

Drainage Reports

Abbreviated Water & Sewer Need Reports

Water Study

Wastewater Study

Stormwater Waiver Application

Preliminary Water & Sewer Basis of Design Report

Storage at Shea

SEC 116th Street & Shea Boulevard

Scottsdale, Arizona

COS

Case No. 50-DR-2017

Plan Check No. : 9-ZN-2017

Prepared for:

George H. Bell

Land Research and Development, Inc.

18061 N. 99th St.

Scottsdale, Arizona 85255

**PRELIMINARY Basis of Design
Report**

- ACCEPTED
 ACCEPTED AS NOTED
 REVISE AND RESUBMIT



Disclaimer: If accepted, the preliminary approval is granted under the condition that a final basis of design report will also be submitted for city review and approval (typically during the DR or PP case). The final report shall incorporate further water or sewer design and analysis requirements as defined in the city design standards and policy manual and address those items noted in the preliminary review comments (both separate and included herein). The final report shall be submitted and approved prior to the plan review submission.

For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY rrahman

DATE 3/19/2018

For submittal to:

City of Scottsdale

Prepared by:

Erie & Associates, Inc.

3120 North 24th Street

Phoenix, Arizona 85016

[Handwritten signature]

15 FEB 18

EXP 9/30/20

EA #2259.01

August 10, 2017

Revised: February 12, 2018

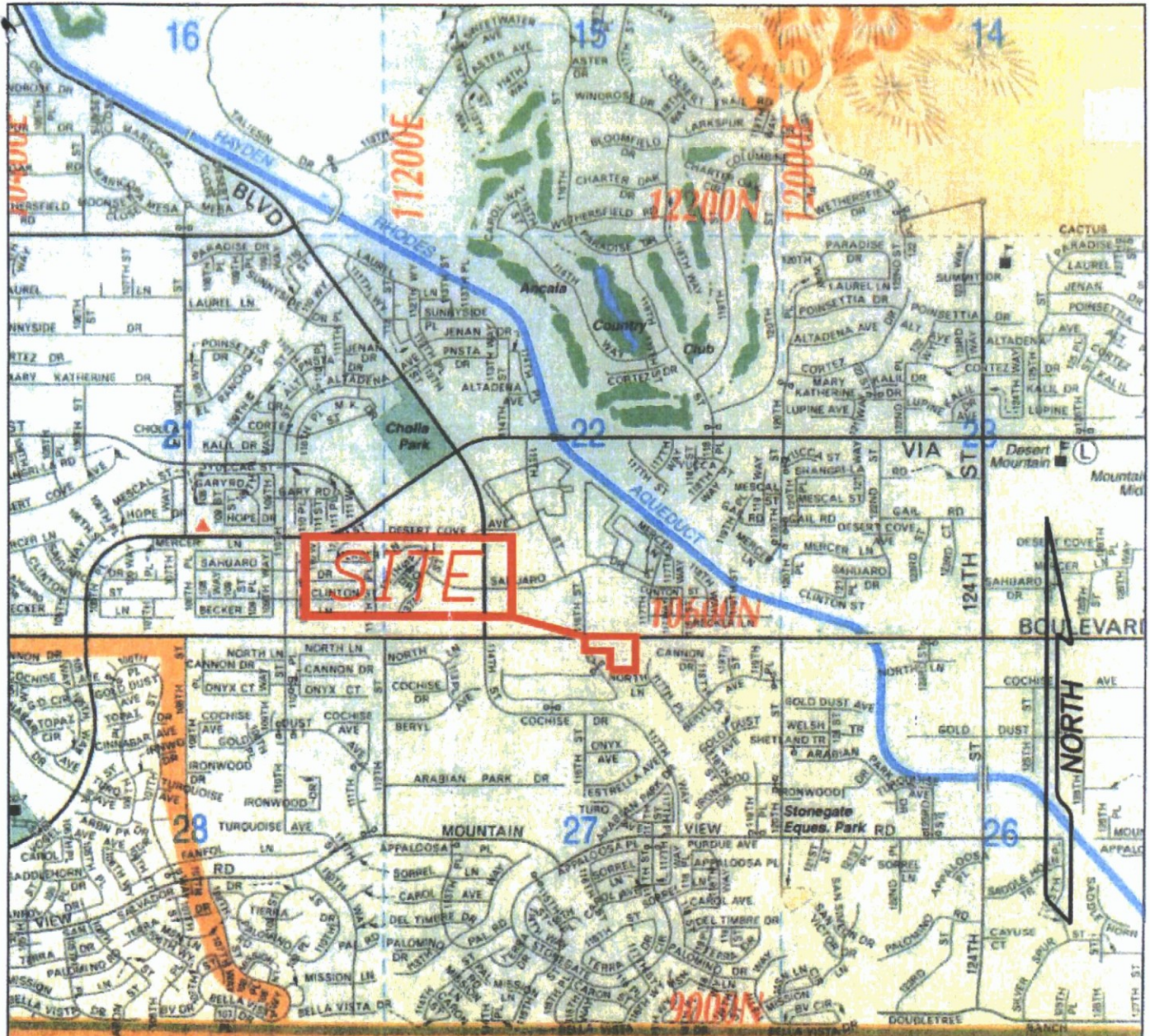
3.0 Location/Description

The proposed 3.8± acre site is located at the southeast corner of 116th Street and Shea Boulevard, and is a portion of the northeast Quarter of Section 27, Township 3 North, Range 5 East of the Gila and Salt River Base and Meridian in Scottsdale, Arizona. The site is bordered along the west side by an office development and along the east side by the Montana Ranch Subdivision. See *Plate 1 – Location Map*.

The proposed building will serve as an internalized community storage facility. The proposed building will be two stories with a basement and the area of each floor is approximately 35,300 SF for a total of 105,864 SF.

The site is located within COS Q.S. 28-56, City of Scottsdale Water Service Area, Pressure Zone 3. There is an existing 12" ACP water main that runs in Shea Boulevard and an 8" DIP water main in 116th Street. The closest fire hydrant is located on the west side of the 116th Street cul-de-sac approximately 325 feet to the west.

There is an existing 15" VCP sewer line in Shea Boulevard and a manhole north of the site. The sewer is accessible with a manhole in Shea Boulevard at a grade below the proposed finish floor.



COMMUNITY

BOUNDARY

33

34

35

PIMA - MARICOPA

INDIAN

JOB NO. 2259.01
 DATE: 10/10/2017
 SCALE: 1"=2000'



ERIE & ASSOCIATES, INC.
 3120 NORTH 24th STREET
 PHOENIX, ARIZONA 85016
 (602) 954-6399

STORAGE AT SHEA
PLATE 1 - LOCATION MAP

4.0 Sanitary Sewer System

The building will be serviced by a 6" building connection that will tap into the existing sewer manhole in Shea Boulevard. The 6" service will be designed at a minimum slope of 1.09%. See *Plate 2 – Water and Sewer Master Plan* for the sewer location.

The sewer demand was calculated using ADEQ unit design flows. The sewer demand for this project is relatively small. The site will have two restrooms, a break room with a sink, and a mop sink. The average daily flow was estimated to be 800 GPD and the peak day flow was estimated to be 3200 GPD (2.2 GPM). The full flow capacity of the proposed 6" sewer was calculated using Manning's equation and found to be 305 GPM. The sanitary sewer calculations are included in *Appendix A*.

5.0 Water Distribution System

A new 12" water line is proposed to connect to the existing 8" stub out in 116th Street and at a second point in the cul-de-sac to create a loop. The building will be served by a 4" fire line and a 1" potable water line. Two fire hydrants are proposed, one north of the driveway, and one in the middle of the parking lot.

Coordinate with Fire Department on location of the fire hydrants. RR-03-19-2019

A water model was produced using EPANET Version 2.0. Two flow tests were completed by EJ Flow Tests, LLC on August 10, 2017 and October 4, 2017 and the results are included in *Appendix A*. Nodes have been placed at the test hydrants and proposed hydrant. Elevations for each node are based on the topography as shown on *Plate 2*.

Model criteria are as follows:

- Average day demand shall be a total of 800 gpd.
- Maximum day demand shall be 2.0 times the average day demand. 1600 gpd = 1.1 gpm
- Peak hour demand shall be 4.0 times the average day demand. 3200 gpd = 2.2 gpm
- Fire flow shall be 6,750 gpm. With a 75% reduction for sprinklers the required fire flow is 1,687.5 gpm. The fire flow is split between the two on-site hydrants.
- Minimum and maximum system pressures under average day, maximum day, and peak hour flows shall be no less than 50 psi and no more than 80 psi.
- The residual pressure for the maximum day plus fire flow shall be 30 psi.
- Maximum head loss for every 1,000 feet shall not exceed 10 feet for the 1,500 gpm fire hydrant criteria.

A 12" looped water line is required to meet the criteria. The required fire flow is split between the two proposed hydrants in the model. The EPANET input/output is included in *Appendix B*. The results are summarized in *Table 1-Residual Pressure Summary*.

Table 1 – Residual Pressure Summary (Max Day + Fire)

EPANET Node I.D.	Flow Test #1		Flow Test #2	
	Residual Pressure (raw data)	Residual Pressure (10% S.F.)	Residual Pressure (raw data)	Residual Pressure (10% S.F.)
NEW-FH	30.39 psi	22.46 psi	29.33 psi	19.67 psi
NEW-FH2	29.68 psi	21.75 psi	28.62 psi	18.96 psi

After modeling the results from Flow Test #1, it was determined that the proposed system would meet the City of Scottsdale's criteria of 30 psi residual using the raw data, but would not meet the criteria using the 10% Safety Factor data. An agreement was reached with City of Scottsdale staff (Rezaur Rahman) that the raw data would be acceptable if a second flow test confirmed the first flow test. The second test was conducted and the results are similar to the first test (see table 1). Based on these results we propose to use the raw data from Flow Test #1 for our modeling.

The system pressure results for Flow Test #1 for average day, maximum day, and peak hour are summarized in *Table 2*.

Table 2 – System Pressure Summary

Flow Test #1		
Average Day Pressure range	Maximum Day Pressure range	Peak Hour Pressure range
68.47 to 75.41 psi	68.47 to 75.41 psi	68.47 to 75.41 psi

All pressures fall within the 50 psi to 80 psi range.

6.0 References

“Design Standards and Policies Manual”, prepared by City of Scottsdale, dated January 2010.

Appendix A – Calculation Worksheets

SEWER DEMAND CALCULATIONS:

UNIT FLOW

- ASSUME 1. 2 PUBLIC RESTROOMS = 200 GPD
2. 2 EMPLOYEES (USE 2 R.R.) = 200 GPD

AVERAGE DAILY FLOW

$$Q = 2(200) + 2(200) = 800 \text{ GPD}$$

PEAK DAY

$$Q = 800 \times 4 = \underline{3200 \text{ GPD}}$$

MAX DAY

$$Q = 800 \times 2 = 1600 \text{ GPD}$$

$$Q_{\text{avg}} = 1.1 \text{ gpm}$$

$$Q = 3200 \frac{\text{gal}}{\text{day}} \times \frac{1 \text{ day}}{24(60) \text{ min}}$$

$$Q = \underline{2.22 \text{ gpm}}$$

CAPACITY OF 6"

- Assume 1. $n = 0.012$
2. $s = 0.0109$

$$Q = 305 \text{ gpm} \checkmark$$

$$Q_{6"} > Q_{\text{PEAK DAY}}$$



Flow Test Summary

Project Name: EJFT 17164
Project Address: 10105 N 116th St, Scottsdale, AZ 85259
Date of Flow Test: 2017-08-10
Time of Flow Test: 7:32 AM
Data Reliable Until: 2018-02-10
Conducted By: Austin Gourley & Eder Cueva (EJ Flow Tests) 602.999.7637
Witnessed By: Larry Frandle (City of Scottsdale) 602.541.4942
City Forces Contacted: City of Scottsdale (602.541.4942)
Permit Number: C53611

Raw Flow Test Data

Static Pressure: 78.0 PSI
Residual Pressure: 40.0 PSI
Flowing GPM: 1,595
GPM @ 20 PSI: 2,004

Data with a 10 % Safety Factor

Static Pressure: 70.2 PSI
Residual Pressure: 32.2 PSI
Flowing GPM: 1,595
GPM @ 20 PSI: 1,854

Hydrant F₁

Pitot Pressure (1): 20 PSI
Coefficient of Discharge (1): 0.9
Hydrant Orifice Diameter (1): 4 inches
Additional Coefficient 0.83 on orifice #1



 Static-Residual Hydrant

 Flow Hydrant

Distance Between F₁ and R
286 ft (measured linearly)

Static-Residual Elevation
1461 ft (above sea level)

Flow Hydrant (F₁) Elevation
1458 ft (above sea level)

Elevation & distance values are approximate



Flow Test Summary

Project Name: EJFT 17205
Project Address: 10105 N 116th St, Scottsdale, AZ 85259
Date of Flow Test: 2017-10-04
Time of Flow Test: 7:45 AM
Data Reliable Until: 2018-04-04
Conducted By: Cesar Reyna & Eder Cueva (EJ Flow Tests) 602.999.7637
Witnessed By: Larry Frandle (City of Scottsdale) 602.541.4942
City Forces Contacted: City of Scottsdale (602.828.0847)
Permit Number: C53948

Raw Flow Test Data

Static Pressure: 80.0 PSI
Residual Pressure: 59.0 PSI
Flowing GPM: 1,094
GPM @ 20 PSI: 1,929

Data with a 10 % Safety Factor


Static Pressure: 72.0 PSI
Residual Pressure: 51.0 PSI
Flowing GPM: 1,094
GPM @ 20 PSI: 1,785

Hydrant F₁

Pitot Pressure (1): 42.5 PSI
Coefficient of Discharge (1): 0.9
Hydrant Orifice Diameter (1): 2.5 inches



 Static-Residual Hydrant

 Flow Hydrant

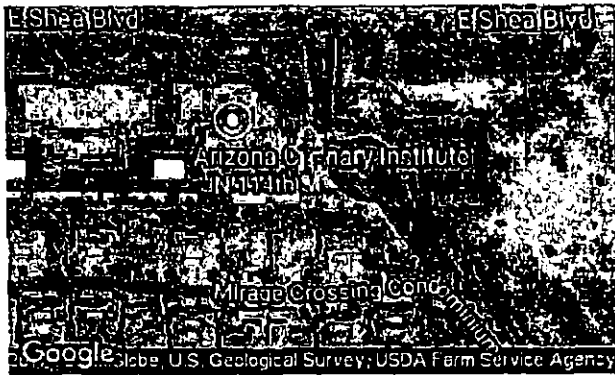
Distance Between F₁ and R
287 ft (measured linearly)

Static-Residual Elevation
1461 ft (above sea level)

Flow Hydrant (F₁) Elevation
1458 ft (above sea level)

Elevation & distance values are approximate

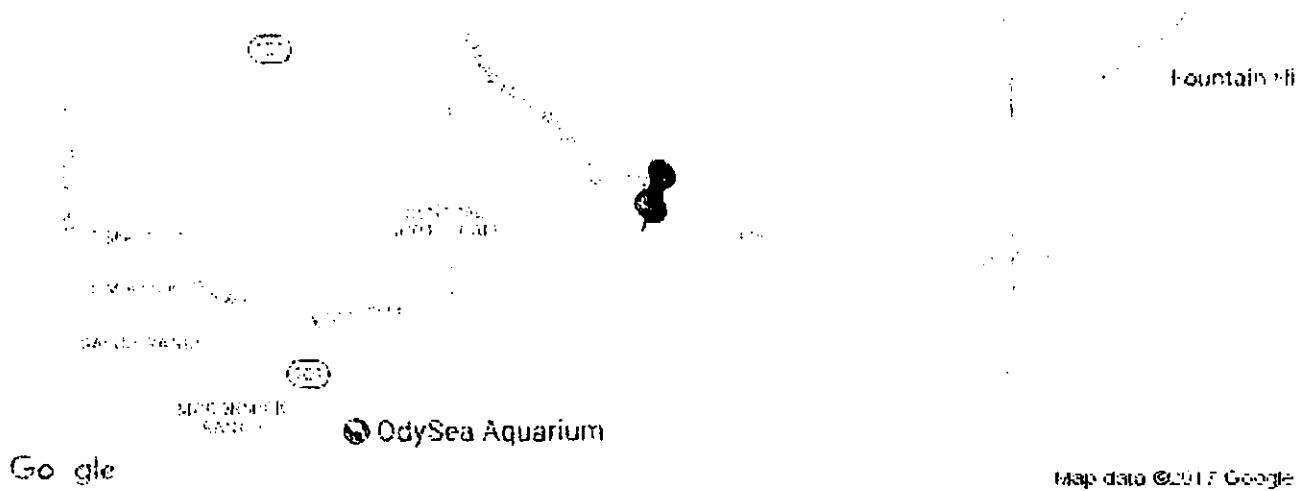
Static-Residual Hydrant



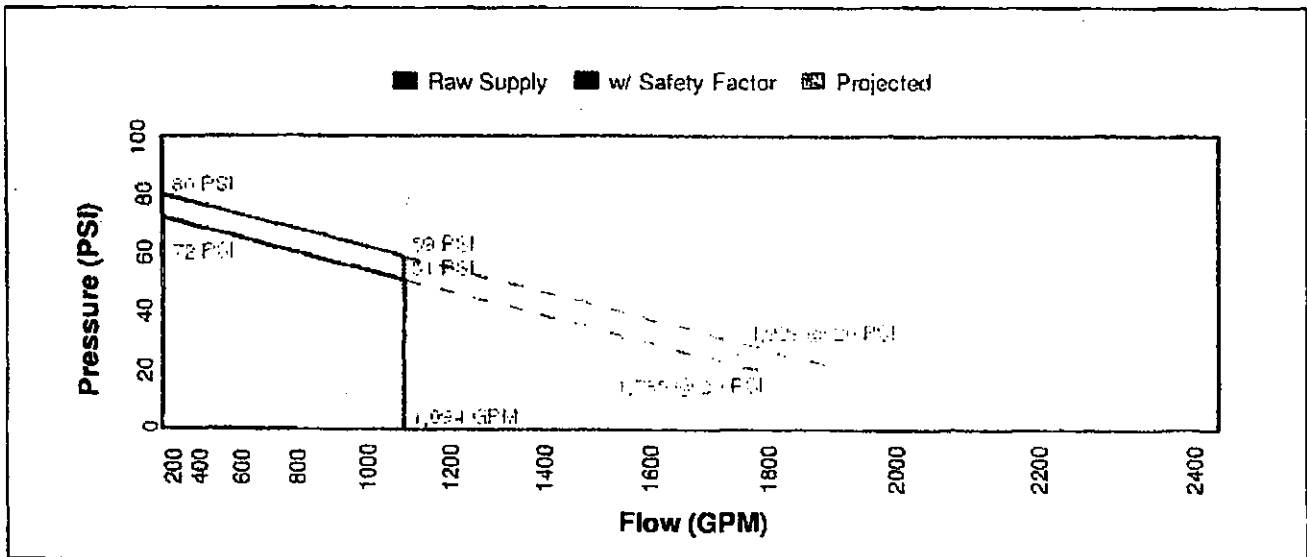
Flow Hydrant (only hydrant F1 shown for clarity)



Approximate Project Site



Water Supply Curve N^{1.85} Graph



6" SEWER
Worksheet for Circular Channel

Project Description	
Project File	untitled.fm2
Worksheet	6" SEWER
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coefficient	0.012
Channel Slope	0.010900 ft/ft
Depth	0.50 ft
Diameter	6.00 in

Results	
Discharge	240 gal(imp)/min
Flow Area	0.20 ft ²
Wetted Perimeter	1.57 ft
Top Width	0.00 ft
Critical Depth	0.40 ft
Percent Full	100.00
Critical Slope	0.011173 ft/ft
Velocity	3.23 ft/s
Velocity Head	0.16 ft
Specific Energy	FULL ft
Froude Number	FULL
Maximum Discharge	0.68 cfs
Full Flow Capacity	0.63 cfs
Full Flow Slope	0.010900 ft/ft

= 305 gpm

TABLE B105.1(2) REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute) ^b	FLOW DURATION (hours)
Type IA and IB ^a	Type IIA and IIIA ^a	Type IV and V-A ^a	Type IIB and IIIB ^a	Type V-B ^a		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-	166,501-	106,501-	77,001-	47,401-	6,000	

Greater	Greater	115,800	83,700	51,500	
-	-	115,801-125,500	83,701-90,600	51,501-55,700	6,250
-	-	125,501-135,500	90,601-97,900	55,701-60,200	6,500
-	-	135,501-145,800	97,901-106,800	60,201-64,800	6,750
-	-	145,801-156,700	106,801-113,200	64,801-69,600	7,000
-	-	156,701-167,900	113,201-121,300	69,601-74,600	7,250
-	-	167,901-179,400	121,301-129,600	74,601-79,800	7,500
-	-	179,401-191,400	129,601-138,300	79,801-85,100	7,750
-	-	191,401- Greater	138,301- Greater	85,101- Greater	8,000

Department of Environmental Quality - Water Pollution Control

12, 2005 (05-3).

Table 1. Unit Design Flows

Wastewater Source	Applicable Unit	Sewage Design Flow per Applicable Unit, Gallons Per Day
Airport	Passenger (average daily number)	4
	Employee	15
Auto Wash	Facility	Per manufacturer, if consistent with this Chapter
Bar/Lounge	Seat	30
Barber Shop	Chair	35
Beauty Parlor	Chair	100
Bowling Alley (snack bar only)	Lane	75
Camp		
Day camp, no cooking facilities	Camping unit	30
Campground, overnight, flush toilets	Camping unit	75
Campground, overnight, flush toilets and shower	Camping unit	150
Campground, luxury	Person	100-150
Camp, youth, summer, or seasonal	Person	50
Church		
Without kitchen	Person (maximum attendance)	5
With kitchen	Person (maximum attendance)	7
Country Club	Resident Member	100
	Nonresident Member	10
Dance Hall	Patron	5
Dental Office	Chair	500
Dog Kennel	Animal, maximum occupancy	15
Dwelling For determining design flow for sewage treatment facilities under R18-9-B202(A)(9)(a) and sewage collection systems under R18-9-E301(D) and R18-9-B301(K), excluding peaking factor.	Person	80
Dwelling For on-site wastewater treatment facilities per R18-9-E302 through R18-9-E323:		
Apartment Building		
1 bedroom	Apartment	200
2 bedroom	Apartment	300
3 bedroom	Apartment	400
4 bedroom	Apartment	500
Seasonal or Summer Dwelling (with recorded seasonal occupancy restriction)	Resident	100
Single Family Dwellings	see R18-9-A314(D)(1)	see R18-9-A314(D)(1)
Other than Single Family Dwelling, the greater flow value based on:		
Bedroom count		
1-2 bedrooms	Bedroom	300
Each bedroom over 2	Bedroom	150
Fixture count	Fixture unit	25
Fire Station	Employee	45
Hospital		
All flows	Bed	250
Kitchen waste only	Bed	25
Laundry waste only	Bed	40

Hotel/motel Without kitchen	Bed (2 person)	50
With kitchen	Bed (2 person)	60
Industrial facility Without showers	Employee	25
With showers	Employee	35
Cafeteria, add	Employee	5
Institutions Resident	Person	75
Nursing home	Person	125
Rest home	Person	125
Laundry Self service	Wash cycle	50
Commercial	Washing machine	Per manufacturer, if consistent with this Chapter
Office Building	Employee	20
Park (temporary use) Picnic, with showers, flush toilets	Parking space	40
Picnic, with flush toilets only	Parking space	20
Recreational vehicle, no water or sewer connections	Vehicle space	75
Recreational vehicle, with water and sewer connections	Vehicle space	100
Mobile home/Trailer	Space	250
Restaurant/Cafeteria With toilet, add	Employee	20
Kitchen waste, add	Customer	7
Garbage disposal, add	Meal	6
Cocktail lounge, add	Meal	1
Kitchen waste disposal service, add	Customer	2
	Meal	2
Restroom, public	Toilet	200
School Staff and office	Person	20
Elementary, add	Student	15
Middle and High, add	Student	20
with gym & showers, add	Student	5
with cafeteria, add	Student	3
Boarding, total flow	Person	100
Service Station with toilets	First bay	1000
	Each additional bay	500
Shopping Center, no food or laundry	Square foot of retail space	0.1
Store	Employee	20
Public restroom, add	Square foot of retail space	0.1
Swimming Pool, Public	Person	10
Theater Indoor	Seat	5
Drive-in	Car space	10

Note: Unit flow rates published in standard texts, literature sources, or relevant area or regional studies are considered by the Department, if appropriate to the project.

Historical Note

New Section adopted by final rulemaking at 7 A.A.R. 235, effective January 1, 2001 (Supp. 00-4). Amended by final rulemaking at 11 A.A.R. 4544, effective November 12, 2005 (05-3).

ARTICLE 4. NITROGEN MANAGEMENT GENERAL PERMITS

R18-9-401. Definitions

In addition to the definitions established in A.R.S. §§ 49-101 and 49-201 and A.A.C. R18-9-101, the following terms apply to this Article:

1. "Application of nitrogen fertilizer" means any use of a substance containing nitrogen for the commercial production of a crop or plant. The commercial production of a

crop or plant includes commercial sod farms and nurseries.

2. "Contact stormwater" means stormwater that comes in contact with animals or animal wastes within a concentrated animal feeding operation.
3. "Crop or plant needs" means the amount of water and nitrogen required to meet the physiological demands of a crop or plant to achieve a defined yield.
4. "Crop or plant uptake" means the amount of water and nitrogen that can be physiologically absorbed by the roots

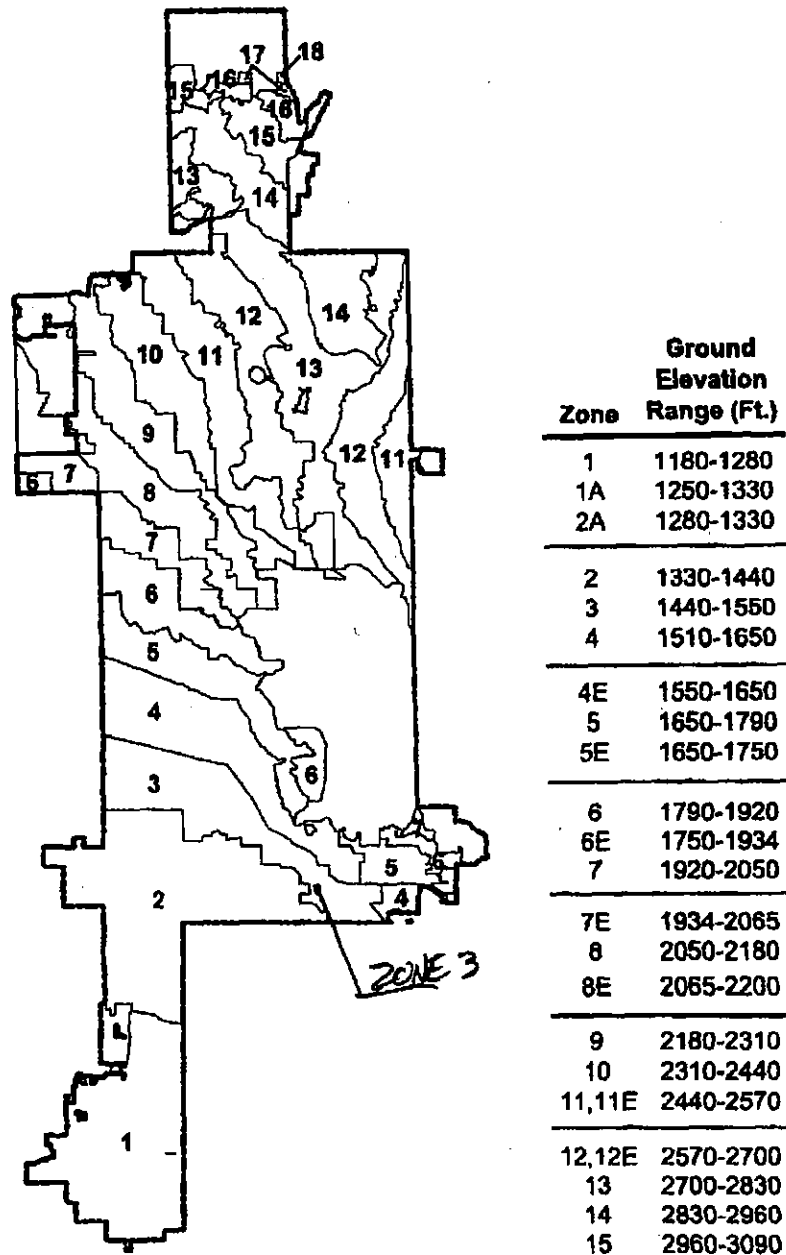


FIGURE 6.1-3 PRESSURE ZONE MAP

6-1.300 WATER FACILITIES

Water facilities (wells, reservoirs and booster pump stations) are typically designed and constructed by the city through its capital improvement program. Developers needing to construct water facilities should contact the Water Resources Department and request a meeting. The developer should be prepared to address how the proposed system will conform to the Integrated Water Master Plan. The city will address design issues, the review process for facilities and any potential city cost participation.

Subject **RE: STORAGE AT SHEA**
From Robert Kubicek <rkubicek@rkaa.com>
To Josh Lessard <josh@waterwiz.net>
Date 2017-06-16 09:35



Josh- water / sewer from 116th street/ we will have 2 restrooms, a break room with sink and a mop sink.
Bob

Robert W. Kubicek, A.I.A.
Senior Principal

RKAA Architects, Inc.

Arizona Office
2233 East Thomas Road - Phoenix, AZ 85016
Office: (602) 955-3900

California Office
26591 La Roda - Mission Viejo, CA 92691
Office: (949) 954-8785

rkaa.com

-----Original Message-----

From: Josh Lessard [mailto:josh@waterwiz.net]
Sent: Friday, June 16, 2017 8:23 AM
To: Robert Kubicek
Subject: RE: STORAGE AT SHEA

Bob,

Do you know where the water and sewer will enter the building? What facilities will the building have? I need to calculate a water usage.

Thanks,

Josh Lessard, PE

Erie & Associates, Inc.
3120 N 24th Street
Phoenix, AZ 85016
602-954-6399 Office
602-954-6601 Fax

1 N Calle Cesar Chavez, #102
Santa Barbara, CA 93103
805-963-3692

On 2017-06-15 17:11, Robert Kubicek wrote:

thanks Josh

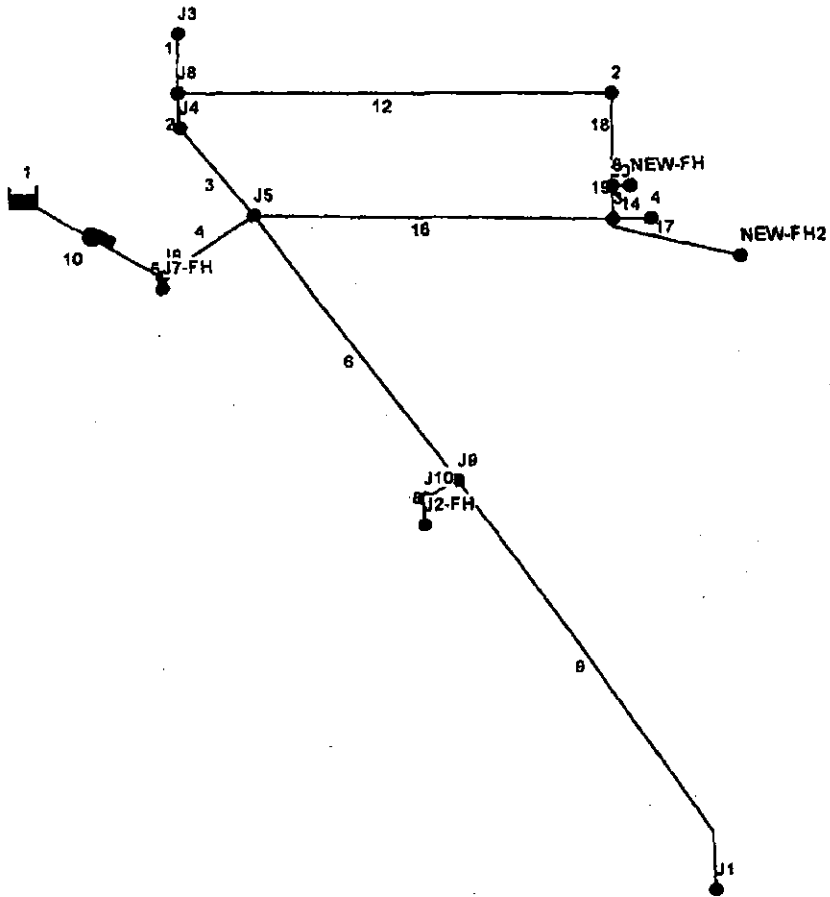
Robert W. Kubicek, A.I.A.
Senior Principal

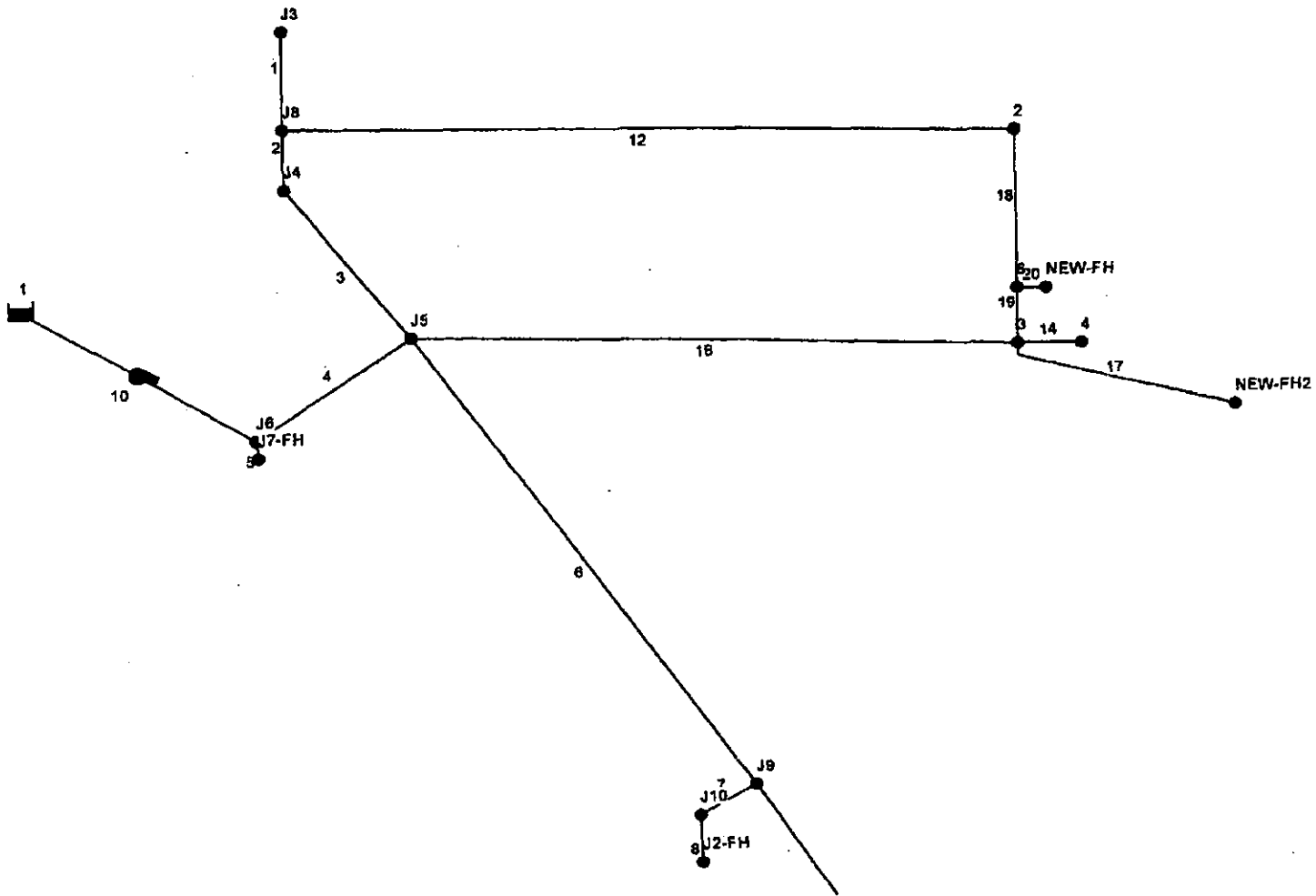
RKAA Architects, Inc.

Arizona Office
2233 East Thomas Road - Phoenix, AZ 85016
Office: (602) 955-3900

California Office

Appendix B – EPANET input/output





Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft
Pipe 1	47.73	8	135	0.00	0.00	0.00
Pipe 2	27.92	8	135	-503.55	3.21	8.80
Pipe 3	91.60	8	135	-503.55	3.21	6.01
Pipe 4	86.27	8	135	-1688.61	10.78	103.48
Pipe 5	8.91	6	135	0.00	0.00	0.00
Pipe 6	270.29	8	135	0.00	0.00	0.00
Pipe 7	29.48	8	135	0.00	0.00	0.00
Pipe 8	22.25	6	135	0.00	0.00	0.00
Pipe 9	401.42	8	135	0.00	0.00	0.00
Pipe 12	338.05	12	140	503.55	1.43	0.75
Pipe 14	28.89	12	140	1.11	0.00	0.00
Pipe 16	281.90	12	140	1185.06	3.36	3.90
Pipe 17	108.05	12	140	-843.75	2.39	3.26
Pipe 18	75.14	12	140	503.55	1.43	0.87
Pipe 19	27.10	12	140	-340.20	0.97	0.62
Pipe 20	13.74	12	140	843.75	2.39	14.56
Pump 10	#N/A	#N/A	#N/A	1688.61	0.00	-68.57

TEST #1
1090 S.F.
MAX DAY + FIRE

Network Table - Nodes

Node ID	Elevation ft	Demand GPM	Head ft	Pressure psi
Junc J3	63	0.00	121.84	25.50
Junc J4	60.5	0.00	122.09	26.69
Junc J5	60	0.00	122.64	27.14
Junc J6	60	0.00	131.57	31.01
Junc J7-FH	67	0.00	131.57	27.98
Junc J8	61	0.00	121.84	26.36
Junc J9	55	0.00	122.64	29.31
Junc J10	56	0.00	122.64	28.88
Junc J2-FH	63	0.00	122.64	25.84
Junc J1	55	0.00	122.64	29.31
Junc 2	63.5	0.00	121.59	25.17
Junc 3	62.5	0.00	121.54	25.58
Junc 4	62.5	1.11	121.54	25.58
Junc NEW-FH	69.5	843.75	121.32	22.46
Junc NEW-FH2	71	843.75	121.19	21.75
Junc 6	63	0.00	121.52	25.36
Resvr 1	63	-1688.61	63.00	0.00

1090 S.F.
MTR DAY + FIRE

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft
Pipe 1	47.73	8	135	0.00	0.00	0.00
Pipe 2	27.92	8	135	-503.55	3.21	8.80
Pipe 3	91.60	8	135	-503.55	3.21	6.01
Pipe 4	86.27	8	135	-1688.61	10.78	103.48
Pipe 5	8.91	6	135	0.00	0.00	0.00
Pipe 6	270.29	8	135	0.00	0.00	0.00
Pipe 7	29.48	8	135	0.00	0.00	0.00
Pipe 8	22.25	6	135	0.00	0.00	0.00
Pipe 9	401.42	8	135	0.00	0.00	0.00
Pipe 12	338.05	12	140	503.55	1.43	0.75
Pipe 14	28.89	12	140	1.11	0.00	0.00
Pipe 16	281.90	12	140	1185.06	3.36	3.90
Pipe 17	108.05	12	140	-843.75	2.39	3.26
Pipe 18	75.14	12	140	503.55	1.43	0.87
Pipe 19	27.10	12	140	-340.20	0.97	0.62
Pipe 20	13.74	12	140	843.75	2.39	14.56
Pump 10	#N/A	#N/A	#N/A	1688.61	0.00	-86.88

TEST #1
 RAW DATA
 MAY DAY + FIRE

Network Table - Nodes

Node ID	Elevation ft	Demand GPM	Head ft	Pressure psi
Junc J3	63	0.00	140.16	33.43
Junc J4	60.5	0.00	140.40	34.62
Junc J5	60	0.00	140.95	35.08
Junc J6	60	0.00	149.88	38.95
Junc J7-FH	67	0.00	149.88	35.91
Junc J8	61	0.00	140.16	34.30
Junc J9	55	0.00	140.95	37.24
Junc J10	56	0.00	140.95	36.81
Junc J2-FH	63	0.00	140.95	33.78
Junc J1	55	0.00	140.95	37.24
Junc 2	63.5	0.00	139.90	33.11
Junc 3	62.5	0.00	139.85	33.52
Junc 4	62.5	1.11	139.85	33.52
Junc NEW-FH	69.5	843.75	139.64	30.39
Junc NEW-FH2	71	843.75	139.50	29.68
Junc 6	63	0.00	139.84	33.29
Resvr 1	63	-1688.61	63.00	0.00

TEST #1
 RAW DATA
 MAX DAY + FIRE

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft
Pipe 1	47.73	8	135	0.00	0.00	0.00
Pipe 2	27.92	8	135	-0.66	0.00	0.00
Pipe 3	91.60	8	135	-0.66	0.00	0.00
Pipe 4	86.27	8	135	-2.22	0.01	0.00
Pipe 5	8.91	6	135	0.00	0.00	0.00
Pipe 6	270.29	8	135	0.00	0.00	0.00
Pipe 7	29.48	8	135	0.00	0.00	0.00
Pipe 8	22.25	6	135	0.00	0.00	0.00
Pipe 9	401.42	8	135	0.00	0.00	0.00
Pipe 12	338.05	12	140	0.66	0.00	0.00
Pipe 14	28.89	12	140	2.22	0.01	0.00
Pipe 16	281.90	12	140	1.56	0.00	0.00
Pipe 17	108.05	12	140	0.00	0.00	0.00
Pipe 18	75.14	12	140	0.66	0.00	0.00
Pipe 19	27.10	12	140	0.66	0.00	0.00
Pipe 20	13.74	12	140	0.00	0.00	0.00
Pump 10	#N/A	#N/A	#N/A	2.22	0.00	-166.03

TEST #1
10% SF.
PEAK HOUR

Network Table - Nodes

Node ID	Elevation ft	Demand GPM	Head ft	Pressure psi
Junc J3	63	0.00	229.03	71.94
Junc J4	60.5	0.00	229.03	73.02
Junc J5	60	0.00	229.03	73.24
Junc J6	60	0.00	229.03	73.24
Junc J7-FH	67	0.00	229.03	70.21
Junc J8	61	0.00	229.03	72.81
Junc J9	55	0.00	229.03	75.41
Junc J10	56	0.00	229.03	74.97
Junc J2-FH	63	0.00	229.03	71.94
Junc J1	55	0.00	229.03	75.41
Junc 2	63.5	0.00	229.03	71.72
Junc 3	62.5	0.00	229.03	72.16
Junc 4	62.5	2.22	229.03	72.16
Junc NEW-FH	69.5	0.00	229.03	69.12
Junc NEW-FH2	71	0.00	229.03	68.47
Junc 6	63	0.00	229.03	71.94
Resvr 1	63	-2.22	63.00	0.00

78574#1
10% S.F.
PEAK HOUR

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft
Pipe 1	47.73	8	135	0.00	0.00	0.00
Pipe 2	27.92	8	135	-0.33	0.00	0.00
Pipe 3	91.60	8	135	-0.33	0.00	0.00
Pipe 4	86.27	8	135	-1.11	0.01	0.00
Pipe 5	8.91	6	135	0.00	0.00	0.00
Pipe 6	270.29	8	135	0.00	0.00	0.00
Pipe 7	29.48	8	135	0.00	0.00	0.00
Pipe 8	22.25	6	135	0.00	0.00	0.00
Pipe 9	401.42	8	135	0.00	0.00	0.00
Pipe 12	338.05	12	140	0.33	0.00	0.00
Pipe 14	28.89	12	140	1.11	0.00	0.00
Pipe 16	281.90	12	140	0.78	0.00	0.00
Pipe 17	108.05	12	140	0.00	0.00	0.00
Pipe 18	75.14	12	140	0.33	0.00	0.00
Pipe 19	27.10	12	140	0.33	0.00	0.00
Pipe 20	13.74	12	140	0.00	0.00	0.00
Pump 10	#N/A	#N/A	#N/A	1.11	0.00	-166.03

10% S.F.
MAX DAY

Network Table - Nodes

Node ID	Elevation ft	Demand GPM	Head ft	Pressure psi
Junc J3	63	0.00	229.03	71.94
Junc J4	60.5	0.00	229.03	73.02
Junc J5	60	0.00	229.03	73.24
Junc J6	60	0.00	229.03	73.24
Junc J7-FH	67	0.00	229.03	70.21
Junc J8	61	0.00	229.03	72.81
Junc J9	55	0.00	229.03	75.41
Junc J10	56	0.00	229.03	74.97
Junc J2-FH	63	0.00	229.03	71.94
Junc J1	55	0.00	229.03	75.41
Junc 2	63.5	0.00	229.03	71.72
Junc 3	62.5	0.00	229.03	72.16
Junc 4	62.5	1.11	229.03	72.16
Junc NEW-FH	69.5	0.00	229.03	69.12
Junc NEW-FH2	71	0.00	229.03	68.47
Junc 6	63	0.00	229.03	71.94
Resvr 1	63	-1.11	63.00	0.00

TEST #1
10% SF.
MAX DAY

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft
Pipe 1	47.73	8	135	0.00	0.00	0.00
Pipe 2	27.92	8	135	-0.16	0.00	0.00
Pipe 3	91.60	8	135	-0.16	0.00	0.00
Pipe 4	86.27	8	135	-0.55	0.00	0.00
Pipe 5	8.91	6	135	0.00	0.00	0.00
Pipe 6	270.29	8	135	0.00	0.00	0.00
Pipe 7	29.48	8	135	0.00	0.00	0.00
Pipe 8	22.25	6	135	0.00	0.00	0.00
Pipe 9	401.42	8	135	0.00	0.00	0.00
Pipe 12	338.05	12	140	0.16	0.00	0.00
Pipe 14	28.89	12	140	0.55	0.00	0.00
Pipe 16	281.90	12	140	0.39	0.00	0.00
Pipe 17	108.05	12	140	0.00	0.00	0.00
Pipe 18	75.14	12	140	0.16	0.00	0.00
Pipe 19	27.10	12	140	0.16	0.00	0.00
Pipe 20	13.74	12	140	0.00	0.00	0.00
Pump 10	#N/A	#N/A	#N/A	0.55	0.00	-166.03

TEST #1
1096 S.F.
AVERAGE DAY

Network Table - Nodes

Node ID	Elevation ft	Demand GPM	Head ft	Pressure psi
Junc J3	63	0.00	229.03	71.94
Junc J4	60.5	0.00	229.03	73.02
Junc J5	60	0.00	229.03	73.24
Junc J6	60	0.00	229.03	73.24
Junc J7-FH	67	0.00	229.03	70.21
Junc J8	61	0.00	229.03	72.81
Junc J9	55	0.00	229.03	75.41
Junc J10	56	0.00	229.03	74.97
Junc J2-FH	63	0.00	229.03	71.94
Junc J1	55	0.00	229.03	75.41
Junc 2	63.5	0.00	229.03	71.72
Junc 3	62.5	0.00	229.03	72.16
Junc 4	62.5	0.55	229.03	72.16
Junc NEW-FH	69.5	0.00	229.03	69.12
Junc NEW-FH2	71	0.00	229.03	68.47
Junc 6	63	0.00	229.03	71.94
Resvr 1	63	-0.55	63.00	0.00

TEST #1
10% SF.
AVERAGE DAY

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft
Pipe 1	47.73	8	135	0.00	0.00	0.00
Pipe 2	27.92	8	135	-503.55	3.21	8.80
Pipe 3	91.60	8	135	-503.55	3.21	6.01
Pipe 4	86.27	8	135	-1688.61	10.78	103.48
Pipe 5	8.91	6	135	0.00	0.00	0.00
Pipe 6	270.29	8	135	0.00	0.00	0.00
Pipe 7	29.48	8	135	0.00	0.00	0.00
Pipe 8	22.25	6	135	0.00	0.00	0.00
Pipe 9	401.42	8	135	0.00	0.00	0.00
Pipe 12	338.05	12	140	503.55	1.43	0.75
Pipe 14	28.89	12	140	1.11	0.00	0.00
Pipe 16	281.90	12	140	1185.06	3.36	3.90
Pipe 17	108.05	12	140	-843.75	2.39	3.26
Pipe 18	75.14	12	140	503.55	1.43	0.87
Pipe 19	27.10	12	140	-340.20	0.97	0.62
Pipe 20	13.74	12	140	843.75	2.39	14.56
Pump 10	#N/A	#N/A	#N/A	1688.61	0.00	-62.14

TEST #2
10% S.F.
MAX DAY + FIRE

Network Table - Nodes

Node ID	Elevation ft	Demand GPM	Head ft	Pressure psi
Junc J3	63	0.00	115.42	22.71
Junc J4	60.5	0.00	115.67	23.90
Junc J5	60	0.00	116.22	24.36
Junc J6	60	0.00	125.14	28.23
Junc J7-FH	67	0.00	125.14	25.19
Junc J8	61	0.00	115.42	23.58
Junc J9	55	0.00	116.22	26.53
Junc J10	56	0.00	116.22	26.09
Junc J2-FH	63	0.00	116.22	23.06
Junc J1	55	0.00	116.22	26.53
Junc 2	63.5	0.00	115.17	22.39
Junc 3	62.5	0.00	115.12	22.80
Junc 4	62.5	1.11	115.12	22.80
Junc NEW-FH	69.5	843.75	114.90	19.67
Junc NEW-FH2	71	843.75	114.77	18.96
Junc 6	63	0.00	115.10	22.58
Resvr 1	63	-1688.61	63.00	0.00

151 #2
10% S.F.
MAY DAY FIRE

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft
Pipe 1	47.73	8	135	0.00	0.00	0.00
Pipe 2	27.92	8	135	-503.55	3.21	8.80
Pipe 3	91.60	8	135	-503.55	3.21	6.01
Pipe 4	86.27	8	135	-1688.61	10.78	103.48
Pipe 5	8.91	6	135	0.00	0.00	0.00
Pipe 6	270.29	8	135	0.00	0.00	0.00
Pipe 7	29.48	8	135	0.00	0.00	0.00
Pipe 8	22.25	6	135	0.00	0.00	0.00
Pipe 9	401.42	8	135	0.00	0.00	0.00
Pipe 12	338.05	12	140	503.55	1.43	0.75
Pipe 14	28.89	12	140	1.11	0.00	0.00
Pipe 16	281.90	12	140	1185.06	3.36	3.90
Pipe 17	108.05	12	140	-843.75	2.39	3.26
Pipe 18	75.14	12	140	503.55	1.43	0.87
Pipe 19	27.10	12	140	-340.20	0.97	0.62
Pipe 20	13.74	12	140	843.75	2.39	14.56
Pump 10	#N/A	#N/A	#N/A	1688.61	0.00	-84.43

TEST #2
 RAN DATA
 MAX DAY + FIRE

Network Table - Nodes

Node ID	Elevation ft	Demand GPM	Head ft	Pressure psi
Junc J3	63	0.00	137.70	32.37
Junc J4	60.5	0.00	137.95	33.56
Junc J5	60	0.00	138.50	34.01
Junc J6	60	0.00	147.43	37.88
Junc J7-FH	67	0.00	147.43	34.85
Junc J8	61	0.00	137.70	33.24
Junc J9	55	0.00	138.50	36.18
Junc J10	56	0.00	138.50	35.75
Junc J2-FH	63	0.00	138.50	32.71
Junc J1	55	0.00	138.50	36.18
Junc 2	63.5	0.00	137.45	32.04
Junc 3	62.5	0.00	137.40	32.45
Junc 4	62.5	1.11	137.40	32.45
Junc NEW-FH	69.5	843.75	137.18	29.33
Junc NEW-FH2	71	843.75	137.05	28.62
Junc 6	63	0.00	137.38	32.23
Resvr 1	63	-1688.61	63.00	0.00

TEST #2
 RAW DATA
 MAX DAY + FIRE