Fire Flow information

Project: Clarity Pointe, City of Coconut Creek

April 27, 2016

Prepared by: Jeffrey T. Schnars, P.E.

Required Fire Flow per NFPA 18.4

Building Area = 60,972 sf (provided by architect)

Building Type = II (111) (provided by architect)

Per Table 18.4.5.1.2, required fire flow is 3500 gpm

Per 18.4.5.2.1, required fire flow shall be reduced by 75% when the building is protected throughout by an approved automatic sprinkler system. The resulting fire flow shall not be less than 1000 gpm.

3500 x 0.25 = 875 gpm. Therefore, the required fire flow is 1000 gpm.

Available Fire Flow

The City of Coconut Creek performed a fire hydrant water flow test which yielded an available fire flow of 2260 gpm.

See attached supporting documents.

The available fire flow exceeds the required fire flow.

18.2.3.4.3.2 Turns in fire department access roads shall maintain the minimum road width.

18.2.3.4.4 Dead Ends. Dead-end fire department access roads in excess of 150 ft (46 m) in length shall be provided with approved provisions for the fire apparatus to turn around.

18.2.3.4.5 Bridges.

18.2.3.4.5.1 When a bridge is required to be used as part of a fire department access road, it shall be constructed and maintained in accordance with nationally recognized standards.

18.2.3.4.5.2 The bridge shall be designed for a live load sufficient to carry the imposed loads of fire apparatus.

18.2.3.4.5.3 Vehicle load limits shall be posted at both entrances to bridges where required by the AHJ.

18.2.3.4.6 Grade.

18.2.3.4.6.1 The gradient for a fire department access road shall not exceed the maximum approved.

18.2.3.4.6.2* The angle of approach and departure for any means of fire department access road shall not exceed 1 ft drop in 20 ft (0.3 m drop in 6 m) or the design limitations of the fire apparatus of the fire department, and shall be subject to approval by the AHJ.

18.2.3.4.6.3 Fire department access roads connecting to roadways shall be provided with curb cuts extending at least 2 ft (0.61 m) beyond each edge of the fire lane.

18.2.3.4.7 Traffic Calming Devices. The design and use of traffic calming devices shall be approved by the AHJ.

18.2.3.5 Marking of Fire Apparatus Access Road.

18.2.3.5.1 Where required by the AHJ, approved signs, approved roadway surface markings, or other approved notices shall be provided and maintained to identify fire department access roads or to prohibit the obstruction thereof or both.

18.2.3.5.2 A marked fire apparatus access road shall also be known as a fire lane.

18.2.4* Obstruction and Control of Fire Department Access Road.

18.2.4.1 General.

18.2.4.1.1 The required width of a fire department access road shall not be obstructed in any manner, including by the parking of vehicles.

18.2.4.1.2 Minimum required widths and clearances established under 18.2.3.4 shall be maintained at all times.

18.2.4.1.3* Facilities and structures shall be maintained in a manner that does not impair or impede accessibility for fire department operations.

18.2.4.1.4 Entrances to fire department access roads that have been closed with gates and barriers in accordance with 18.2.4.2.1 shall not be obstructed by parked vehicles.

18.2.4.2 Closure of Accessways.

18.2.4.2.1 The AHJ shall be authorized to require the installation and maintenance of gates or other approved barricades across roads, trails, or other accessways not including public streets, alleys, or highways.

18.2.4.2.2 Where required, gates and barricades shall be secured in an approved manner.

18.2.4.2.3 Roads, trails, and other accessways that have been closed and obstructed in the manner prescribed by 18.2.4.2.1 shall not be trespassed upon or used unless authorized by the owner and the AHJ.

18.2.4.2.4 Public officers acting within their scope of duty shall be permitted to access restricted property identified in 18.2.4.2.1.

18.2.4.2.5 Locks, gates, doors, barricades, chains, enclosures, signs, tags, or seals that have been installed by the fire department or by its order or under its control shall not be removed, unlocked, destroyed, tampered with, or otherwise vandalized in any manner.

18.2.4.2.6 When authorized by the AHJ, public officers acting within their scope of duty shall be permitted to obtain access through secured means identified in 18.2.4.2.1.

18.3 Water Supplies.

18.3.1* An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into the jurisdiction. The approved water supply shall be in accordance with Section 18.4.

18.3.1.1* Where no adequate or reliable water distribution system exists, approved reservoirs, pressure tanks, elevated tanks, fire department tanker shuttles, or other approved systems capable of providing the required fire flow shall be permitted.

18.4 Fire Flow Requirements for Buildings.

18.4.1* Scope.

18.4.1.1* The procedure determining fire flow requirements for buildings hereafter constructed or moved into the jurisdiction shall be in accordance with Section 18.4.

18.4.1.2 Section 18.4 shall not apply to structures other than buildings.

18.4.2 Definitions. See definitions 3.3.14.5, Fire Flow Area, and 3.3.120, Fire Flow.

18.4.3 Modifications.

18.4.3.1 Decreases. Fire flow requirements shall be permitted to be decreased by the AHJ for isolated buildings or a group of buildings in rural areas or suburban areas where the development of full fire flow requirements is impractical as determined by the AHJ.

18.4.3.1.1 The AHJ shall be authorized to establish conditions on fire flow reductions approved in accordance with 18.4.3.1 including, but not limited to, fire sprinkler protection, type of construction of the building, occupancy, and setbacks.

18.4.3.2 Increases. Fire flow shall be permitted to be increased by the AHJ where conditions indicate an unusual susceptibility to group fires or conflagrations. An upward modification shall not be more than twice that required for the building under consideration.

18.4.4 Fire Flow Area.

18.4.4.1 General. The fire flow area shall be the total floor area of all floor levels of a building except as modified in 18.4.4.1.1.

18.4.4.1.1 Type I (443), Type I (332), and Type II (222) Construction. The fire flow area of a building constructed of Type I (443), Type I (332), and Type II (222) construction shall be the area of the three largest successive floors.

18.4.5 Fire Flow Requirements for Buildings.

18.4.5.1 One- and Two-Family Dwellings.

18.4.5.1.1 The minimum fire flow and flow duration requirements for one- and two-family dwellings having a fire flow area that does not exceed 5000 ft^2 (334.5 m^2) shall be 1000 gpm (3785 L/min) for 1 hour.

18.4.5.1.1.1 A reduction in required fire flow of 50 percent shall be permitted when the building is provided with an approved automatic sprinkler system.

18.4.5.1.1.2 A reduction in the required fire flow of 25 percent shall be permitted when the building is separated from other buildings by a minimum of 30 ft (9.1 m).

18.4.5.1.1.3 The reduction in 18.4.5.1.1.1 and 18.4.5.1.1.2 shall not reduce the required fire flow to less than 500 gpm (1900 L/min).

18.4.5.1.2 Fire flow and flow duration for dwellings having a fire flow area in excess of 5000 ft^2 (334.5 m^2) shall not be less than that specified in Table 18.4.5.1.2.

18.4.5.1.2.1 Required fire flow shall be reduced by 50 percent when the building is provided with an approved automatic sprinkler system.

18.4.5.2 Buildings Other Than One- and Two-Family Dwellings. The minimum fire flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in Table 18.4.5.1.2.

18.4.5.2.1 Required fire flow shall be reduced by 75 percent when the building is protected throughout by an approved automatic sprinkler system. The resulting fire flow shall not be less than 1000 gpm (3785 L/min).

18.4.5.2.2 Required fire flow shall be reduced by 75 percent when the building is protected throughout by an approved automatic sprinkler system, which utilizes quick response sprinklers throughout. The resulting fire flow shall not be less than 600 gpm (2270 L/min).

18.4.5.3* For a building with an approved fire sprinkler system, the fire flow demand and the fire sprinkler system demand shall not be required to be added together. The water supply shall be capable of delivering the larger of the individual demands.

18.5 Fire Hydrants.

18.5.1* The number and type of fire hydrants and connections to other approved water supplies shall be capable of delivering the required fire flow and shall be provided at approved locations.

18.5.2 Fire hydrants and connections to other approved water supplies shall be accessible to the fire department.

18.5.3 Clear Space Around Hydrants. A 36 in. (914 mm) clear space shall be maintained around the circumference of fire hydrants except as otherwise required or approved.

18.5.4 Private water supply systems shall be tested and maintained in accordance with NFPA 25.

18.5.5 Where required by the AHJ, fire hydrants subject to vehicular damage shall be protected unless located within a public right of way.

18.5.6 Where water supplies or fire hydrants are out of service for maintenance or repairs, a visible indicator acceptable to the AHJ shall be used to indicate that the hydrant is out of service.

18.5.7 Marking of Hydrants.

18.5.7.1 Fire hydrants shall be marked with an approved reflector affixed to the roadway surface where required by the AHJ.

18.5.7.2 Fire hydrants shall be marked with an approved flag or other device affixed to or proximate to the fire hydrant where required by the AHJ.

18.5.7.3* Where required by the AHJ, fire hydrants shall be color coded or otherwise marked with an approved system indicating the available flow capacity.

Chapter 19 Combustible Waste and Refuse

19.1 General.

19.1.1 Permits. Permits, where required, shall comply with Section 1.12.

19.1.2 Persons owning or having control of any property shall not allow any combustible waste material to accumulate in any area or in any manner that creates a fire hazard to life or property.

19.1.3 Combustible waste or refuse shall be properly stored or disposed of to prevent unsafe conditions.

19.1.4 Fire extinguishing capabilities approved by the AHJ including, but not limited to, fire extinguishers, water supply and hose, and earth-moving equipment shall be provided at waste disposal sites.

19.1.5 Burning debris shall not be dumped at a waste disposal site except at a remote location on the site where fire extinguishment can be accomplished before compacting, covering, or other disposal activity is carried out. *(See Section 10.11 for additional guidance.)*

19.1.6 Electrical Wiring.

19.1.6.1 Electrical wiring and equipment in any combustible fiber storage room or building shall be installed in accordance with the requirements of Section 11.1 and NFPA 70, *National Electrical Code*, for Class III hazardous locations.

19.1.6.2 The AHJ shall be responsible for designating the areas that require hazardous location electrical classifications and shall classify the areas in accordance with the classification system set forth in NFPA 70.

19.1.7 No Smoking.

19.1.7.1 No smoking or open flame shall be permitted in any area where combustible fibers are handled or stored or within 50 ft (15 m) of any uncovered pile of such fibers.

19.1.7.2 "No Smoking" signs shall be posted.

19.1.8 Vehicles or Conveyances Used to Transport Combustible Waste or Refuse.

19.1.8.1 Vehicles or conveyances used to transport combustible waste or refuse over public thoroughfares shall have all

60,972

Table 18.4.5.1.2 Minimum Required Fire Flow and Flow Duration for Buildings

Fire Flow Area ft² (× 0.0929 for m²)					Fire Flow gpm† (× 3.785 for L/min)	Flow Duration (hours)
I(443), I(332), II(222)*	II(111), III(211)*	IV(2HH), V(111)*	II(000), III(200)*	V(000)*		
0–22,700	0–12,700	0–8200	0–5900	0–3600	1500	2
22,701–30,200	12,701–17,000	8201–10,900	5901–7900	3601–4800	1750	
30,201–38,700	17,001–21,800	10,901–12,900	7901–9800	4801–6200	2000	
38,701–48,300	21,801–24,200	12,901–17,400	9801–12,600	6201–7700	2250	
48,301–59,000	24,201–33,200	17,401–21,300	12,601–15,400	7701–9400	2500	
59,001–70,900	33,201–39,700	21,301–25,500	15,401–18,400	9401–11,300	2750	
70,901–83,700	39,701–47,100	25,501–30,100	18,401–21,800	11,301–13,400	3000	3
83,701–97,700	47,101–54,900	30,101–35,200	21,801–25,900	13,401–15,600	3250	
97,701–112,700	54,901–63,400	35,201–40,600	25,901–29,300	15,601–18,000	3500	
112,701–128,700	63,401–72,400	40,601–46,400	29,301–33,500	18,001–20,600	3750	
128,701–145,900	72,401–82,100	46,401–52,500	33,501–37,900	20,601–23,300	4000	
145,901–164,200	82,101–92,400	52,501–59,100	37,901–42,700	23,301–26,300	4250	
164,201–183,400	92,401–103,100	59,101–66,000	42,701–47,700	26,301–29,300	4500	
183,401–203,700	103,101–114,600	66,001–73,300	47,701–53,000	29,301–32,600	4750	
203,701–225,200	114,601–126,700	73,301–81,100	53,001–58,600	32,601–36,000	5000	
225,201–247,700	126,701–139,400	81,101–89,200	58,601–65,400	36,001–39,600	5250	
247,701–271,200	139,401–152,600	89,201–97,700	65,401–70,600	39,601–43,400	5500	
271,201–295,900	152,601–166,500	97,701–106,500	70,601–77,000	43,401–47,400	5750	
Greater than 295,900	Greater than 166,500	106,501–115,800	77,001–83,700	47,401–51,500	6000	4
		115,801–125,500	83,701–90,600	51,501–55,700	6250	
		125,501–135,500	90,601–97,900	55,701–60,200	6500	
		135,501–145,800	97,901–106,800	60,201–64,800	6750	
		145,801–156,700	106,801–113,200	64,801–69,600	7000	
		156,701–167,900	113,201–121,300	69,601–74,600	7250	
		167,901–179,400	121,301–129,600	74,601–79,800	7500	
		179,401–191,400	129,601–138,300	79,801–85,100	7750	
		Greater than 191,400	Greater than 138,300	Greater than 85,100	8000	

*Types of construction are based on NFPA 220.
†Measured at 20 psi (139.9 kPa).

$\times 0.25^{3} = 875$
$\Rightarrow$ 1000 gpm
REQUIRED.

cargo space covered and maintained tight enough to ensure against ignition from external fire sources and the scattering of burning and combustible debris that can come in contact with ignition sources.

19.1.8.2 Transporting burning waste or refuse shall be prohibited.

19.1.8.3 Trucks or automobiles, other than mechanical handling equipment and approved industrial trucks as listed in NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations*, shall not enter any fiber storage room or building but shall be permitted to be used at loading platforms.

19.2 Combustible Waste and Refuse.

19.2.1 Rubbish Containers.

19.2.1.1 General. Rubbish containers kept outside of rooms or vaults shall not exceed 40.5 ft³ (1.15 m³) capacity.

19.2.1.1.1 Containers exceeding a capacity of 5⅓ ft³ [40 gal (0.15 m³)] shall be provided with lids.

COCONUT CREEK
BUTTERFLY CAPITAL OF THE WORLD®

WATER FLOW TEST FOR FIRE DEMAND

DATE : 12/11/2014 **TIME : N/A**

CONDUCTED BY : R&M Service Solutions

RELATED PROJECT : Clarity Pointe

LOCATION(S) : 5461 Johnson Road

Pitot Gauge Method, Q_t

Residual Hydrant Static Pressure, P_s	=	66 psi
Residual Hydrant Dynamic Pressure, P_t	=	52 psi
Flowing Hydrant Pressure, p	=	50 psi
Diameter of Outlet, D	=	2.5 $inches$
Coefficient of Discharge, C	=	0.9

Hydrant Flow, Q_t $= 29.8\, D^2\, C\, \sqrt{p}$

$=$ 1185.29 gpm

Available Fire Demand, Q_{fa} $= Q_t \left(\frac{P_s - P_f}{P_s - P_t}\right)^{0.54}$, $with\ P_f = 20\ psi$

$=$ 2260.0 gpm

Fire Demand (per ISO Calculation), Q_{fd} $=$ _____ gpm

Minimum required Fire Demand = **1500 psi** for Commerical and **750 psi** for Residential

If Fire Demand, Q_{fd} , is greater than the Available, Q_{fa} , then alternative site water distribution designs should be considered.

X - Y Trajectory Method, Q_T

Check Q_t from Pitot gauge by evaluating flow calculated from the X - Y trajectory of the flowing 2.5 inch hose connection.

Velocity, V $= \frac{X}{\sqrt{2Y/g}}$

$=$ _____ ps

N/A

Where, X = _____ $ft.$

Y = _____ $ft.$

g = 32.2 ft/sec^2

Q_T $= VA$

$=$ _____ cfs

Where, A = 0.0341 ft^2

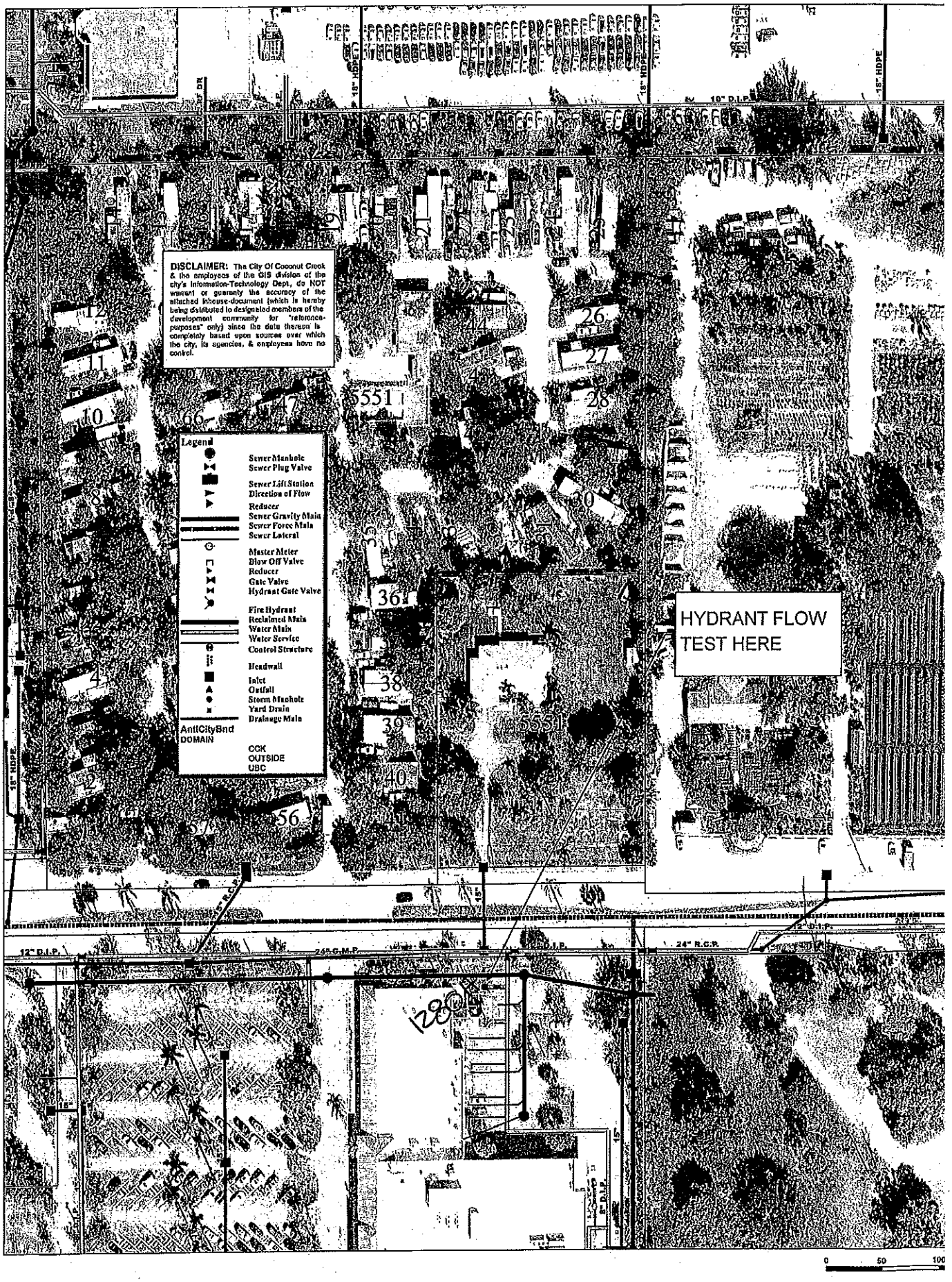
Q_t and Q_T should compare fairly close

Remarks : _____

Eileen Cohen
Engineer

4/7/16
Date

All tests and calculations conducted in accordance with American Water Works Association (AWWA) Manual of Water Supply Practices M17 (Installation, Field Testing, and Maintenance of Fire Hydrants.)


DISCLAIMER: The City Of Coconut Creek & the employees of the GIS division of the city's Information-Technology Dept, do NOT warrant or guaranty the accuracy of the attached inhouse-document (which is hereby being distributed to designated members of the development community for "reference-purposes" only) since the data thereon is compiled upon sources over which the city, its agencies, & employees have no control.
Legend
Sewer Manhole
Sewer Plug Valve
Sewer Lift Station
Direction of Flow
Reducer
Sewer Gravity Main
Sewer Force Main
Sewer Lateral
Master Meter
Blow Off Valve
Reducer
Gate Valve
Hydrant Gate Valve
Fire Hydrant
Reclaimed Main
Water Main
Water Service
Control Structure
Headwall
Inlet
Outfall
Storm Manhole
Yard Drain
Drainage Main
AntiCityBnd
DOMAIN
CCK
OUTSIDE
UBC
HYDRANT FLOW TEST HERE
18" HDPE
15" HDPE
10" D.I.P.
12" D.I.P.
24" C.M.P.
24" R.C.P.
0
50
100
Map Scale =