ERION ASSOCIATES
consulting civil engineers

SITE SERVICING & STORMWATER MANAGEMENT

ANALYSIS BRIEF

for

PROPOSED REZONING FROM INDUSTRIAL TO RESIDENTIAL

at

112 NELSON ST., OTTAWA, K1N 7R5

by

CARLETON CONDOMINIUM CORP. #396
C/O DOMICILE DEVELOPMENTS INC.

prepared by

ERION ASSOCIATES
Proj. No. EA 17-297

November 2017

Submitted in support of an application for Rezoning to the City of Ottawa.

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SITE SERVICING
&
STORMWATER MANAGEMENT

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112 NELSON ST., OTTAWA, ON, K1N 7R5
APPLICATION FOR REZONING (INDUSTRIAL TO RESIDENTIAL)
APPLICANT: CARELTON CONDOMINIUM CORP. #396
C/O DOMICILE DEVELOPMENTS INC.

1. GENERAL

This analysis of servicing issues for future re-development is in reference to an application for rezoning the subject property from IG1H(11), General Industrial Subzone 1, 11m Height limit to R5 to permit a 9 storey residential building. The future project will replace an existing industrial building containing small offices and warehousing that was created in 1987 by partial demolition of an existing large furniture warehouse, renovating and dividing the remaining building into a 16 unit commercial/industrial condominium (CCC #396).

2. SITE DESCRIPTION

2.1 Location: West side of Nelson St., midway between Rideau St. and York St.
2.2 P.I.N. 15396-0001 to0033
2.3 Total Site Area: 2949 sq. metres (0.295 ha.)
2.4 Street Frontage: 18.47 metres

3. RECENT SITE HISTORY

With reference to Surveyor's Real Property Report, Part 1, November 7, 2017 by A.O.V. Ltd., a copy of which has been filed as part of the application for rezoning , the site in 1987 originally included what is now an 8 storey apt. building at the north-east corner of a rectangle having a total of 80.63 m frontage on Nelson St. The remnant L-shaped parcel was then serviced with new on-site sanitary and storm sewer and watermain as shown on Site Plan, Dwg. M-1 by Everest Engineering Ltd., Rev. 6 (As-built), Oct 28/87.

The new site services to 112 Nelson St. connected to City sewers through the reduced (18.47m) site frontage while previous services (sanitary, combined and water) that connected through the severed parcel were capped and abandoned. An 8 storey apartment building (#110 Nelson St.) was constructed on the severed parcel after 1987 with separate new service connections to Nelson St.

4. EXISTING SITE CONDITIONS

4.1 Site Topography

In the absence of a detailed topographic survey of the site at this time, reference to City topo mapping together with on-site observations, it is obvious that this site neither discharges nor receives overland flow to/from adjacent lands. The site is 99% covered by building roof and paved parking as shown on the surveyor's plan dated 7 Nov/2017 referred to in Section 3.0, above.

4.2 Adjacent Lands

South Boundary: #134 Nelson St., small restaurant with parking in rear.
West Boundary: #365 King Edward Ave., Hydro Ottawa transformer substation
#339 King Edward, commercial outdoor parking lot
#331 King Edward, performing arts theatre outdoor parking and access to underground parking.

North Boundary: #100 Nelson St., outdoor parking
#110 Nelson St., outdoor parking and access to apt. building
East Boundary: #110 Nelson St., parking garage and outdoor terrace for apt. building
Nelson St. roadway

4.3 Site Services

The following service connections were installed as part of site development in 1987.

- Sanitary – 150 mm dia. @ 1.0% connected to 300 dia. City sewer constructed in 1978. (SAN 39117)
- Storm – 300 dia.@ 1.0% connected to 450 dia. City sewer constructed in 1978 (STM39307)
- Water – 200 dia. service to renovated building and on-site private fire hydrant connected to 200 dia. City watermain. In 2006, under City Contract #ISB03-3000 (Dwg. 6050-06, the existing 200 dia. water service was reconfigured within the road allowance to permit abandonment of a 125 dia. watermain in the roadway north of #112 Nelson St. to York St.

4.4 Site Drainage

Site runoff is collected by roof drains on flat roofs and by 2 paved surface catchbasins all of which are connected to a 150, 200, 250, 300 on-site storm sewer system delivering flow directly to the 450 dia. City storm sewer.

4.5 Natural Gas

The site is connected to a gas line on the east side of Nelson St. road allowance.

4.6 Wire Utilities

- Hydro: an on-site transformer is connected to a large underground Hydro vault located below the sidewalk on the west side of Nelson St. adjacent to the north end of the site frontage.
- Communication lines are located underground along both sides of Nelson St. across the site frontage.

4.7 Geotechnical Factors

From the ESA Phase I report it is known that the site is underlain by 5m to 15m soil overburden above limestone bedrock. Rock removal is therefore not anticipated on any new building construction that is not deeper than 1 floor level below grade.

5. FUTURE DEVELOPMENT CONCEPT

The proposed rezoning will allow a 9 storey building with 174 residential apartments and 1 level of underground parking for 67 cars to be constructed on the site as shown on Dwg. A-01 by AWA Architects, Inc.

Both pedestrian and vehicular access are necessarily located along the 18.47 m frontage on Nelson St. with the building taking the same L-shape as the property parcel using minimum setbacks along each boundary.

The proposed site plan is conceptual only to be used for analysis of all impacts, including site servicing and stormwater management.

Any detailed site grading and on-site services design including connection to the City sewer and water systems, will be part of a future submission by others for Site Plan Control.

6. WATER SUPPLY

The site is presently connected to a 200 dia. watermain on Nelson St. by a 200 dia. extension to the City main into the centre of the site to supply a private hydrant (HP239) installed in 1987, including a 200 dia. valve in a valve chamber at the property line on Nelson St. In 2006, the City, under Contract ISB03-3000, transferred the connection to a new location on the City watermain as shown on Dwg. 6050-06, partial copy of which is included in Appendix 'A'.
The site plan concept attached to this application would require that the on-site watermain and hydrant be removed. Under this scenario, the existing connection could remain in service to the property line to supply both domestic and fire demand for a fully sprinklered building. A new hydrant would be required to be installed on the roadway within 10 m of a Fire Department building connection on the front wall.
Referring to detail calculations in Appendix 'A', the results are summarized as follows:

Maximum Pressure at Bldg.	= 569.6 kPa	82.6 psi> 80 psi max. allowed
Minimum Pressure at Ground Fl.	= 482.4 kPa	69.9 psi> 40 psi min. allowed
Minimum Pressure at 9th Fl.	= 227.5 kPa	33 psi< 40 psi min. allowed
*Residual Pressure at Street Hydrant	= 348 kPa	50.5 psi> 20 psi min. allowed

*For fire flow of 13,000 L/min.

It can therefore be concluded that a pressure reducing valve may be required for the lower floors, a booster pump will be necessary for supply to the upper floors and that there is more than adequate residual pressure for a fire flow of 13,000 L/min.

7. WASTE WATER

In 1978 the existing 9" and 12" combined sewers on Nelson St. between Rideau St. and York St. were removed and replaced with a 300 dia. (12") concrete sanitary sewer under City Contract 77-32/Dwg. 1423 (sheet 1/6)/As-built March/92. The upstream end of this sewer is approximately 18 m north of Rideau St. and receives flow from a connection to 333 Rideau St., a small 1 storey commercial building on the N/W corner of Rideau and Nelson. The existing 300 mm sanitary sewer on Nelson St. discharges to a 24" (600 mm) on York St. that was also constructed under Contract 77-32 and which discharges into a 42" (1050 mm) at King Edward Ave. The York St. sewer has a maximum capacity of 500 L/s and does not receive any upstream flows other than Nelson St. from Rideau St. to York St.
In 1997, redevelopment of the subject site included a new 150 dia. connection to the 300 dia. sanitary sewer. Referring to Dwg. M-1 by Everest Engineering, the invert of 300 dia. sanitary sewer is 56.14 at the point of connection. Calculation of the invert elevation as detailed in Appendix 'B' results in an invert of 56.33 at the front wall of a future 9 storey building. Assuming that the future first floor elevation is 300 mm above centre line of Nelson St. roadway, the following calculation determines the elevation of basement floor:

Centre Line Nelson St.	= 59.2+		
Add	.03		
First Floor elevation	59.5		
Subtract	min = 2.7	(Fl. to Fl.) max =	3.0
Basement Floor elevation	56.8 (highest)		56.5 (lowest)
Compared to invert 150 dia. at front wall	56.3	(Appendix 'B')	56.3
Difference	0.5 m		0.2 m

It can be concluded that either a 150 dia. or 200 dia. sanitary service could be installed with invert of pipe below basement floor at the point of entry depending upon detail design of future building.
However, there will not be sufficient grade difference to allow gravity flow in basement floor drain pipes connected directly to the service connection.
Pumping of basement floor drainage will be necessary and will protect against possible back-up from the street sewer.
From calculations in Appendix 'B', it is obvious that the 150 dia. pipe connection has capacity to convey the expected peak wastewater flow. It may be necessary to relocate the existing pipe connection and/or to provide a 200 dia. pipe size in replacement to reduce the chance of flow obstruction affecting such a large number of residents. In such case, a new manhole would be required at the point of connection to the City sewer since the connection is greater than 50% of the diameter of the concrete pipe sewer.

8. STORMWATER MANAGEMENT

8.1 EXISTING DRAINAGE

The subject property is 98% covered by impervious surfaces consisting of flat roofs and paved parking and access routes. Roof drains and 2 surface catchbasins collect all runoff and are directly connected to a storm sewer on site which, in turn, delivers all runoff to the City storm sewer on Nelson St. midway between Rideau St. and York st.
Nelson St. storm sewer (450 dia.) is connected to York St. (600 dia.) draining westerly to King Edward Ave. where it drops approximately 1 m (invert to obvert) into a 1800 dia. trunk storm sewer. Both Nelson St. and York St. storm sewers can be considered slightly oversized in relation to the relatively small catchment area served.
Using the Rational Method formula, existing site runoff peak flow can be estimated for both 1:5 yr. and 1:100 yr. storm events as detailed in Appendix 'D' and as summarized below:

	Tc = 10 min.	Tc = 15 min.
1:5 yr. event	56.9 L/s	45.6 L/s
1:100 yr. event	146.5 L/s	117.1 L/s

These flows are compared to the capacity of Nelson St. and York St. storm sewers as follows:

Nelson St.	450 dia. @ 0.82% = 269 L/s
York St.	600 dia. @ 1.51% = 457 L/s

It is obvious that the existing sewers that were designed to serve a 1:5 yr. storm event, are vulnerable to serious overloading during larger storms. However, City staff have indicated that these 2 street sections are not subject to regular backup with street flooding during major storms.
This block of Nelson St. has no sag points in the longitudinal road profile that would give rise to roadway surface ponding that could impact adjacent properties.

8.2 POST-DEVELOPMENT S.W.M.

The concept site plan shows maximum building coverage permitted by minimum building setbacks applied along all boundaries. This arrangement will give rise to maximum site runoff that must be controlled by on-site detention storage induced by restrictive flow relief devices(s). The only practical options for detention storage in this concept are roof ponding storage OR structural (tank) storage in the basement OR a combination of both. In the building configuration shown, only the 9th floor roof would be suitable for roof ponding storage and it could only be utilized in combination with basement tank storage for runoff from balconies and terraces shown on all other floors. For purposes of this analysis, all detention storage is located in the basement in order to determine the maximum tank size required.
Similarly, the maximum permitted release rate is calculated in Appendix 'D' using a time of concentration (Rational Method) of 15 min. which gives rise to a lower release rate that results in a maximum detention storage volume required.
For collection and conveyance of outside ground level runoff (Area A3/FIG.1/Appendix 'C') a series of area drains (inlets) are connected to longitudinal drain pipes attached to the inside basement walls leading to the detention tank attached to the east wall (Nelson St.)

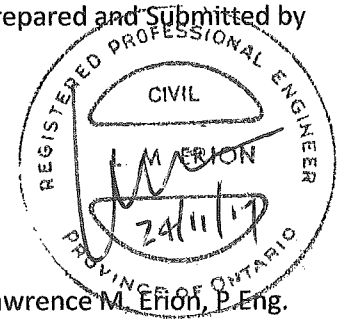
Detailed calculations in Appendix 'D' indicate that a detention tank can be provided for approximately 52 cu. metres (1:100 yr. storm event) storage volume that can be configured to fit available space both vertically and horizontally and will discharge by gravity to the existing 300 dia. service connection that has capacity to spare for the controlled release rate using a circular orifice plate having a diameter in the range of 100 mm to 120 mm.

9. SUMMARY

Rezoning of 112 Nelson St. from industrial to residential that allows a 9 storey building with 174 apartments can be serviced by connection to existing City infrastructure in the roadway based on the following conclusions:

- Water supply: the existing 200 dia. service connection constructed by the City in 2006 can be utilized to supply both domestic and fire demands for a fully sprinklered building subject to replacement of the existing private hydrant with a new hydrant located within 10 m of the fire department building connection.
- A new 200 dia. sanitary service complete with a manhole at the 300 dia. City sewer connection point is preferable to utilization of the existing 150 mm dia. pipe.
- The existing 300 dia. storm service connection, constructed in 1987 has the capacity to serve as outlet for a storm detention storage tank complete with a restrictive flow device to meet City requirements for reducing flows from major storms up to a 1:100 yr. event. Reduction of site runoff to the existing 450 dia. City storm sewer can be in the order of 66% (1:5 yr.) and 70% (1:100 yr.) based on the concept plan that maximizes building coverage on the site. A future application for site plan approval based on any lesser building area or other hard surface coverage can therefore be capable of achieving a similar degree of runoff reduction.

Prepared and Submitted by



Lawrence M. Erion, P.Eng.

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NOV/17

APPENDIX 'A'

WATER SUPPLY CALCULATIONS & DRAWINGS

7 PAGES

Water Analysis for 112 Nelson Street

Boundary condition provided by City of Ottawa on Nelson Street adjacent to site

Max HGL	115.6 m
PXHR	106.7 m
MXDY + Fire*	94.7 m

* based on fire flow 13,000 l/min

Elevations

Proposed Building	Ground Floor	57.50 m
	9th Floor	83.50 m
Road elevation at hydrant		59.20 m

Maximum Pressure at Building

Max HGL elevation	115.60 m	
Ground Floor	57.50 m	
Difference	58.10 m	
Pressure	569.6 kPa	82.59 psi

Pressure Reducing Valve (PVR) required as max pressure exceeds 552 kPa (80 psi)

Minimum Pressure at Building

PKHR elevation	106.70 m	
Ground Floor	57.50 m	
Difference	49.20 m	
Pressure	482.4 kPa	69.94 psi

Minimum pressure at ground floor exceeds minimum required value of 276 kPa (40 psi)

PKHR elevation	106.70 m	
9th Floor	83.50 m	
Difference	23.20 m	
Pressure	227.5 kPa	32.98 psi

Minimum pressure at 9th floor is less than minimum required value of 276 kPa (40 psi)
Booster pump required

Fire Flow at Street Hydrant

MXDY + Fire elevation	94.70 m	
Hydrant elevation	59.20 m	
Difference	35.50 m	
Pressure	348.0 kPa	50.47 psi

For fire flow of 13,000 l/min residual pressure at hydrant exceeds minimum requirement of 140 kPa (20 psi)

Lawrence Erion

From: "Mottalib, Abdul" <Abdul.Mottalib@ottawa.ca>
Date: November-15-17 3:26 PM
To: <erion@rideau.net>
Cc: "Wu, John" <John.Wu@ottawa.ca>; "Mottalib, Abdul" <Abdul.Mottalib@ottawa.ca>; "James, Douglas" <Douglas.James@ottawa.ca>
Attach: 112 Nelson November 2017.pdf
Subject: FW: boundary condition request on 112 Nelson Street

Hi Lawrence,

Please see the water boundary conditions below as requested.

Thanks.
Abdul Mottalib, P. Eng.

From: .....
Sent: November 15, 2017 2:08 PM
To: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Cc: .....
Subject: RE: boundary condition request on 112 Nelson Street

Hi Abdul,

Please see below.

The following are boundary conditions, HGL, for hydraulic analysis at 112 Nelson (zone 1W) assumed to be connected to the 203 mm on Nelson (see attached PDF for location).

Minimum HGL = 106.7 m

Maximum HGL = 115.6 m

The maximum pressure is estimated to be above 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

Max Day + Fire Flow = 94.7 m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.


Boundary Condition for 112 Nelson
YORK ST
LITTLE LONDON PRIV
TURN LANE
KING EDWARD AVE
NELSON ST
SITE
F.H.
F.H.
N
Legend
Water Pipe Ownership
Private
Public
EA 17-297
NOV/17
APPENDIX 'A'
P.3/7

Lawrence Erion

From: "Lawrence Erion" <erion@rideau.net>
Date: November-03-17 2:02 PM
To: <john.wu@ottawa.ca>
Cc: "David Renfroe" <renfroe@domicile.ca>
Attach: 14325p&p02.pdf; scan0002.pdf; 17-297.fire flow.docx
Subject: 112 Nelson St./Proposed Re-zoning Request for Boundary Conditions EA 17-297

John
I submit the following request in replacement of my initial offering yesterday, with apologies.
This project involves re-zoning of the subject property at this time with only a theoretical building design to accompany the application to indicate a maximum potential redevelopment of 174 apartment units in a single building.
The site is currently serviced by a 200 mm dia. water connection that was constructed by the City under Contract ISB03-3000 as shown on as-built dwg. #6050-06 (copy attached). It is assumed that the existing water service will be utilized for a proposed new building.

The estimated domestic demand is outlined in the following table using 350 Lcd for AVDY per OWDG.

Unit Type	No. Units	PPO	AVDY	MXDY x 2.5	PKHR x 2.2
Studio	3	1.4	1470	3675	8085
1 Bed	83	1.4	40670	101675	223685
2 Bed	88	2.1	67760	169400	372680
			109,900 L/d	274,750 L/d	604,450 L/d
TOTAL	174				
			1.27 L/s	3.18 L/s	7.0 L/s

Fire Flow, as detailed in the attached, is calculated per the F.U.S. 1999 method assuming concrete, steel and masonry construction including a sprinkler system. The resulting total required fire flow is 13000 L/min (217 L/s) for a duration of 2.5 hrs.

To Summarize:

AVDY = 109,900 L/d (1.27 L/s)
MXDY = 274,750 L/d (3.18 L/s)
PKHR = 604,450 L/d (7.0 L/s
Fire Flow = 13,000 L/min (217 L/s)

Please provide boundary conditions for the 4 events summarized above ASAP.

Many Thanx
Lawrence

Nov 3/17
EA 17-297

112 Nelson St./Proposed Re-zoning
Fire Flow Estimate per F.U.S. 1999

Building Floor Area = 8600 m^2
(based on 2 largest floors + 50% of floors above to 8 max).

1. $F = 220. C. A^{0.5}$
   where C = 0.6 (fire resistive)
   F= 12,244 L/min
   Use 12,000 L/min

2. Occupancy Adjustment
   Use – 25% (non-combustible)
   Adjustment = -3,000 L/min
   Fire Flow = 9,000 L/min

3. Sprinkler Adjustment
   Assume 30% reduction
   Adjustment – 2,700 L/m

4. Exposure Adjustment

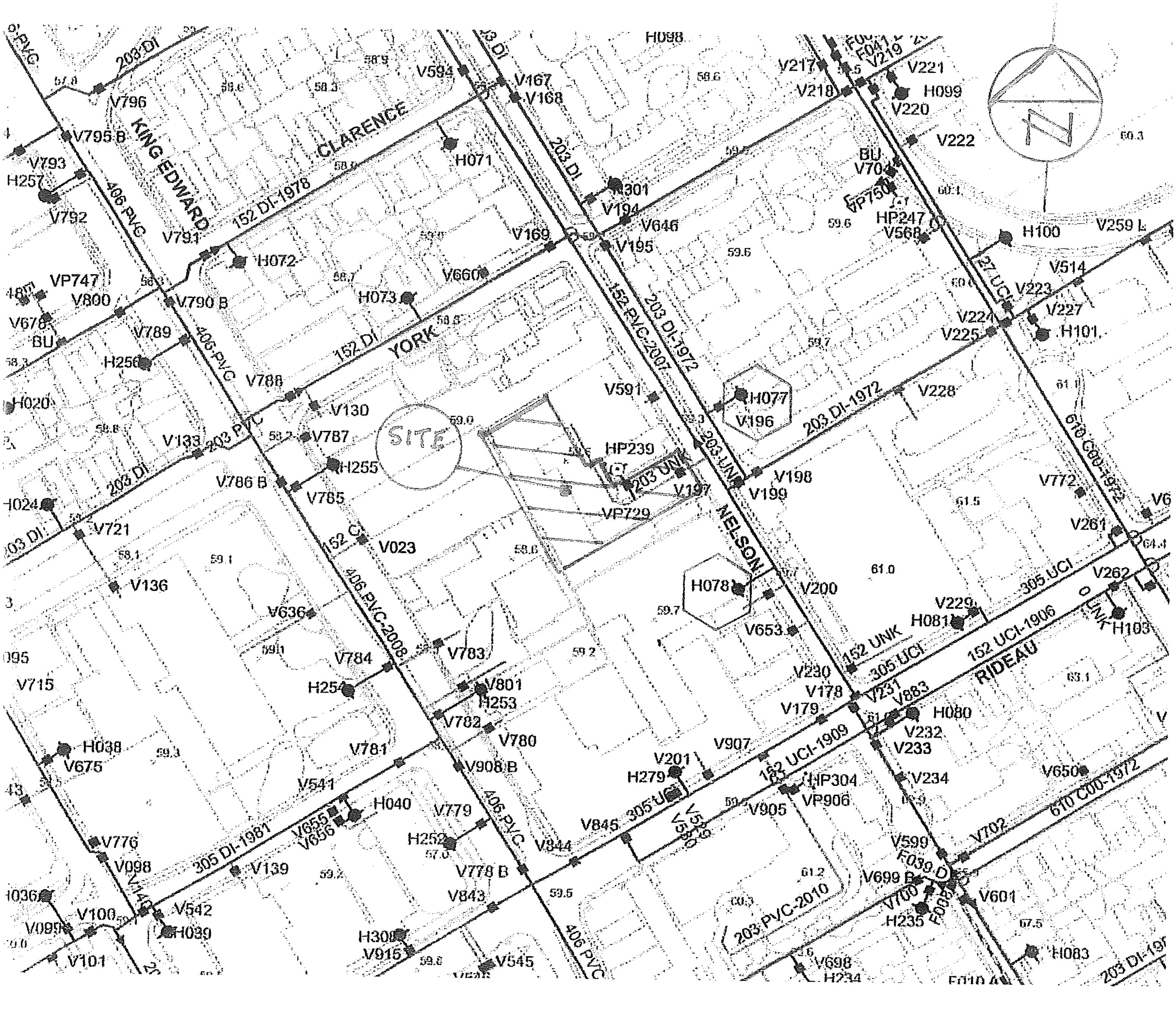
Bldg. Face	Separation	Change
north	13 m	+15%
east	13 m	15%
south	6 m	20%
west	6 m	20 %
	Total	+ 70%

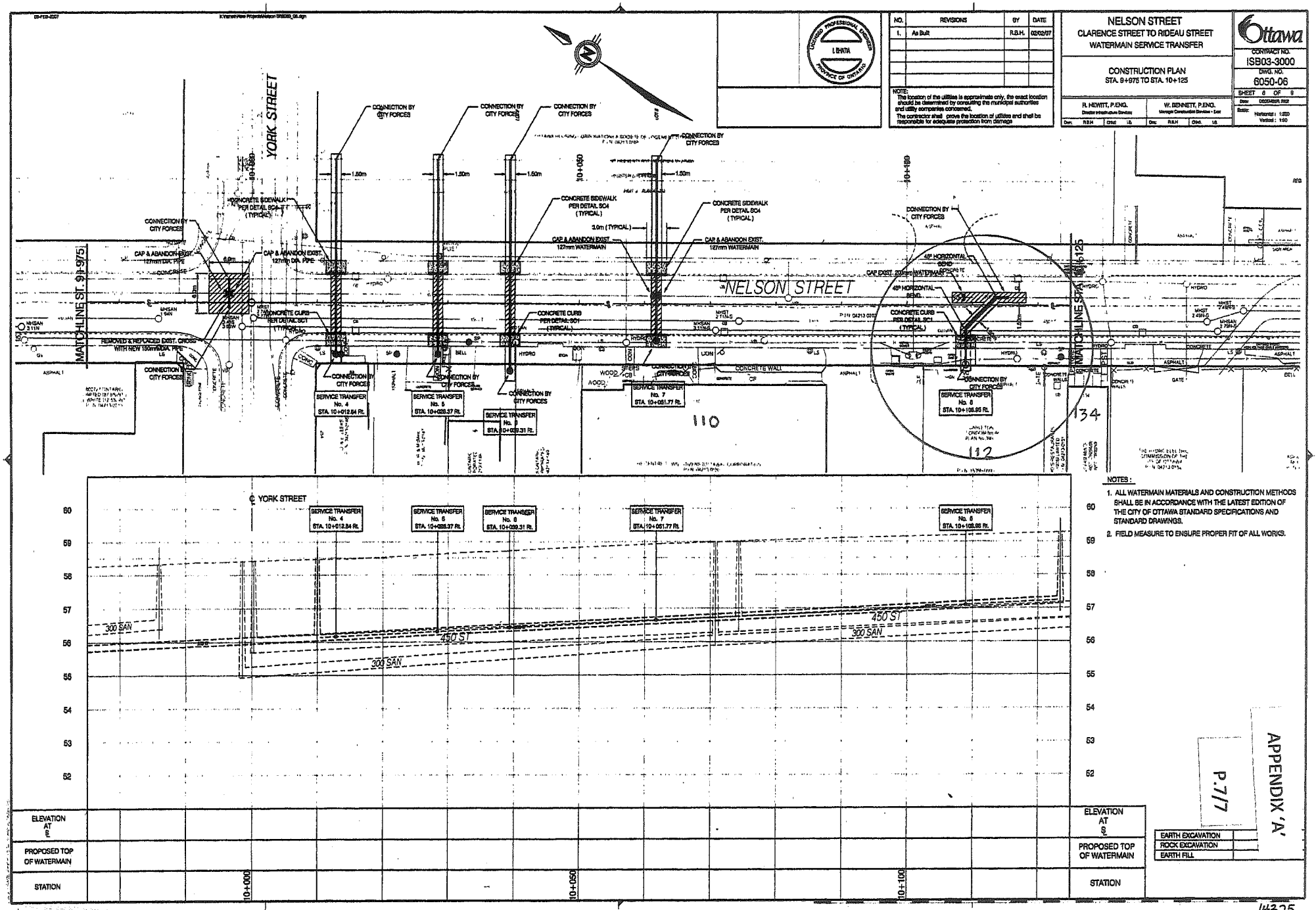
Adjustment + 6,300

5. Summary

Fire Flow per2	9,000 L/m
Add exposure	+6,300
Less sprinkler	-2,700
Total Fire Flow	12,600 L/m
USE	13,000 L/m (217 L/s)

Lawrence Erion, P.Eng
Erion Associates


CLARENCE
YORK
KING EDWARD
NELSON
RIDEAU
SITE
N
152 DI-1978
406 PVC
406 PVC-2008
152 PVC-2007
203 DI-1972
203 UNK
305 DI-1981
152 UCI-1909
152 UCI-1906
610 C00-1972
203 PVC-2010
HP239
VP729
H077
H078



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NOV/17

APPENDIX 'B'

SANITARY SEWER CONNECTION SIZING

1 PAGE

APPENDIX 'B'

112 NELSON ST./OTTAWA

PROPOSED RE-ZONING FROM INDUSTRIAL TO RESIDENTIAL

SANITARY SEWER CONNECTION SIZING

A. PER OTTAWA SEWER DESIGN GUIDELINES (O.S.D.G.)

Assume 9 storey bldg. with 174 res. Apartments

Studio apts.	3 @ 1.4 p.p.u.	= 4.2
1 Bed	83 @ 1.4 p.p.u.	116.2
2 Bed	88 @ 2.1 p.p.u.	184.8
	174	305.2 persons

Peak Res. Flow = Qp = $\frac{350 \text{ Lcd} \times 305}{86{,}400} \times 4.0$ (P.F.) = 4.94 L/s

Infiltration Allowance = 0.30 ha x 0.28 L/s/ha = 0.08

Total Peak Design Flow = 5.02 L/s

B. SELECT SANITARY CONNECTION PIPE SIZE

Existing site connection* = 150 dia. @ 1.0% (Q^{CAP} = 15.7 L/s/ V^{FULL} = 0.89 m/s)

Future replacement = 200 dia. @ 1.0% (Q^{CAP} = 62.0 L/s/V^{FULL} = 1.22 m/s)

*Constructed in 1987

C. CAPACITY OF NELSON ST. SANITARY SEWER

Existing sewer constructed in 1978 (concrete pipe) is 300 dia. @ 0.92% (Q^{CAP} = 96.8 L/s/V^{FULL} = 1.32 m/s)

D. PEAK DESIGN FLOW = 5.02/15.7 x 100 = 32% of capacity of existing 150 dia. connection

CAPACITY RATIOS 5.02/62 x 100 = 8.1% of capacity of future 200 dia. connection

5.02/96.8 x 100 = 5.2% of capacity of existing 300 dia. sanitary sewer.

E. CALCULATE INVERT OF 150 DIA. SERVICE AT FRONT BUILDING WALL

Invert 300 dia. at connection = 56.14 m (Dwg. M1/Everest Eng.)

\+ 0.07

Invert 150 dia. at connection = 56.21

+ 9.3 m @ 1% = 0.09 (Pipe slope)

Invert 150 dia. at front wall = 56.30 m

Nov/2017

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APPENDIX 'C'

STORM SEWER CONNECTION ANALYSIS

2 PAGES

APPENDIX 'C'

112 NELSON ST./OTTAWA

PROPOSED REZONING- INDUSTRIAL to RESIDENTIAL
STORM SEWER CONNECTION ANALYSIS

Reference: (1) OTTAWA SEWER DESIGN GUIDELINES (O.S.D.G.)
(2) CONCEPT SITE PLAN – DWG. SP-1 (AWA ARCHITECT)
(3) STORM DRAINAGE AREAS (FIGURE 1)

Storm sewer connection is sized to convey the peak runoff flow resulting from a 1:5yr rainfall event applied to all captured surface areas on the site. Pipe capacity to be equal or greater than the resulting peak flow without surcharging and with no restrictive flow control devices in place.

- From Table 1, pg.2

Total site area captured	= 2857 (96.9%)
Total site area uncaptured	= 92 (3.1 %)
Total site area	= 2949 (100%)
Total A x C captured	= 1963.7 (96%)
Total A x C uncaptured	= 82.8 (4%)
Total A x C	= 2046.5 (100%)

- Peak Captured Flow (1:5 yr.) = $Qp_5 = 2.78 \times A \times C \times I$
  A x C = 0.19637
  for Tc = 10 min., $Qp_5 = 2.78 \times 0.19637 \times 104.2$ mm/hr. = 56.9 L/sec
  for Tc = 15 min., $Qp_5 = 2.78 \times 0.19637 \times 83.6$ mm/hr. = 45.6 L/sec

- Existing Service Connection:

Pipe Diameter	300 mm
Slope	1.0%
Capacity	100.9 L/sec Q_P/Q_C = 56% to 45%
Velocity (full)	1.38 m/sec

- Capacity of City Storm Sewers
  (a) Nelson St. (ST 39307: 450 dia. @ 0.82% =269 L/sec
  (b) York St. (ST 39305): 600 dia. @ 0.51% = 457 L/sec

- Elevation of Existing 300 dia. service connection

Inv. 450 dia. on Nelson St.	= 56.57 m
+	0.07
Inv. 300 dia. @ connection	= 56.64
+ 12 m @ 1.0% slope	= 0.12
Inv. 300 dia. @ Bldg. wall	= 56.76
+	0.30
Obvert 300 dia. @ Bldg. wall	= 57.06

Future Basement Floor Elevation	56.8 ± highest	EA 17-297
(Per Appendix 'B')	56.5 ± lowest	NOV/17

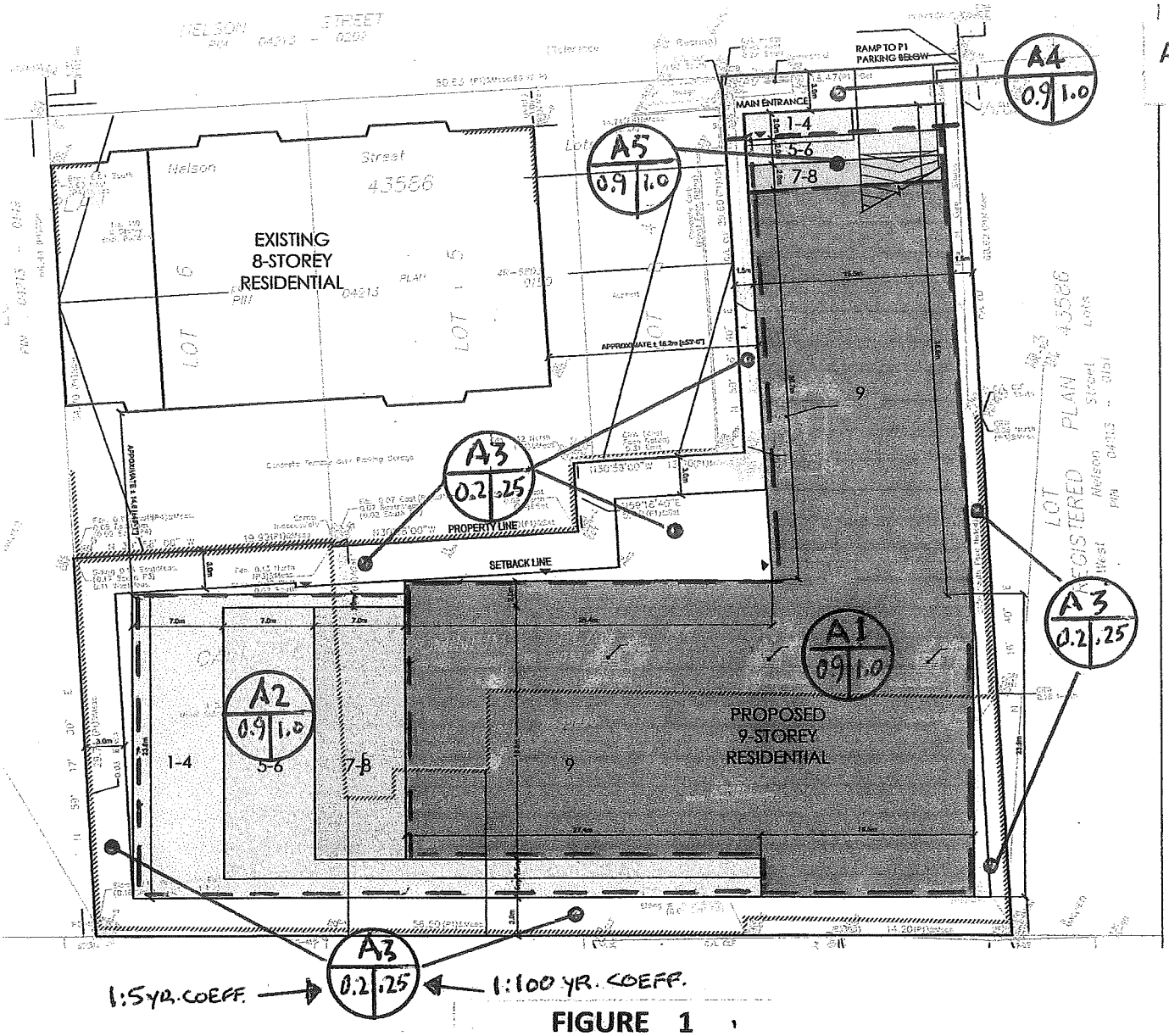

FIGURE 1
POST-DEV. DRAINAGE AREAS

AREA I.D.	AREA m^2 (A)	RUNOFF COEFF (C) 1:5yr.	(C) 1:100 yr.	(A) x (C) 1:5 yr.	(A) x (C) 1:100 yr.	COMMENT
A1	1263	0.9	1.0	1136.7	1263	CAPTURED
A2	664	0.9	1.0	597.6	664	CAPTURED
A3	868	0.2	0.25	173.6	217	CAPTURED
A4	92	0.9	1.0	82.8	92	UNCAPTURED
A5	62	0.9	1.0	55.8	62	CAPTURED
TOTAL	2949					

	1:5yr.	1:100 yr.
TOTAL A x C CAPTURED	1963.7	2206
A X C UNCAPTURED	82.8	92

TABLE 1
POST-DEV. DRAINAGE DATA
(RATIONAL METHOD)

NOV/2017

EA 17-297

APPENDIX 'D'

STORMWATER MANAGEMENT ANALYSIS

3 PAGES

NOV/2017

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APPENDIX 'D'

112 NELSON ST.

PROPOSED REZONING (INDUSTRIAL to RESIDENTIAL

STORMWATER MANAGEMENT ANALYSIS

Reference: Appendix 'C' (FIG 1/TABLE 1)

1. EXISTING SITE RUNOFF

Using Rational Method formula $Q = 2.78 \times A \times C \times I$
where A = 0.295 ha.
C = 0.9 (1:5 yr. = 1.0 (1:100 yr.)

Q_5 = 2.78 x 0.295 x 0.9 x 83.6 = 61.7 L/sec (Tc = 15 min.)
= 2.78 x 0.295 x .09 x 104.2 = 76.9 /sec (Tc = 10 min.)

Q_{100} = 2.78 x 0.295 x 1.0 x 142.9 = 117.2 L/sec (Tc = 15 min)
2.78 x 0.295 x 1.0 x 178.6 = 146.5 L/sec (Tc = 10 min)
Existing service 300 @ 1.0% Q_{CAP} = 100.9 L/sec Q_5/Q_{CAP} = 61%(Tc = 15), 76%(Tc = 10)
Existing storm sewer (ST 39307) Q_{CAP} = 269 L/sec (Appendix 'C')

2. POST-DEV. RUNOFF

2.1 - Max. allowable site release (1:5 yr./C = 0.50)
Q_{ALLOW} = 2.78 x 0.295 x 0.50 x 83.6 = 34.3 L/sec (Tc = 15 min)
= 2.78 x 0.295 x 0.50 x 104.2 = 42.7 L/sec (Tc = 10 min)

2.2 – Uncaptured + uncontrolled release (1:100) yr. Area A4)
Q_{UNCAP} = 2.78 x 0.0092 x 1.0 x 142.9 = 37 L/sec (Tc = 15 min)
= 2.78 x 0.0092 x 1.0 x 178.6 = 46 L/sec (Tc = 10 min)

2.3 – Max. controlled release from SWM storage
$Q_{CONT} = Q_{ALLOW} - Q_{UNCAP}$
= 34.3 – 3.7 = 30.6 L/sec (Tc = 15 min)
= 42.7 - 4.6 = 38.1 L/sec (Tc = 10 min)

APPENDIX 'D'

3. STORAGE REQUIRED

Assume all storage to be provided in a structural tank located in the basement adjacent to the frontage wall at Nelson St.

For purposes of this analysis using the modified rational method formula, the lower allowance release derived from Tc = 15 minutes (30.6 L/sec) will be used to derive a maximum storage volume requirement.

$Q_{100} = 2.78 \times (A \times C) \times I_{100} = 2.78 \times 0.2206 \times I_{100} = 0.61323 \times I_{100}$

Tc (min)	I_{100} (mm/hr.)	Q_{100} (L/s)	- $Q_{RELEASE}$ (L/s)	= $Q_{STORAGE}$ (L/s)	x T (sec/1000)	= $V_{STORAGE}$ c.m.
10	178.6	109.5	30.6	78.9	0.6	47.3
15	142.9	87.6	30.6	57	0.9	51.3
20	120.0	73.6	30.6	43	1.2	51.6 <
25	103.9	63.7	30.6	33.1	1.5	49.7

Therefore: Required storage volume for 1:100 yr. = 51.6 cu.m.

4 . STORAGE PROVIDED

For the concept design of the building, a concrete storage tank could be constructed adjacent to the inside of the front basement wall including the area below the access ramp to underground parking. Listed below are a few possible rectangular configurations with the resulting depth of water for 51.6 cubic metres of storage.

Alternative tank configurations:

W m	L m	A m^2	D m
6	7	42	1.23
6	8	48	1.14
7	8	56	0.92
7	7.5	52.5	0.98

Where W = distance along front wall from south wall
L = distance perpendicular to front wall
A = floor area of tank
D = depth of water to contain 51.6 cu. m.

Allowance for additional storage depth of 0.30 m above 1:100 yr. storm level (1.4 m above highest tank floor level) would provide an additional 15 c.m. ± before overflow in pipe connected to 300 dia. storm service down-stream of the control device. The top of the tank wall would then be set 0.4 m above invert of overflow pipe (200 dia.) or 2.1 m above tank floor.

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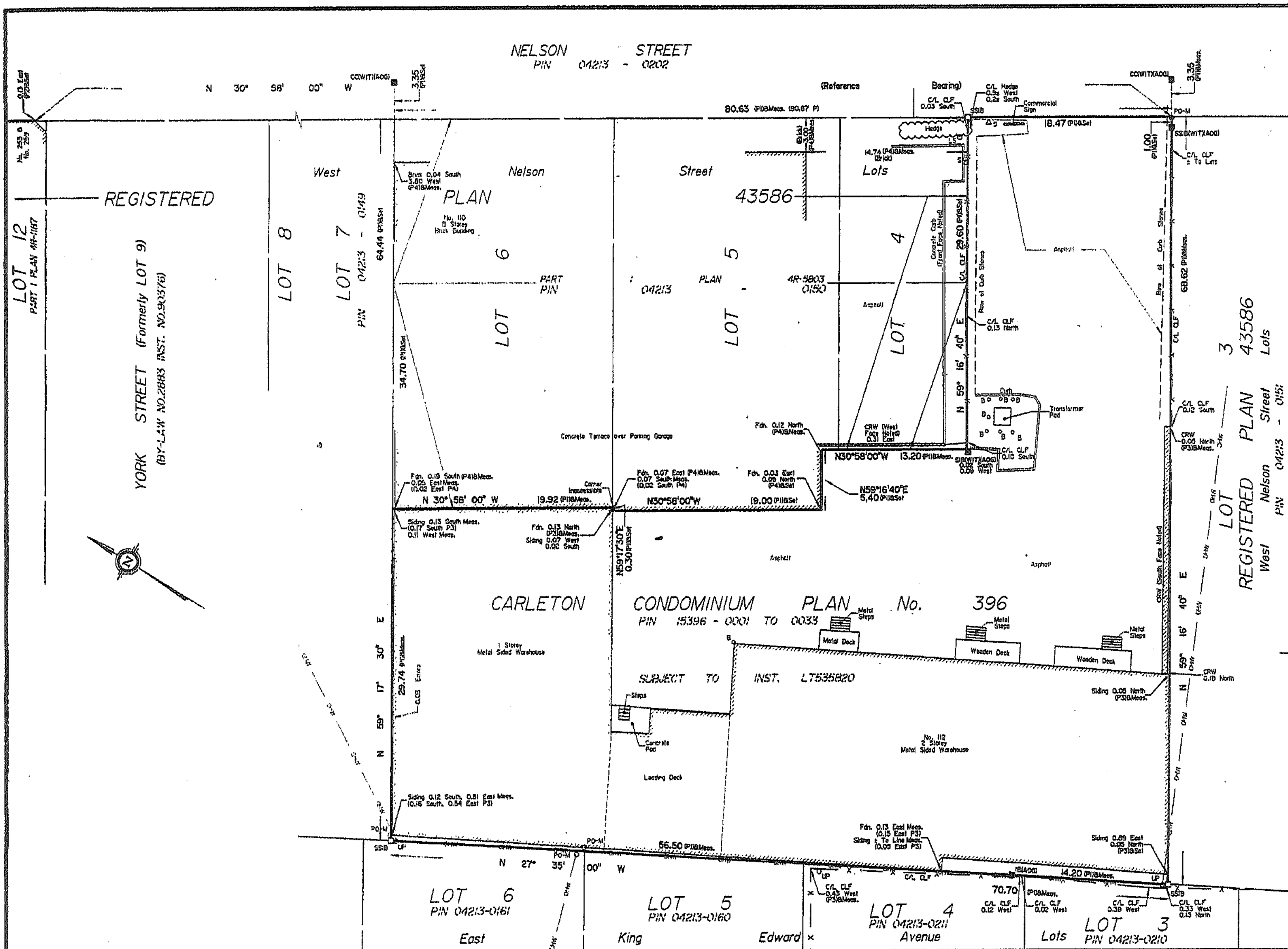
APPENDIX 'E'

MISCELLANEOUS DRAWINGS

5 PAGES



SURVEYOR'S REAL PROPERTY REPORT

PART 1 Plan of

CARLETON CONDOMINIUM PLAN No. 396
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 250

10 7.5 5.0 2.5 0 5 10 Metres

Metric
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

Surveyor's Certificate

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the Land Titles Act and the regulations made under them.
2. The survey was completed on the 6th day of November, 2017.

November 7, 2017
Date

A.J. Broxham
Andrew J. Broxham
Ontario Land Surveyor

PART 2
THIS PLAN MUST BE READ IN CONJUNCTION WITH SURVEY REPORT DATED: November 7, 2017

ANNIS, O'SULLIVAN, VOLLEBEKK LTD. grants to Domicile ("The Client"), their solicitors, mortgagees, and other related parties, permission to use original, signed, sealed copies of the Surveyor's Real Property Report in transactions involving The Client.

Notes & Legend

—□—	Denotes	Survey Monument Planted
—■—	"	Survey Monument Found
SIB	"	Standard Iron Bar
SSIB	"	Short Standard Iron Bar
IB	"	Iron Bar
(WIT)	"	Witness
(AOG)	"	Annis, O'Sullivan, Vollebekk Ltd.
Meas.	"	Measured
(P)	"	Registered Plan 43586
(P1)	"	Plan 4R-5803
(P2)	"	Plan 4R-1187
(P3)	"	Carleton Condominium Plan No. 396
(P4)	"	(AOG) Plan August 25, 1986
OHW	"	Overhead Wires
O UP	"	Utility Pole
• AN	"	Anchor
O LS	"	Light Standard
o B	"	Bollard
Δ S	"	Sign
CLF	"	Chain Link Fence
CRW	"	Concrete Retaining Wall
O PO-M	"	Metal Pole
C/L	"	Centerline

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2029633

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR In accordance with Regulation 1026, Section 29 (3).

Bearings are astronomic, derived from the Westerly Limit of Nelson Street, shown to be N30°58'00"W on Plan 4R-5803.

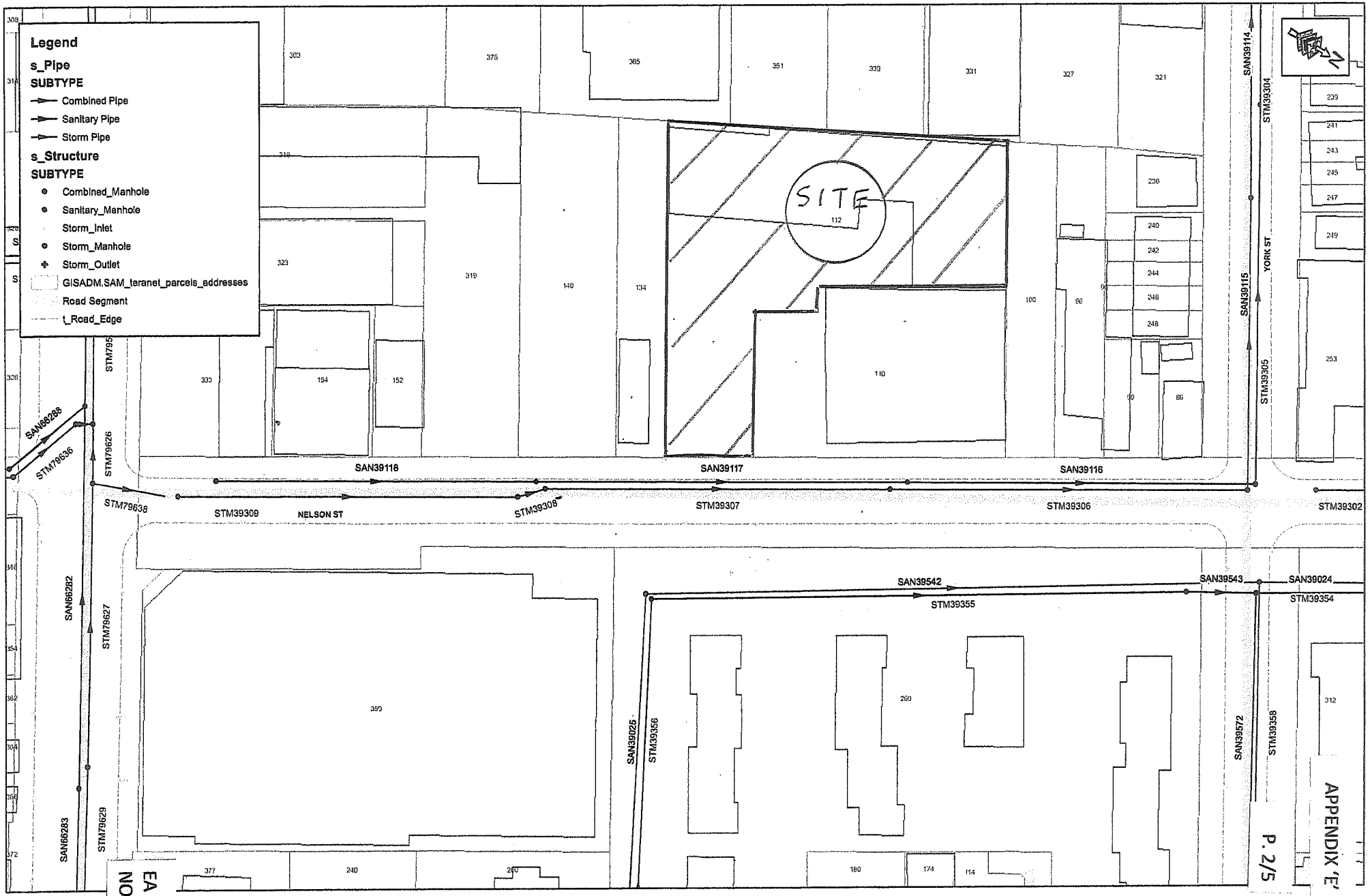
ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Ontario Land Surveyors

Job No. 19696-17 Domicile CC No.396 D F

APPENDIX 'E'

P.1/5

EA 17-297
NOV/17



EA 17-297
NOV/17

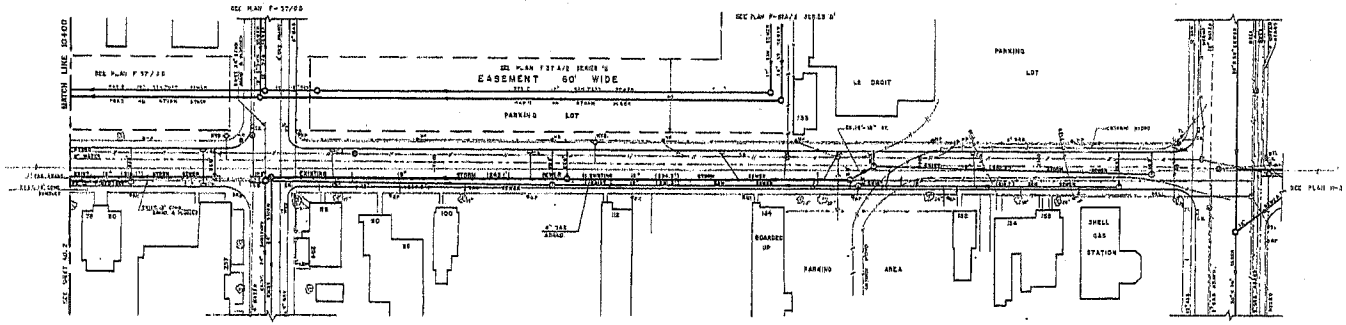
APPENDIX 'E'
P. 2/5

14234

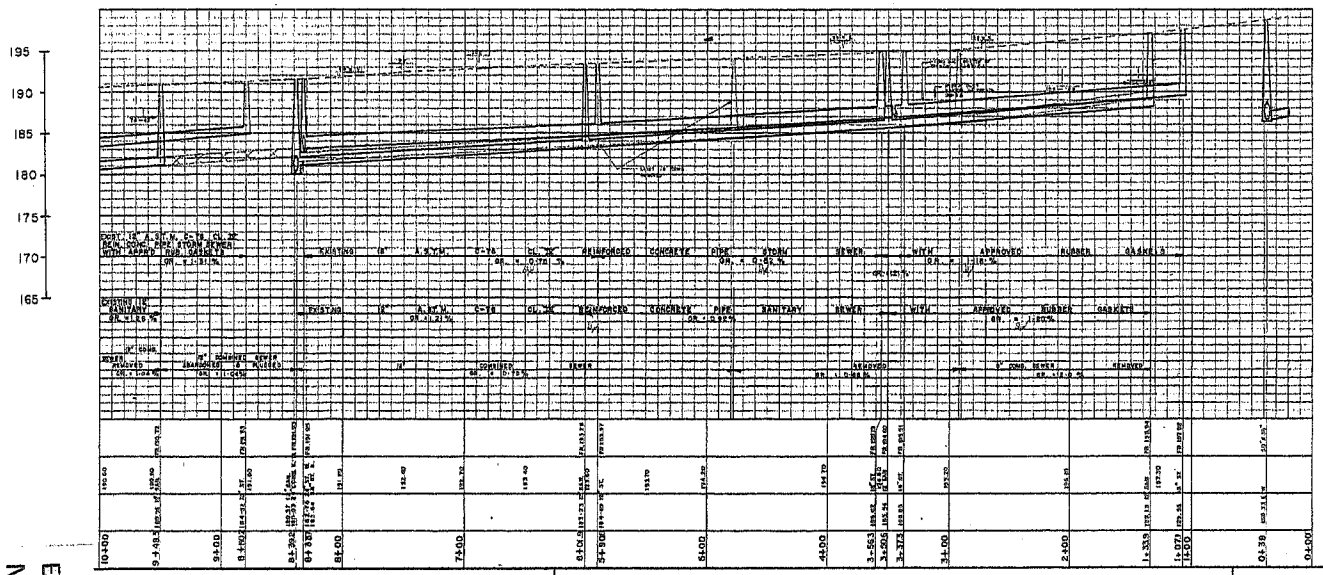
NELSON STREET

NOTES

1. PLAN 1423 SHT. 1 SUPERSEDES PART OF PLAN J-10.
2. ⊥ INDICATES SEWER CONNECTIONS AS PER T.V. INSPECTION.



NOTE: NELSON STREET FROM YORK TO RIDEAU, 18" & 9" COMBINED SEWERS REMOVED. APPROXIMATELY SAME LOCATION OF EXISTING 12" SANITARY SEWER.



NOTES:
A MINIMUM 1' CLEARANCE TO BE MAINTAINED SEWERS AND WATERMAINS.
UTILITIES SHOWN ARE TAKEN FROM BEST AVAI RECORDS. CONTRACTOR IS REQUESTED TO CHEC ALL UTILITY COMPANIES BEFORE DIGGING.
SOILS INFORMATION SHOWN IS NOT GUARANTE CONTRACTORS ARE ADVISED TO COLLECT AD SOILS INFORMATION AS DEEMED NECESSARY

CHECKED BY	DATE
BASIC PLAN	
SURVEY DETAIL	
DESIGN DRAFTING	

DESIGNED BY	DATE
ROAD GRADE	
SANITARY SEWER	
STORM SEWER	

DATE	DESCRIPTION	DESIGN
	REVISION	

CITY OF OTTAWA
DEPARTMENT OF PHYSICAL ENVIRONMENT
ENGINEERING AND SURVEYS BRANCH

NELSON STREET
RIDEAU ST. TO YORK ST.

DESIGNED BY	SCALES:
J. BRADLEY	HOR. 1"= 40'
CHECKED BY	VERT. 1"= 8'
P. WEST	

CONTRACT No. 77-32 | DATE: JULY 1978 | SURVEY BOOKS: 8706-8803 | PLAN No. 1423 | SHEET 1 of 5

APPENDIX 'E'

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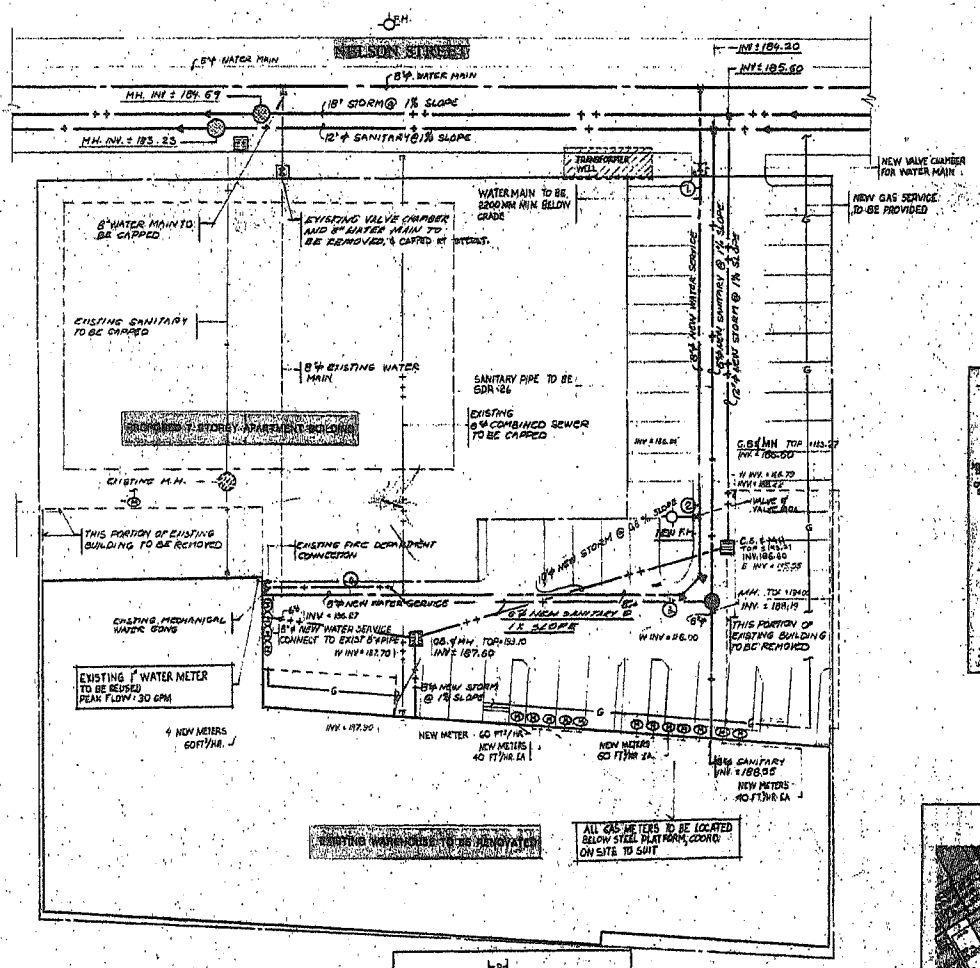
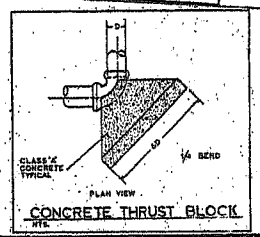
NOV/17

P.3/5



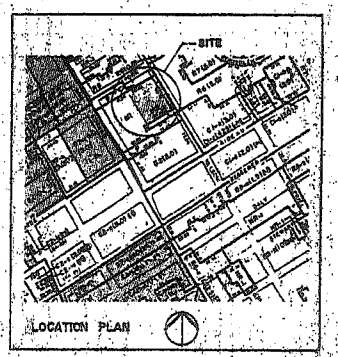
SITE PLAN SCALE 1:250



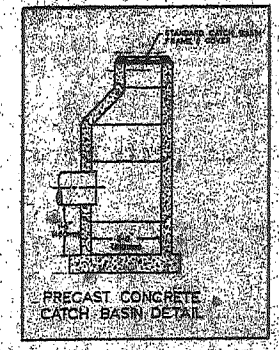
CONCRETE THRUST BLOCK

NO	GRADE	INVERT	DEPTH
1	194.03	186.70	2.2M
2	193.27	185.97	2.2M
3	194.03	186.70	2.2M
4	193.10	185.85	2.2M

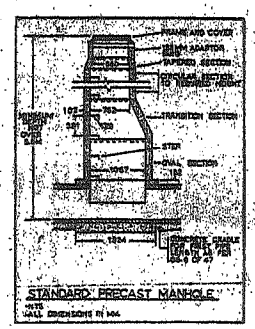
WATER MAIN PROFILE



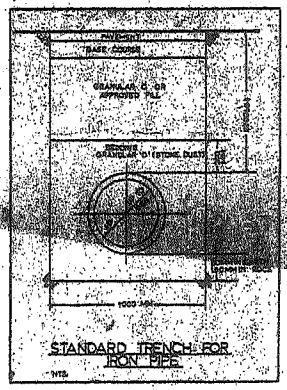
LOCATION PLAN



PRECAST CONCRETE CATCH BASIN DETAIL



STANDARD PRECAST MANHOLE



STANDARD TRENCH FOR IRON PIPE

GAS SERVICE

GENERAL
Inspect site before submitting tender and allow for all site-originated construction problems. Invert elevations of existing sewers have been taken from City of Nepean drawings. These inverts must be confirmed before connecting construction of services. All sewer constructions to be to City of Nepean standards and to their satisfaction.

SEWERS & MATERIALS
Main sanitary and storm sewer to be constructed of PVC pipe with watertight joints.
Bed pipe and laterals on 19 Class B granular material.
Backfill and cover to 8" above the pipes with granular material before backfilling with excavated material. Compact granular to 95% standard Proctor. Trenches under future roads and parking areas to be backfilled with native material between existing ground surface and 8" below. This portion of trench backfill in the road zone shall mean that exposed on the subgrade trench soils. Compaction of excavated material to be consistent with the native material being used for backfill and the native materials removed will then also be type of material and extra compactive effort will be required to reach the required density of 95% of the standard Proctor maximum dry density.
Manholes to be standard 4'ø circular precast.
Joints between sections to be watertight O ring.
Catchbasins to be standard 2'ø diameter precast with 1'ø frost sumps. Water services to be constructed in accordance with PWC standards.

Drawings are not to be used for construction unless signed by the engineer and labelled "ISSUED FOR CONSTRUCTION"

LEGEND

- PRESSURE REDUCING VALVE
- CHECK VALVE
- STRAINER
- PRESSURE SENSOR
- CLEAN OUT
- FLOOR DRAIN
- ROOF DRAIN
- WALL HYDRANT
- FIRE DEPARTMENT CONNECTION
- WATER METER
- UPRIGHT SPRINKLER HEAD
- PENDANT SPRINKLER HEAD
- BURIED SANITARY SEWER
- BURIED STORM SEWER
- COLD WATER
- HOT WATER
- VENT
- FIRE PROTECTION WATER SUPPLY
- STORM SEWER
- CL.'A' SUPERVISED VALVE
- GATE VALVE
- GLOBE VALVE
- THERMOMETER
- GAS
- HUB DRAIN
- FIRE EXTINGUISHER
- FLOW SWITCH
- UNION
- ROOM THERMOSTAT
- HUMIDISTAT
- SPRINKLER PIPING
- PRESSURE SWITCH
- BRANCH TOP CONNECTION
- BRANCH BOTTOM CONNECTION
- RISER DOWN
- RISER UP
- RISE OR DROP
- ACOUSTICALLY INSULATED DUCT
- BALANCING DAMPER
- SUPPLY DUCT
- RETURN OR EXHAUST DUCT

No.	REVISION	DATE
6	AS-BUILT DRAWING	OCT 20/87
5	ISSUED FOR CONSTRUCTION	JAN 6/87
4	GAS METERS RELOCATED & SHOWN	NOV 4/86
3	ADDENDUM No.1	SEPT 29/86
2	ISSUED FOR TENDER	OCT 21/86
1	ISSUED FOR CLIENT APPROVAL	OCT 9/86

NELSON INDUSTRIAL WAREHOUSE

NELSON STREET, OTTAWA

EVEREST ENGINEERING LIMITED
199 Colonnade Rd. S.
Nepean, Ont. K2E 7K3
(613) 224-1868
CONSULTING ENGINEERS

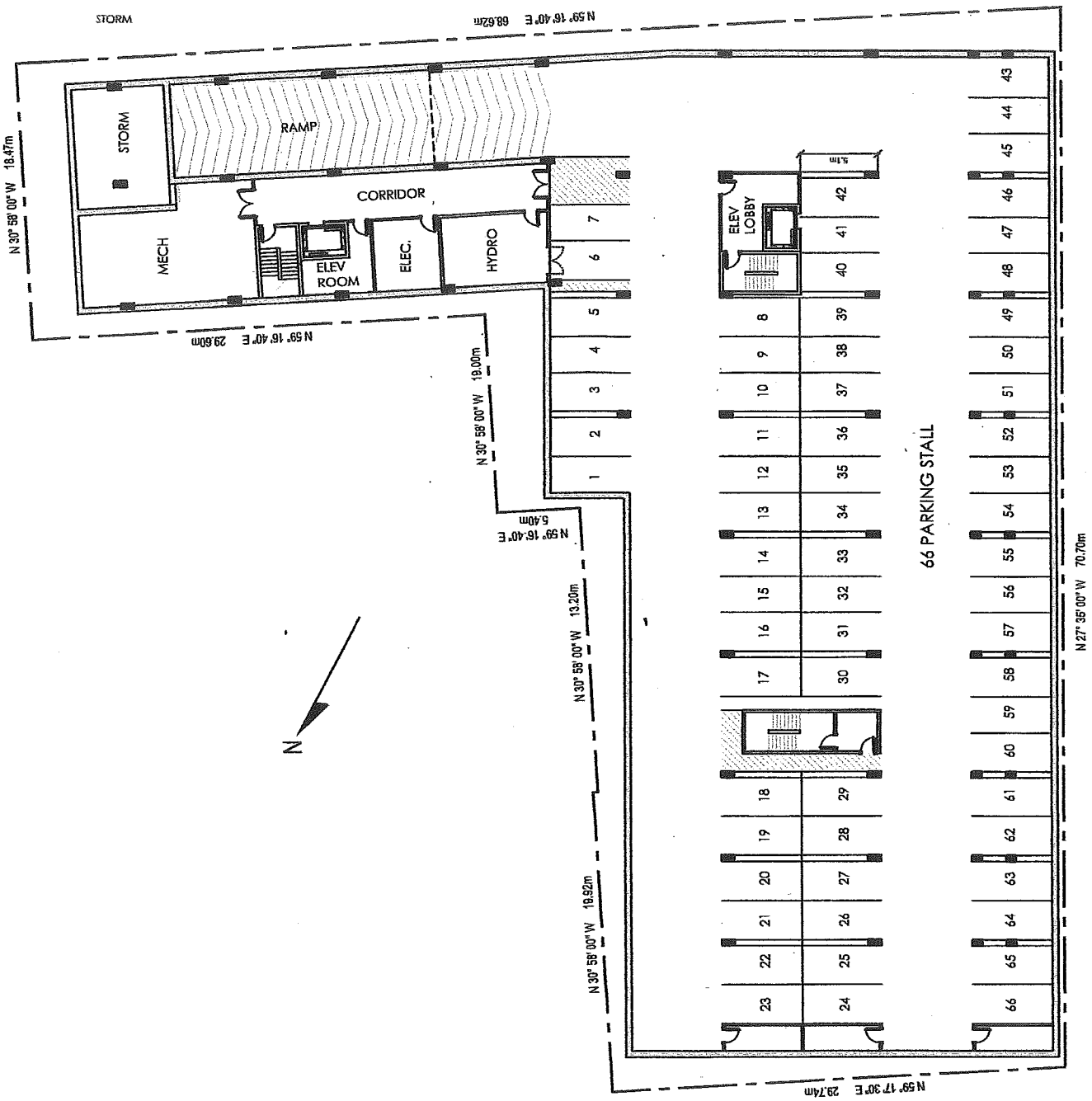
Date	SEPT/86
Scale	1:250
Drawn by	S.S.
Checked by	M.C.
Project No.	
Issued	

DRAWING NUMBER

SITE PLAN

EA 17-297
NO/17

APPENDIX 'E'
P.4/5



1 P1 PARKING LEVEL