February 8, 2018 File No.: 161-17798-00

Thomas Burr, Vice President
Suite 200, 12420–104 Avenue NW
Edmonton, AB
T5N 3Z9

RE: SITE SERVICING DESIGN BRIEF FOR 99TH STREET MIXED USE DEVELOPMENT REVISION #4 FEBRUARY 8, 2018 (SANITARY & STORM SERVICING)

Dear Thomas;

INTRODUCTION

WSP Canada Inc. on behalf of ONE Properties, has completed a servicing design brief on the above noted lands for the proposed rezoning to a mixed use development. This proposed development consists of 2 tower structures over a 3 level underground parkade. The west tower is 18 storeys of residential units. The main and second floors contain 5 Town House style units. The east tower is 15 storeys and is mixed use. The main and second floors comprise a commercial podium and the remaining tower is residential. In total, there are 242 proposed residential units between the two towers. The site is located at the NW corner of 99 Street and 89 Avenue and is approximately 0.35 hectares in size. The location plan as seen in the accompanied “Figure A” shows the proposed locations of the development and the rezoning of 8 lots: Lots 1-5 and Lots 26-28, Block 122, Plan RN27.

The uses of the proposed commercial space for this development are currently unknown. For the purpose of this brief, it is assumed that all the retail space will be restaurants. This is a conservative assumption that considers the highest probable sanitary flows. However, it may be likely that some of the area may be retail shopping or grocery which produces less wastewater. The sanitary flow generation calculations will be adjusted to reflect the actual proposed usage at the time of detailed design.

The preliminary alignment of the deep underground utilities, capacity restriction solutions, and service connection locations will be finalized during detailed design upon further discussions between WSP, EPCOR Water and Sewer Services (WASS) department, and the City of Edmonton (COE) Drainage department.

SANITARY AND STORM

Design Criteria

The post development sanitary flows, calculated from current City of Edmonton sanitary sewage generation rates, shows that the site will produce approximately 10.49 L/s of sanitary flow. New sanitary sewers in the City are to be designed to carry the design flow at a flow depth of 80% of the sewer diameter. This results in a flow rate of approximately 86% of the sewers' full flow capacity. The available capacity based on this expected flow will be approximately 10.59/0.86 = 12.31 L/s as shown in the figure shown below. Jatinder

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Tiwana with the City of Edmonton Drainage Department has confirmed via meeting and confirmation email that since the existing sewer system capacity is already strained in certain areas, the sanitary flow rate without the 0.86 is sufficient for design for the existing system.

Location	From MH	To MH	Added Lot ha	Added Road ha	Total Lot ha	Total Area ha	Added Avg Flow l/s	Tot Avg Flow l/s	Peak Factor	PDW Flow l/s	I/I Allow l/s	Sag MH's ea	Tot Sag MH's ea	MH Inflow l/s	PWW Flow l/s	Req. Flow l/s	Pipe Size mm	Slope %	Length m	Pipe Cap. l/s	Full Vel. m/s	PDWF Vel. m/s
	LOT	MH1	0.355	0.00	0.355	0.36	0.07	0.07	32.88	10.49	0.10	0	0	0.00	10.59	**12.31**	150	2.000	7.36	21.54	1.22	1.21

	Classification	2	Floor	Area ft2	Area m2	L/Day/m2	L/S	Pf calc	Max Pf	Pf	QPDW
Commercial	Retail		N/A	9776	908.220119	20	0.2102	20.17	25	20	4.241
	CRU-CAFE (Restaurant)		N/A			20					
	CRU-Grocer		N/A			8					
	Garbage/Service		1	1846	171.4990118	8	0.0159	64.51	25	25	0.397
	Amenity Space (office)			5583	518.6776723	8	0.048	39.20	25	25	1.201
					0	8					

Residential:	Units	Net Area ha	People/Unit	People/ha.	Population	G (L/Day/ Person)	L/s	Pf	QPDW
	237		1.909029536		452.44	300	1.571	2.81	4.422
TH-L1	5		3.32		16.6	300	0.0576	3.92	0.226
								Total QPDW	10.486

The storm system for this development is required to be designed to accommodate the 1 in a 100 year return frequency rainfall event. Due to the capacity restrictions in the existing downstream system, the City of Edmonton Drainage department is requiring that this site specifically be restricted to a release rate of 11.27 L/s/ha, resulting in a flow of 4 L/s generated from the site. This has been confirmed via meeting and email by Jatinder Tiwana. With a combined runoff coefficient of 0.95 (determined from hardscaped and landscapes surface areas) and a development area of 0.355 ha, the onsite storage requirement for the 1 in 100 year storm event for a 24 hour drawdown period is 185.58 m^3. The precise method of onsite storage and location of the service connection point will be established at the detailed design phase.

From MH	To MH	Added Ha	Total Ha	C	CA	Total CA	Initial Time	Time in Pipe	Total Time	Int. mm/hr	Design Flow L/s	Design Flow L/s/ha	Total Flow L/s	Length m	Pipe Size mm	Slope %	Cap. L/s	Cap. Ratio	Full Vel. m/s	Design Vel. m/s
												35L/s/ha								
	LOT	0.35	0.35									12								
Building	1	0.00	0.35	0.89	0.00	0.00	8.00	0.30	8.30	76.68	0		12	15.6	150	1.00	16	0.78	0.869	0.000

NOTES:

Rims, Inverts, and Depths are approximate only - Refer to detail design drawings.

Land Use	C (Runoff Coef)	Area (ha	C x A
1) Landscaped Area	0.1	0.027	0.0027
2) Hardscape Surface	0.95	0.326	0.3097
Total		0.353	0.3124

Combined C = 0.885

Calculated as per the COE Drainage design standards, the total of the flows generated from the storm and sanitary systems will yield a total flow value of 14.49 L/s.

Existing Conditions

The site cadastral, servicing reports, and combined main-line capacities have been provided to WSP by the WASS department. WSP has also met with the COE Drainage System Assessment department to address the existing design capacities and potential constraints.

Sanitary

The servicing information provided by WASS for building 1 & 2 (as shown on the attached "Figure B") indicates that the existing sanitary service connects to the existing 200 mm combined sewer on 99th street. Pre-development flow calculations produced by these two combined areas is approximately 5.11 L/s, yielding a required available capacity of 5.99 L/s.

The servicing information provided for building 3 indicates that the sanitary service connects to the existing 200mm combined sewer on 89th avenue. The pre-development flow calculation produced is approximately 2.08 L/s yielding a required available capacity of 2.46 L/s.

Storm

Pre-development flows have been generated to determine the overland flows entering the combined sewer system. A runoff coefficient of 0.95 was used for the existing sites. Based on existing topographical information it has been assumed that the site runoff is currently uncontrolled flow. Using the site area of 0.355 ha, and a runoff coefficient of 0.95, the total pre-developmental flow generated by the site is approximately 91L/s.

System Constraints (See "Figure C" for reference)

1) The 200mm combined main on 99th street north of 89th avenue has a total design capacity of 35.34 L/s.

2) The 2 mains on 100th street, north of 89th avenue have a combined capacity of 360 L/s. However, the direction of flow is partially uncontrolled at the intersection of 100th street and 89th avenue between the west and northwest inverts. The flow is initially directed through the north invert, but the flow could possibly flow further west on 89th and that 200mm main west on 89th avenue has a total capacity of 13 L/s. It could back up and flow north though the north-west and eventually travel down 100th Ave within the two parallel combined mains.

3) The 200mm combined main on 89th avenue east of the 99th street has a total design capacity of 30 L/s. This main ultimately connects to the 1500mm Combined Sewer Overflow (CSO) trunk main at 98th street and 88th avenue. This 1500mm main continues east along 88th avenue.

4) There have been reported issues with downstream surcharging and flooding around the residential areas along 91st Ave. between 98th St. and 99th St. during high storm flow events.

From recent correspondence between the COE Drainage System Assessment department and WSP, the combined sewer mains listed above in the site constraints are assumed to have limited capacity to fulfill the preliminary demands of the proposed development, however no modeling of the system for this area is available.

Proposed Developmental Flows & Service Connections (See "Figure D" for reference)

Existing design capacities were received from and discussed with COE Drainage System Assessment department, though no existing flows were available to be provided or discussed. Based on the design information received, and additional requirements provided by the Drainage department, Drainage proposed that the development connect the sanitary and storm services storm separately from 89th avenue. The reasoning is that any improvements required will decrease in cost if completed on 89th Ave in comparison to installation on 99th St.; 89th St. will be easier for traffic control; and there is more downstream capacity for the flows along the twin combined sewers along 100th St. Also, there are current surcharging and flooding issues into the east properties from the 99th St. main along 91st Ave towards 98th St. Servicing to the 99th St. main as-is will magnify the issue, unless the main is replaced and upsized for a significant length north of the proposed development. This is a less feasible option.

The sanitary contribution to the existing combined sewer on 89th St. will increase from the pre-development flow of 2.08 L/s to the calculated post development flow of 10.48 L/s. Although this is an increase in the sanitary contribution, this is ultimately a reduction to the existing combined (sanitary and storm) sewer if the portion of pre-developed uncontrolled storm flow currently entering the system is considered. As per a meeting held with Jatinder, Donovan Pederson, and Mikaela Hanley on March 1st, 2017, COE Drainage is requiring additional sanitary storage. On-site storage is higher-risk to the developer, but the option can be further explored during preliminary and detailed design. The alternative option is that the combined sewer on 89th Ave be upsized for increased storage capacity. Drainage recommends upsizing the 200 mm clay tile combined sewer along 89th Ave from 99th St to 100th St with a 600 mm pipe. This is the shortest length of upsizing option in comparison to extending north on 99th St or going east on 89th Ave to 98th St.

If required, the actual direction and the system distribution routes of the current uncontrolled storm flow can be further addressed when additional topographical information is available. Further considerations for including Low Impact Development (LID) features can be also be examined to further reduce the coefficient and thus decreasing the required storage volume. The storm service connection to 89th avenue will maintain a release rate of 11.27 L/s/ha for the proposed development which corresponds to 4 L/s of flow generated with 185.58 m^3 allocated to onsite storage. This significantly reduces the current overall uncontrolled storm flow of approximately 91 L/s.

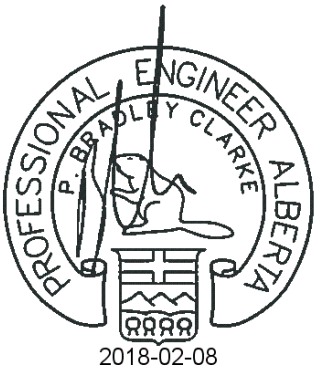
SUMMARY

This brief has investigated the direct options for servicing the proposed development with storm and sanitary. Utilizing the measures and preliminary assumptions as outlined above in this servicing brief, it appears that since the storm will now be controlled then the post-developmental flows will not increase the total contribution to the existing combined systems. The options provided in this report have been reviewed by the City of Edmonton and can be further assessed by the respective departments and WSP to finalize the approved servicing methods during detailed design.

Sincerely,

P. Bradley Clarke, P.Eng.
Senior Project Manager
Infrastructure

pbc

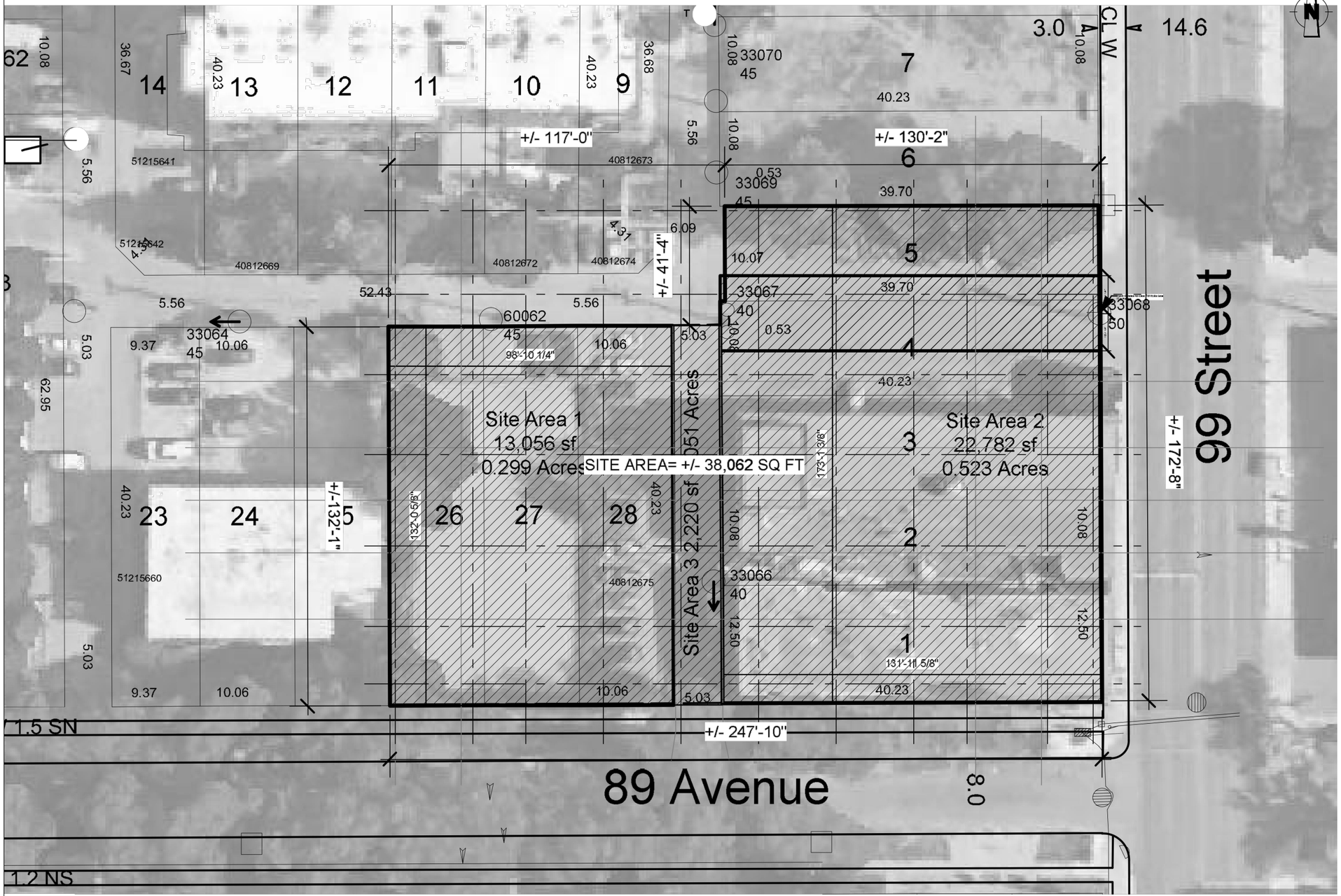


2018-02-08

APEGA Permit to Practice P-7641

Appendix A

FIGURES



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DESIGNED BY: B.C. / DRAWN BY: C.A.	
CHECKED BY: / APPROVED BY:	

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CLIENT:

CLIENT REF. #:

PROJECT:

SITE SERVICING DESIGN BRIEF FOR
99th STREET MIXED USE DEVELOPMENT

TITLE:

LOCATION PLAN
FIGURE A

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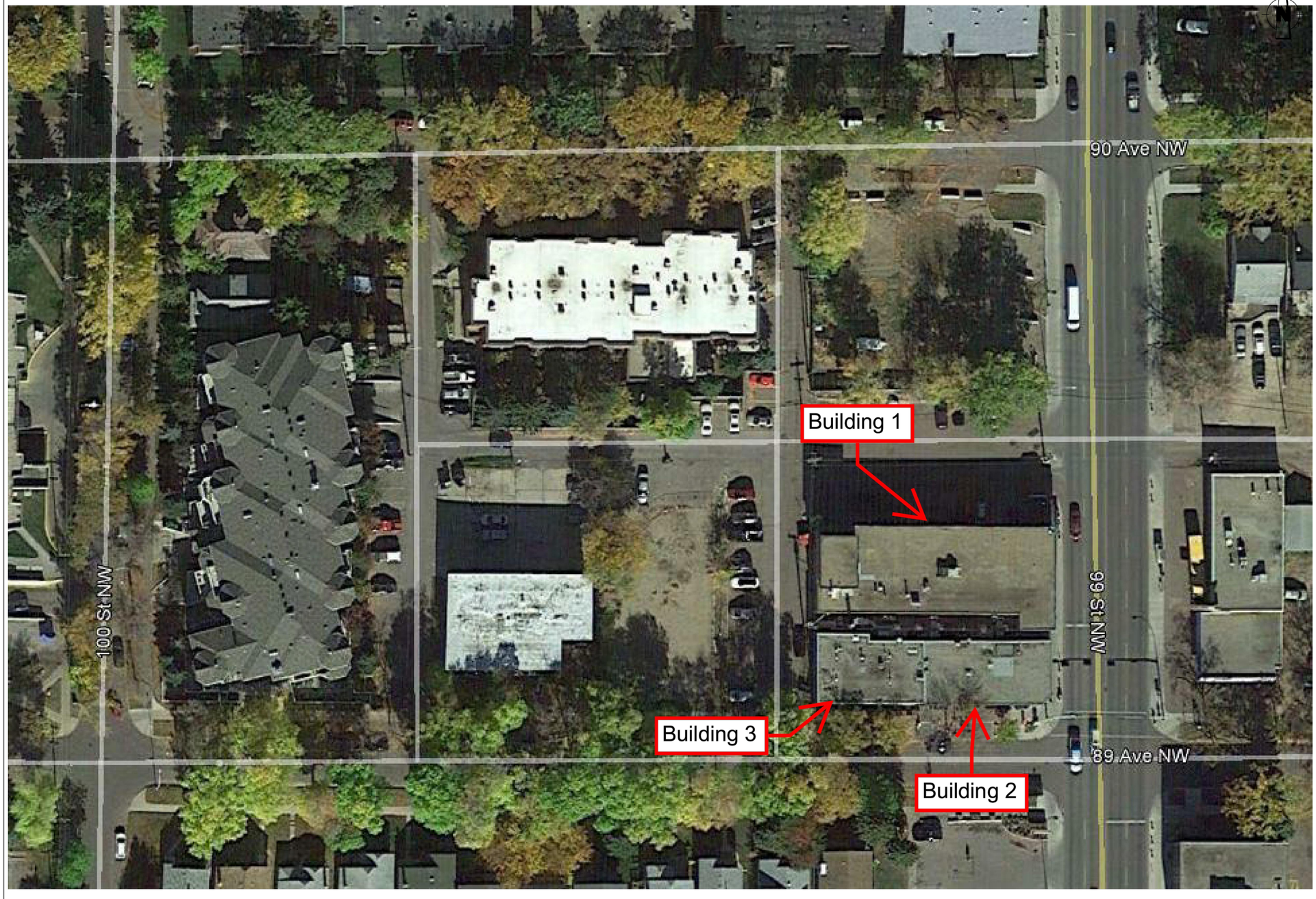

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PROJECT:

SITE SERVICING DESIGN BRIEF FOR
99th STREET MIXED USE DEVELOPMENT

TITLE:

EXISTING BUILDING AND
TOPOGRAPHIC CONFIGURATION
FIGURE B

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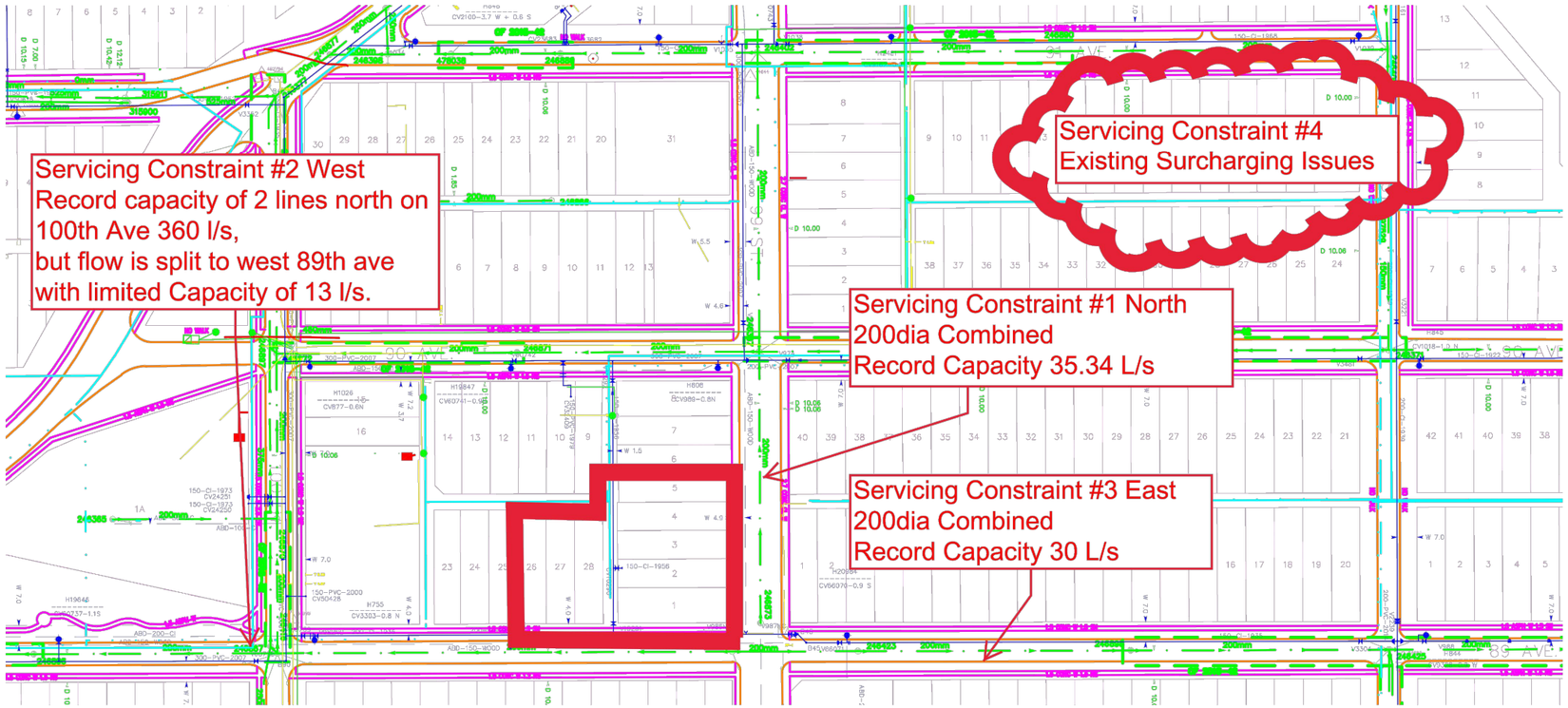

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PROJECT:

SITE SERVICING DESIGN BRIEF FOR
99th STREET MIXED USE DEVELOPMENT

TITLE:

NEIGHBORHOOD CAPACITY
CONSTRAINTS
FIGURE C

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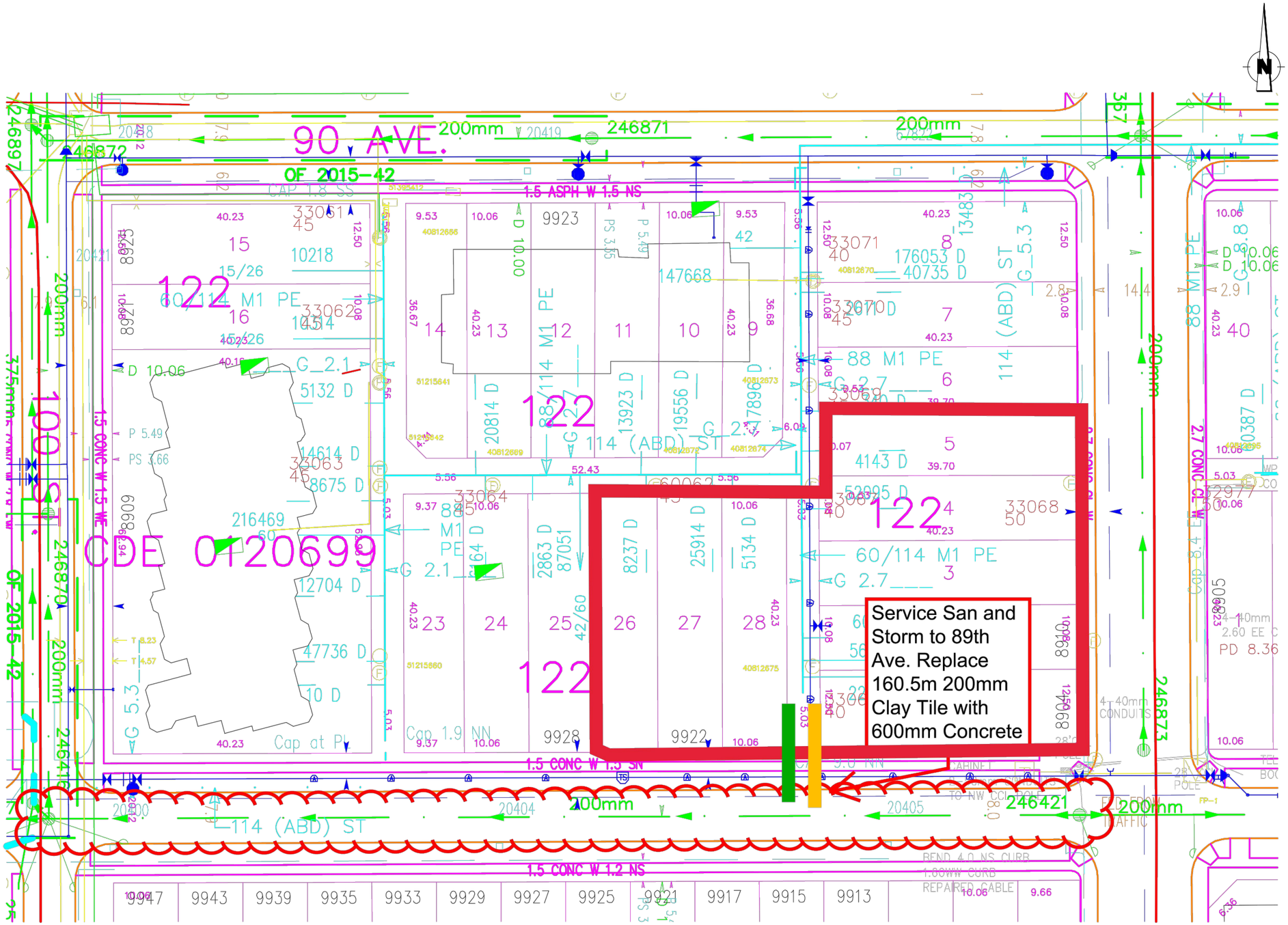

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PROJECT:

SITE SERVICING DESIGN BRIEF FOR
99th STREET MIXED USE DEVELOPMENT

TITLE:

PROPOSED SANITARY AND STORM
SERVICING CONCEPT
FIGURE D

N:\161-17798-00 99th St & 89th Ave Mix Use Project\6 Civil\Dwgs\02 Figs-SKS\161177798-CF04.dwg Feb 08, 2018-1:11pm BY:(albardac)