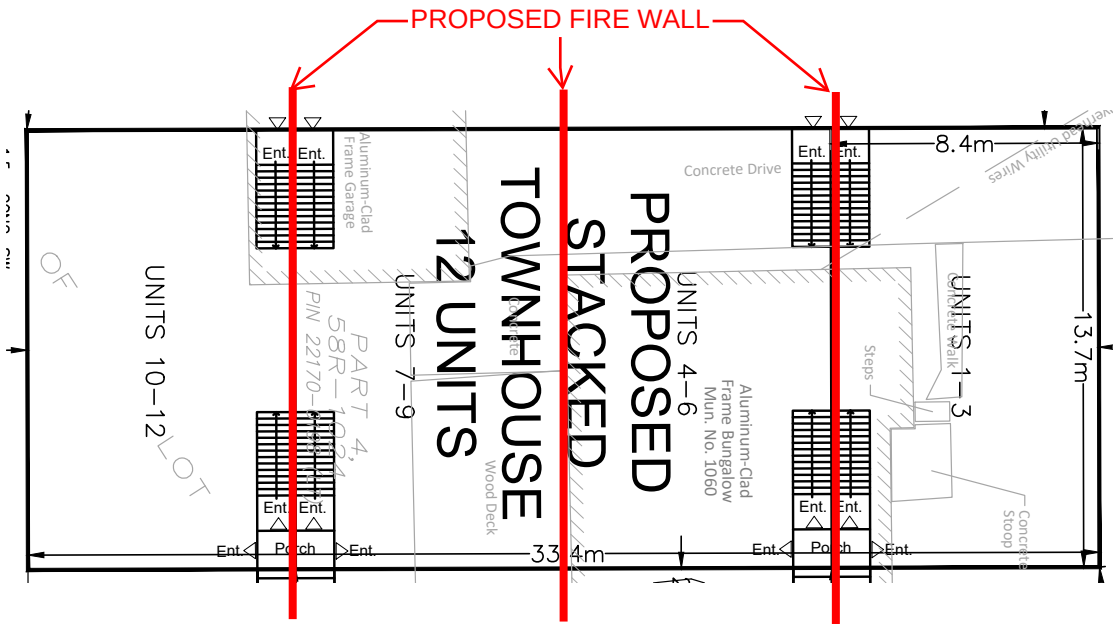
Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 1a - Wood Frame Construction w/ Three (3) Fire Walls

$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Wood-Frame**		**1.5**	
Total Effective Floor Area, m^2:	Area of all subdivided floors =		228.81	m^2
			228.81	
	Baseline Fire Flow, L/min		4992	
	***Baseline Fire Flow to the nearest 1,000 L/min**		**5000**	
Fire Hazard of Contents:	**Limited Combustible**		**0.85**	
			4250.0	
Sprinkler Modification:	**No**		**0.0**	
			0.0	
Separation, Side 1 (North):	**> 30m**	0%		
Separation, Side 2 (East):	**20.1 to 30m**	10%		
Separation, Side 3 (South):	**20.1 to 30m**	10%		
Separation, Side 4 (West):	**> 30m**	0%		
Sum of Separation Coefficients (Shall Not Exceed 75%:)			**20%**	
			850.0	
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)			5100	
***Required Supply Flow Rate, L/min =**	**5000**	=	83	L/s
Plus Maximum Daily Water Demand		=	1.34	L/s
Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**85**	L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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P: 519-725-8093

www.sbmltd.ca

sbm@sbmltd.ca

Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 1b

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 1b - Ordinary Construction w/ Three (3) Fire Walls

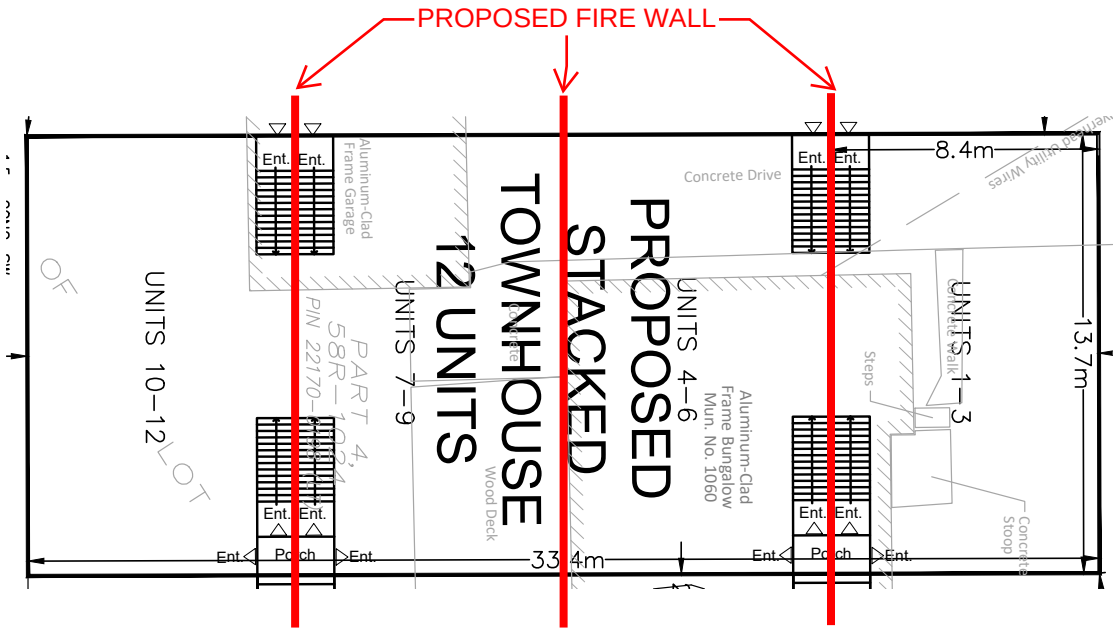
$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Ordinary**	**1.0**		
Total Effective Floor Area, m^2:	Area of all subdivided floors =	228.81	m^2	
		228.81		
	Baseline Fire Flow, L/min	3328		
	***Baseline Fire Flow to the nearest 1,000 L/min**	**4000**		
Fire Hazard of Contents:	**Limited Combustible**	**0.85**		
		3400.0		
Sprinkler Modification:	**No**	**0.0**		
		0.0		

Separation, Side 1 (North):	**> 30m**	0%	
Separation, Side 2 (East):	**20.1 to 30m**	10%	
Separation, Side 3 (South):	**20.1 to 30m**	10%	
Separation, Side 4 (West):	**> 30m**	0%	
Sum of Separation Coefficients (Shall Not Exceed 75%:)		**20%**	
		680.0	

F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)		4080		
***Required Supply Flow Rate, L/min =**	**4000**	=	67	L/s
Plus Maximum Daily Water Demand		=	1.34	L/s
Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**68**	L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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P: 519-471-6667

KITCHENER LOCATION
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Kitchener, ON N2R 0L3
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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 1c

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 1c - Non-Combustible Construction w/ one (1) Fire Wall

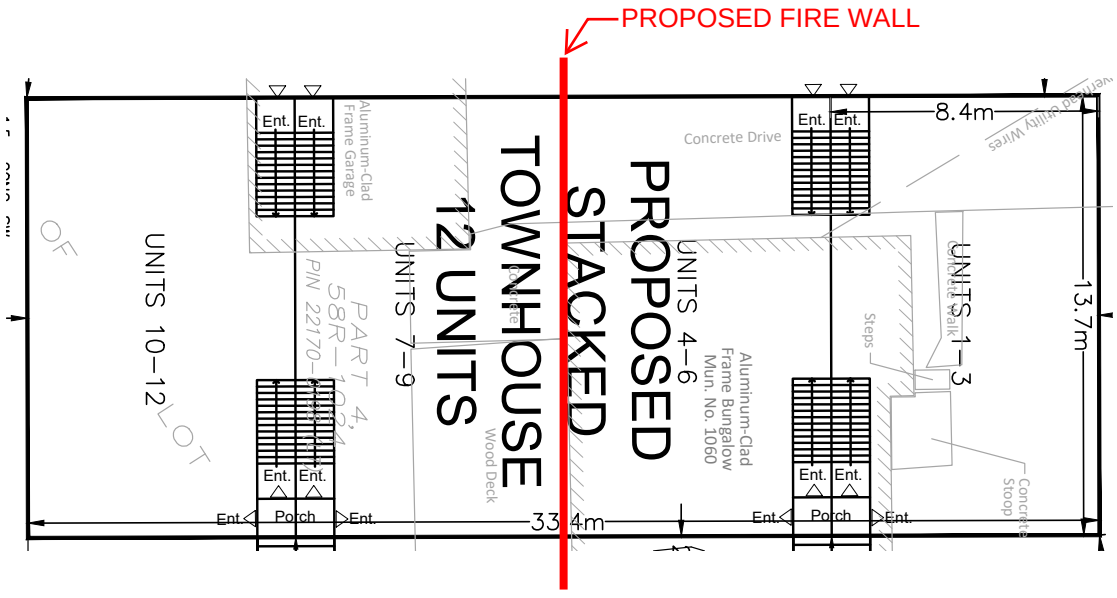
$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Non-Combustible**	**0.8**		
Total Effective Floor Area, m^2:	Area of all subdivided floors =	457.62	m^2	
		457.62		
	Baseline Fire Flow, L/min	3765		
	***Baseline Fire Flow to the nearest 1,000 L/min**	**4000**		
Fire Hazard of Contents:	**Limited Combustible**	**0.85**		
		3400.0		
Sprinkler Modification:	**No**	**0.0**		
		0.0		

Separation, Side 1 (North):	**> 30m**	0%
Separation, Side 2 (East):	**20.1 to 30m**	10%
Separation, Side 3 (South):	**20.1 to 30m**	10%
Separation, Side 4 (West):	**> 30m**	0%

Sum of Separation Coefficients (Shall Not Exceed 75%:)	**20%**			
	680.0			
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)	4080			
***Required Supply Flow Rate, L/min =**	**4000**	=	67	L/s
Plus Maximum Daily Water Demand		=	1.34	L/s
Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**68**	L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 2a

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

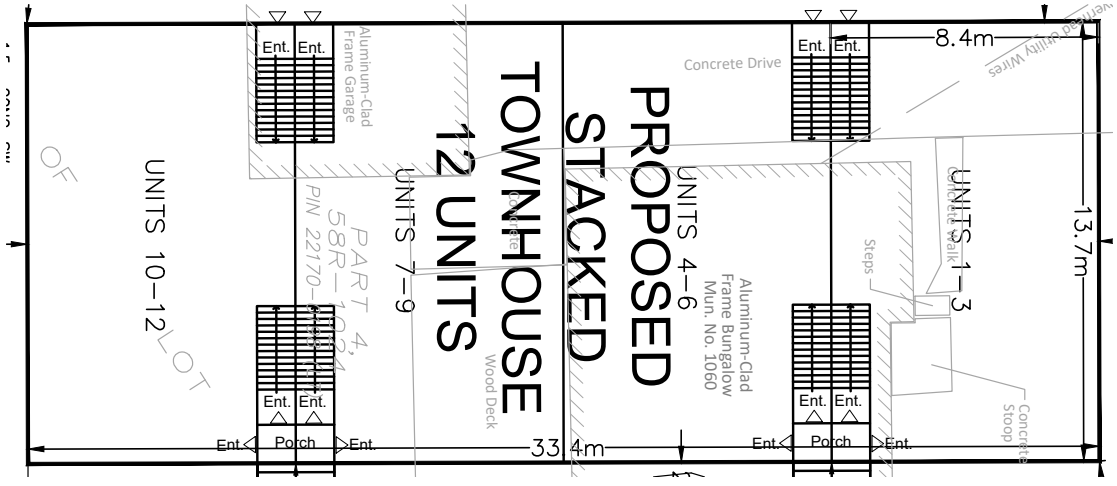
Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 2a - Wood Frame Construction w/o Fire Wall but w/ NFPA Standard Sprinkler

$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Wood-Frame**		**1.5**	
Total Effective Floor Area, m^2:	Area of all subdivided floors =		915.24	m^2
			915.24	
	Baseline Fire Flow, L/min		9983	
	***Baseline Fire Flow to the nearest 1,000 L/min**		**10000**	
Fire Hazard of Contents:	**Limited Combustible**		**0.85**	
			8500.0	
Sprinkler Modification:	**Yes - NFPA Standard**		**0.3**	
			-2550.0	
Separation, Side 1 (North):	**> 30m**	0%		
Separation, Side 2 (East):	**20.1 to 30m**	10%		
Separation, Side 3 (South):	**20.1 to 30m**	10%		
Separation, Side 4 (West):	**> 30m**	0%		
	Sum of Separation Coefficients (Shall Not Exceed 75%:)		**20%**	
			1700.0	
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)			7650	
	***Required Supply Flow Rate, L/min =**	**8000**	=	133 L/s
	Plus Maximum Daily Water Demand		=	1.34 L/s
	Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**135** L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 2b

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

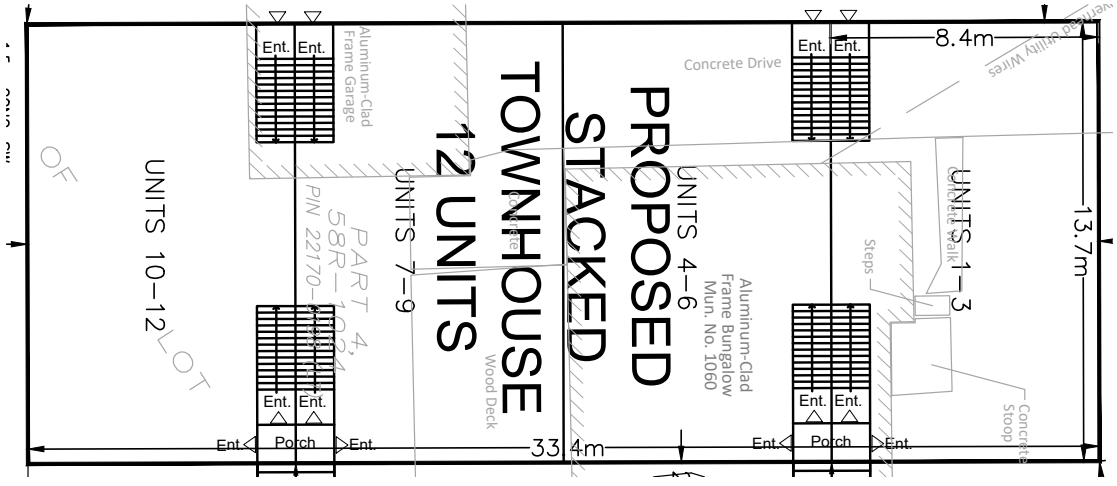
Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 2b - Ordinary Construction w/o Fire Wall but w/ NFPA Standard Sprinkler

$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Ordinary**		**1.0**	
Total Effective Floor Area, m^2:	Area of all subdivided floors =		915.24	m^2
			915.24	
	Baseline Fire Flow, L/min		6656	
	***Baseline Fire Flow to the nearest 1,000 L/min**		**7000**	
Fire Hazard of Contents:	**Limited Combustible**		**0.85**	
			5950.0	
Sprinkler Modification:	**Yes - NFPA Standard**		**0.3**	
			-1785.0	
Separation, Side 1 (North):	**> 30m**	0%		
Separation, Side 2 (East):	**20.1 to 30m**	10%		
Separation, Side 3 (South):	**20.1 to 30m**	10%		
Separation, Side 4 (West):	**> 30m**	0%		
	Sum of Separation Coefficients (Shall Not Exceed 75%:)		**20%**	
			1190.0	
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)			5355	
	***Required Supply Flow Rate, L/min =**	**5000**	=	83 L/s
	Plus Maximum Daily Water Demand		=	1.34 L/s
	Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**85** L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 2c

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

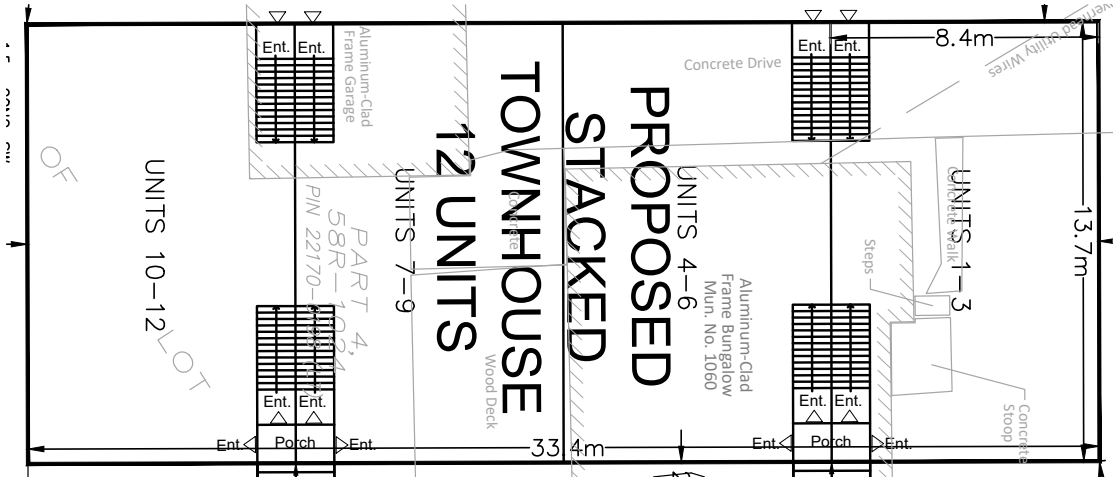
Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 2c - Ordinary Construction w/o Fire Wall but w/ NFPA Standard Sprinkler (Fully Supervised)

$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Ordinary**		**1.0**	
Total Effective Floor Area, m^2:	Area of all subdivided floors =		915.24	m^2
			915.24	
	Baseline Fire Flow, L/min		6656	
	***Baseline Fire Flow to the nearest 1,000 L/min**		**7000**	
Fire Hazard of Contents:	**Limited Combustible**		**0.85**	
			5950.0	
Sprinkler Modification:	**Yes - NFPA Standard (Fully Supervised)**		**0.5**	
			-2975.0	
Separation, Side 1 (North):	**> 30m**	0%		
Separation, Side 2 (East):	**20.1 to 30m**	10%		
Separation, Side 3 (South):	**20.1 to 30m**	10%		
Separation, Side 4 (West):	**> 30m**	0%		
	Sum of Separation Coefficients (Shall Not Exceed 75%:)		**20%**	
			1190.0	
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)			4165	
	***Required Supply Flow Rate, L/min =**	**4000**	=	67 L/s
	Plus Maximum Daily Water Demand		=	1.34 L/s
Total Flow required during Fire-Fighting + Maximum Daily Water Demand			=	**68** L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 3a

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

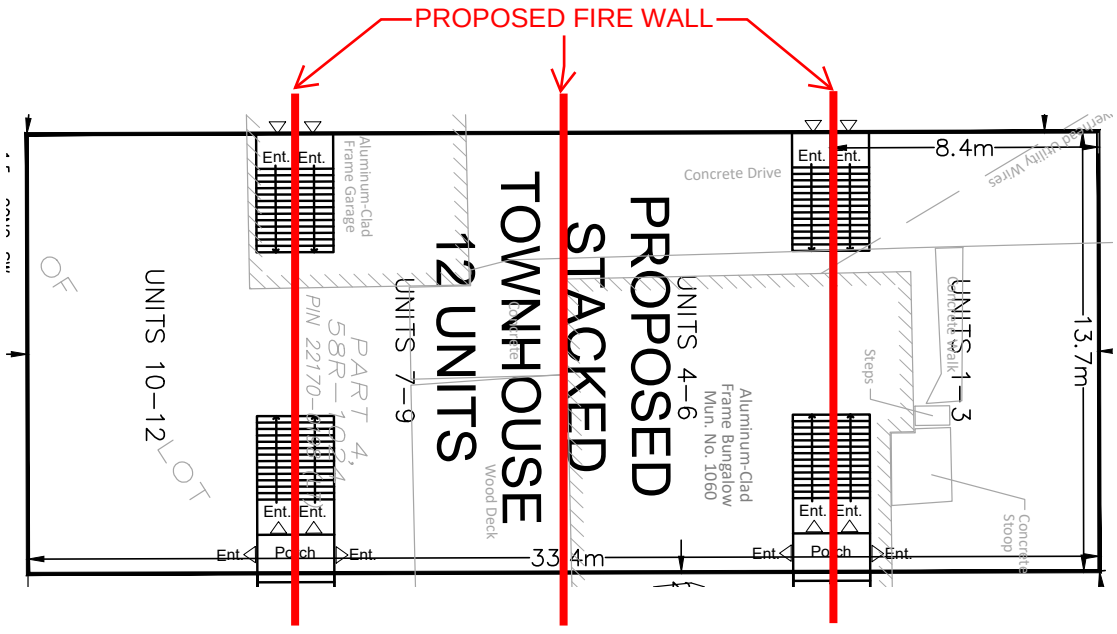
Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 3a - Wood Frame Construction w/ Three (3) Fire Walls and NFPA Standard Sprinkler

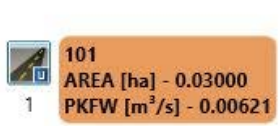
$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Wood-Frame**		**1.5**	
Total Effective Floor Area, m^2:	Area of all subdivided floors =		228.81	m^2
			228.81	
	Baseline Fire Flow, L/min		4992	
	***Baseline Fire Flow to the nearest 1,000 L/min**		**5000**	
Fire Hazard of Contents:	**Limited Combustible**		**0.85**	
			4250.0	
Sprinkler Modification:	**Yes - NFPA Standard**		**0.3**	
			-1275.0	
Separation, Side 1 (North):	**> 30m**	0%		
Separation, Side 2 (East):	**20.1 to 30m**	10%		
Separation, Side 3 (South):	**20.1 to 30m**	10%		
Separation, Side 4 (West):	**> 30m**	0%		
	Sum of Separation Coefficients (Shall Not Exceed 75%:)		**20%**	
			850.0	
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)			3825	
	***Required Supply Flow Rate, L/min =**	**4000**	=	67 L/s
	Plus Maximum Daily Water Demand		=	1.34 L/s
	Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**68** L/s

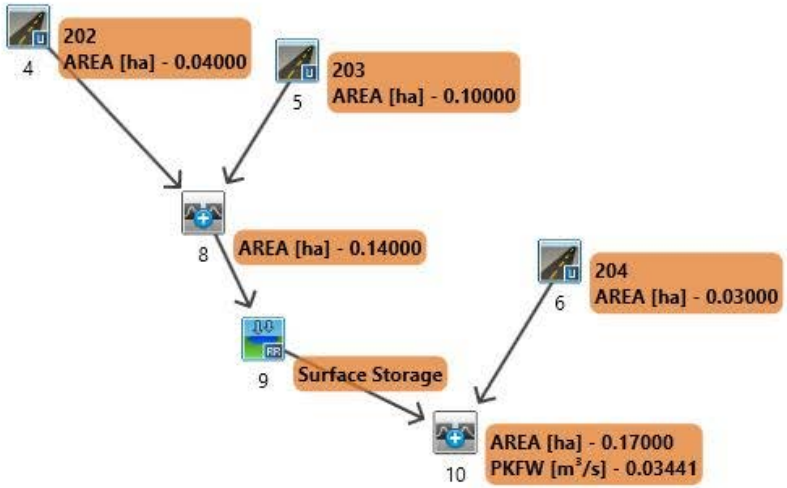
*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



141040 - 1060 Queens Bush Road, Wellesley ON
Visual OTTHYMO Modelling Schematic



Existing Conditions



Proposed Conditions

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

06/09/2023

Province:	Ontario
City:	Wellesley
Nearest Rainfall Station:	WATERLOO WELLINGTON AP
Climate Station Id:	6149387
Years of Rainfall Data:	34

Site Name:	Areas 202 and 203

Drainage Area (ha):	0.14
% Imperviousness:	75.00

Runoff Coefficient 'c': 0.75

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	3.98
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	30.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	1060 Queens Bush Road
Project Number:	141040
Designer Name:	Andy Kroess
Designer Company:	IBI Group
Designer Email:	andy.kroess@ibigroup.com
Designer Phone:	519-585-2255
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	96
EFO6	99
EFO8	100
EFO10	100
EFO12	100

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 96

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

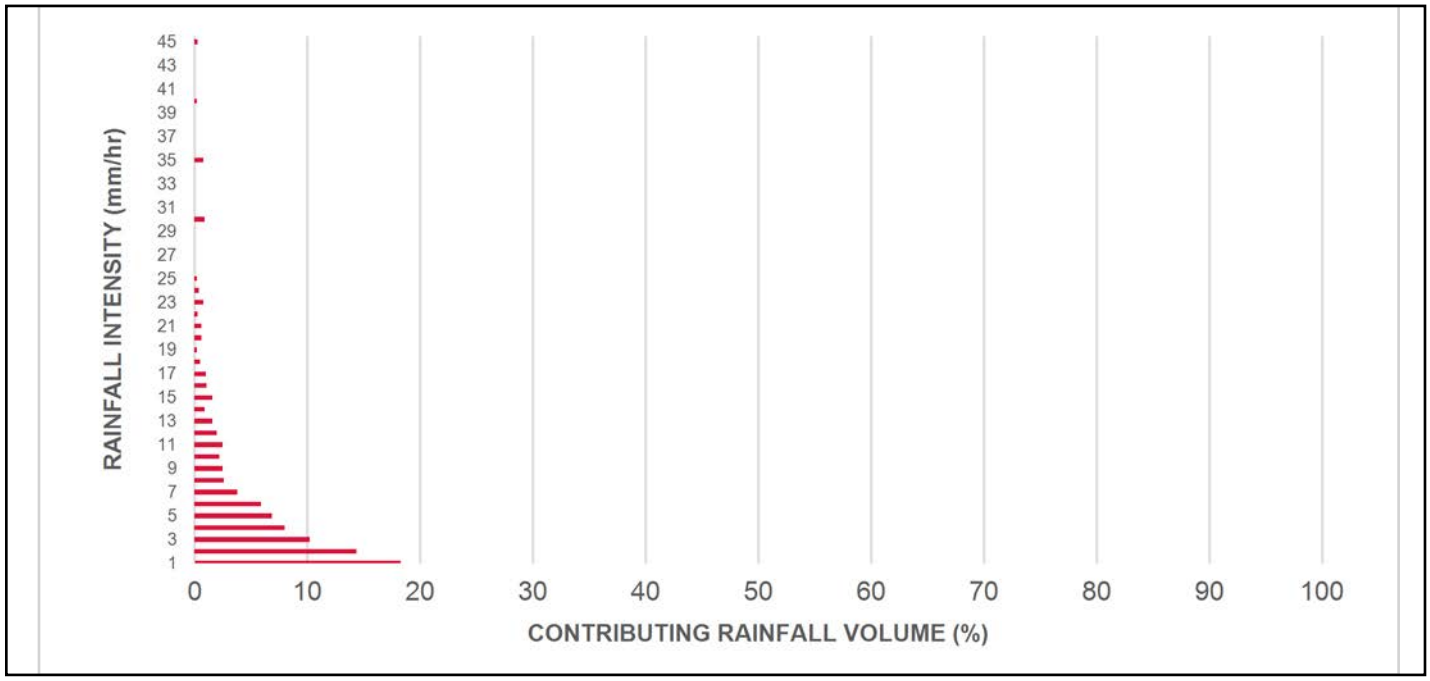
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

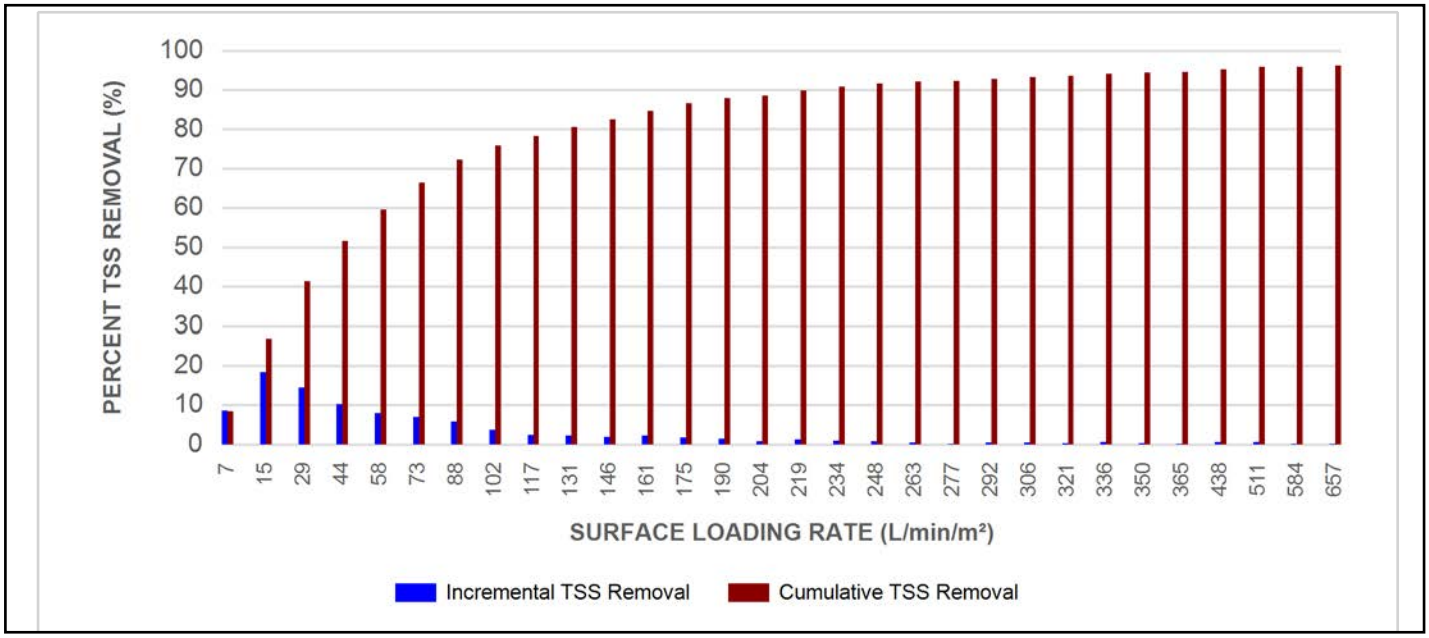
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	8.5	8.5	0.15	9.0	7.0	100	8.5	8.5
1	18.3	26.8	0.29	18.0	15.0	100	18.3	26.8
2	14.4	41.3	0.58	35.0	29.0	100	14.4	41.3
3	10.2	51.5	0.88	53.0	44.0	100	10.2	51.5
4	8.0	59.5	1.17	70.0	58.0	100	8.0	59.5
5	6.9	66.4	1.46	88.0	73.0	100	6.9	66.4
6	5.9	72.3	1.75	105.0	88.0	98	5.8	72.2
7	3.8	76.1	2.04	123.0	102.0	96	3.6	75.8
8	2.6	78.7	2.34	140.0	117.0	95	2.5	78.3
9	2.5	81.1	2.63	158.0	131.0	92	2.3	80.5
10	2.2	83.3	2.92	175.0	146.0	91	2.0	82.5
11	2.5	85.8	3.21	193.0	161.0	88	2.2	84.7
12	2.0	87.8	3.50	210.0	175.0	87	1.7	86.5
13	1.6	89.4	3.79	228.0	190.0	84	1.4	87.8
14	0.9	90.4	4.09	245.0	204.0	83	0.8	88.6
15	1.6	91.9	4.38	263.0	219.0	83	1.3	89.9
16	1.1	93.0	4.67	280.0	234.0	82	0.9	90.8
17	1.0	94.0	4.96	298.0	248.0	81	0.8	91.6
18	0.5	94.6	5.25	315.0	263.0	80	0.4	92.1
19	0.2	94.8	5.55	333.0	277.0	80	0.2	92.3
20	0.6	95.4	5.84	350.0	292.0	79	0.5	92.7
21	0.6	96.1	6.13	368.0	306.0	78	0.5	93.2
22	0.3	96.4	6.42	385.0	321.0	78	0.2	93.5
23	0.8	97.2	6.71	403.0	336.0	77	0.7	94.1
24	0.4	97.6	7.01	420.0	350.0	76	0.3	94.4
25	0.2	97.8	7.30	438.0	365.0	76	0.1	94.6
30	0.9	98.7	8.76	525.0	438.0	72	0.6	95.2
35	0.8	99.5	10.22	613.0	511.0	69	0.6	95.8
40	0.2	99.7	11.68	701.0	584.0	66	0.2	95.9
45	0.3	100.0	13.14	788.0	657.0	64	0.2	96.1
Estimated Net Annual Sediment (TSS) Load Reduction =								**96 %**

Climate Station ID: 6149387 *Years of Rainfall Data*: 34

RAINFALL DATA FROM WATERLOO WELLINGTON AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

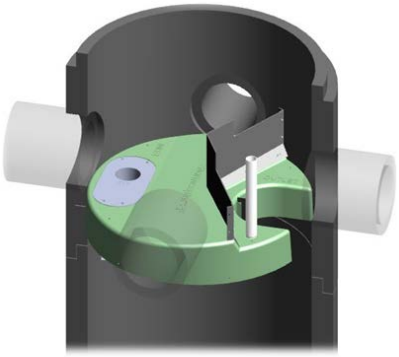
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

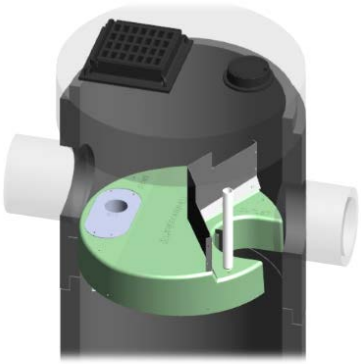
DESIGN FLEXIBILITY

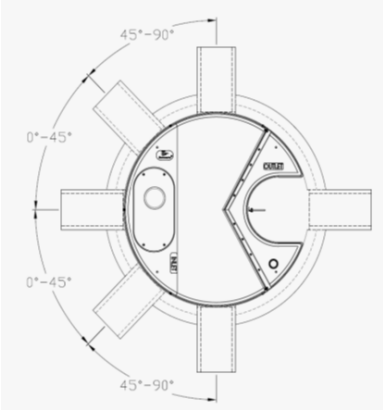
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

STRIK BALDINELLI MONIZ
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27 July 2023

SBM-23-0925

Water and Wastewater Services
Region of Waterloo

Attn: Kevin Dolishny, P. Eng.
Senior Engineer

Re: Water Supply for Fire-Fighting Design Brief
Bradley & Company
Proposed Stacked Townhouse – 12 units
1060 Queens Bush Road, Wellesley, Ontario

1. INTRODUCTION

This Water Supply for Fire-Fighting Design Brief (Brief) has been prepared by Strik, Baldinelli, Moniz Ltd. (SBM) to address the water supply for fire-fighting for the proposed redevelopment which consists of a 12-unit residential stacked townhouse building with associated surface parking and landscaped areas, in the Township of Wellesley (Township), Region of Waterloo (Region), Ontario. This Brief is intended to represent a component of the overall planning application package to be submitted to the Township and Region and should be read in conjunction with all other submitted documents.

2. WATER SUPPLY FOR FIRE-FIGHTING

2.1 General Considerations

Based on the email communication from the Region of Waterloo provided in Appendix A, the Region's water distribution infrastructure model indicates a maximum flow of 72.2 L/s can be provided while maintaining the minimum design pressure of 14 m (140 kPa, 20 psi) at all nodes within the pressure zone. We understand the Region's model was used instead of a hydrant flow test due to ongoing construction which would impact the reliability of the hydrant flow testing results. Fire flow calculations were conducted based on Water Supply for Public Fire Protection (WSPFP) (Fire Underwriters Survey, 2020) and Site information is based on the Site Plan prepared by IBI Group, Project No 141040 dated 2023-06-09, provided in Appendix A.

The maximum day domestic water demand of 0.89 L/s was calculated based on average day demand of 225 L/day/cap as per Region of Waterloo and Area Municipalities – Design Guidelines and Supplemental Specifications for Municipal Services (February 2023) (DGSSMS) and population and maximum day peaking factor from Table 3-3 of Ministry of Environment, Conservation and Parks (MECP) – Design Guidelines for Drinking-Water Systems (DSDWS). Please refer to Domestic Water Demand Calculation provided in Appendix B for details.

As the bounding capacity of the system was confirmed by the Region, different design options were reviewed to reduce the required flow rate during fight fighting condition. These options include changes to the type of construction (whereas wood frame construction (Type V) is the typical construction type for stacked townhomes) and subdividing the building by providing vertical firewall(s) with a fire resistance rating of not less than 2 hours between units. This method of determining the total effective area is outlined on page 22 of WSPFP. Please find except of the FUS – WSPFP 2020 where different types of constructions are listed and defined as well as Total Effective Area (A), provided in Appendix A.

2.2 Fire Fighting Flow

Using the method outlined in WSPFP, an initial fire-fighting demand calculation was undertaken which assumed the townhouse building to be of wood frame (Type V) construction, no fire walls, limited combustible contents, no sprinkler system, and exposure adjustment charges based on separation distance from adjacent buildings. Based on the above criteria, total flow required during fire-fighting plus maximum daily demand of 168 L/s was calculated.

As this is greater than the available 72.2 L/s, seven different options were considered. Please refer to definition of construction types within the excerpt of WSPFP provided in Appendix A.

- Option 1a – Wood frame construction with three (3) fire walls
- Option 1b – Ordinary construction with three (3) fire walls
- Option 1c – Non-Combustible construction with one (1) fire wall

- Option 2a – Wood frame construction without fire wall but with NFPA Standard Sprinkler
- Option 2b – Ordinary construction without fire wall but with NFPA Standard Sprinkler
- Option 2c – Ordinary construction without fire wall but with NFPA Standard Sprinkler (fully supervised)

- Option 3a – Wood frame construction with three (3) fire walls and NFPA Standard Sprinkler

As per the fire flow calculations provided in Appendix B for all seven options, the required flow rates below the available maximum 72.2 L/s can be achieved with options 1b, 1c, 2C, and 3a (68 L/s). Please refer to detailed calculations of all options provided in Appendix B.

This analysis was undertaken using the maximum 72.2 L/s provided by the Region. If the watermain infrastructure construction is completed prior to a later planning or permitting stage, a hydrant flow test could be undertaken which may result in a different maximum available water supply and subsequent recommendations.

3. LIMITATIONS

This Brief was prepared by SBM for the Township of Wellesley, Region of Waterloo, and Bradley & Company. Use of this Brief by any third party, or any reliance upon its findings, is solely the responsibility of that party. SBM accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions undertaken as a result of this Brief. Third party use of this Brief, without the express written consent of the Consultant, denies any claims, whether in contract, tort, and/or any other cause of action in law, against the Consultant.

All findings and conclusions presented in this Brief are based on site conditions as they appeared during the period of the investigation. This Brief is not intended to be exhaustive in scope, or to imply a risk-free facility. It should be recognized that the passage of time may alter the opinions, conclusions, and recommendations provided herein.

The design was limited to the documents referenced above. SBM accepts no responsibility for the accuracy of the information provided by others. All designs and recommendations presented in this Brief are based on the information available at the time of the review.

4. CLOSURE

We trust this Brief meets your satisfaction. Should you have any questions or require further information, please do not hesitate to contact us.

Respectfully submitted,

Strik, Baldinelli, Moniz Ltd.

Planning • Civil • Structural • Mechanical • Electrical

Ben Hyland, P.Eng., PMP
Civil Project & Team Lead, Eng. III
Associate I

Juduk Lee, EIT
Civil Engineering Trainee III

Cloe Maw, EIT
Civil Engineering Trainee I

APPENDIX A

Email Communication from Region of Waterloo – Available Capacity 72.2 L/s
Site Plan prepared by IBI Group, Project No 141040 dated 2023-06-09
Excerpt of FUS – WSPFP 2020

Region of Waterloo

ENGINEERING AND ENVIRONMENTAL SERVICES
Water and Wastewater Services
150 Frederick Street 7th Floor
Kitchener Ontario N2G 4J3 Canada
Telephone: 519-575-4400; TTY: 519-575-4608
Email: waterservices@regionofwaterloo.ca
www.regionofwaterloo.ca/water

Mohammad Meqdad, P.Eng.
Arcadis/IBI Group
410 Albert St, Suite 101
Waterloo, ON N2L 3V3
mohammad.meqdad@ibigroup.com

Date: April 13, 2023

Dear: Mohammad

Re: 1060 Queens Bush Road, Wellesley

Please find the results of the modeling simulations for boundary conditions for 1060 Queens Bush Road in lieu of a hydrant flow test. The results include a figure showing the location of the node from the Region's model. Attached are a series of spreadsheets containing results for Average Day, Maximum Day demands and available fire flows for node JCT_10165 located Queens Bush Rd and Village Rd. The diurnal 24-hour demand distribution accounts for the minimum hour and peak hour peaking factors. The maximum pressure on the average day represents the minimum hour, and the minimum pressure on the maximum day represents the peak hour.

Table 1 – Modeling Results

Node	Elevation (mASL)	Demand		Fire Flow Results	
		Ave Day (L/s)	Max Day (L/s)	Design Flow (L/s)	Design Pressure (m)
JCT_10165	366.0	0.0	0.0	72.2	14.9

A fire flow analysis shows the maximum flow available at a node with an associated design pressure during the maximum day scenario while maintaining the minimum design pressure of 14 m (140 kPa) at all nodes within the pressure zone.

If you have any questions, please contact me

Kevin Dolishny P.Eng.
Senior Engineer, Water Services
c. 226.751.4551
e. kdolishny@regionofwaterloo.ca

c. Jeff Hayhurst, Stumpf Fire Protection Limited

Wellesley\

JCT_10165 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.02	419.93	53.93
01:00 hrs	0.02	420.07	54.07
02:00 hrs	0.02	419.97	53.97
03:00 hrs	0.02	419.77	53.77
04:00 hrs	0.02	419.79	53.79
05:00 hrs	0.02	419.88	53.88
06:00 hrs	0.03	419.59	53.59
07:00 hrs	0.03	419.02	53.02
08:00 hrs	0.04	418.79	52.79
09:00 hrs	0.04	418.72	52.72
10:00 hrs	0.04	418.79	52.79
11:00 hrs	0.04	418.86	52.86
12:00 hrs	0.03	418.93	52.93
13:00 hrs	0.03	419.01	53.01
14:00 hrs	0.03	419.18	53.18
15:00 hrs	0.03	419.24	53.24
16:00 hrs	0.03	419.09	53.09
17:00 hrs	0.03	418.95	52.95
18:00 hrs	0.04	418.77	52.77
19:00 hrs	0.04	418.38	52.38
20:00 hrs	0.05	418.00	52.00
21:00 hrs	0.05	417.97	51.97
22:00 hrs	0.04	418.77	52.77
23:00 hrs	0.03	419.42	53.42

Average Day HGL:	419.12
Minimum Hour:	420.07

JCT_10165 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.04	426.42	60.42
01:00 hrs	0.03	412.24	46.24
02:00 hrs	0.04	411.62	45.62
03:00 hrs	0.04	409.87	43.87
04:00 hrs	0.04	409.49	43.49
05:00 hrs	0.04	409.24	43.24
06:00 hrs	0.05	407.29	41.29
07:00 hrs	0.07	422.73	56.73
08:00 hrs	0.08	421.84	55.84
09:00 hrs	0.08	421.23	55.23
10:00 hrs	0.08	421.18	55.18
11:00 hrs	0.08	421.61	55.61
12:00 hrs	0.07	422.30	56.30
13:00 hrs	0.07	422.38	56.38
14:00 hrs	0.07	422.73	56.73
15:00 hrs	0.07	422.98	56.98
16:00 hrs	0.07	422.73	56.73
17:00 hrs	0.07	422.19	56.19
18:00 hrs	0.08	421.09	55.09
19:00 hrs	0.09	419.93	53.93
20:00 hrs	0.10	419.49	53.49
21:00 hrs	0.10	419.62	53.62
22:00 hrs	0.08	421.57	55.57
23:00 hrs	0.06	423.97	57.97

Maximum Day HGL:	418.99
Peak Hour:	407.29

Available Flow (L/s)	Residual Pressure (m)
0.0	56.3
5.0	54.0
10.0	52.3
15.0	50.7
20.0	49.2
25.0	47.5
30.0	45.8
35.0	44.3
40.0	42.1
45.0	39.6
50.0	36.2
55.0	32.2
60.0	28.2
65.0	23.9
70.0	17.7
72.2	14.9

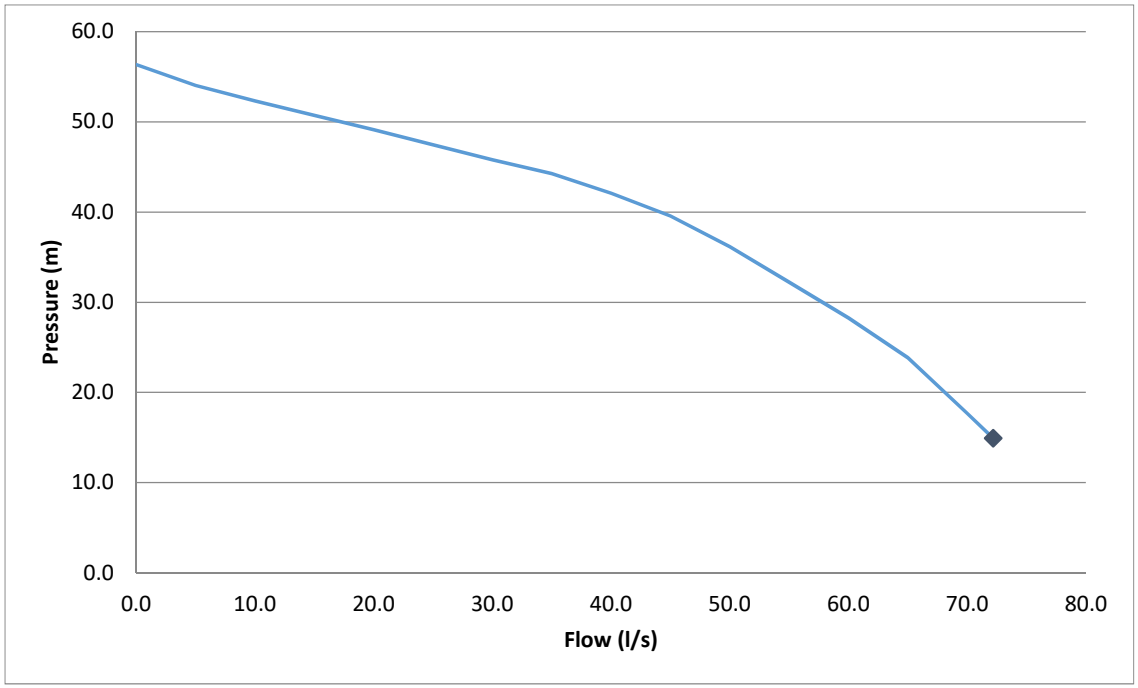
Fire Flow Analysis

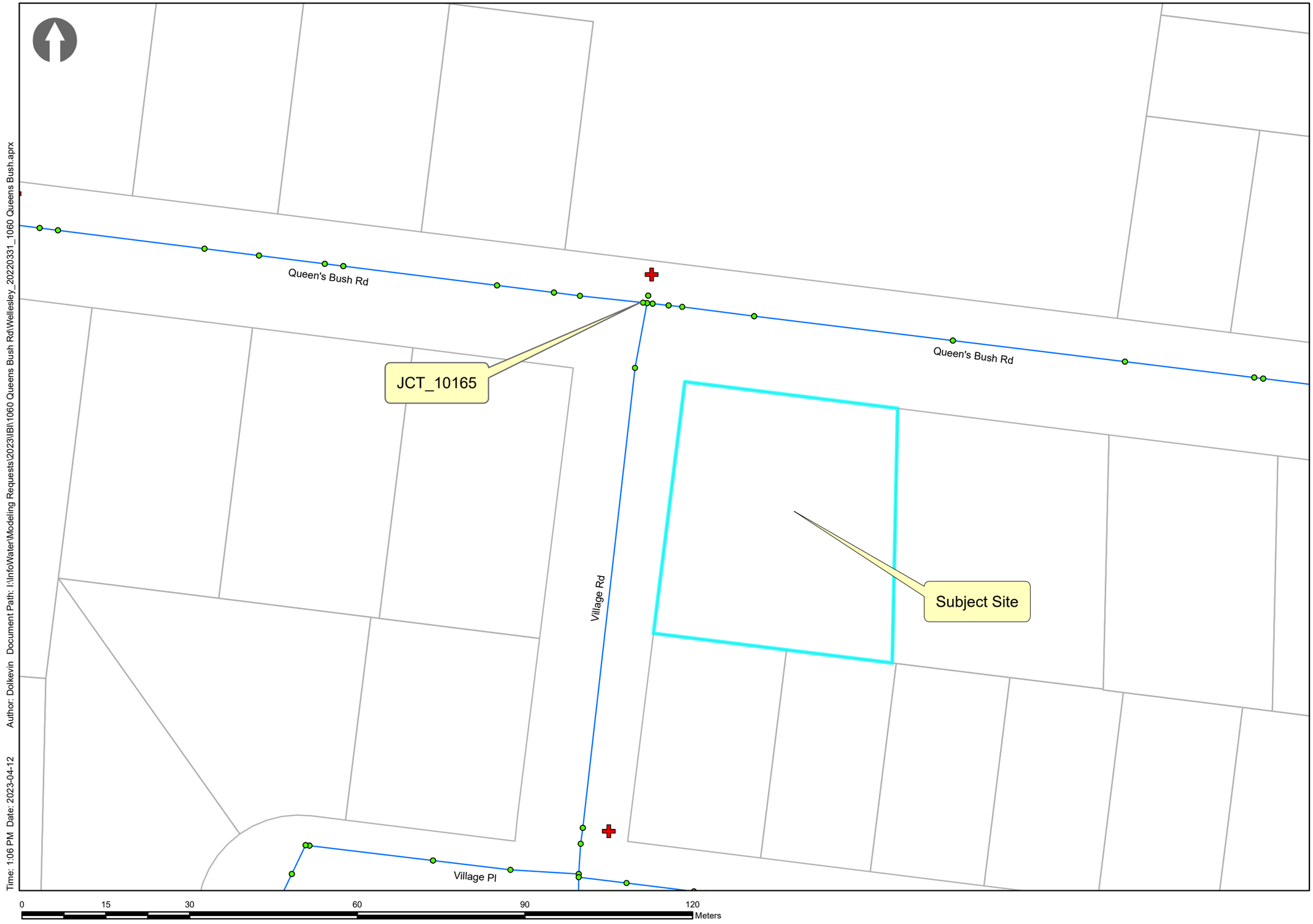
Fire Flow Node:	JCT_10165
Design Flow (L/s):	72.2
Design Pressure (m):	14.9

Design Flow: *The final adjusted flow at the node to maintain the minimum desigr pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Design Pressure: *The lowest allowable pressure at the node to maintain the minimum desigr pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Critical Node ID: *The constraining node within the pressure zone that drops to the minimum desigr pressure of (14m (140 kPa)) during the design flow.*





Time: 1:06 PM Date: 2023-04-12 Author: Dolkevin Document Path: I:\InfoWater\Modeling Requests\2023\IBI\1060 Queens Bush Rd\Wellesley_20220331_1060 Queens Bush.aprx

Region of Waterloo

TRANSPORTATION AND ENVIRONMENTAL SERVICES

Water Services

150 Frederick Street
Kitchener ON Canada N2G 4J3
Telephone: (519) 575-4426
Fax: (519) 575-4452
www.regionofwaterloo.ca

Legend

Junction
TYPE
- Active
- Domain

Tank
TYPE
- Active
- Domain

Reservoir
TYPE
- Active
- Domain

Pump
TYPE
- Active
- Domain

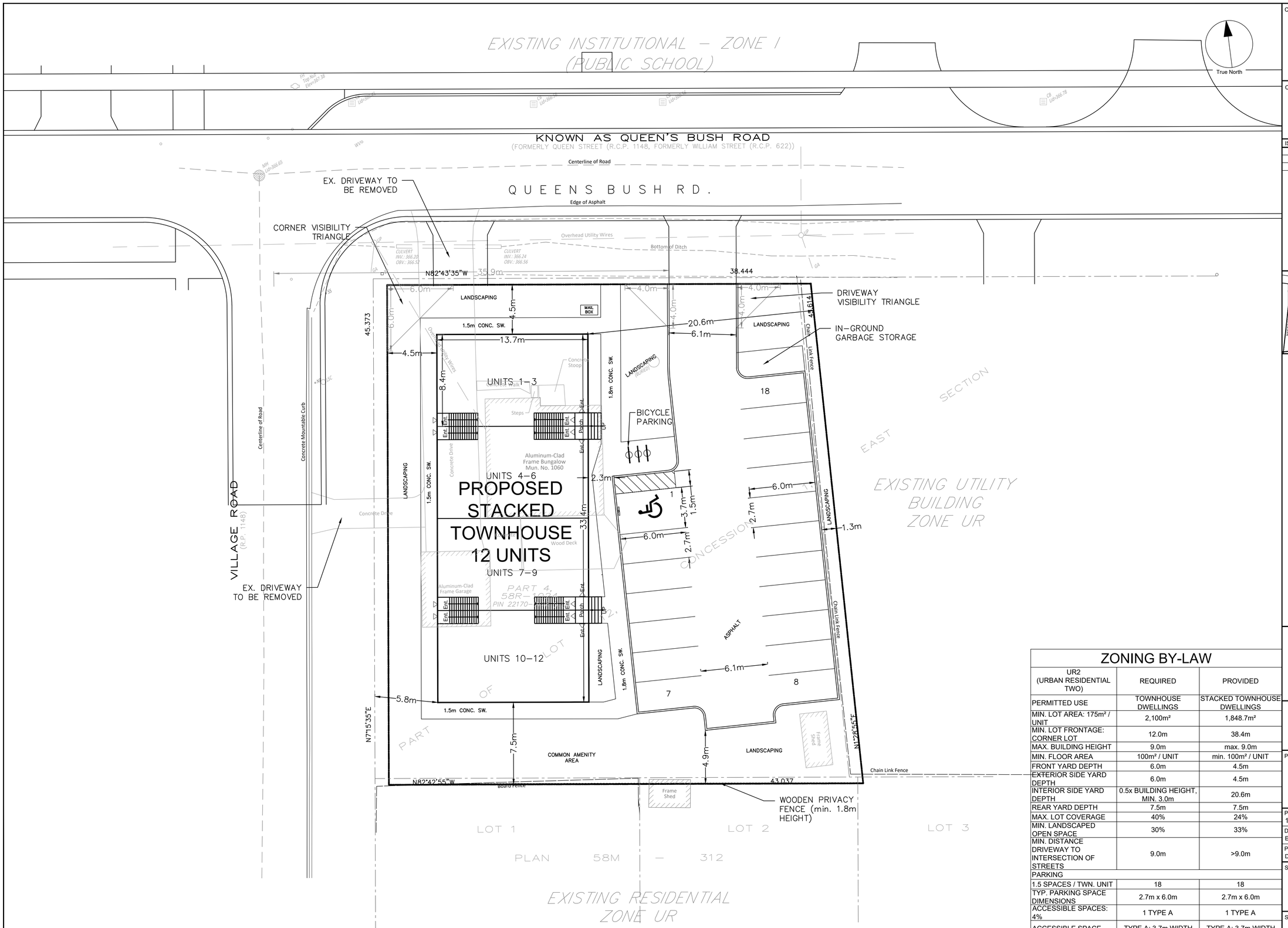
Valve
TYPE
- Active
- Domain

Pipe
TYPE
- Active
- Domain

Roads
- Highway
- Arterial/Collector
- Local
- Private

- Assessment Parcels (MPAC)
- Hydrants (Water)
- Junctions (Water)
- Mains (Water)
- Valves (Water)

1060 Queens Bush Rd
Wellesley



ZONING BY-LAW

UR2 (URBAN RESIDENTIAL TWO)	REQUIRED	PROVIDED
PERMITTED USE	TOWNHOUSE DWELLINGS	STACKED TOWNHOUSE DWELLINGS
MIN. LOT AREA: 175m² / UNIT	2,100m²	1,848.7m²
MIN. LOT FRONTAGE: CORNER LOT	12.0m	38.4m
MAX. BUILDING HEIGHT	9.0m	max. 9.0m
MIN. FLOOR AREA	100m² / UNIT	min. 100m² / UNIT
FRONT YARD DEPTH	6.0m	4.5m
EXTERIOR SIDE YARD DEPTH	6.0m	4.5m
INTERIOR SIDE YARD DEPTH	0.5x BUILDING HEIGHT, MIN. 3.0m	20.6m
REAR YARD DEPTH	7.5m	7.5m
MAX. LOT COVERAGE	40%	24%
MIN. LANDSCAPED OPEN SPACE	30%	33%
MIN. DISTANCE DRIVEWAY TO INTERSECTION OF STREETS	9.0m	>9.0m
PARKING		
1.5 SPACES / TWN. UNIT	18	18
TYP. PARKING SPACE DIMENSIONS	2.7m x 6.0m	2.7m x 6.0m
ACCESSIBLE SPACES: 4%	1 TYPE A	1 TYPE A
ACCESSIBLE SPACE WIDTH	TYPE A: 3.7m WIDTH 1.5m ACCESS AISLE	TYPE A: 3.7m WIDTH 1.5m ACCESS AISLE

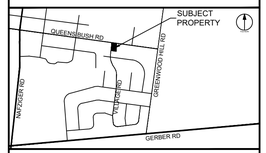
CLIENT

BRADLEY & CO

1060 QUEENS BUSH ROAD

ISSUES

No.	DESCRIPTION	DATE
1	SITE PLAN SUBMISION	2023-01-26
2	REVISED - TOWNSHIP COMMENTS	2023-06-09



IBI GROUP
Suite 101 - 410 Albert Street
Waterloo ON N2L 3V3 Canada
tel 519 585 2255
ibigroup.com

PROJECT

1060 QUEENS BUSH ROAD

TOWNSHIP OF WELLESLEY

PROJECT NO:	SCALE:
141040	1 : 150
DRAWN BY: E.T.	CHECKED BY: C.T.
PROJECT MGR: D.W.S.	APPROVED BY: D.W.S.

SHEET TITLE

SITE PLAN

SHEET NUMBER	ISSUE
SP1	01

SCALE CHECK 1 in 10mm

File Location: J:\141040_1060_Queens_\7.0_Production\7.03_Design\17_Planning\Sheets\141040_SP.dwg Last Saved: June 9, 2023, by emma.tilley Plotted: Friday, June 9, 2023 10:17:13 AM by Emma Tilley

Construction Coefficient (C)

Note that the construction typology used by the insurance industry and public fire protection differs from the terms of reference in the National Building Code of Canada (NBC).

The following Construction Types and Coefficients are used in the required fire flow formula:

C	=	1.5 for **Type V** Wood Frame Construction
	=	0.8 for **Type IV-A** Mass Timber Construction
	=	0.9 for **Type IV-B** Mass Timber Construction
	=	1.0 for **Type IV-C** Mass Timber Construction
	=	1.5 for **Type IV-D** Mass Timber Construction
	=	1.0 for **Type III** Ordinary Construction
	=	0.8 for **Type II** Noncombustible Construction
	=	0.6 for **Type I** Fire Resistive Construction

When determining the predominate Construction Coefficient of a building, the following reference terms are used by fire underwriters and fire departments.

Wood Frame Construction (Type V)
A building is considered to be of Wood Frame construction (Type V) when structural elements, walls, arches, floors, and roofs are constructed entirely or partially of wood or other material.

Note: Includes buildings with exterior wall assemblies that are constructed with any materials that do not have a fire resistance rating that meets the acceptance criteria of CAN/ULC-S114. May include exterior surface brick, stone, or other masonry materials where they do not meet the acceptance criteria.

Mass Timber (Type IV)
Mass timber construction, including Encapsulated Mass Timber, Heavy Timber and other forms of Mass Timber are considered as one of the following sub-types relating to the fire resistance ratings of assemblies as follows:

- Type IV-A (Encapsulated Mass Timber)
    - A building is considered to be of Mass Timber Type IV-A (Encapsulated Mass Timber) construction when structural elements, walls, arches, and floors have a minimum 2-hour fire resistance rating and the roof has a minimum 1 hour fire resistance rating. Additionally all elements of the building must meet the requirements set out for Encapsulated Mass Timber Construction within the 2020 National Building Code of Canada . For types of mass timber construction that do not fully meet these criteria, treat as Type IV-B, Type IV-C or Type IV-D.
- Type IV-B (Rated Mass Timber)
    - A building is considered to be of Mass Timber Type IV-B (Rated Mass Timber) construction when the building assemblies include mass timber construction elements and all structural elements, exterior walls, interior bearing walls and roof have a minimum 1-hour fire resistance rating.

- Type IV-C (Ordinary Mass Timber)
    - A building is considered to be of Mass Timber Type IV-C (Partially Rated Mass Timber) construction when exterior walls are of Mass Timber construction with a minimum 1-hour fire resistance rating. Other structural elements, interior bearing walls and the roof may not have a fire resistance rating.
- Type IV-D (Un-Rated Mass Timber)
    - A building is considered to be of Mass Timber Type IV-D (Un-Rated Mass Timber) construction when exterior walls do not have a minimum 1-hour fire resistance rating, regardless of the fire resistance rating of other structural elements, interior bearing walls and the roof.

Ordinary Construction (Type III also known as joisted masonry)

A building is considered to be of Ordinary construction (Type III) when exterior walls are of masonry construction (or other approved material) with a minimum 1-hour fire resistance rating, but where other elements such as interior walls, arches, floors and/or roof do not have a minimum 1 hour fire resistance rating.

Noncombustible Construction (Type II)

A building is considered to be of Noncombustible construction (Type II) when all structural elements, walls, arches, floors, and roofs are constructed with a minimum 1-hour fire resistance rating and are constructed with noncombustible materials.

Fire-Resistive Construction (Type I)

A building is considered to be of Fire-resistive construction (Type I) when all structural elements, walls, arches, floors, and roofs are constructed with a minimum 2-hour fire resistance rating, and all materials used in the construction of the structural elements, walls, arches, floors, and roofs are constructed with noncombustible materials.

Items of Note Regarding Construction Coefficients

i. Unprotected noncombustible construction (example unprotected steel) should be considered within ordinary construction or noncombustible construction based on the minimum fire resistance rating of the structural elements, exterior walls, and interior bearing walls;
    - If minimum fire resistance rating of exterior walls is 1 hr, apply Ordinary Construction Coefficient (1.0)
    - If minimum fire resistance rating of all structural elements, walls, arches, floors, and roofs is 1 hr, apply Noncombustible Construction Coefficient (0.8).

ii. If a building cannot be defined within a single Construction Coefficient, the Construction Coefficient is determined by the predominate Construction Coefficient that makes up more than 66% or over of the Total Floor Area.

Total Effective Area (A)

To determine a required fire flow for an individual building, the Total Effective Area that would be affected during the design fire must be determined. The Total Effective Area is the largest Floor Area (in square metres) plus the following percentages of the total area of the other floors:

1) For a building classified with a Construction Coefficient from 1.0 to 1.5:
   a) 100% of all Floor Areas are considered in determining the Total Effective Area to be used in the formula.
2) For a building classified with a Construction Coefficient below 1.0:
   a) if any vertical openings in the building (ex. interconnected floor spaces, atria, elevators, escalators, etc.) are unprotected, consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight; or
   b) if all vertical openings and exterior vertical communications are properly protected in accordance with the National Building Code, consider only the single largest Floor Area plus 25% of each of the two immediately adjoining floors.

Protection requirements:

The protection requirements for vertical openings are only applicable in buildings with a Construction Coefficient below 1.0. The type of protection for vertical openings shall be based on the construction of the enclosure walls and the type of opening or other device used for the protection of openings in the enclosure. See also NBC Division B, Section 3.5. Vertical Transportation.

Protected openings:

i. Enclosures shall have walls of masonry or other limited or noncombustible construction with a fire resistance rating of not less than one hour.
ii. Openings including doors shall be provided with automatic closing devices
iii. Elevator doors shall be of metal or metal-covered construction, so arranged that the doors must normally be closed for operation of the elevator.

Unprotected openings:

i. Any opening through horizontal separations that are unprotected or otherwise have closures that do not meet the minimum requirements for protected openings, above.

High One Storey Buildings

When a building has large single storey spaces (ex. warehouses, atria, etc.) exceeding 3 m in height, the number of storeys to be used in determining the total effective area depends upon the use being made of the building. For example, consider a 1=3 storey building. If the building is being used for high piled stock, or for rack storage, the building would be considered as 3 storeys. However, if the building is being used for steel fabrication and the extra height is provided only to facilitate movement of objects by a crane, the building should be considered as a one storey.

Each normal height (3m) storey included in the formula provides for additional fire loading. In the case of normal height storeys this fire loading comes from the structure, walls, floors, ceilings/roofs as well as the contents.

Subdividing Buildings (Vertical Firewalls)

In determining Total Effective Area, a building may be subdivided if a vertical firewall with a fire-resistance rating of not less than 2 hours, and meeting the requirements of the National Building Code exists. If the firewall is properly constructed and all openings are properly protected in accordance with the NBC, then the boundary can be treated as protected with no exposure charge.

Notes:

1. If there is a severe risk of fire on the exposed side of the firewall due to hazard conditions, a charge of up to 10% may be applied at the discretion of the Authority Having Jurisdiction or design engineer determining required fire flows.
2. If there are unprotected openings (or improperly protected) in the firewall, then the severity of the exposure in relation to the subject building should be considered (ex. percentage of openings, distance to exposure, combustibility of exposure, etc.) and an exposure charge of up to 10% may be applied.

Basements

Basement floor area is excluded from the Total Effective Area when the basement is at least 50% below grade in the building being considered.

Open Parking Garages

For open parking garages, use the area of the largest floor as the Total Effective Area.

APPENDIX B

Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Typical
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 1a
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 1b
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 1c
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 2a
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 2b
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 2c
Fire Flow Calculations – Water Supply for Public Fire Protection (Fire Underwriters Survey) – Option 3a

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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Typical

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Typical Building Design

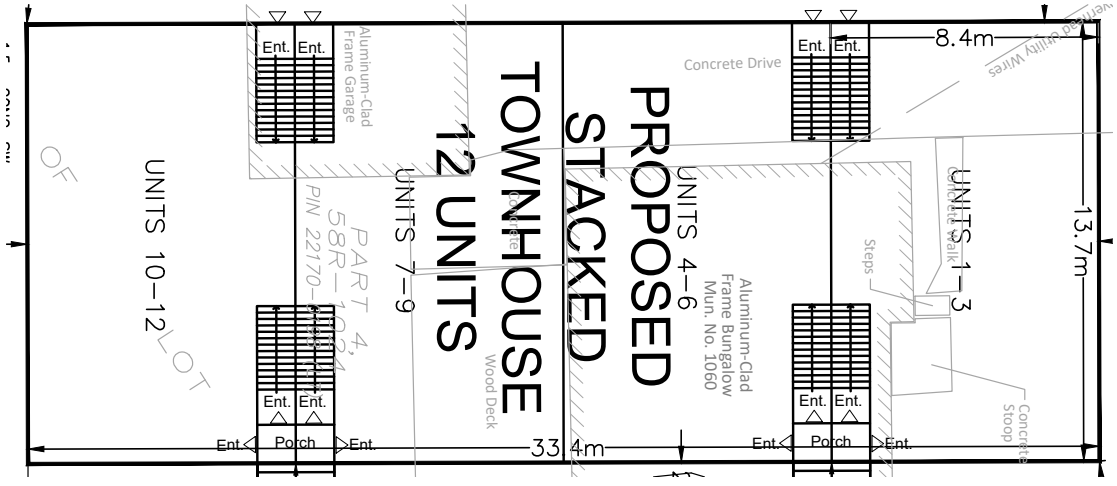
$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Wood-Frame**	**1.5**		
Total Effective Floor Area, m^2:	Area of all subdivided floors =	915.24	m^2	
		915.24		
	Baseline Fire Flow, L/min	9983		
	***Baseline Fire Flow to the nearest 1,000 L/min**	**10000**		
Fire Hazard of Contents:	**Limited Combustible**	**0.85**		
		8500.0		
Sprinkler Modification:	**No**	**0.0**		
		0.0		

Separation, Side 1 (North):	**> 30m**	0%
Separation, Side 2 (East):	**20.1 to 30m**	10%
Separation, Side 3 (South):	**20.1 to 30m**	10%
Separation, Side 4 (West):	**> 30m**	0%

Sum of Separation Coefficients (Shall Not Exceed 75%:)	**20%**			
	1700.0			
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)	10200			
***Required Supply Flow Rate, L/min =**	**10000**	=	167	L/s
Plus Maximum Daily Water Demand		=	1.34	L/s
Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**168**	L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 1a

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

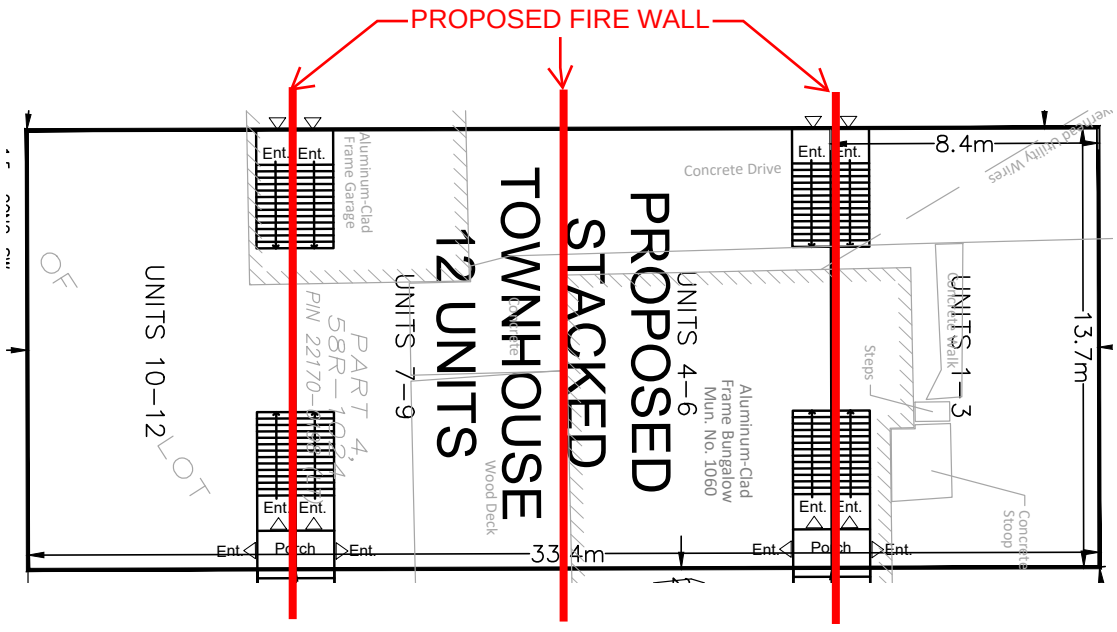
Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 1a - Wood Frame Construction w/ Three (3) Fire Walls

$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Wood-Frame**		**1.5**	
Total Effective Floor Area, m^2:	Area of all subdivided floors =		228.81	m^2
			228.81	
	Baseline Fire Flow, L/min		4992	
	***Baseline Fire Flow to the nearest 1,000 L/min**		**5000**	
Fire Hazard of Contents:	**Limited Combustible**		**0.85**	
			4250.0	
Sprinkler Modification:	**No**		**0.0**	
			0.0	
Separation, Side 1 (North):	**> 30m**	0%		
Separation, Side 2 (East):	**20.1 to 30m**	10%		
Separation, Side 3 (South):	**20.1 to 30m**	10%		
Separation, Side 4 (West):	**> 30m**	0%		
Sum of Separation Coefficients (Shall Not Exceed 75%:)			**20%**	
			850.0	
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)			5100	
***Required Supply Flow Rate, L/min =**	**5000**	=	83	L/s
Plus Maximum Daily Water Demand		=	1.34	L/s
Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**85**	L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 1b

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 1b - Ordinary Construction w/ Three (3) Fire Walls

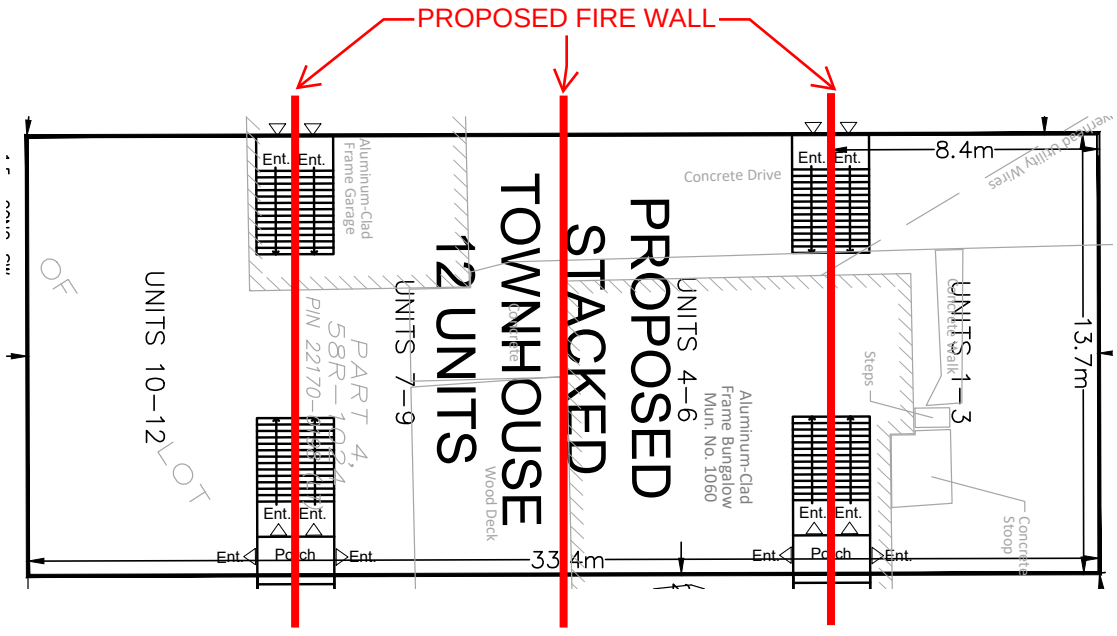
$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Ordinary**	**1.0**		
Total Effective Floor Area, m^2:	Area of all subdivided floors =	228.81	m^2	
		228.81		
	Baseline Fire Flow, L/min	3328		
	***Baseline Fire Flow to the nearest 1,000 L/min**	**4000**		
Fire Hazard of Contents:	**Limited Combustible**	**0.85**		
		3400.0		
Sprinkler Modification:	**No**	**0.0**		
		0.0		

Separation, Side 1 (North):	**> 30m**	0%	
Separation, Side 2 (East):	**20.1 to 30m**	10%	
Separation, Side 3 (South):	**20.1 to 30m**	10%	
Separation, Side 4 (West):	**> 30m**	0%	
Sum of Separation Coefficients (Shall Not Exceed 75%:)		**20%**	
		680.0	

F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)		4080		
***Required Supply Flow Rate, L/min =**	**4000**	=	67	L/s
Plus Maximum Daily Water Demand		=	1.34	L/s
Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**68**	L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 1c

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 1c - Non-Combustible Construction w/ one (1) Fire Wall

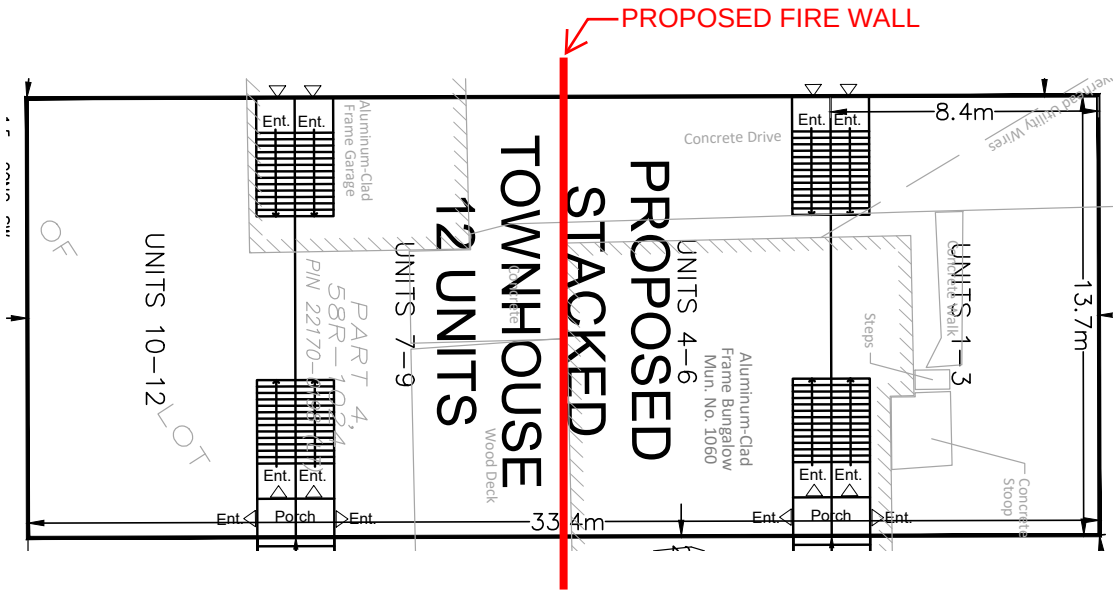
$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Non-Combustible**	**0.8**		
Total Effective Floor Area, m^2:	Area of all subdivided floors =	457.62	m^2	
		457.62		
	Baseline Fire Flow, L/min	3765		
	***Baseline Fire Flow to the nearest 1,000 L/min**	**4000**		
Fire Hazard of Contents:	**Limited Combustible**	**0.85**		
		3400.0		
Sprinkler Modification:	**No**	**0.0**		
		0.0		

Separation, Side 1 (North):	**> 30m**	0%
Separation, Side 2 (East):	**20.1 to 30m**	10%
Separation, Side 3 (South):	**20.1 to 30m**	10%
Separation, Side 4 (West):	**> 30m**	0%

Sum of Separation Coefficients (Shall Not Exceed 75%:)	**20%**			
	680.0			
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)	4080			
***Required Supply Flow Rate, L/min =**	**4000**	=	67	L/s
Plus Maximum Daily Water Demand		=	1.34	L/s
Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**68**	L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 2a

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

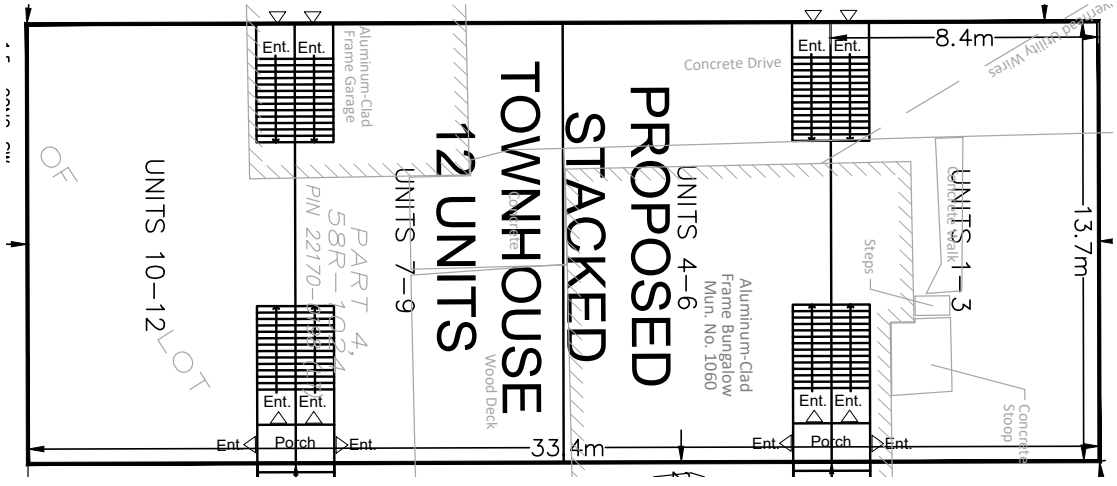
Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 2a - Wood Frame Construction w/o Fire Wall but w/ NFPA Standard Sprinkler

$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Wood-Frame**		**1.5**	
Total Effective Floor Area, m^2:	Area of all subdivided floors =		915.24	m^2
			915.24	
	Baseline Fire Flow, L/min		9983	
	***Baseline Fire Flow to the nearest 1,000 L/min**		**10000**	
Fire Hazard of Contents:	**Limited Combustible**		**0.85**	
			8500.0	
Sprinkler Modification:	**Yes - NFPA Standard**		**0.3**	
			-2550.0	
Separation, Side 1 (North):	**> 30m**	0%		
Separation, Side 2 (East):	**20.1 to 30m**	10%		
Separation, Side 3 (South):	**20.1 to 30m**	10%		
Separation, Side 4 (West):	**> 30m**	0%		
	Sum of Separation Coefficients (Shall Not Exceed 75%:)		**20%**	
			1700.0	
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)			7650	
	***Required Supply Flow Rate, L/min =**	**8000**	=	133 L/s
	Plus Maximum Daily Water Demand		=	1.34 L/s
	Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**135** L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 2b

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

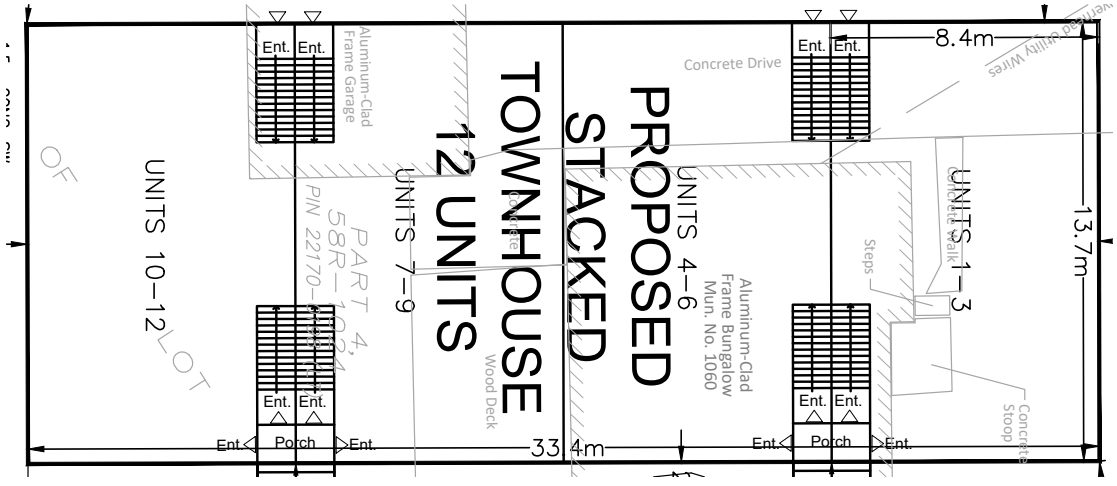
Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 2b - Ordinary Construction w/o Fire Wall but w/ NFPA Standard Sprinkler

$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Ordinary**		**1.0**	
Total Effective Floor Area, m^2:	Area of all subdivided floors =		915.24	m^2
			915.24	
	Baseline Fire Flow, L/min		6656	
	***Baseline Fire Flow to the nearest 1,000 L/min**		**7000**	
Fire Hazard of Contents:	**Limited Combustible**		**0.85**	
			5950.0	
Sprinkler Modification:	**Yes - NFPA Standard**		**0.3**	
			-1785.0	
Separation, Side 1 (North):	**> 30m**	0%		
Separation, Side 2 (East):	**20.1 to 30m**	10%		
Separation, Side 3 (South):	**20.1 to 30m**	10%		
Separation, Side 4 (West):	**> 30m**	0%		
	Sum of Separation Coefficients (Shall Not Exceed 75%:)		**20%**	
			1190.0	
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)			5355	
	***Required Supply Flow Rate, L/min =**	**5000**	=	83 L/s
	Plus Maximum Daily Water Demand		=	1.34 L/s
	Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**85** L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 2c

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

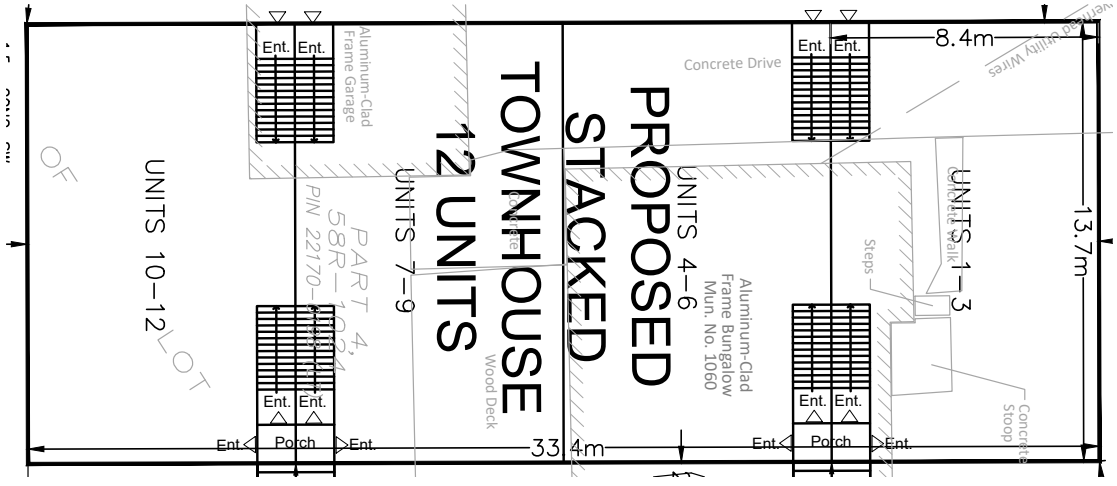
Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 2c - Ordinary Construction w/o Fire Wall but w/ NFPA Standard Sprinkler (Fully Supervised)

$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Ordinary**		**1.0**	
Total Effective Floor Area, m^2:	Area of all subdivided floors =		915.24	m^2
			915.24	
	Baseline Fire Flow, L/min		6656	
	***Baseline Fire Flow to the nearest 1,000 L/min**		**7000**	
Fire Hazard of Contents:	**Limited Combustible**		**0.85**	
			5950.0	
Sprinkler Modification:	**Yes - NFPA Standard (Fully Supervised)**		**0.5**	
			-2975.0	
Separation, Side 1 (North):	**> 30m**	0%		
Separation, Side 2 (East):	**20.1 to 30m**	10%		
Separation, Side 3 (South):	**20.1 to 30m**	10%		
Separation, Side 4 (West):	**> 30m**	0%		
	Sum of Separation Coefficients (Shall Not Exceed 75%:)		**20%**	
			1190.0	
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)			4165	
	***Required Supply Flow Rate, L/min =**	**4000**	=	67 L/s
	Plus Maximum Daily Water Demand		=	1.34 L/s
Total Flow required during Fire-Fighting + Maximum Daily Water Demand			=	**68** L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.



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Fire Flow Calculations - Water Supply for Public Fire Protection (Fire Underwriters Survey) - Option 3a

	For data entry
	Calculated, not for data entry

DATE:	July 27, 2023
JOB N0.:	SBM-23-0925

Client:	**Bradley & Company Inc.**
Project:	**Proposed Stacked Townhouse Development**
Location:	**1060 Queens Bush Road, Wellesley, ON**

Option 3a - Wood Frame Construction w/ Three (3) Fire Walls and NFPA Standard Sprinkler

$F = 220 \times C \times \sqrt{A}$

Type of Construction:	**Wood-Frame**		**1.5**	
Total Effective Floor Area, m^2:	Area of all subdivided floors =		228.81	m^2
			228.81	
	Baseline Fire Flow, L/min		4992	
	***Baseline Fire Flow to the nearest 1,000 L/min**		**5000**	
Fire Hazard of Contents:	**Limited Combustible**		**0.85**	
			4250.0	
Sprinkler Modification:	**Yes - NFPA Standard**		**0.3**	
			-1275.0	
Separation, Side 1 (North):	**> 30m**	0%		
Separation, Side 2 (East):	**20.1 to 30m**	10%		
Separation, Side 3 (South):	**20.1 to 30m**	10%		
Separation, Side 4 (West):	**> 30m**	0%		
	Sum of Separation Coefficients (Shall Not Exceed 75%:)		**20%**	
			850.0	
F, L/min (Shall not exceed 45,000 L/min or be less than 2,000 L/min)			3825	
	***Required Supply Flow Rate, L/min =**	**4000**	=	67 L/s
	Plus Maximum Daily Water Demand		=	1.34 L/s
	Total Flow required during Fire-Fighting + Maximum Daily Water Demand		=	**68** L/s

*Rounded to the nearest 1000 L/min per the Fire Underwriters Survey 2020 Guidelines
As per the Fire Underwirters Survey 2020, this is an estimated fire flow requirements.