



H. Ayuntamiento
Constitucional
de San Francisco
Telixtlahuaca, Etlá. Oax.
2011-2013

H. AYUNTAMIENTO DE SAN FRANCISCO TELIXTLAHUACA, ETLA, OAX.

PROYECTO DE: REHABILITACIÓN DE LAS LÍNEAS DE CONDUCCIÓN
Y RED DE DISTRIBUCIÓN DE AGUA POTABLE

MEMORIA DESCRIPTIVA DEL PROYECTO

consta en la

MEMORIA DESCRIPTIVA DEL PROYECTO TÉCNICO

REHABILITACIÓN DE LAS LÍNEAS DE CONDUCCIÓN Y RED DE DISTRIBUCIÓN DE AGUA POTABLE

LOCALIDAD DE SAN FRANCISCO TELIXTLAHUACA

MUNICIPIO DE SAN FRANCISCO TELIXTLAHUACA

El proyecto es para rehabilitar el sistema de agua potable de la Localidad de San Francisco Telixtlahuaca, ubicado en el municipio del mismo nombre.

De acuerdo a los censos de los últimos años la localidad de San Francisco Telixtlahuaca ha ido creciendo de manera incontrolada la mancha urbana en el cual se ve afectada el abastecimiento de ciertos servicios básicos como son la electrificación, pavimentación de calles, alcantarillado y agua potable, este último como vital líquido para subsistir así como para la crianza de ganados y animales domésticos. Actualmente la red de distribución se encuentra en mal estado física y funcionalmente, ya que últimamente se han presentado fugas y desperdicios, por lo que se han realizado reparaciones necesarias pero esto ha generados altos costos razón por la cual se decidió rehabilitar todo el sistema.

El proyecto consta de dos partes, las dos líneas de conducción por bombeo y la red de distribución. Para las líneas de conducción se han diseñado de la siguiente manera:

Línea de conducción L1 el cual consta de 202.89 ml de tubería de 6" de diámetro el cual conducirá 21.01 lps de agua con bombeo de 24 horas, con un desnivel topográfico de 34.08 mts para el cual se ha propuesto una bomba de 35 hp el cual no incluye en el proyecto, que la rehabilitación del pozo profundo se realizará en otro proyecto y no está contemplado para esta etapa.

Línea de conducción L3, consta de 513.17 ml de tubería de 6" de diámetro el cual conducirá 18.01 lps durante un tiempo de bombeo de 12 ya que originalmente se había calculado que trabajara durante las 24 horas con un gasto de 9.00 lps con los cuales completaría los 30.01 lps que la localidad de San Francisco Telixtlahuaca necesita para abastecimiento. Por tal razón y la longitud de la tubería hizo que el caballaje de la bomba aumentara y se propone una bomba de 27 hp al igual que la línea L1 la rehabilitación del pozo profundo y el equipo de bombeo no está considerado en este proyecto solo incluye el suministro y colocación de las tuberías y los accesorios necesarios para su posterior funcionamiento.

Así mismo tampoco se incluye la construcción de un nuevo tanque ya que con el gasto calculado para totalidad de la población antes mencionada no requiere mayor almacenamiento que con los que ya se cuenta que son dos tanques de almacenamiento uno de 340 m³ y otro de 150 M³ con los cuales son suficientes para regular la cantidad necesaria que es 440 M³ que necesitarían en caso que no existiese ningún tanque.

Red de distribución.

Para la red de distribución se instalaran 17884.74 ml de tubería de PVC de distintos diámetros desde 8" hasta 1 1/2" a continuación se presenta las cantidades de cada diámetro:

Ø de 8" 31.17 ml

Ø de 6" 985.70 ml

Ø de 4" 7,899.16 ml

Ø de 3" 2,116.23 ml

Ø de 2.5" 1,948.44 ml

Ø de 2" 4,847.72 ml

Ø de 1.5" 56.33 ml

En los cruceros importantes se instalaran válvulas de seccionamiento de vástago fijo para el control y seccionamiento de las áreas a suministrar el líquido.



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MEMORIA DE CÁLCULO

H. AYUNTAMIENTO DE SAN FRANCISCO TELIXTLAHUACA
REGIDURIA DE OBRAS PUBLICAS
EJERCICIO FISCAL 2013

POBLACION DE LA LOCALIDAD DE SAN FRANCISCO TELIXTLAHUACA

AÑO	POBLACION	HOMBRES	MUJERES
1980	4044	NO SE TIENE REGISTRO	
1990	6630	3235	3395
1995	7555	3614	3941
2000	8336	4084	4252
2005	9322	4500	4822
2010	10618	5322	5296

CALCULO DE POBLACION PARA ACTUALIZACION AL AÑO 2013

1-. METODO ARITMETICO

FORMULAS:

$$Pf= Pa+IN$$

DONDE:

Pf= POBLACION FUTURA

Pa= POBLACION ACTUAL

N= NUMERO DE AÑOS PARA LOS QUE SE VA A CALCULAR LA POBLACION CONTANDO A PARTIR DEL ULTIMO CENSO

I= CRECIMIENTO ANUAL PROMEDIO

$$I= \frac{Pa-Pi}{n}$$

DONDE:

I= CRECIMIENTO ANUAL PROMEDIO.

Pa= POBLACION ACTUAL (La del ultimo censo)

Pi= POBLACION DEL ULTIMO CENSO

n= AÑOS TRANSCURRIDOS ENTRE EL PRIMER CENSO Y EL ULTIMO

a) CRECIMIENTO ANUAL

$$I= 219 \text{ HAB/AÑO}$$

$$n= 30 \text{ Años}$$

b) POBLACION ACTUALIZADA AL AÑO 2013

$$PA= (10618) + (219) (3)$$

$$PA= 11275.40$$

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2.- METODO DE MALTHUS

AÑO	POBLACION	INCREMENTO	% DE INCREMENTO
1980	4044		
1990	6630	2586	0.639
1995	7555	925	0.140
2000	8536	981	0.115
2005	9322	786	0.092
2010	10618	1296	0.123
			1.140

a) FORMULAS:

$$Pf = Pa(1+A)^x$$

DONDE:

Pf= poblacion Futura

Pa= poblacion actual

A= incremento med. De pob. =

$$\text{PROMEDIO} = \frac{1.140}{5} = 0.228$$

0.228

X= periodo normal entre censos,

que se toma como unidad 10 años

para este caso X= 0.3 ya que solamente se actualizara 3 años

por lo tanto

$$PA = 10618 (1 + 0.228)^{0.3}$$

$$PA = 11292.78$$

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3.- METODO GEOMETRICO POR PORCENTAJE

AÑO	POBLACION	INCREMENTO	% DE INCREMENTO
1980	4044		
1990	6630	2586	63.95
1995	7555	925	13.95
2000	8536	981	12.93
2005	9322	786	9.21
2010	10618	1296	13.90
		Σ	113.99

$$Pf = pa + (Pa)(\%Pr)(N)/100$$

DONDE:

Pf= poblacion futura

Pa= poblacion actual

%Pr= porcentaje anual promedio de incremento

N= numero de años a proyectar

n= numero de años entre el primer censo y el ultimo = 30 años

$$\Sigma 113.99$$

para este caso N= 3

$$n = 30$$

$$\%Pr = \Sigma \% / n = 113.99 / 30$$

$$\%Pr = 3.79979$$

$$pa = \frac{(10618) + (10618) (3.800) (3)}{100}$$

$$Pa = 11828 \text{ hab}$$

RESUMEN DE LOS METODOS APLICADOS PARA ESTA LOCALIDAD

METODO APLICADO	POBLACION
1.- METODO ARITMETICO	11275
2.- METODO DE TANTOS	11295
3.- METODO GEOMETRICO POR PORCENTAJE	11828
PROMEDIO TOTAL	11466

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POBLACION DE LA LOCALIDAD DE SAN FRANCISCO TELIXTLAHUACA

AÑO	POBLACION	HOMBRES	MUJERES
1980	4044	NO SE TIENE REGISTRO	
1990	6630	331	676
1995	7555	713	773
2000	8536	697	739
2005	9322	798	880
2010	10618	832	924
2013	11466		

CALCULO DE POBLACION FUTURA 2023

1-. METODO ARITMETICO

FORMULAS:

$$Pf= Pa+IN$$

DONDE:

Pf= POBLACION FUTURA

Pa= POBLACION ACTUAL

N= NUMERO DE AÑOS PARA LOS QUE SE VA A CALCULAR LA POBLACION CONTANDO A PARTIR DEL ULTIMO CENSO

I= CRECIMIENTO ANUAL PROMEDIO

$$I= Pa-Pi/n$$

DONDE:

I= CRECIMIENTO ANUAL PROMEDIO.

Pa= POBLACION ACTUAL (La del ultimo censo)

Pi= POBLACION DEL ULTIMO CENSO

n= AÑOS TRANSCURRIDOS ENTRE EL PRIMER CENSO Y EL ULTIMO

a) CRECIMIENTO ANUAL

$$I= 225 \text{ HAB/AÑO}$$

$$n= 33 \text{ Años}$$

b) POBLACION CALCULADA AL AÑO 2023

$$PA= (11466) + (225) (10)$$

$$PA= 13715.09$$

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2.- METODO DE MALTHUS

AÑO	POBLACION	INCREMENTO	% DE INCREMENTO
1980	4044		
1990	6830	2786	0.689
1995	7555	925	0.140
2000	8536	981	0.138
2005	9322	786	0.092
2010	10618	1296	0.139
2013	11466	848	0.080

1.220

a) FORMULAS:

$$Pf = Pa(1+A)^x$$

DONDE:

Pf= poblacion Futura

Pa= poblacion actual

A= incremento med. De pob. =

X= periodo normal entre censos,

que se toma como unidad

PROMEDIO=

$$\frac{1.220}{6} = 0.203$$

0.203

10 años

$$Pf = Pa(1+A)^x$$

por lo tanto

$$PF = 11466 (1 + 0.203)^1$$

$$PF = 13797.04$$

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3.- METODO GEOMETRICO POR PORCENTAJE

AÑO	POBLACION	INCREMENTO	% DE INCREMENTO
1980	4044		
1990	6630	2586	63.95
1995	7555	925	13.95
2000	8536	981	12.98
2005	9322	786	9.21
2010	10616	1296	13.90
2013	11466	848	7.99
		Σ	121.98

$$Pf = pa + (Pa)(\%Pr)(N)/100$$

DONDE:

Pf= poblacion futura

Pa= poblacion actual

%Pr= porcentaje anual promedio de incremento

N= numero de años a proyectar

n= numero de años entre el primer censo y el ultimo = 30 años

848 121.98 para este caso N= 10

n= 33

%Pr= $\Sigma \% / n = 121.98 / 33$

%Pr= 3.69637

$$PF = \frac{(11466) + (11466) (3.696) (10)}{100}$$

PF= 15704 hab

RESUMEN DE LOS METODOS APLICADOS PARA ESTA LOCALIDAD

METODO APLICADO	POBLACION
1.- METODO ARITMETICO	13715
2.- METODO DE MALTUS	13797
3.- METODO GEOMETRICO POR PORCENTAJE	15704
PROMEDIO TOTAL	14405



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1., CALCULO DE DOTACION Y GASTOS PARA EL DISEÑO

DOTACION

Consumo Domestico

Para beber y cocinar =	30	Lt
Para lavado de ropa =	50	Lt
Fugas y desperdicios=	25	Lt
Descarga de WC =	20	Lt
Aseo personal =	25	Lt
Consumo por influencia del clima	20	Lt
D =	150	Lt

Gasto Medio Anual (Q.M.A.)

$$\begin{aligned} \text{Q.M.A.} &= \frac{P \times D}{86400} = \text{L.P.S.} \\ P &= \text{Poblacion futura de proyecto} \\ D &= \text{Dotación en Lt/Hab/Día} \\ \text{Q.M.A.} &= \frac{14,405.00 \times 150}{86400} = \end{aligned}$$

NOTA: POBLACION TOTAL
= 14405

PARA ESTE PROYECTO SE CONSIDERE
SOLAMENTE EL 50% DE LA
POBLACION

$$\text{Q.M.A.} = 25.01 \text{ L.P.S.}$$

Gasto Máximo Diario (Q.M.D.)

$$\begin{aligned} \text{Q.M.D.} &= \text{Q.M.A.} \times \text{C.V.D.} = \text{L.P.S.} \\ \text{C.V.D.} &= \text{Coeficiente de Variacion Diaria (1 a 1.2)} \\ \text{Q.M.D.} &= 25.01 \times 1.2 = \\ \text{Q.M.D.} &= 30.01 \text{ L.P.S.} \end{aligned}$$

Gasto Máximo Horario (Q.M.H.)

$$\begin{aligned} \text{Q.M.H.} &= \text{Q.M.D.} \times \text{C.V.H.} = \text{L.P.S.} \\ \text{C.V.H.} &= \text{Coeficiente de Variacion Horaria (1 a 1.50)} \\ \text{Q.M.H.} &= 30.01 \times 1.50 = \\ \text{Q.M.H.} &= 45.02 \text{ L.P.S.} \end{aligned}$$

CAPACIDAD DEL TANQUE DE REGULARIZACION (C.T.R.):

$$\begin{aligned} \text{C.T.R.} &= \text{CR} \times \text{Q.M.D.} \\ \text{C.T.R.} &= 14.58 \times 30.01 \\ \text{C.T.R.} &= 437.55 \approx 438.00 \end{aligned}$$

Donde: CR: COEFICIENTE DE REGULARIZACION
CR: 14.58



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NOTA:

Q.M.H. (Para diseño de la linea de alimentación)

RESUMEN

Q.M.D. =	30.01
Q.M.A. =	25.01
Q.M.H. =	45.02

consumo anual en m³

2160750	diarios	2160.75
788673750	anual	788673.75
2592900		
946408500		946408.5



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2.- CALCULO DE DIAMETROS PARA LA LINEA DE CONDUCCION

L3

GASTO TOTAL= 30.01

CALCULO DE DIAMETRO

Q.M.D.= 9.00 L.P.S.

V = 1.20
 π = 3.141526536

$$D = \sqrt{(4Q/\pi V)} = 3.09 = \text{DIAM. TENTATIVO}$$

SE BOMBEO DURANTE

12 HORAS

Q. CONDUCCION=

$$\frac{24 \times \text{Q.M.D.}}{12 \text{ hrs de bombeo}} = 18.01$$

L.P.S = 0.01801 M³/SEG

como A = 0.785 d²

$$D = \frac{0.138271096}{3.75} = 5.4''$$

PROPONEMOS UNA TUBERIA DE PEAD DE 3" DE RD-13,5 EXTRUPACK

n= 0.009

3.- CALCULO PARA LA POTENCIA DE LA BOMBA

A)

PRESION NORMAL APROXIMADA

DESNIVEL TOPOGRAFICO=

1758.35 - 1714.69 = 43.66

B)

CALCULO DE LA PERDIDA POR FRICCION

L= 513.17 MTS

K= 18.999

Q= 18.01

$K=(10.3 * n^2)/D^{16/3}$

$$H_f = KQ^2 = 18.99921918 \times 513.17 \times (18)^2$$

H_f= 3.16 MTS

PARA 6.0 18.999219

PARA 6"= 19.085

RD 21

CALCULADO

manual de
extrupak

C)

PERDIDAS MENORES

$$H_{\text{menores}} = 5\% H_f = 0.05 \times (3.16) = 0.16 \text{ mts.}$$

$$A = Q/V = 0.0150083 \text{ m}^2$$

D)

CALCULO DE LA CARGA DINAMICA TOTAL DE BOMBEO

DESNIVEL TOPOGRAFICO=	43.66
NIVEL DINAMICO=	43.00
NIVEL ESTATICO=	3.00
CARGA EN EL TANQUE=	3.00
PERDIDA TOTAL=	3.32
C.D.T.B.=	95.98

para el trazo de la linea piezometrica

E)

CALCULO DE LA SOBREPRESION O GOLPE DE ARIETE

$$V = 1/n r^{(2/3)} s^{(1/2)}$$

4''

$$A = 0.7854 \times (0.1524)^2$$

$$A = 0.0182415 \text{ M}^2$$



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$$P = 2r \cdot \pi$$
$$P = 0.4787686 \text{ M}^2$$

$$R = A/P = \frac{0.018241512}{0.478768644} = 0.038100891$$

$$R^{(2/3)} = 0.113228761$$

$$S = H_f/L = \frac{3.32}{513.17} = 0.006470718$$

$$S^{(1/2)} = 0.080440774$$

$$V = 1.01 \text{ m/seg}$$

$$V = Q/A \cdot 6 = 0.988$$

AHi= GOLPE DE ARIETE

$$AHi = 145V / \sqrt{(1 + K_d/Ee)}$$

$$AHi = 25.56538711$$

Ka= Modulo de la elasticidad del agua = 20738 kg/cm²
e= Espesor mínimo para 8" de diametro= 10.400 mm 1.04 cm
Et= Modulo de la elasticidad del material PEAD = 10000.00 kg/cm²
d= Diametro de la tubería en cm= 6.0 pulg 15.24 cm
V= velocidad del agua en la tubería en metros por segundo

20% presión de la tubería =	5.113077422	mts
presión en valvulas =	52.09365581	mts = 5.20937 Kg/cm ² de presión

F)
CALCULO DE LA POTENCIA DE LA BOMBA

para determinar clase o
RD de tubería

$$P = \gamma Q H_t / 76n = \frac{1000 \times 0.0180 \times 95.98}{76 \times 0.85} = 26.75867209$$

$$n = 0.85$$

ALTURAS:

LINEA ESTATICA =	1761.35
ALTURA PIEZOMETRICA =	1764.67
SOBREPRESION =	1769.78



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2.- CALCULO DE DIAMETROS PARA LA LINEA DE CONDUCCION

L1

GASTO TOTAL= 30.01

CALCULO DE DIAMETRO

Q.M.D.= 21.01 L.P.S.

V = 1.20
 π = 3.141526536

$$D = \sqrt{(4Q/\pi V)} = 4.72 = \text{DIAM. TENTATIVO}$$

SE BOMBEO DURANTE

24 HORAS

Q. CONDUCCION=

24 X Q.M.D.

= 21.01

L.P.S =

0.02101 M³/SEG

24 hrs de bombeo

como A = 0.785 d²

$$D = \sqrt{0.14934393} = 5.9"$$

5.73

PROPONEMOS UNA TUBERIA DE PEAD DE 3" DE RD-13,5 EXTRUPACK

n= 0.009

3.- CALCULO PARA LA POTENCIA DE LA BOMBA

A)

PRESION NORMAL APROXIMADA

DESNIVEL TOPOGRAFICO=

1758.35

-

1724.27

34.08

B)

CALCULO DE LA PERDIDA POR FRICCION

L= 202.89 MTS

K= 18.999

Q= 21.01

$$K=(10.3 * n^2)/D^{16/3}$$

$$H_f = KQ^2 = 18.99921918 \times 202.89 \times (21)^2$$

$$H_f = 1.70 \text{ MTS}$$

PARA D= 6.0 18.999219 CALCULADO

PARA D= 6"= 19.085 manual de
RD 21 extrupak

C)

PERDIDAS MENORES

H_{menores} = 5% H_f =

0.05 x (1.70) =

0.09 mts.

$$A = Q/V = 0.0175083 \text{ m}^2$$

D)

CALCULO DE LA CARGA DINAMICA TOTAL DE BOMBEO

DESNIVEL TOPOGRAFICO=	34.08
NIVEL DINAMICO=	57.00
NIVEL ESTATICO=	3.00
CARGA EN EL TANQUE =	3.00
PERDIDA TOTAL =	1.79
C.D.T.B. =	98.87

para el trazo de la linea piezometrica

E)

CALCULO DE LA SOBREPRESION O GOLPE DE ARIETE

$$V=1/n r^{(2/3)} s^{(1/2)}$$

4"

$$A = 0.7854 \times (0.1524)^2$$

$$A = 0.0182415 \text{ M}^2$$



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$$P = 2r \cdot \pi$$
$$P = 0.4787686 \text{ M}^2$$

$$R = A/P = \frac{0.018241512}{0.478768644} = 0.038100891$$

$$R^{(2/3)} = 0.113228761$$

$$S = H_f/L = \frac{1.79}{202.89} = 0.008805969$$

$$S^{(1/2)} = 0.093840125$$

$$V = 1.18 \text{ m/seg}$$

$$V = Q/A \cdot 6 = 1.152$$

AHi= GOLPE DE ARIETE

$$AHi = 145V / \sqrt{(1 + K_{ad}/Ee)}$$

$$AHi = 29.82391911$$

Ka= Modulo de la elasticidad del agua = 20738 kg/cm²
e= Espesor minimo para 6" de diametro= 10.400 mm 1.04 cm
Et= Modulo de la elasticidad del material PEAD = 10000.00 kg/cm²
d= Diametro de la tubería en cm= 6.0 pulg 15.24 cm
V= velocidad del agua en la tubería en metros por segundo

20% presión de la tubería =	5.964783822	mts =	41.83	4.2 Kg/cm ² de presión
presión en válvulas =	41.83142689	mts =		

para determinar clase o RD de tubería

F)

CALCULO DE LA POTENCIA DE LA BOMBA

$$P = \gamma Q H_t / 76n = \frac{1000 \times 0.0210 \times 98.87}{76 \times 0.85} = 32.15461565$$

$$n = 0.85$$

ALTURAS:

LINEA ESTATICA =	1761.35
ALTURA PIEZOMETRICA =	1763.14
SOBREPRESION =	1769.10

TABLA DE CALCULO DE REDES DE DISTRIBUCION DE AGUA POTABLE METODO HARDY-CROSS/HAZEN-WILLIAMS																			
PROYECTO: LINEA DE CONDUCCION L1																			
PROYECTISTA: ING. VICTOR MENDOZA MARIN																			
No. de tramos: 12 No. de nodos: 13																			
DESCRIPCION		TRAMO		LONGITUD (m)	DIAMETRO INTERIOR(mm)	DIAMETRO EFFECTIVO(mm)	COEF. H-WILLIAMS	GASTO		VELOCIDAD (m/s)	PERDIDA DE CARGA(m)		COTA DE T.N.(m)		COTA PIEZOMETRICA(m)		CARGA DISPONIBLE(m)		OBSERVACIONES
De	a	INICIAL(lps)	FINAL(lps)					TUBERIA	ADICIONAL		INICIAL	FINAL	INICIAL	FINAL	INICIAL	FINAL			
1	2	33.724	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.265	0.000	1724.275	1724.238	1763.145	1762.880	38.870	38.642	
2	3	26.905	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.211	0.000	1724.238	1729.916	1762.880	1762.669	38.642	32.753	
3	4	9.531	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.075	0.000	1729.916	1732.981	1762.669	1762.594	32.753	29.613	
4	5	13.356	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.105	0.000	1732.981	1736.614	1762.594	1762.489	29.613	25.875	
5	6	10.001	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.079	0.000	1736.614	1738.996	1762.489	1762.411	25.875	23.415	
6	7	15.001	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.118	0.000	1738.996	1742.098	1762.411	1762.293	23.415	20.195	
7	8	6.405	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.050	0.000	1742.098	1743.582	1762.293	1762.243	20.195	18.660	
8	9	16.425	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.129	0.000	1743.582	1745.180	1762.243	1762.114	18.660	16.934	
9	10	20.429	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.160	0.000	1745.180	1749.817	1762.114	1761.953	16.934	12.136	
10	11	19.027	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.149	0.000	1749.817	1752.317	1761.953	1761.804	12.136	9.487	
11	12	13.604	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.107	0.000	1752.317	1754.082	1761.804	1761.697	9.487	7.615	
12	13	18.482	152.4	152.4	150	152.4	150	21.650	21.650	1.187	0.145	0.000	1754.082	1758.125	1761.697	1761.552	7.615	3.427	
202.891																			

202.891

PROYECTO: LINEA DE CONDUCCION L3

PROYECTISTA: ING. VICTOR MENDOZA MARIN

No. de tramos: 20

No. de nodos: 21

DESCRIPCION		TRAMO		LONGITUD (m)	DIAMETRO INTERIOR(mm)	DIAMETRO EFECTIVO(mm)	COEF. H-WILLIAMS	GASTO INICIAL(pps)	GASTO FINAL(pps)	VELOCIDAD (m/s)	PERDIDA DE CARGA(m)		COTA DE T.N.(m)		COTA PIEZOMETRICA(m)		CARGA DISPONIBLE(m)		OBSERVACIONES
		De	A								TUBERIA	ADICIONAL	INICIAL	FINAL	INICIAL	FINAL	INICIAL	FINAL	
	1	2		6.124	152.4	152.4	150	21.650	21.650	1.187	0.048	0.000	1714.887	1714.824	1764.667	1764.619	49.980	49.795	
	2	3		25.870	152.4	152.4	150	21.650	21.650	1.187	0.203	0.000	1714.824	1714.992	1764.619	1764.416	49.795	49.424	
	3	4		60.792	152.4	152.4	150	21.650	21.650	1.187	0.477	0.000	1714.992	1715.871	1764.416	1763.938	49.424	48.067	
	4	5		20.925	152.4	152.4	150	21.650	21.650	1.187	0.164	0.000	1715.871	1716.126	1763.938	1763.774	48.067	47.649	
	5	6		81.362	152.4	152.4	150	21.650	21.650	1.187	0.640	0.000	1716.126	1718.217	1763.774	1763.134	47.649	44.917	
	6	7		38.018	152.4	152.4	150	21.650	21.650	1.187	0.299	0.000	1718.217	1718.291	1763.134	1762.835	44.917	44.544	
	7	8		78.245	152.4	152.4	150	21.650	21.650	1.187	0.614	0.000	1718.291	1724.658	1762.835	1762.221	44.544	37.563	
	8	9		9.097	152.4	152.4	150	21.650	21.650	1.187	0.071	0.000	1724.658	1725.175	1762.221	1762.149	37.563	36.974	
	9	10		22.401	152.4	152.4	150	21.650	21.650	1.187	0.176	0.000	1725.175	1724.249	1762.149	1761.973	36.974	37.724	
	10	11		26.865	152.4	152.4	150	21.650	21.650	1.187	0.209	0.000	1724.249	1729.874	1761.973	1761.764	37.724	31.890	
	11	12		9.785	152.4	152.4	150	21.650	21.650	1.187	0.077	0.000	1729.874	1733.086	1761.764	1761.687	31.890	28.601	
	12	13		13.533	152.4	152.4	150	21.650	21.650	1.187	0.106	0.000	1733.086	1736.681	1761.687	1761.581	28.601	24.900	
	13	14		9.526	152.4	152.4	150	21.650	21.650	1.187	0.075	0.000	1736.681	1738.980	1761.581	1761.506	24.900	22.526	
	14	15		14.391	152.4	152.4	150	21.650	21.650	1.187	0.113	0.000	1738.980	1741.914	1761.506	1761.393	22.526	19.480	
	15	16		6.377	152.4	152.4	150	21.650	21.650	1.187	0.050	0.000	1741.914	1743.452	1761.393	1761.343	19.480	17.892	
	16	17		16.909	152.4	152.4	150	21.650	21.650	1.187	0.133	0.000	1743.452	1745.166	1761.343	1761.210	17.892	16.044	
	17	18		20.458	152.4	152.4	150	21.650	21.650	1.187	0.161	0.000	1745.166	1749.813	1761.210	1761.050	16.044	11.237	
	18	19		19.218	152.4	152.4	150	21.650	21.650	1.187	0.151	0.000	1749.813	1752.080	1761.050	1760.899	11.237	8.819	
	19	20		15.272	152.4	152.4	150	21.650	21.650	1.187	0.120	0.000	1752.080	1754.328	1760.899	1760.779	8.819	6.451	
	20	21		18.000	152.4	152.4	150	21.650	21.650	1.187	0.141	0.000	1754.328	1758.351	1760.779	1760.638	6.451	2.287	

PROYECTO: RED DE DISTRIBUCION DE AGUA POTABLE DE SAN FRANCISCO TELIXTLAHUACA PROYECTISTA: ING. VICTOR MENDOZA MARIN

TABLA DE CALCULO DE REDES DE DISTRIBUCION DE AGUA POTABLE METODO HARDY-CROSS/MANNING

DESCRIPCION		TRAMO		LONGITUD (m)	DIAMETRO INTERIOR(mm)	DIAMETRO EFFECTIVO(mm)	COEF. RUGOSIDAD	GASTO		VELOCIDAD (m/s)	PERDIDA DE CARGA(m)		COTA DE T.M.(m)		COTA PIEZOMETRICA(m)		CARGA DISPONIBLE(m)		OBSERVACIONES
		De	a					INICIAL(p/s)	FINAL(p/s)		TUBERIA	ADICIONAL	INICIAL	FINAL	INICIAL	FINAL	INICIAL	FINAL	
1		1	2	17.734	203.2	203.2	0.00900	46.390	46.390	1.430	0.156	0.000	1758.351	1754.558	1760.851	1760.695	2.500	6.137	
2		2	3	13.432	203.2	203.2	0.00900	46.344	46.344	1.429	0.118	0.000	1754.558	1752.212	1760.695	1760.577	6.137	8.365	
3		3	58	11.509	152.4	152.4	0.00900	41.170	41.170	2.257	0.370	0.000	1752.212	1751.000	1760.577	1760.206	8.365	9.206	
4		4	5	7.754	101.6	101.6	0.00900	5.139	5.139	0.634	0.034	0.000	1752.212	1751.000	1760.577	1760.543	8.365	9.543	
5		5	6	13.697	101.6	101.6	0.00900	5.119	5.119	0.631	0.059	0.000	1751.000	1749.000	1760.543	1760.484	9.543	11.484	
6		6	7	9.611	101.6	101.6	0.00900	5.083	5.083	0.627	0.041	0.000	1749.000	1747.668	1760.484	1760.443	11.484	12.775	
7		7	8	51.137	101.6	101.6	0.00900	5.058	5.058	0.624	0.216	0.000	1747.668	1741.557	1760.443	1760.227	12.775	18.669	
8		8	9	21.042	101.6	101.6	0.00900	4.926	4.926	0.608	0.084	0.000	1741.557	1738.436	1760.227	1760.142	18.669	21.706	
9		9	10	18.654	101.6	101.6	0.00900	4.871	4.871	0.601	0.045	0.000	1738.436	1737.593	1760.142	1760.097	21.706	22.504	
10		10	24	21.632	101.6	101.6	0.00900	1.783	1.783	0.220	0.010	0.000	1737.593	1735.000	1760.097	1760.064	22.504	25.087	
11		11	11	33.819	101.6	101.6	0.00900	3.058	3.058	0.377	0.033	0.000	1735.000	1732.000	1760.064	1760.071	25.087	28.071	
12		12	12	16.448	101.6	101.6	0.00900	1.735	1.735	0.214	0.017	0.000	1732.000	1730.493	1760.071	1760.063	28.071	29.570	
13		13	13	27.870	101.6	101.6	0.00900	1.604	1.604	0.198	0.012	0.000	1730.493	1729.000	1760.063	1760.051	29.570	31.051	
14		14	22	23.778	101.6	101.6	0.00900	1.532	1.532	0.189	0.030	0.000	1729.000	1725.078	1760.051	1760.021	31.051	34.943	
15		15	15	22.119	101.6	101.6	0.00900	0.078	0.078	0.010	0.000	0.000	1725.078	1724.729	1760.021	1760.021	34.943	35.293	
16		16	16	259.304	101.6	101.6	0.00900	1.253	1.253	0.155	0.006	0.000	1724.729	1724.665	1760.021	1760.016	35.293	35.350	
17		17	17	47.090	101.6	101.6	0.00900	1.196	1.196	0.147	0.061	0.000	1724.665	1723.233	1760.016	1759.955	35.350	36.722	
18		18	18	47.527	101.6	101.6	0.00900	0.523	0.523	0.065	0.002	0.000	1723.233	1724.000	1759.955	1759.952	36.722	35.952	
19		19	19	18.716	101.6	101.6	0.00900	0.401	0.401	0.049	0.001	0.000	1724.000	1723.894	1759.952	1759.951	35.952	36.057	
20		20	20	68.174	101.6	101.6	0.00900	0.278	0.278	0.034	0.000	0.000	1723.894	1723.847	1759.951	1759.951	36.057	36.104	
21		21	21	19.116	101.6	101.6	0.00900	0.229	0.229	0.028	0.001	0.000	1723.847	1722.265	1759.951	1759.950	36.104	37.686	
22		22	23	6.315	101.6	101.6	0.00900	0.050	0.050	0.006	0.000	0.000	1722.265	1722.000	1759.950	1759.950	37.686	37.950	
23		23	24	17.307	101.6	101.6	0.00900	0.016	0.016	0.002	0.000	0.000	1722.000	1724.366	1760.021	1760.021	35.293	35.656	
24		24	25	43.607	101.6	101.6	0.00900	3.002	3.002	0.370	0.028	0.000	1724.366	1738.875	1760.038	1760.038	21.195	20.163	
25		25	26	15.894	101.6	101.6	0.00900	2.957	2.957	0.365	0.063	0.000	1738.875	1738.784	1760.038	1759.975	20.163	21.191	
26		26	27	9.193	101.6	101.6	0.00900	2.844	2.844	0.351	0.021	0.000	1738.784	1736.434	1759.975	1759.954	21.191	23.520	
27		27	28	59.621	101.6	101.6	0.00900	2.803	2.803	0.346	0.012	0.000	1736.434	1734.617	1759.954	1759.942	23.520	25.325	
28		28	29	21.436	101.6	101.6	0.00900	2.779	2.779	0.343	0.076	0.000	1734.617	1728.501	1759.942	1759.866	25.325	31.365	
29		29	30	37.254	101.6	101.6	0.00900	2.528	2.528	0.312	0.023	0.000	1728.501	1727.694	1759.866	1759.843	31.365	32.149	
30		30	52	58.591	50.8	50.8	0.00900	0.097	0.097	0.048	0.002	0.000	1727.694	1726.241	1759.843	1759.864	31.365	31.623	
31		31	31	121.820	101.6	101.6	0.00900	0.429	0.429	0.212	0.072	0.000	1726.241	1720.181	1759.772	1759.772	32.149	29.591	
32		32	32	64.245	50.8	50.8	0.00900	2.044	2.044	0.252	0.084	0.000	1720.181	1726.000	1759.843	1759.759	32.149	33.759	
33		33	33	46.198	50.8	50.8	0.00900	0.899	0.899	0.443	0.345	0.000	1726.000	1723.894	1759.759	1759.759	33.759	35.520	
34		34	34	16.957	50.8	50.8	0.00900	0.829	0.829	0.182	0.024	0.000	1723.894	1724.172	1759.759	1759.735	33.759	34.115	
35		35	35	23.203	50.8	50.8	0.00900	0.672	0.672	0.332	0.051	0.000	1724.172	1724.142	1759.735	1759.735	35.520	35.221	
36		36	36	10.081	50.8	50.8	0.00900	0.628	0.628	0.030	0.001	0.000	1724.142	1724.172	1759.735	1759.735	35.221	34.514	
37		37	37	12.163	50.8	50.8	0.00900	0.520	0.520	0.257	0.018	0.000	1724.172	1726.000	1759.735	1759.735	34.514	33.289	
38		38	38	8.062	50.8	50.8	0.00900	0.052	0.052	0.026	0.000	0.000	1726.000	1724.793	1759.735	1759.735	34.514	34.719	
39		39	39	130.419	50.8	50.8	0.00900	0.021	0.021	0.010	0.000	0.000	1724.793	1724.589	1759.735	1759.735	34.719	34.307	
40		40	40	20.831	50.8	50.8	0.00900	0.494	0.494	0.244	0.212	0.000	1724.589	1726.000	1759.735	1759.735	34.307	21.077	
41		41	41	7.365	50.8	50.8	0.00900	0.156	0.156	0.077	0.003	0.000	1726.000	1738.000	1759.735	1759.735	33.289	21.077	
42		42	42	5.745	50.8	50.8	0.00900	0.102	0.102	0.050	0.001	0.000	1738.000	1742.000	1759.735	1759.735	33.289	21.077	
43		43	43	5.704	50.8	50.8	0.00900	0.083	0.083	0.041	0.000	0.000	1742.000	1745.574	1759.735	1759.735	33.289	21.077	
44		44	44	9.689	50.8	50.8	0.00900	0.068	0.068	0.034	0.000	0.000	1745.574	1746.566	1759.735	1759.735	33.289	21.077	
45		45	45	10.807	50.8	50.8	0.00900	0.053	0.053	0.026	0.000	0.000	1746.566	1749.000	1759.735	1759.735	33.289	21.077	
46		46	46	83.554	76.2	76.2	0.00900	0.028	0.028	0.014	0.000	0.000	1749.000	1751.550	1759.735	1759.735	33.289	21.077	
47		47	50	112.461	50.8	50.8	0.00900	0.709	0.709	0.155	0.032	0.000	1751.550	1722.671	1759.735	1759.735	33.289	21.077	
48		48	48	48.052	50.8	50.8	0.00900	0.325	0.325	0.160	0.079	0.000	1722.671	1719.986	1759.735	1759.735	33.289	21.077	
49		49	49	15.438	101.6	101.6	0.00900	0.167	0.167	0.083	0.009	0.000	1719.986	1724.475	1759.735	1759.735	33.289	21.077	
50		50	51	12.853	101.6	101.6	0.00900	0.040	0.040	0.005	0.000	0.000	1724.475	1723.406	1759.735	1759.735	33.289	21.077	
								0.033	0.033	0.004	0.000	0.000	1719.986	1720.122	1759.735	1759.735	33.289	21.077	

TABLA DE CALCULO DE REDES DE DISTRIBUCION DE AGUA POTABLE METODO HARDY-CROSS/MANNING

DESCRIPCION		TRAMO		LONGITUD (m)	DIAMETRO INTERIOR(mm)	DIAMETRO EFFECTIVO(mm)	COEF. RUGOSIDAD	GASTO INICIAL(lps)	GASTO FINAL(lps)	VELOCIDAD (m/s)	PERDIDA DE CARGA(m)		COTA DE T.M.(m)		COTA PIEZOMETRICA(m)		CARGA DISPONIBLE(m)		OBSERVACIONES
		De	a								TUBERIA	ADICIONAL	INICIAL	FINAL	INICIAL	FINAL	INICIAL	FINAL	
		52	53	47.412	50.8	50.8	0.00900	0.277	0.137	0.024	0.000	0.000	1727.603	1727.603	1759.772	1759.748	29.591	32.145	
		53	54	17.171	50.8	50.8	0.00900	0.154	0.076	0.003	0.000	0.000	1726.740	1726.740	1759.748	1759.748	32.145	33.005	
		54	55	14.147	50.8	50.8	0.00900	0.109	0.054	0.001	0.000	0.000	1726.740	1726.740	1759.745	1759.744	33.005	33.744	
		55	56	27.950	50.8	50.8	0.00900	0.072	0.036	0.001	0.000	0.000	1726.740	1726.740	1759.744	1759.743	33.744	34.379	
		56	57	9.288	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	34.379	35.005	
		57	58	13.348	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	35.005	35.744	
		58	59	9.288	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	35.744	36.483	
		59	60	17.018	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	36.483	37.222	
		60	61	17.018	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	37.222	37.961	
		61	62	14.942	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	37.961	38.699	
		62	63	3.582	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	38.699	39.438	
		63	64	4.614	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	39.438	40.177	
		64	65	14.625	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	40.177	40.916	
		65	66	3.215	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	40.916	41.655	
		66	67	9.937	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	41.655	42.394	
		67	68	10.062	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	42.394	43.133	
		68	69	9.312	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	43.133	43.872	
		69	70	25.799	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	43.872	44.611	
		70	71	21.822	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	44.611	45.350	
		71	72	30.701	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	45.350	46.089	
		72	73	16.883	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	46.089	46.828	
		73	74	25.581	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	46.828	47.567	
		74	75	29.595	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	47.567	48.306	
		75	76	21.767	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	48.306	49.045	
		76	77	21.767	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	49.045	49.784	
		77	78	23.648	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	49.784	50.523	
		78	79	64.308	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	50.523	51.262	
		79	80	20.596	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	51.262	52.001	
		80	81	20.596	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	52.001	52.740	
		81	82	91.907	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	52.740	53.479	
		82	83	23.965	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	53.479	54.218	
		83	84	5.132	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	54.218	54.957	
		84	85	13.138	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	54.957	55.696	
		85	86	13.105	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	55.696	56.435	
		86	87	15.899	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	56.435	57.174	
		87	88	6.993	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	57.174	57.913	
		88	89	46.853	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	57.913	58.652	
		89	90	124.176	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	58.652	59.391	
		90	91	88.301	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	59.391	60.130	
		91	92	42.483	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	60.130	60.869	
		92	93	54.567	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	60.869	61.608	
		93	94	80.100	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	61.608	62.347	
		94	95	77.824	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	62.347	63.086	
		95	96	60.529	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	63.086	63.825	
		96	97	112.824	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	63.825	64.564	
		97	98	78.371	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	64.564	65.303	
		98	99	73.660	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	65.303	66.042	
		99	100	68.530	50.8	50.8	0.00900	0.140	0.072	0.003	0.000	0.000	1726.740	1726.740	1759.744	1759.743	66.042	66.781	

PROYECTO: RED DE DISTRIBUCION DE AGUA POTABLE DE SAN FRANCISCO TELIXTLAHUACA

PROYECTISTA: ING. VICTOR MENDOZA MARIN

No. de tramos: 351

No. de nodos: 352

TABLA DE CALCULO DE REDES DE DISTRIBUCION DE AGUA POTABLE METODO HARDY-CROSS/MANNING

DESCRIPCION	TRAMO		LONGITUD (m)	DIAMETRO INTERIOR(mm)	DIAMETRO EFECTIVO(mm)	COEF. RUGOSIDAD	GASTO INICIAL(lps)	GASTO FINAL(lps)	VELOCIDAD (m/s)	PERDIDA DE CARGA(m) TUBERIA	ADICIONAL	COTA DE T.N.(m)		COTA PIEZOMETRICA(m)		CARGA DISPONIBLE(m)		OBSERVACIONES
	De	a										INICIAL	FINAL	INICIAL	FINAL	INICIAL	FINAL	
96	109	108.253	50.8	50.8	50.8	0.00900	0.281	0.281	0.139	0.057	0.000	1715.407	1716.137	1750.675	1750.618	35.269	34.482	
96	97	57.201	101.6	101.6	101.6	0.00900	1.777	1.777	0.219	0.030	0.000	1715.407	1714.000	1750.675	1750.645	35.269	36.645	
97	106	64.287	101.6	101.6	101.6	0.00900	0.404	0.404	0.050	0.002	0.000	1714.000	1714.983	1750.645	1750.644	36.645	35.661	
97	98	40.729	101.6	101.6	101.6	0.00900	1.224	1.224	0.151	0.010	0.000	1714.000	1712.498	1750.645	1750.635	36.645	38.137	
98	103	26.061	50.8	50.8	50.8	0.00900	0.173	0.173	0.088	0.005	0.000	1712.498	1713.435	1750.635	1750.630	38.137	37.195	
98	99	165.488	101.6	101.6	101.6	0.00900	0.945	0.945	0.117	0.024	0.000	1712.498	1710.636	1750.635	1750.611	38.137	39.974	
99	100	34.511	76.2	76.2	76.2	0.00900	0.516	0.516	0.113	0.007	0.000	1710.636	1710.706	1750.611	1750.604	39.974	39.898	
100	101	126.403	76.2	76.2	76.2	0.00900	0.427	0.427	0.084	0.018	0.000	1710.706	1705.031	1750.604	1750.596	39.898	45.555	
101	102	63.5	50.8	50.8	50.8	0.00900	0.099	0.099	0.031	0.001	0.000	1705.031	1703.369	1750.596	1750.586	45.555	47.217	
103	104	17.506	50.8	50.8	50.8	0.00900	0.106	0.106	0.052	0.001	0.000	1713.435	1713.829	1750.630	1750.629	37.195	36.800	
104	105	23.316	50.8	50.8	50.8	0.00900	0.060	0.060	0.030	0.001	0.000	1713.829	1713.698	1750.629	1750.628	36.800	36.931	
106	107	73.477	50.8	50.8	50.8	0.00900	0.237	0.237	0.117	0.027	0.000	1714.983	1714.168	1750.644	1750.616	35.661	36.449	
107	108	17.863	50.8	50.8	50.8	0.00900	0.046	0.046	0.023	0.000	0.000	1714.168	1714.137	1750.616	1750.616	36.449	36.479	
111	114	20.288	101.6	101.6	101.6	0.00900	3.900	3.900	0.481	0.051	0.000	1718.859	1718.787	1750.473	1750.422	31.614	31.635	
111	112	22.051	50.8	50.8	50.8	0.00900	0.132	0.132	0.065	0.003	0.000	1718.859	1719.206	1750.473	1750.470	31.614	31.264	
112	113	28.931	50.8	50.8	50.8	0.00900	0.075	0.075	0.037	0.001	0.000	1719.206	1720.860	1750.470	1750.469	31.264	29.610	
114	115	118.874	101.6	101.6	101.6	0.00900	3.847	3.847	0.476	0.290	0.000	1719.206	1716.405	1750.422	1750.132	31.635	33.727	
115	116	13.796	101.6	101.6	101.6	0.00900	0.976	0.976	0.120	0.021	0.000	1716.405	1713.487	1750.132	1750.111	33.727	36.624	
116	117	52.986	101.6	101.6	101.6	0.00900	2.563	2.563	0.316	0.015	0.000	1716.405	1716.394	1750.132	1750.117	33.727	33.722	
116	118	103.407	101.6	101.6	101.6	0.00900	2.259	2.259	0.278	0.045	0.000	1716.394	1716.000	1750.117	1750.115	33.722	35.115	
117	118	42.278	101.6	101.6	101.6	0.00900	2.268	2.268	0.333	0.001	0.000	1716.000	1715.241	1750.115	1750.111	33.722	34.072	
118	119	121.198	101.6	101.6	101.6	0.00900	2.012	2.012	0.262	0.031	0.000	1715.241	1706.362	1750.041	1750.041	34.072	34.800	
119	120	65.361	101.6	101.6	101.6	0.00900	1.698	1.698	0.209	0.081	0.000	1706.362	1705.297	1749.960	1749.960	34.800	43.597	
120	121	20.123	101.6	101.6	101.6	0.00900	1.528	1.528	0.189	0.008	0.000	1705.297	1704.689	1749.928	1749.921	43.597	44.632	
121	122	48.917	101.6	101.6	101.6	0.00900	1.476	1.476	0.182	0.018	0.000	1704.689	1703.185	1749.921	1749.921	44.632	45.232	
122	123	74.627	101.6	101.6	101.6	0.00900	1.349	1.349	0.166	0.022	0.000	1703.185	1702.708	1749.903	1749.881	45.232	46.719	
123	124	70.933	101.6	101.6	101.6	0.00900	1.156	1.156	0.143	0.016	0.000	1702.708	1702.255	1749.881	1749.865	46.719	47.173	
124	125	51.368	101.6	101.6	101.6	0.00900	0.972	0.972	0.120	0.008	0.000	1702.255	1702.024	1749.865	1749.857	47.173	47.610	
125	126	60.351	101.6	101.6	101.6	0.00900	0.838	0.838	0.103	0.007	0.000	1702.024	1702.000	1749.857	1749.850	47.610	47.833	
126	127	24.530	76.2	76.2	76.2	0.00900	0.682	0.682	0.150	0.009	0.000	1702.000	1701.674	1749.850	1749.841	47.833	47.850	
127	128	33.261	76.2	76.2	76.2	0.00900	0.618	0.618	0.136	0.010	0.000	1701.674	1701.623	1749.841	1749.832	47.850	48.167	
128	129	74.990	76.2	76.2	76.2	0.00900	0.532	0.532	0.117	0.016	0.000	1701.623	1701.086	1749.832	1749.815	48.167	48.208	
129	130	92.007	76.2	76.2	76.2	0.00900	0.338	0.338	0.074	0.008	0.000	1701.086	1700.284	1749.815	1749.807	48.208	48.729	
130	131	13.117	50.8	50.8	50.8	0.00900	0.099	0.099	0.049	0.001	0.000	1700.284	1699.720	1749.807	1749.806	48.729	49.523	
131	132	24.995	50.8	50.8	50.8	0.00900	0.065	0.065	0.032	0.001	0.000	1699.720	1699.000	1749.806	1749.806	49.523	50.086	
134	135	106.211	50.8	50.8	50.8	0.00900	0.275	0.275	0.136	0.054	0.000	1713.487	1713.448	1750.111	1750.057	50.086	50.806	
134	136	43.440	50.8	50.8	50.8	0.00900	0.361	0.361	0.178	0.038	0.000	1713.448	1711.311	1750.057	1750.073	50.806	36.611	
136	137	40.590	50.8	50.8	50.8	0.00900	0.249	0.249	0.123	0.017	0.000	1711.311	1710.598	1750.073	1750.057	36.624	38.763	
137	139	29.196	50.8	50.8	50.8	0.00900	0.076	0.076	0.037	0.001	0.000	1710.598	1710.589	1750.057	1750.057	38.763	39.458	
137	138	26.038	50.8	50.8	50.8	0.00900	0.068	0.068	0.033	0.001	0.000	1710.589	1709.064	1750.057	1750.056	39.458	39.467	
144	145	46.928	152.4	152.4	152.4	0.00900	21.868	21.868	1.199	0.426	0.000	1720.640	1723.598	1752.272	1751.845	39.458	40.992	
145	146	84.824	152.4	152.4	152.4	0.00900	2.916	2.916	0.160	0.014	0.000	1723.598	1726.000	1751.845	1751.832	40.992	28.248	
145	146	40.163	152.4	152.4	152.4	0.00900	18.831	18.831	1.032	0.270	0.000	1726.000	1722.117	1751.832	1751.827	28.248	25.575	
146	165	39.783	50.8	50.8	50.8	0.00900	0.103	0.103	0.051	0.003	0.000	1722.117	1725.086	1751.832	1751.829	25.575	26.743	
146	147	14.993	152.4	152.4	152.4	0.00900	2.593	2.593	0.142	0.002	0.000	1725.086	1721.826	1751.829	1751.830	26.743	30.004	
147	164	37.303	50.8	50.8	50.8	0.00900	0.097	0.097	0.048	0.002	0.000	1721.826	1721.514	1751.830	1751.827	30.004	30.314	
147	148	20.752	152.4	152.4	152.4	0.00900	2.457	2.457	0.135	0.002	0.000	1721.514	1720.517	1751.827	1751.822	30.314	31.305	
148	149	50.982	152.4	152.4	152.4	0.00900	2.324	2.324	0.127	0.005	0.000	1720.517	1721.829	1751.822	1751.826	31.305	29.997	
148	163	30.642	50.8	50.8	50.8	0.00900	0.079	0.079	0.039	0.001	0.000	1721.829	1721.829	1751.822	1751.822	31.305	31.005	
149	159	57.898	50.8	50.8	50.8	0.00900	0.284	0.284	0.140	0.031	0.000	1720.517	1720.517	1751.822	1751.816	31.005	33.275	
149	150	86.373	152.4	152.4	152.4	0.00900	1.907	1.907	0.105	0.006	0.000	1720.517	1718.541	1751.822	1751.816	33.275	33.986	
150	151	25.809	152.4	152.4	152.4	0.00900	1.594	1.594	0.087	0.001	0.000	1718.541	1717.829	1751.816	1751.815	33.986		

TABLA DE CALCULO DE REDES DE DISTRIBUCION DE AGUA POTABLE METODO HARDY-CROSS/MANNING

DESCRIPCION		TRAMO		LONGITUD (m)	DIAMETRO INTERIOR(mm)	DIAMETRO EFECTIVO(mm)	COEF. RUGOSIDAD	GASTO INICIAL(p/s)	GASTO FINAL(p/s)	VELOCIDAD (m/s)	PERDIDA DE CARGA(m)		COTA DE T.N.(m)		COTA PIEZOMETRICA(m)		CARGA DISPONIBLE(m)		OBSERVACIONES
		De	A								TUBERIA	ADICIONAL	INICIAL	FINAL	INICIAL	FINAL	INICIAL	FINAL	
150	158	150	158	31.269	50.8	50.8	0.00900	0.081	0.081	0.040	0.001	0.000	1718.541	1718.749	1751.816	1751.815	33.275	33.066	
151	157	151	157	115.082	63.5	63.5	0.00900	0.299	0.299	0.094	0.021	0.000	1717.829	1718.069	1751.815	1751.794	33.986	33.726	
151	152	151	152	160.752	101.6	101.6	0.00900	1.229	1.229	0.152	0.040	0.000	1717.829	1714.223	1751.815	1751.775	33.986	37.551	
152	156	152	156	109.998	63.5	63.5	0.00900	0.285	0.285	0.090	0.018	0.000	1714.223	1715.338	1751.775	1751.757	37.551	36.419	
152	153	152	153	114.188	101.6	101.6	0.00900	0.526	0.526	0.056	0.000	0.000	1714.223	1711.910	1751.775	1751.770	37.551	39.860	
153	155	153	155	35.966	50.8	50.8	0.00900	0.093	0.093	0.043	0.002	0.000	1711.910	1711.569	1751.770	1751.767	39.860	40.199	
153	154	153	154	52.827	63.5	63.5	0.00900	0.137	0.137	0.043	0.002	0.000	1711.569	1710.827	1751.770	1751.768	39.860	40.941	
159	160	159	160	13.932	50.8	50.8	0.00900	0.134	0.134	0.036	0.002	0.000	1720.786	1721.000	1751.791	1751.789	31.005	30.789	
160	162	160	162	21.771	50.8	50.8	0.00900	0.056	0.056	0.028	0.000	0.000	1721.000	1720.998	1751.789	1751.789	30.789	30.791	
161	161	161	161	13.966	50.8	50.8	0.00900	0.041	0.041	0.020	0.000	0.000	1721.000	1720.998	1751.789	1751.789	31.531	31.531	
166	167	166	167	92.929	152.4	152.4	0.00900	18.727	18.727	1.027	0.619	0.000	1726.000	1721.649	1751.575	1750.956	25.575	29.307	
167	168	167	168	21.356	50.8	50.8	0.00900	0.249	0.249	0.123	0.009	0.000	1721.649	1721.547	1750.956	1750.947	29.307	29.401	
167	167	167	167	76.392	152.4	152.4	0.00900	18.236	18.236	1.000	0.482	0.000	1721.547	1721.000	1750.956	1750.947	29.307	29.474	
168	170	168	170	30.511	50.8	50.8	0.00900	0.079	0.079	0.039	0.001	0.000	1721.547	1721.854	1750.947	1750.946	29.401	29.092	
168	169	168	169	44.243	50.8	50.8	0.00900	0.115	0.115	0.057	0.004	0.000	1721.854	1722.017	1750.947	1750.944	29.401	28.927	
171	172	171	172	15.550	101.6	101.6	0.00900	18.038	18.038	2.225	0.835	0.000	1721.000	1721.079	1750.947	1750.947	28.560	28.560	
172	173	172	173	107.368	101.6	101.6	0.00900	3.542	3.542	0.437	0.222	0.000	1721.079	1719.957	1749.639	1749.639	28.560	29.460	
172	196	172	196	13.690	101.6	101.6	0.00900	14.456	14.456	1.763	0.472	0.000	1721.079	1721.847	1749.639	1749.639	28.560	27.320	
173	174	173	174	42.287	101.6	101.6	0.00900	3.145	3.145	0.388	0.020	0.000	1719.957	1719.959	1749.639	1749.639	29.438	29.438	
173	195	173	195	45.639	50.8	50.8	0.00900	0.118	0.118	0.058	0.004	0.000	1719.957	1720.537	1749.639	1749.639	29.460	28.875	
174	194	174	194	54.874	50.8	50.8	0.00900	0.142	0.142	0.070	0.007	0.000	1719.959	1720.157	1749.639	1749.639	29.438	29.233	
174	175	174	175	46.517	101.6	101.6	0.00900	2.971	2.971	0.366	0.068	0.000	1719.959	1719.705	1749.639	1749.639	29.438	29.624	
175	189	175	189	72.171	101.6	101.6	0.00900	0.628	0.628	0.077	0.005	0.000	1719.705	1718.316	1749.639	1749.639	29.624	31.008	
175	176	175	176	83.685	101.6	101.6	0.00900	2.223	2.223	0.274	0.068	0.000	1719.705	1719.529	1749.639	1749.639	29.624	29.731	
176	177	176	177	27.179	101.6	101.6	0.00900	2.005	2.005	0.247	0.018	0.000	1719.529	1719.473	1749.639	1749.639	29.731	29.770	
177	178	177	178	67.114	101.6	101.6	0.00900	1.935	1.935	0.239	0.041	0.000	1719.473	1718.790	1749.639	1749.639	29.770	30.411	
178	184	178	184	54.832	101.6	101.6	0.00900	0.948	0.948	0.117	0.008	0.000	1718.790	1716.169	1749.639	1749.639	30.411	33.024	
178	179	178	179	41.706	101.6	101.6	0.00900	0.813	0.813	0.100	0.005	0.000	1718.790	1720.165	1749.639	1749.639	30.411	29.031	
179	180	179	180	40.614	101.6	101.6	0.00900	0.704	0.704	0.087	0.003	0.000	1720.165	1720.652	1749.639	1749.639	28.542	28.542	
180	181	180	181	39.444	101.6	101.6	0.00900	0.599	0.599	0.074	0.002	0.000	1720.652	1718.306	1749.639	1749.639	30.885	30.885	
181	183	181	183	113.225	63.5	63.5	0.00900	0.294	0.294	0.093	0.020	0.000	1718.306	1713.451	1749.639	1749.639	30.885	35.720	
181	182	181	182	78.300	101.6	101.6	0.00900	0.203	0.203	0.025	0.001	0.000	1718.306	1715.714	1749.639	1749.639	30.885	33.477	
184	188	184	188	72.605	101.6	101.6	0.00900	0.188	0.188	0.023	0.000	0.000	1716.169	1714.177	1749.639	1749.639	33.024	35.016	
184	186	184	186	95.884	101.6	101.6	0.00900	0.399	0.399	0.049	0.003	0.000	1716.169	1713.367	1749.639	1749.639	33.024	35.823	
184	185	184	185	84.181	50.8	50.8	0.00900	0.218	0.218	0.108	0.027	0.000	1716.169	1717.053	1749.639	1749.639	33.024	32.113	
186	187	186	187	58.081	63.5	63.5	0.00900	0.151	0.151	0.048	0.003	0.000	1713.367	1712.000	1749.639	1749.639	31.008	31.008	
189	191	189	191	13.239	101.6	101.6	0.00900	0.327	0.327	0.040	0.000	0.000	1718.316	1718.218	1749.639	1749.639	31.008	30.864	
189	190	189	190	43.572	50.8	50.8	0.00900	0.113	0.113	0.056	0.004	0.000	1718.316	1718.456	1749.639	1749.639	31.008	30.864	
191	193	191	193	80.853	101.6	101.6	0.00900	0.210	0.210	0.026	0.001	0.000	1718.218	1717.784	1749.639	1749.639	31.008	31.539	
191	192	191	192	32.128	50.8	50.8	0.00900	0.083	0.083	0.041	0.001	0.000	1718.218	1718.709	1749.639	1749.639	31.008	30.614	
196	197	196	197	54.358	101.6	101.6	0.00900	14.420	14.420	1.779	1.866	0.000	1721.847	1722.247	1749.639	1749.639	27.320	25.055	
197	198	197	198	81.693	101.6	101.6	0.00900	14.279	14.279	1.761	2.756	0.000	1722.247	1721.819	1749.639	1749.639	25.055	22.726	
198	199	198	199	57.428	101.6	101.6	0.00900	14.067	14.067	1.735	1.876	0.000	1721.819	1721.360	1749.639	1749.639	22.726	21.310	
199	204	199	204	119.224	101.6	101.6	0.00900	0.309	0.309	0.038	0.002	0.000	1721.360	1719.755	1749.639	1749.639	21.310	22.912	
199	200	199	200	28.481	101.6	101.6	0.00900	13.609	13.609	1.679	0.871	0.000	1721.360	1721.030	1749.639	1749.639	21.310	20.769	
200	201	200	201	47.733	101.6	101.6	0.00900	13.535	13.535	1.669	1.443	0.000	1721.030	1720.331	1749.639	1749.639	20.769	20.025	
201	202	201	202	27.631	101.6	101.6	0.00900	13.411	13.411	1.654	0.820	0.000	1720.331	1719.805	1749.639	1749.639	19.731	19.264	
202	203	202	203	26.597	101.6	101.6	0.00900	13.339	13.339	1.645	0.781	0.000	1719.805	1719.491	1749.639	1749.639	19.731	19.264	
203	204	203	204	121.133	101.6	101.6	0.00900	13.270	13.270	1.637	3.521	0.000	1719.491	1717.223	1749.639	1749.639	18.011	16.324	
204	283	204	283	72.451	50.8	50.8	0.00900	0.188	0.188	0.093	0.017	0.000	1717.223	1718.893	1749.639	1749.639	17.833	17.833	
204	205	204	205	48.870	101.6	101.6	0.00900	12.768	12.768	1.575	1.315	0.000	1717.223	1716.086	1749.639	1749.639	17.833	17.833	
205	206	205	206	42.005	101.6	101.6	0.00900	12.641	12.641	1.559	1.108	0.000	1716.086	1715.328	1749.639	1749.639	17.833	17.483	
206	240	206	240	48.629	101.6	101.6	0.00900	9.311	9.311	1.148	0.696	0.000	1715.328	1715.475	1749.639	1749.639	17.483	16.641	

PROYECTO: RED DE DISTRIBUCION DE AGUA POTABLE DE SAN FRANCISCO TELIXTLAHUACA

PROYECTO: RED DE DISTRIBUCION DE AGUA POTABLE DE SAN FRANCISCO TELIXTLAHUACA										PROYECTISTA: ING. VICTOR MENDOZA MARIN										No. de tramos: 351				No. de nodos: 352				OBSERVACIONES	
DESCRIPCION		TRAMO		LONGITUD (m)	DIAMETRO INTERIOR(mm)	DIAMETRO EFECTIVO(mm)	COEF. RUGOSIDAD	GASTO		VELOCIDAD (m/s)	PERDIDA DE CARGA(m)		COTA DE T.N(m)		COTA PIEZOMETRICA(m)		CARGA DISPONIBLE(m)		FINAL										
De	A	INICIAL(lps)	FINAL(lps)					TUBERIA	ADICIONAL		INICIAL	FINAL	INICIAL	FINAL	INICIAL	FINAL													
206		207		83.097	101.6	101.6	0.00900	3.222	3.222	0.397	0.142	0.000	1715.328	1713.000	1732.811	1732.669	17.483	19.669											
207		208		220.886	101.6	101.6	0.00900	3.006	3.006	0.371	0.329	0.000	1713.000	1707.674	1732.669	1732.340	19.669	24.666											
208		209		21.567	101.6	101.6	0.00900	2.433	2.433	0.300	0.021	0.000	1707.674	1707.105	1732.340	1732.319	24.666	25.213											
209		209		67.600	63.5	63.5	0.00900	0.175	0.175	0.055	0.004	0.000	1707.105	1707.698	1732.319	1732.314	25.213	24.617											
209		210		24.664	101.6	101.6	0.00900	2.202	2.202	0.272	0.020	0.000	1707.105	1707.000	1732.319	1732.299	25.213	25.299											
210		211		23.799	101.6	101.6	0.00900	2.138	2.138	0.264	0.018	0.000	1707.000	1706.673	1732.299	1732.281	25.299	25.608											
211		238		92.108	63.5	63.5	0.00900	0.239	0.239	0.075	0.011	0.000	1706.673	1703.545	1732.281	1732.270	25.608	28.725											
211		212		32.840	101.6	101.6	0.00900	1.837	1.837	0.227	0.018	0.000	1706.673	1706.182	1732.281	1732.263	25.608	26.101											
212		213		18.361	101.6	101.6	0.00900	1.752	1.752	0.216	0.009	0.000	1706.162	1705.531	1732.263	1732.253	26.101	26.722											
213		214		32.295	101.6	101.6	0.00900	1.704	1.704	0.210	0.015	0.000	1705.531	1704.891	1732.253	1732.238	26.722	27.347											
214		215		35.977	101.6	101.6	0.00900	1.621	1.621	0.200	0.016	0.000	1704.891	1703.880	1732.238	1732.222	27.347	28.342											
215		216		17.803	101.6	101.6	0.00900	1.527	1.527	0.188	0.007	0.000	1703.880	1703.315	1732.222	1732.215	28.342	28.900											
216		233		133.523	76.2	76.2	0.00900	0.642	0.642	0.141	0.042	0.000	1703.315	1702.396	1732.215	1732.173	28.900	29.777											
216		217		6.904	50.8	50.8	0.00900	0.839	0.839	0.414	0.032	0.000	1703.315	1703.221	1732.215	1732.183	28.900	28.962											
217		218		20.325	50.8	50.8	0.00900	0.821	0.821	0.405	0.091	0.000	1703.221	1702.455	1732.183	1732.092	28.962	29.637											
218		219		38.374	50.8	50.8	0.00900	0.769	0.769	0.379	0.151	0.000	1702.455	1701.633	1732.092	1731.941	29.637	30.308											
219		220		18.185	50.8	50.8	0.00900	0.669	0.669	0.330	0.054	0.000	1701.633	1701.326	1731.941	1731.887	30.308	30.561											
220		221		19.593	50.8	50.8	0.00900	0.622	0.622	0.307	0.050	0.000	1701.326	1701.096	1731.887	1731.836	30.561	30.740											
221		222		17.574	50.8	50.8	0.00900	0.571	0.571	0.282	0.038	0.000	1701.096	1700.793	1731.836	1731.798	30.740	31.005											
222		223		20.136	50.8	50.8	0.00900	0.526	0.526	0.259	0.037	0.000	1700.793	1700.538	1731.798	1731.761	31.005	31.223											
223		224		19.171	50.8	50.8	0.00900	0.473	0.473	0.234	0.029	0.000	1700.538	1700.345	1731.761	1731.733	31.223	31.388											
224		225		21.209	50.8	50.8	0.00900	0.424	0.424	0.209	0.025	0.000	1700.345	1700.160	1731.733	1731.707	31.388	31.548											
225		226		17.978	50.8	50.8	0.00900	0.369	0.369	0.182	0.016	0.000	1700.160	1699.985	1731.707	1731.691	31.548	31.706											
226		227		19.458	50.8	50.8	0.00900	0.322	0.322	0.159	0.013	0.000	1699.985	1699.810	1731.691	1731.678	31.706	31.868											
227		228		17.970	50.8	50.8	0.00900	0.271	0.271	0.134	0.009	0.000	1699.810	1699.848	1731.678	1731.669	31.868	31.821											
228		229		19.614	50.8	50.8	0.00900	0.225	0.225	0.111	0.007	0.000	1699.848	1699.801	1731.669	1731.662	31.821	31.861											
229		230		28.689	50.8	50.8	0.00900	0.174	0.174	0.086	0.006	0.000	1699.801	1699.813	1731.662	1731.656	31.861	31.843											
230		231		8.287	50.8	50.8	0.00900	0.100	0.100	0.049	0.001	0.000	1699.813	1699.827	1731.656	1731.656	31.843	31.829											
231		232		30.104	50.8	50.8	0.00900	0.078	0.078	0.039	0.001	0.000	1699.827	1699.581	1731.656	1731.655	31.829	32.073											
233		237		40.020	50.8	50.8	0.00900	0.104	0.104	0.051	0.003	0.000	1702.396	1702.490	1732.173	1732.170	29.777	29.681											
233		234		42.650	50.8	50.8	0.00900	0.192	0.192	0.095	0.010	0.000	1702.396	1701.000	1732.173	1732.163	29.777	31.163											
234		235		15.322	50.8	50.8	0.00900	0.081	0.081	0.040	0.001	0.000	1701.000	1704.000	1732.163	1732.162	31.163	28.162											
235		236		16.040	50.8	50.8	0.00900	0.042	0.042	0.021	0.000	0.000	1704.000	1700.771	1732.116	1730.289	16.641	19.575											
240		243		153.634	101.6	101.6	0.00900	8.488	8.488	1.047	1.827	0.000	1715.475	1708.313	1732.116	1732.022	16.641	19.575											
240		241		251.884	76.2	76.2	0.00900	0.697	0.697	0.153	0.094	0.000	1715.475	1708.313	1732.116	1732.022	16.641	19.575											
241		242		16.638	50.8	50.8	0.00900	0.043	0.043	0.021	0.000	0.000	1708.313	1707.631	1732.022	1732.022	23.710	24.391											
243		244		57.469	101.6	101.6	0.00900	8.090	8.090	0.998	0.621	0.000	1710.714	1710.233	1730.289	1729.668	19.575	19.435											
244		245		113.135	101.6	101.6	0.00900	5.967	5.967	0.736	0.665	0.000	1710.233	1708.720	1729.668	1729.003	19.435	20.283											
244		272		9.800	101.6	101.6	0.00900	1.974	1.974	0.243	0.006	0.000	1710.233	1708.362	1729.003	1728.932	20.283	19.574											
245		246		13.360	101.6	101.6	0.00900	5.673	5.673	0.700	0.071	0.000	1708.720	1708.362	1729.003	1728.932	20.283	20.570											
246		260		47.886	101.6	101.6	0.00900	2.844	2.844	0.351	0.064	0.000	1708.362	1707.468	1728.932	1728.868	20.570	21.400											
246		247		29.231	101.6	101.6	0.00900	2.795	2.795	0.345	0.038	0.000	1708.362	1707.858	1728.868	1728.895	20.570	21.036											
247		248		74.521	101.6	101.6	0.00900	2.719	2.719	0.335	0.091	0.000	1707.858	1705.732	1728.895	1728.804	21.036	23.072											
248		259		54.597	63.5	63.5	0.00900	0.142	0.142	0.045	0.002	0.000	1705.732	1706.558	1728.804	1728.802	23.072	22.244											
248		249		107.388	101.6	101.6	0.00900	2.384	2.384	0.294	0.101	0.000	1706.558	1705.371	1728.804	1728.703	23.072	23.332											
249		268		54.549	63.5	63.5	0.00900	0.045	0.045	0.002	0.000	0.000	1705.371	1705.823	1728.703	1728.701	23.332	22.878											
249		250		125.159	101.6	101.6	0.00900	1.964	1.964	0.242	0.080	0.000	1705.823	1702.546	1728.703	1728.623	23.332	26.078											
250		257		47.463	50.8	50.8	0.00900	0.123	0.123	0.061	0.005	0.000	1702.546	1702.501	1728.623	1728.619	26.078	26.118											
250		251		33.432	63.5	63.5	0.00900	1.516	1.516	0.479	0.156	0.000	1702.546	1701.366	1728.623	1728.468	26.078	27.082											
251		252		110.746	63.5	63.5	0.00900	1.429	1.429	0.451	0.458	0.000	1701.366	1700.512	1728.468	1728.010	27.082	27.498											
252		253		199.002	63.5	63.5	0.00900	1.142	1.142	0.361	0.525	0.000	1700.512	1702.000	1728.010	1727.484	27.498	25.484											
253		254		184.997	63.5	63.5	0.00900	0.626	0.626	0.198	0.147	0.000	1702.000	1695.751	1727.484	1727.338	25.484	31.586											
254		255		30.233	38.1	38.1	0.00900	0.078	0.078	0.069	0.006	0.000	1695.751	1696.000	1727.338	1727.332	31.586	31.332											

PROYECTO: RED DE DISTRIBUCION DE AGUA POTABLE DE SAN FRANCISCO TELIXTLAHUACA

PROYECTISTA: ING. VICTOR MENDOZA MARIN

No. de nodos: 352

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

DESCRIPCION		TRAMO		LONGITUD (m)	DIAMETRO INTERIOR(mm)	DIAMETRO EFFECTIVO(mm)	COEF. RUGOSIDAD	GASTO INICIAL(lps)	GASTO FINAL(lps)	VELOCIDAD (m/s)	PERDIDA DE CARGA(m) TUBERIA	ADICIONAL	COTA DE T.M.(m)		COTA PIEZOMETRICA(m)		CARGA DISPONIBLE(m)		OBSERVACIONES
De	a	INICIAL	FINAL										INICIAL	FINAL	INICIAL	FINAL			
	254	256	26.097	38.1	38.1	0.00900	0.068	0.068	0.059	0.004	0.000	1695.751	1695.545	1727.338	1727.334	31.586	31.789		
	260	270	63.5	63.5	63.960	0.00900	0.347	0.000	0.110	0.016	0.000	1707.468	1708.451	1728.968	1728.853	21.400	20.402		
	260	261	22.269	101.6	101.6	0.00900	2.372	2.372	0.293	0.021	0.000	1707.468	1707.241	1728.868	1728.848	21.400	21.607		
	261	262	80.610	101.6	101.6	0.00900	2.315	2.315	0.286	0.071	0.000	1707.241	1706.584	1728.848	1728.776	21.607	22.193		
	262	268	63.5	63.5	91.567	0.00900	0.411	0.411	0.130	0.031	0.000	1706.584	1708.245	1728.776	1728.745	22.193	20.500		
	262	263	105.848	76.2	76.2	0.00900	1.695	1.695	0.372	0.233	0.000	1706.584	1705.828	1728.776	1728.544	22.193	22.715		
	263	267	202.119	63.5	63.5	0.00900	0.524	0.524	0.166	0.112	0.000	1705.828	1701.090	1728.544	1728.431	22.715	27.342		
	263	264	122.126	76.2	76.2	0.00900	0.896	0.896	0.196	0.075	0.000	1705.828	1702.448	1728.544	1728.469	22.715	26.021		
	264	265	97.374	63.5	63.5	0.00900	0.579	0.579	0.183	0.066	0.000	1702.448	1701.411	1728.469	1728.403	26.021	26.962		
	265	266	125.934	63.5	63.5	0.00900	0.327	0.327	0.103	0.027	0.000	1701.411	1700.166	1728.403	1728.375	26.962	28.210		
	268	269	66.824	63.5	63.5	0.00900	0.173	0.173	0.055	0.004	0.000	1708.245	1702.199	1728.745	1728.741	20.500	26.542		
	270	271	69.897	63.5	63.5	0.00900	0.181	0.181	0.057	0.005	0.000	1708.451	1702.321	1728.853	1728.848	20.402	26.527		
	272	273	120.488	101.6	101.6	0.00900	1.949	1.949	0.240	0.076	0.000	1710.088	1708.810	1729.662	1729.586	19.574	20.776		
	273	282	73.806	63.5	63.5	0.00900	0.191	0.191	0.060	0.005	0.000	1708.810	1708.707	1729.586	1729.581	20.776	20.873		
	273	274	105.105	101.6	101.6	0.00900	1.445	1.445	0.178	0.036	0.000	1708.810	1707.760	1729.586	1729.550	20.776	21.790		
	274	275	10.660	50.8	50.8	0.00900	0.028	0.028	0.014	0.000	0.000	1707.760	1707.696	1729.550	1729.550	21.790	21.854		
	274	276	25.244	101.6	101.6	0.00900	1.144	1.144	0.141	0.005	0.000	1707.760	1706.703	1729.550	1729.545	21.790	22.842		
	276	277	20.269	101.6	101.6	0.00900	1.079	1.079	0.133	0.004	0.000	1706.703	1705.863	1729.545	1729.541	22.842	23.678		
	277	281	80.057	101.6	101.6	0.00900	0.208	0.208	0.026	0.012	0.000	1705.863	1705.748	1729.541	1729.540	23.678	23.793		
	277	281	109.312	101.6	101.6	0.00900	0.819	0.819	0.101	0.012	0.000	1705.863	1703.529	1729.541	1729.529	23.678	26.000		
	278	280	77.832	101.6	101.6	0.00900	0.202	0.202	0.025	0.001	0.000	1703.529	1705.359	1729.529	1729.528	26.000	24.169		
	278	279	128.470	101.6	101.6	0.00900	0.333	0.333	0.041	0.002	0.000	1703.529	1702.052	1729.529	1729.526	26.000	27.474		
	285	286	31.905	50.8	50.8	0.00900	0.083	0.083	0.041	0.001	0.000	1718.000	1721.000	1752.955	1752.953	34.955	31.953		
	287	288	47.500	101.6	101.6	0.00900	7.449	7.449	0.919	0.435	0.000	1724.921	1724.267	1752.774	1752.339	27.853	28.071		
	288	289	52.538	101.6	101.6	0.00900	7.326	7.326	0.904	0.465	0.000	1723.780	1752.339	1751.874	1751.874	28.093	28.093		
	289	290	83.346	101.6	101.6	0.00900	7.190	7.190	0.897	0.711	0.000	1724.267	1723.080	1751.874	1751.162	28.093	28.162		
	290	291	45.296	101.6	101.6	0.00900	6.974	6.974	0.860	0.364	0.000	1723.000	1722.606	1751.162	1750.799	28.162	28.193		
	291	292	53.043	101.6	101.6	0.00900	6.856	6.856	0.846	0.412	0.000	1722.606	1722.168	1750.799	1750.387	28.193	28.210		
	292	293	79.771	101.6	101.6	0.00900	6.719	6.719	0.829	0.594	0.000	1722.168	1722.691	1750.387	1748.793	28.219	27.102		
	293	294	81.196	101.6	101.6	0.00900	6.512	6.512	0.803	0.568	0.000	1722.691	1722.066	1748.793	1749.225	27.102	27.159		
	294	295	34.084	101.6	101.6	0.00900	6.301	6.301	0.777	0.223	0.000	1722.066	1721.673	1749.225	1749.001	27.159	27.328		
	295	296	57.053	101.6	101.6	0.00900	6.213	6.213	0.766	0.363	0.000	1721.673	1721.363	1749.001	1748.638	27.328	27.275		
	296	297	48.640	101.6	101.6	0.00900	6.065	6.065	0.748	0.295	0.000	1721.363	1720.527	1748.638	1748.343	27.275	27.816		
	297	298	29.432	101.6	101.6	0.00900	5.939	5.939	0.732	0.171	0.000	1720.527	1720.131	1748.343	1748.171	27.816	28.040		
	298	299	27.720	101.6	101.6	0.00900	5.862	5.862	0.723	0.157	0.000	1720.131	1719.694	1748.171	1748.014	28.040	28.321		
	298	300	28.109	101.6	101.6	0.00900	5.790	5.790	0.714	0.156	0.000	1719.694	1719.288	1748.014	1747.859	28.321	28.571		
	300	301	59.374	101.6	101.6	0.00900	5.717	5.717	0.705	0.320	0.000	1719.288	1718.000	1747.859	1747.538	28.571	29.538		
	301	302	83.910	101.6	101.6	0.00900	5.563	5.563	0.686	0.429	0.000	1718.000	1716.107	1747.538	1747.110	29.538	31.003		
	302	303	66.575	101.6	101.6	0.00900	5.346	5.346	0.659	0.314	0.000	1716.107	1714.942	1747.110	1746.796	31.003	31.854		
	303	304	31.749	101.6	101.6	0.00900	2.458	2.458	0.303	0.032	0.000	1714.942	1714.181	1746.796	1746.259	31.854	32.584		
	303	323	95.095	76.2	76.2	0.00900	2.715	2.715	0.595	0.537	0.000	1714.942	1714.262	1746.796	1746.631	33.032	36.021		
	304	305	23.057	101.6	101.6	0.00900	2.376	2.376	0.293	0.021	0.000	1714.181	1713.711	1746.764	1746.743	32.584	33.032		
	305	306	125.932	101.6	101.6	0.00900	2.316	2.316	0.286	0.111	0.000	1713.711	1710.610	1746.743	1746.605	36.021	37.640		
	306	307	80.888	101.6	101.6	0.00900	2.175	1.775	0.219	0.042	0.000	1710.610	1708.829	1746.631	1746.589	37.640	38.076		
	307	321	76.562	50.8	50.8	0.00900	0.199	0.199	0.098	0.020	0.000	1708.829	1709.481	1746.589	1746.569	37.600	37.088		
	307	308	56.434	101.6	101.6	0.00900	1.366	1.366	0.169	0.017	0.000	1708.829	1707.810	1746.589	1746.572	37.760	38.762		
	308	309	12.227	76.2	76.2	0.00900	1.040	1.040	0.228	0.010	0.000	1707.810	1707.486	1746.572	1746.562	38.762	39.076		
	308	320	68.237	50.8	50.8	0.00900	0.180	0.180	0.089	0.015	0.000	1707.810	1708.744	1746.572	1746.557	38.762	37.813		
	309	310	13.452	76.2	76.2	0.00900	1.009	1.009	0.221	0.010	0.000	1707.486	1707.178	1746.562	1746.551	39.076	39.373		
	310	311	39.116	76.2	76.2	0.00900	0.974	0.974	0.214	0.028	0.000	1707.178	1706.553	1746.551	1746.523	39.373	39.970		
	311	312	20.634	76.2	76.2	0.00900	0.507	0.507	0.111	0.004	0.000	1706.553	1706.000	1746.523	1746.519	39.970	40.519		
	311	317	50.698	50.8	50.8	0.00900	0.365	0.365	0.180	0.045	0.000	1706.553	1704.778	1746.523	1746.478	40.519	41.700		

TABLA DE CALCULO DE REDES DE DISTRIBUCION DE AGUA POTABLE METODO HARDY-CROSS/MANNING																				
PROYECTO: RED DE DISTRIBUCION DE AGUA POTABLE DE SAN FRANCISCO TELIXTLAHUACA PROYECTISTA: ING. VICTOR MENDOZA MARIN																				
No. de tramos: 351 No. de nodos: 352																				
DESCRIPCION			TRAMO		LONGITUD (m)	DIAMETRO INTERIOR(mm)	DIAMETRO EFFECTIVO(mm)	COEF. RUGOSIDAD	GASTO		VELOCIDAD (m/s)	PERDIDA DE CARGA(m)		COTA DE T.N.(m)		COTA PIEZOMETRICA(m)		CARGA DISPONIBLE(m)		OBSERVACIONES
De	a		INICIAL(lps)	FINAL(lps)					TUBERIA	ADICIONAL		INICIAL	FINAL	INICIAL	FINAL					
312	313		45.592	76.2	76.2	0.00900	0.453	0.453	0.007	0.099	0.003	0.000	1704.851	1704.851	1746.519	1746.511	40.519	41.661		
313	314		36.135	76.2	76.2	0.00900	0.335	0.335	0.073	0.035	0.073	0.003	0.000	1704.851	1703.875	1746.511	1746.508	41.881	42.633	
314	315		19.571	76.2	76.2	0.00900	0.241	0.241	0.053	0.024	0.053	0.001	0.000	1703.875	1700.600	1746.508	1746.508	42.633	43.211	
315	316		73.449	50.8	50.8	0.00900	0.191	0.191	0.094	0.115	0.094	0.018	0.000	1703.297	1700.600	1746.508	1746.490	43.211	45.890	
316	317		44.816	50.8	50.8	0.00900	0.234	0.234	0.115	0.016	0.115	0.016	0.000	1704.778	1702.875	1746.478	1746.461	41.700	43.586	
317	318		45.418	50.8	50.8	0.00900	0.118	0.118	0.058	0.088	0.058	0.004	0.000	1702.875	1700.646	1746.461	1746.457	43.586	45.812	
323	337		38.363	50.8	50.8	0.00900	0.398	0.398	0.197	0.041	0.197	0.041	0.000	1714.262	1713.922	1746.259	1746.219	31.997	32.297	
323	324		168.535	76.2	76.2	0.00900	2.070	2.070	0.454	0.553	0.454	0.000	0.000	1714.262	1711.000	1746.259	1745.706	31.997	34.706	
324	335		57.952	50.8	50.8	0.00900	0.357	0.357	0.176	0.357	0.176	0.009	0.000	1711.000	1711.078	1745.706	1745.657	34.706	34.579	
324	325		41.184	76.2	76.2	0.00900	1.276	1.276	0.280	0.051	0.280	0.051	0.000	1710.100	1710.100	1745.706	1745.655	34.706	35.555	
325	334		63.069	50.8	50.8	0.00900	0.164	0.164	0.081	0.164	0.081	0.011	0.000	1710.100	1709.659	1745.655	1745.644	35.555	35.985	
325	326		40.368	76.2	76.2	0.00900	1.005	1.005	0.220	0.031	0.220	0.031	0.000	1710.100	1709.450	1745.655	1745.624	35.555	36.174	
326	327		79.793	76.2	76.2	0.00900	0.513	0.513	0.112	0.016	0.112	0.016	0.000	1709.450	1708.528	1745.624	1745.608	36.174	37.080	
326	331		113.366	50.8	50.8	0.00900	0.388	0.388	0.191	0.113	0.191	0.113	0.000	1709.450	1701.720	1745.624	1745.510	36.174	43.790	
327	328		55.279	50.8	50.8	0.00900	0.306	0.306	0.151	0.034	0.151	0.034	0.000	1708.528	1707.652	1745.608	1745.573	37.080	37.921	
328	329		37.952	50.8	50.8	0.00900	0.162	0.162	0.080	0.162	0.080	0.007	0.000	1707.652	1706.000	1745.573	1745.567	37.921	39.567	
329	330		24.671	50.8	50.8	0.00900	0.064	0.064	0.032	0.001	0.064	0.032	0.001	1706.000	1704.435	1745.567	1745.566	39.567	41.132	
331	332		18.580	50.8	50.8	0.00900	0.094	0.094	0.046	0.094	0.046	0.001	0.000	1701.720	1701.528	1745.510	1745.509	43.790	43.982	
332	333		17.519	50.8	50.8	0.00900	0.045	0.045	0.022	0.000	0.022	0.000	0.000	1701.528	1701.488	1745.509	1745.509	44.097	44.022	
335	336		79.745	50.8	50.8	0.00900	0.207	0.207	0.102	0.023	0.207	0.102	0.000	1711.078	1711.537	1745.657	1745.634	34.579	44.097	
337	338		20.776	50.8	50.8	0.00900	0.299	0.299	0.147	0.012	0.299	0.147	0.012	1713.922	1711.731	1746.219	1746.206	32.297	34.475	
338	339		32.462	50.8	50.8	0.00900	0.245	0.245	0.121	0.013	0.245	0.121	0.013	1708.814	1708.814	1746.206	1746.193	34.475	37.379	
339	340		62.012	50.8	50.8	0.00900	0.161	0.161	0.079	0.161	0.079	0.011	0.000	1708.814	1704.924	1746.193	1746.183	37.379	41.259	
341	342		66.268	50.8	50.8	0.00900	0.294	0.294	0.145	0.038	0.294	0.145	0.038	1724.872	1722.000	1754.300	1754.262	29.428	32.262	
342	343		47.017	50.8	50.8	0.00900	0.122	0.122	0.060	0.005	0.122	0.060	0.005	1722.000	1721.202	1754.262	1754.258	32.262	33.056	
344	345		14.775	63.5	63.5	0.00900	0.561	0.561	0.177	0.009	0.561	0.177	0.009	1749.000	1750.000	1759.889	1759.889	10.898	9.889	
345	346		15.842	63.5	63.5	0.00900	0.523	0.523	0.165	0.009	0.523	0.165	0.009	1750.000	1750.917	1759.889	1759.880	8.989	8.963	
346	347		28.523	50.8	50.8	0.00900	0.482	0.482	0.238	0.044	0.482	0.238	0.044	1750.917	1751.142	1759.880	1759.836	8.963	8.694	
347	348		17.650	50.8	50.8	0.00900	0.408	0.408	0.201	0.020	0.408	0.201	0.020	1751.142	1751.405	1759.836	1759.816	8.694	8.412	
348	349		17.911	50.8	50.8	0.00900	0.362	0.362	0.179	0.016	0.362	0.179	0.016	1750.628	1750.628	1759.816	1759.801	8.412	9.173	
349	350		63.233	50.8	50.8	0.00900	0.316	0.316	0.156	0.042	0.316	0.156	0.042	1750.628	1750.776	1759.801	1759.759	9.173	9.863	
350	351		17.269	50.8	50.8	0.00900	0.152	0.152	0.075	0.003	0.152	0.075	0.003	1750.776	1748.713	1759.759	1759.756	10.043	10.443	
351	352		41.252	50.8	50.8	0.00900	0.107	0.107	0.053	0.003	0.107	0.053	0.003	1748.713	1748.988	1759.756	1759.753	10.043	10.765	