Functional Servicing Report
County of Lambton – Housing Project
471 Kathleen Ave. Sarnia

June 21, 2024

Prepared by B. M. Ross and Associates Limited
on behalf of the County of Lambton

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 ROADS AND PARKING 1
3.0 WATER 2
3.1 Existing Water System 2
3.2 Proposed Water System 2
4.0 SANITARY 2
4.1 Existing Sanitary Sewer System 2
4.2 Proposed Sanitary Sewer System 2
5.0 STORM DRAINAGE 3
5.1 Existing Drainage Outlets 3
5.2 Proposed Storm Sewers 3
5.3 Proposed Stormwater Management 4
6.0 UTILITIES 5
7.0 CONSTRUCTION 6

APPENDICES

Appendix A 24102-1 – Overall Servicing Drawing

Appendix B Sanitary Design Sheet

B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
2695 Hamilton Rd. Brights Grove, Ont. N0N 1C0
p. (519) 908-9564
www.bmross.net

File No. 24102

COUNTY OF LAMBTON – HOUSING PROJECT
471 KATHLEEN AVE. SARNIA

FUNCTIONAL SERVICING REPORT

1.0 INTRODUCTION

This report has been prepared on behalf of the County of Lambton in support of an application for a Zoning Bylaw Amendment to facilitate the development of #471 Kathleen Ave. This new development proposes one 3-storey apartment building comprising of a total of 50 single bedroom units, surface asphalt parking, concrete sidewalk, and landscaped recreational space. Please refer to the Site Data Plan that has been prepared by Burkhart Gilchrist Architects Inc. detailing the site statistics.

The purpose of this Functional Servicing Report is to review the available existing municipal infrastructure and provide the details of the proposed storm, sanitary, and water servicing strategies for the site development for use by the Municipal Planning and Engineering staff in evaluating the application.

Refer to the following civil site servicing drawing in Appendix A:

- 24102-1 – Overall Servicing Plan

2.0 ROADS AND PARKING

The two proposed site access driveways shall be at the East and West ends of the site from Kathleen Ave. The proposed accesses will be asphalt pavement 7.2m wide from gutter to gutter utilizing barrier curb per OPSD-600.080 which complies with the minimum width of 7.2m for an apartment entrance per City of Sarnia Std. 122-F. The site parking areas will also be asphalt pavement bounded by barrier curb per OPSD-600.080.

Pedestrian access to the building shall consist of a concrete sidewalk from the existing municipal sidewalk on Kathleen Ave. to the entrance of the building. A paved loading zone shall be provided at the rear of the building by the mechanical room and service entrance.

For details regarding parking requirements, parking space sizes and AODA compliance please refer to the Site Plan that has been prepared by Burkhart Gilchrist Architects Inc. and the Planning Justification Report by The County of Lambton.

3.0 WATER

3.1 Existing Water System

There are five inactive existing water services to the site from the existing 300mmØ PVC watermain on Kathleen Ave. Preliminary analysis indicates that none of these existing services will be sufficient for the proposed building. The existing water services shall be decommissioned in accordance with City of Sarnia Standards.

3.2 Proposed Water System

The intention is to install a 300mmx150mm tapping sleeve on the existing watermain and run a 150mmØ PVC DR18 service complete with a 150mm isolation gate valve at the existing watermain. The service will enter through the floor of the proposed mechanical room into a backflow preventor. The water supply shall then be split with one line to supply the fire sprinkler system and a second line to flow through a water meter for the building potable water supply system, all in accordance with the current City of Sarnia Standards.

There are several existing fire hydrants on Kathleen Ave within 75m of the proposed building, the closest being located on the north boulevard of Kathleen Ave, 23m North of the proposed building entrance and Fire Department Connection (FDC) for the fire sprinkler system. The hydrants are colour coded Blue per NFPA 291 indicating available flow greater than 1,500USGPM.

Refer to the Overall Servicing Plan included in Appendix A.

4.0 SANITARY

4.1 Existing Sanitary Sewer System

There is an existing 200mmØ sanitary sewer on Kathleen Ave., which discharges to the Indian Road sanitary sewer, which ultimately gravity feeds into the Talfourd Pumping Station PS16, located on the northeast corner of Indian Road and Talfourd St. The site has five inactive sanitary services connected into the existing 200mmØ sanitary sewer on Kathleen Ave. The existing inactive services are too small to service the proposed apartment building, and the intention is to install a new service pipe for the proposed building. The existing services shall be excavated at property line and water tight caps shall be installed if they do not already have one.

4.2 Proposed Sanitary Sewer System

Sanitary servicing for the proposed development will be by a conventional gravity sewer with a 150mmØ PVC DR28 sanitary service from the site connecting to the existing maintenance hole of the 200mmØ municipal sanitary gravity sewer on Kathleen Ave. A cleanout shall be provided at property line per City of Sarnia Standards. The sewer on Kathleen Ave. flows easterly to a 250mmØ sanitary sewer on Indian Rd., which dicharges into the municipal Pumping Station PS16 on Talfourd St.

A review was completed of sanitary demands for the proposed site using a maximum population of 100 residents which is a conservative estimate based on 2.0 ppu (the recent Development Charges Background Study prepared for the City of Sarnia indicates densities of 1.810ppu for multiple attached dwellings). A flow rate of 337L/cap.d was used which is the design average daily domestic flow rate for residential occupancy (average of the MECP Guidelines range of 225 to 450 L/cap.d for residential land use. (MECP Design Criteria for CLI-ECAs v2.0, May 31, 2023.)

The existing municipal system has sufficient capacity to accommodate the proposed development.

Refer to the Sanitary Design Sheet included in Appendix B and the Overall Servicing Plan included in Appendix A.

5.0 STORM DRAINAGE

5.1 Existing Drainage Outlets and Constraints

The proposed development parcel has an area of 0.47 hectares and is tributary to the existing 1500mmØ diameter storm sewer on Kathleen Ave. Since the surrounding areas are residential land uses and the apartment site was originally services for single family residential lots, a pre-development peak flow rate was determined using the Rational method with a runoff coefficient of C=0.45 and a time of concentration of 10 minutes per City of Sarnia Standards for single family land use. The City of Sarnia SWM Design Standards require control of the post-development discharge rate to the 2-yr pre-development level for all storms up to the 100-yr return frequency. The following is the allowable pre-development peak flowrates for the 2-year 1-hr design storm using the City of Sarnia Modified IDF data.

Pre-Development Flow Rate:

Q=2.78*CiA
Q=2.78*0.45*91.1*0.47 = 53.6 L/s (2-year pre-development)

Pre-development Runoff Volume:

V=PCA
V_{2Pre}=27.61mm*0.45*0.47ha = 58.4m^3 (2-year, 1-hr pre-development)

5.2 Proposed Storm Sewers

Storm drainage within the proposed development will be by conventional gravity sewers, catchbasins, and maintenance holes discharging to the existing 1500mmØ storm sewer on Kathleen Ave.

The proposed site storm sewers will provide a connection to the building to provide an outlet for roof drainage and sump pump discharge from perimeter foundation drain tiles.

5.3 Proposed Stormwater Management

The proposed site development will increase the overall imperviousness of the site from the pre-development conditions resulting in an increase in the post-development runoff.
The storm sewer infrastructure will be designed to capture and convey runoff for the minor system. Major storm runoff in excess of what can be accommodated by the minor collection system will be temporarily detained by surface ponding on site.

The storm sewers shall be designed using a 2-year design storm for the minor system in accordance with the current MECP Guidelines and City of Sarnia Standards. The storm system shall be provided with flow restrictors to control post-development runoff to existing pre-development conditions for storm events up to and including the 100-year storm.

To address stormwater quality control, it is proposed to implement source controls and end of pipe control measures in the development. Quality control shall be provided by incorporating appropriate sumps in the catchbasins and manholes per City of Sarnia Standards and the gravity collection sewers shall be provided with Snout®Oil-Water-Debris separators on all of the catchbasin outlet pipes to collect suspended sediments, oils, and floatable debris and reduce the potential for conveyance of contaminants to the downstream receiver.

Stormwater quantity control shall be provided by installing a flow restrictor on the outlet pipe from storm maintenance hole MH3 to control the site discharge rate to the allowable pre-development conditions. Surplus post-development runoff volumes shall be temporarily detained by surface ponding at the catchbasins in the parking lot.

Additional LIDs or rainwater capture techniques have not been incorporated into the conceptual design calculations; however, they may be utilized in the final stormwater strategy.

The multi-component SWM approach will be designed to meet MECP guidelines for quantity and quality control for the proposed development.

The calculations of the post development runoff coefficient and the post development runoff rates and volumes are calculated as follows:

Post-evelopment Runoff Coefficient:

Surface	**Area (ha)**	**Runoff Coefficient**	**C * A**
Building Roof	0.138	0.95	0.131
Pavements	0.196	0.90	0.176
Landscape	0.136	0.25	0.034
Total	0.47	0.73	

Average runoff coefficient = 0.73

Post-development Runoff Rates:

Q=2.78*CiA
Q=2.78*0.73*91.1*0.47 = 86.9 L/s (2-year post-development)
Q=2.78*0.73*220.29*0.47 = 210.1 L/s (100-year post-development)

Post-development Runoff Volumes:

V=PCA
V_{2Post} =27.61mm*0.73*0.47ha = 94.7m^3 (2-year, 1-hr post-development)
$V_{100Post}$ =61.05mm*0.73*0.47ha = 209.5m^3 (100-year, 1-hr post-development)

With the allowable discharge rate from the site controlled to the 2-yr, 1-hr predevelopment rate of 53.6 L/s the surplus volume from 100-yr, 1-hr storm event to be detained on site will be:

$V_{100Post} – V_{2pre}$ = 209.5m^3 – 58.4m^3 = 151.1m^3

As the proposed development stormwater runoff is greater than the municipal system was designed for, the use of a flow restrictor is required to control runoff from the site.

The City of Sarnia prefers the use of undersized pipes rather than orifice plates for flow restrictors. Therefore, the flow restriction on the parking lot outlet pipe from MH3 shall be provided by an undersized pipe to restrict discharge. The City of Sarnia minimum recommended pipe size for a restrictor pipe is 100mm diameter. Smaller pipes are more susceptible to blockage and can cause maintenance issues.

An orifice tube flow restrictor will be sized to calculate the peak flow under the surcharged flow condition due to the head on the outlet pipe created by the temporary surface ponding. Preliminary sizing of the orifice tube restrictor indicates that a 125mm diameter pipe would control the discharge to the 2-yr pre-development rate.

Temporary ponding to provide storage of the surplus runoff volume for the 100-yr event was calculated assuming storage in the rear parking lot area with ponding depths ranging from 60mm at high points to 210mm at catchbasin locations to achieve the required 151.1m^3 of detention storage.

It should be noted that the final grading plan of the site will be completed during the detailed design phase to ensure that overland flow routes direct any storm overflow to Kathleen Ave.

In order to ensure the stormwater quantity and quality control features continue to function properly, the catchbasins, maintenance holes, Snout® devices and the flow restrictor pipe shall be inspected annually to monitor the amount of oil and sediment collected. The catchbasin sumps should be pumped out and accumulated deleterious materials disposed of as required.

Refer to the Overall Servicing Plan in Appendix A.

6.0 UTILITIES

Utility servicing for the development will consist of an underground primary and secondary hydro distribution system designed by the electrical consultant and Bluewater Power Distribution Corporation, communication infrastructure can be provided by Cogeco and Bell Canada, and natural gas servicing will be provided by Enbridge Gas. Details regarding bulk or individual metering for hydro and gas shall be finalized during the detailed design phase for the project.

7.0 CONSTRUCTION

The municipal servicing and parking lot construction aspects of the project will be constructed by a general contractor selected by the County. General review of construction of the site servicing works shall be provided by B.M. Ross and Associates Limited to ensure ensure general conformance of the work with the drawings and specifications.

We trust that this Functional Servicing Report is sufficient for your present requirements in support of the Planning applications for a Zoning Bylaw Amendment for the proposed development. Should any point require clarification, please contact the undersigned.

All of which is respectfully submitted.

B. M. ROSS AND ASSOCIATES LIMITED

Per _____

A. Morfin, P.Eng.

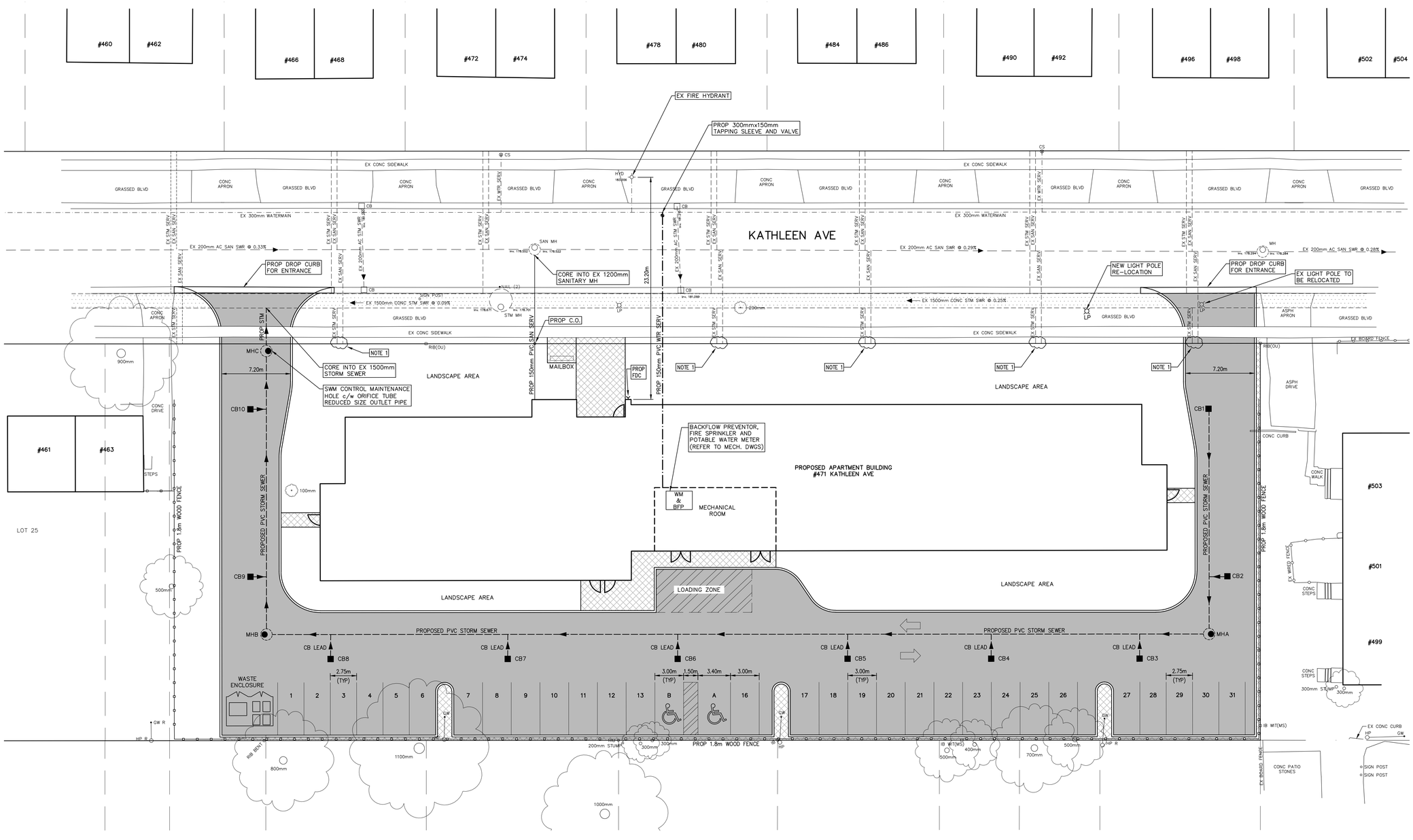
APPENDIX A

24102-1 – Overall Servicing Plan

NOTES:

1. ALL INACTIVE EXISTING STORM AND SANITARY SERVICE PIPES TO BE EXCAVATED AT P/L AND INSTALL WATER TIGHT SEAL CAP IF THERE IS NOT ONE ALREADY INSTALLED.

2. ALL INACTIVE EXISTING WATER SERVICES TO THE SITE ARE TO BE DECOMMISSIONED IN ACCORDANCE WITH CITY OF SARNIA STANDARDS. REMOVE SERVICE BOX FROM CURB STOP.



LEGEND

SAN. or STM.	EXISTING SEWERS, SANITARY or STORM
STORM	PROPOSED STORM SEWER
SANITARY	PROPOSED SANITARY SERVICE
MH, CB,	EXISTING MANHOLE and CATCHBASIN
MH, CB,	PROPOSED MANHOLE and CATCHBASIN
WATER	EXISTING WATERMAIN
WATER	PROPOSED WATER SERVICE
HYD, W.V.	HYDRANT AND WATER VALVE
	ASPHALT AREAS
	CONCRETE AREAS

1:200

2m 0 2m 4m 6m 8m 10m

NOTE

The locations of existing underground utilities are shown in an approximate way only and have not been independently verified by the owner or its representative. The contractor shall determine the exact location of all existing utilities before commencing work and agrees to be fully responsible for any damages which might be occasioned by the contractor's failure to exactly locate and preserve any and all underground utilities.

BENCHMARK INFORMATION

B.M. Elev. 183.556

Top of Hydrant located on north boulevard of at Kathleen Ave. near Mun. #478

Design By: A.E.M. Checked By: G.C.B.

No.	DATE	REVISION
1	06/24	For Functional Servicing Report

BMROSS engineering better communities

Goderich | Mount Forest | Sarnia

County of Lambton

471 Kathleen Ave Apartment Building

Overall Servicing Plan

Project No. 24102

Scale (24x36) 1:200

Drawing No. 1

APPENDIX B

Sanitary Design Sheet

B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
2695 Hamilton Road, P.O. Box 400
Brights Grove, ON N0N 1C0
p. (519) 908-9564 • **www.bmross.net**

Sanitary Sewer Design Sheet

Project:	471 Kathleen Ave - Housing Project	Project #	24102
Client:	Burkhart Gilchrist Architects Inc.	Date:	20-Jun-24
		No. of Sheets:	1 of 1

Design Criteria: (per City of Sarnia Standards)

q_p = average daily per capita flow (337 L/cap.d)

q_{com} = average daily commercial flow (22.5m^3/ha.d)

M_p = Harmon peaking factor = (1 + 14 / (4 + (P / 1000)^0.5))

M_{com} = commercial peaking factor (based on equiv. Pop.)

I = unit of peak extraneous flow (0.10 L/ha. s)

P = Population (assume 2.0 persons / unit)

Q_p = peak population flow = P q_p M_p / 86400 (L/s)

Q_{com} = peak commercial flow = q_{com} M_{com} A / 86.4 (L/s)

A = area in hectares

Q_{ext} = peak extraneous flow = I A (L/s)

Q_d = peak design flow = Q_p + Q_{com} + Q_{ext} (L/s)

Capacity (L/s) = $(7.855*(10)^{-6}/n)D^2R^{2/3}S^{1/2}$, where Manning's n = 0.013, D is diameter (mm), R is hydraulic radius (mm), S is slope (%)

SEWER LOCATION			INDIVIDUAL		CUMULATIVE		Peaking	Population	Peak Ext.	Peak Design	PROPOSED SEWER DATA					
Street	From MH	To MH	Pop: P	Area: A (ha)	Pop: P	Area: A (ha)	Factor: M	Flow: Q_p (L/s)	Flow: Q_{ext} (L/s)	Flow: Q_d (L/s)	Length (m)	Pipe Size (mm)	Material	Grade (%)	Capacity (L/s)	Velocity (m/s)
Site Gravity Sewers																
50 Units	Building	EXMH	100	0.472	100	0.472	4.24	1.66	0.05	1.70	15.0	150	PVC DR28	2.00	21.8	1.23
Existing Gravity Sewer																
Area Contribution to Kathleen Ave Existing San	*EXMH*	*EXMH*			*100.0*	*0.472*	4.24	1.66	0.05	1.70	*76.0*	*200*	*AC Pipe*	*0.30*	***18.2***	*0.58*
East St to EXMH (Estimate) incl Proposed Site	*EXMH*	*EXMH*	*448.0*	*5.604*	*548.0*	*6.076*	3.95	8.45	0.61	9.06	*76.0*	*200*	*AC Pipe*	*0.30*	***18.2***	*0.58*