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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ENGINEERING COMPUTATIONS

NAME OF STRUCTURE DEY STREET UNDERPASS — SHEET NO. 1 OF 3

SUBJECT MATTER SEWER DESIGN — MADE BY J. SPENCER DATE 11/30/79

CHECKED BY _____ DATE _____

I DETERMINE STORM WATER FLOW:

Q (cfs) = C x R (IN/HR) x A (ACRES)

A. COMPUTE THE CONTRIBUTARY AREA - "A" - SEE ATTACHMENT 1.

NO RUNOFF AT STREET LEVEL ENTERS THE DEY STREET SEWER FROM BROADWAY TO CHURCH STREET

AS SHOWN ON ATTACHMENT 1., ONLY ROOF RUNOFF IS ASSUMED TO ENTER THE DEY STREET SEWER

∴ AREA = 70' x 350' ROOF AREA - DEY TO FULTON ST
= 24,500 ft²

100' x 330' ROOF AREA - DEY TO MAIDEN LANE
= 33,000 ft²

TOTAL AREA = 57,500 ft² / 43,560 ft²/ACRE
= 1.32 ACRES

B. COMPUTE THE RAINFALL INTENSITY "R" & RUNOFF COEFFICIENT "C"

$$R = \frac{125}{T+15}$$

T = TOTAL TIME OF CONCENTRATION IN MINUTES TO THE UPPER END OF THE SEWER

ENTRANCE TIME = 6 MINUTES
LENGTH OF SEWER = 340' IN DEY STREET
VELOCITY OF FLOW - ASSUME 3'/SEC AS A MINIMUM

∴ RUNNING TIME IN SEWER = 340'/3 = 113 SEC OR 1.89 MIN

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ENGINEERING COMPUTATIONS

NAME OF STRUCTURE DEY STREET UNDERPASS SHEET NO. 2 OF 3

SUBJECT MATTER SEWER DESIGN MADE BY J. SPENCER DATE 11/30/79

CHECKED BY DATE

$\therefore R = \frac{125}{6 + 1.89 + 15} = 5.46$ IN/HR

USE C = .90

$\therefore Q = CRA$

$(.9)(5.46)(1.32) = 6.49$ CFS

II DETERMINE SANITARY FLOW

ASSUME DISCHARGE INTO DEY STREET FROM BUILDINGS ON BOTH SIDES OF THE STREET

A.T.&T. IS THE MAJOR TENANT ON THE NORTH SIDE OF DEY STREET

POPULATION OF A.T&T BUILDING IS 2600 PEOPLE

THE A.T&T DISCHARGE IS INTO BOTH DEY & FULTON STREET.

FOR DOMESTIC FLOW, USE 150 GALLONS PER CAPITA PER DAY

$\therefore$ AVERAGE FLOW FROM A T & T BUILDING IS

1300 PEOPLE x 150 GAL/CAPITA/DAY

= 195,000 GPD (AVERAGE)

ASSUME SAME DISCHARGE INTO DEY STREET SEWER FROM THE BUILDINGS ON THE SOUTH SIDE $\therefore$ AVERAGE FLOW = 390,000 GPD

PEAK FLOW = AVERAGE FLOW x PEAK FACTOR

USING A PEAK FACTOR OF 2.0

PEAK FLOW = 390,000 GPD x 2.0 = 780,000 GPD = .78 MGD

.78 MGD $\div$ .646317 = 1.21 CFS

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ENGINEERING COMPUTATIONS

NAME OF STRUCTURE Dey Street Underpass — SHEET NO. 3 OF 3

SUBJECT MATTER Sewer Design — MADE BY J. Spencer DATE 11/20/79

CHECKED BY _____ DATE _____

III Check to see if 15" ϕ pipe is capable of handling total combined flow

Combined Flow = 6.49 × 1.21 = 7.70 CFS

15" ϕ R C P Manning Coefficient n = .013

From Profile of New Sewer

$$S = \frac{308.63 - 307.71}{27'} = .0341$$

Use Manning Formula to Compute the Capacity of the Sewer

$$Q = \frac{1.496}{n} A R^{2/3} S^{1/2}$$

Q = Capacity in CFS

n = Roughness Coefficient

A = Cross Sectional Area of Water in Pipe in S.F.

R = Hydraulic Radius in Feet = d/4

S = Slope of Sewer

For 15" ϕ

$A = \pi r^2$

$= \pi (.625')^2 = 1.227 FT^2$

$R = d/4 = .3125 FT$

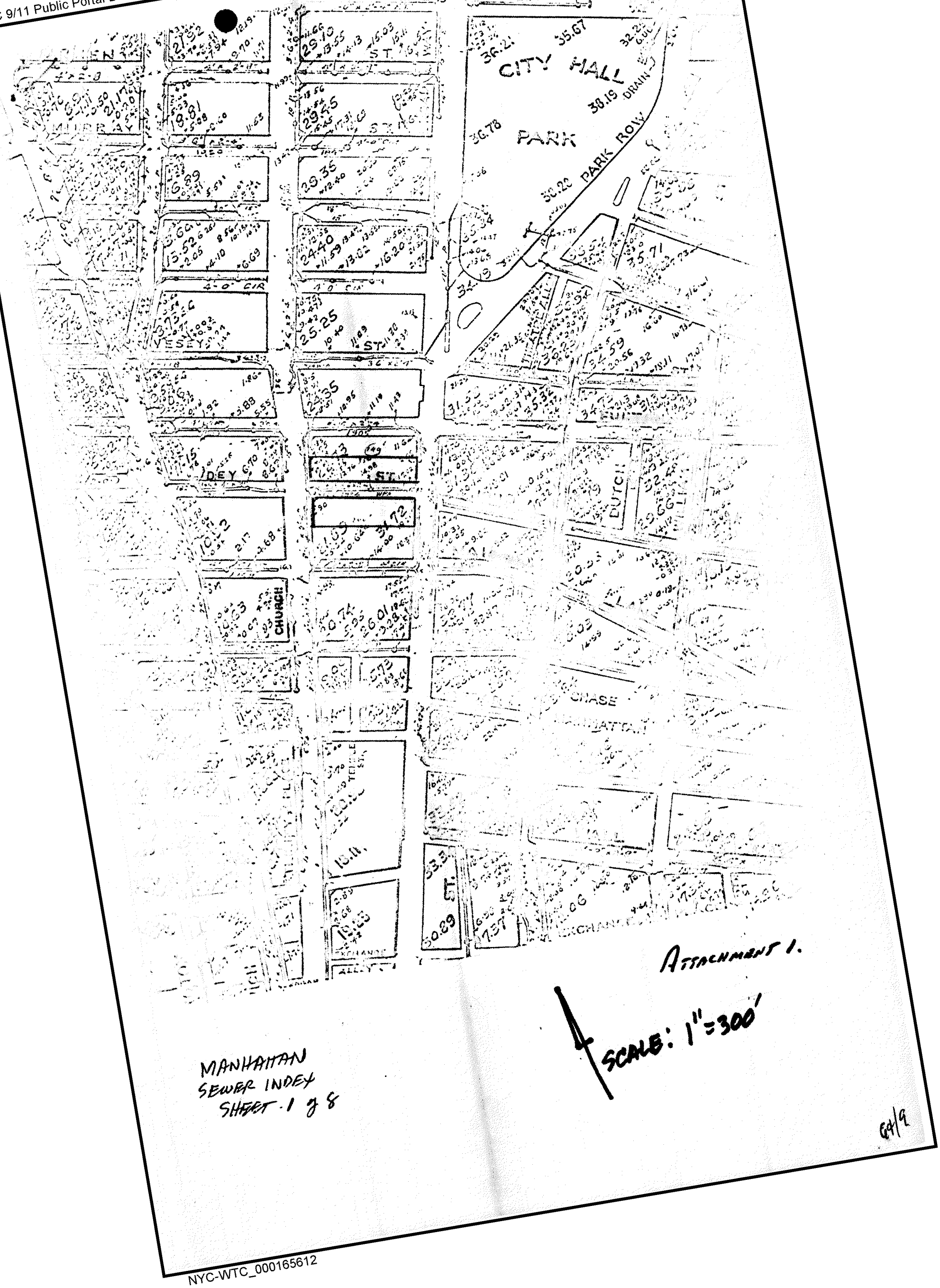
$R^{2/3} = .4605 FT$

$S = .0341$

$S^{1/2} = .1847$

$\therefore Q = \frac{1.496}{.013} \times 1.227 FT^2 \times .4605 \times .1847 = 11.92 CFS$

11.92 CFS > 7.70 CFS $\therefore$ 15" ϕ Pipe is O.K.



ATTACHMENT 1.

SCALE: 1"=300'

MANHATTAN
SEWER INDEX
SHEET 1 of 8

6/9/9