

Mark Taylor Apartments - Rawhide Scottsdale, Arizona

Final Basis of Design Water and Wastewater Needs Report

Accepted For:
City of Scottsdale
Water Resources Department
9379 E. San Salvador
Scottsdale, Arizona

By: Doug Mann
Date: 10.13.15

Prepared for:
Mark Taylor Residential
6623 North Scottsdale Road
Scottsdale, Arizona 85250

Prepared by:
Kimley-Horn and Associates, Inc.
7740 North 16th Street
Suite 300
Phoenix, Arizona 85020

191769002
September 2015

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Water/Wastewater

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1.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this water and wastewater report for the proposed Mark-Taylor Apartments development at the southeast corner of Scottsdale Road and Silverstone Drive as required per the City of Scottsdale. This report will demonstrate that the proposed site conforms to City of Scottsdale design requirements as well as the *Silverstone 160-Acre Mixed Use Project Master Plan* prepared by Wood/Patel.

The proposed project encompasses approximately 16.7 acres and 14 multistory multifamily residential buildings totaling 262 dwelling units.

2.0 DOMESTIC WATER ANALYSIS

2.1 INTENT AND SCOPE

The intent of this section is to evaluate the potable water infrastructure for the proposed Mark-Taylor Apartments development in Scottsdale, Arizona. As a result of this analysis, it will be determined if the potable water infrastructure is capable of satisfying the projected water demands for the proposed development in accordance with the International Fire Code, 2012 ("IFC") for fire prevention.

2.2 GENERAL THEORY

The water system modeling program WaterCAD, developed by Haestad Methods, is used to model the water system servicing the proposed development. The program uses the fluid mechanic headloss theory known as the Hazen-Williams method. This is the typical method used to evaluate water distribution systems.

2.3 INTERNATIONAL FIRE CODE, 2012

According to the City of Scottsdale Fire Department, the 2012 IFC is currently the governing code with respect to fire water system requirements. The IFC evaluates building construction type, occupancy descriptions, and square footage in order to set minimum fire flow with regards to a particular development.

2.4 DOMESTIC WATER SUPPLY

A public water main exists in Silverstone Drive and 74th Street. A portion of this water main is 12" DIP, and the remainder is 8" DIP. This water main is connected to existing water mains in Scottsdale Road (12" DIP) and Williams Drive (8" DIP), creating a loop. A 12" and 8" DIP water main loop will be constructed on-site that will connect to existing 12" DIP stubs in Silverstone Drive and 74th Street and serve new on-site fire hydrants and 8" firelines to the multiple buildings. Domestic water supplies are proposed to serve the apartment buildings. See Appendix C for the Utility Plan.

2.5 WATER DEMANDS

Domestic Water Demand

According to the guidelines provided in Figure 6.1-2 of the City of Scottsdale *Standards and Policies, Chapter 6, Water*, the proposed building will add the following demands to the City of Scottsdale's existing system:

Table 1: Domestic Water Demands

	Area (SF)	Unit Count (DU)	Total Demand* (GPD/DU) or (GPD/SF)	ADD (GPM)	Peak Hour (GPM)	Maximum Day (GPM)
Building A	8374	-	0.8	4.7	16.45	9.4
Building B	-	24	185.3	3.1	10.85	6.2
Building C	-	24	185.3	3.1	10.85	6.2
Building D	-	29	185.3	3.7	12.95	7.4
Building E	-	2	185.3	0.3	1.05	0.6
Building F	-	24	185.3	3.1	10.85	6.2
Building G	-	24	185.3	3.1	10.85	6.2
Building H	-	29	185.3	3.7	12.95	7.4
Building I	-	2	185.3	0.3	1.05	0.6
Building J	-	2	185.3	0.3	1.05	0.6
Building K	-	29	185.3	3.7	12.95	7.4
Building L	-	18	185.3	2.3	8.05	4.6
Building M	-	29	185.3	3.7	12.95	7.4
Building N	-	2	185.3	0.3	1.05	0.6
Building O	-	24	185.3	3.1	10.85	6.2
Cabana	470	-	0.8	0.3	1.05	0.6
Maintenance	1016	-	0.8	0.6	2.10	1.2
TOTAL	9860	262		39.4	137.90	78.8

*High Density Condominium and Commercial/Retail Land use demands per the City of Scottsdale *Standards and Policies, Chapter 6, Water*.

The Peak Hour demand is 3.5 times the Average Daily Demand (ADD). The Maximum Day Demand is two times the ADD.

The *Silverstone 160-Acre Mixed Use Project Master Plan* accounted for the following demands associated with the proposed site:

Table 2: Master Plan Domestic Water Demands

Parcel	Area of Contributing Parcel (AC)	Master Plan WaterCAD Node	Unit Count (DU)	ADD/DU (GPD)	ADD (GPM)	Peak Hour (GPM)	Maximum Day (GPM)
E	8.8	J-40	131	228	20.7	72.6	41.5
E	8.8	J-120	131	228	20.7	72.6	41.5
TOTAL	17.6		262		41.4	145.2	83.0

As demonstrated in the two demand tables above, the water demands for the proposed site are below the demands assigned in the *Silverstone 160-Acre Mixed Use Project Master Plan*. See Appendix F for excerpts from the *Silverstone 160-Acre Mixed Use Project Master Plan*.

Fire Flow Demand

According to the 2012 International Fire Code (IFC), fire flow to Group R (residential) buildings may be reduced by 25%, and then by another 50% if an approved fire sprinkler system is installed. A fire sprinkler system will be installed with all buildings. The largest proposed building is 50,600 S.F. with a V-B

construction type. Therefore, the required maximum building fire flow rate for the proposed buildings is 2,250 gallons per minute.

2.6 HYDRAULIC CALCULATIONS

Water Model

Through the use of WaterCAD, the proposed water distribution system was modeled. Residual and static pressures were obtained from two flow tests performed on four fire hydrants (two flow and two pressure) near both existing 12" stubs. Both tests were performed by EJ Flow Testing Services. The first test took place July 11, 2014 along Silverstone Drive and the second test took place on February 9, 2015 along 74th Street. See Appendix B for the Fire Flow Tests. The pressures from the flow tests were modeled using a reservoir and pump to match the flow test results. The reduced residual and static pressures from the flow tests are included in Table 3.

Table 3: Fire Hydrant Flow Rate Test Results

Fire Hydrant	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)
Test #1 Flow	67.5	N/A	N/A
Test #1 Pressure	N/A	40.5	1,808
Test #2 Flow	72.0	N/A	N/A
Test #2 Pressure	N/A	40.0	1,760

From the static and residual pressures obtained through the first test on July 11, 2014, the maximum operating flow was calculated to be 2,453 gpm at 20 psi. From the static and residual pressures obtained through the first test on February 9, 2015, the maximum operating flow was calculated to be 2,288 gpm at 20 psi. These calculations include a 10% safety factor. The computer model geometry was constructed based on the existing and proposed water infrastructure. See Appendix D for the WaterCAD Analysis.

Water Analysis

Four water analyses were performed to evaluate the existing adjacent off-site water infrastructure and the proposed on-site water system:

1. Average Day Demand
2. Maximum Day Demand
3. Peak Hour Demand
4. Maximum Day Demand + Fire Flow Demand

The system was analyzed to ensure that the existing and proposed public water infrastructure can maintain a minimum pressure of 40 psi for the Average Day, Maximum Day, and Peak Hour Demands and 20 psi for the Maximum Day plus Fire Flow Demand. See Appendix D for water model layout to identify nodes and pipes.

Results

As previously discussed, four water analyses were performed for the development to evaluate the existing adjacent off-site water infrastructure and the proposed on-site water system:

1. Average Day Demand
2. Maximum Day Demand
3. Peak hour Demand
4. Maximum Day Demand + Fire Flow Demand

Fire flow demands were modeled accordingly:

Building Fireline Connections are modeled with the fire flow demand for the largest building as determined using the 2012 IFC. Fire hydrants are modeled using the fire flow required by the 2012 IFC for the largest building.

See Appendix D for the WaterCAD Analysis. A summary of the water analysis results for the public distribution main is tabulated below:

Table 4a: Domestic Water Model Result Summary

Criteria	Constraint	Average Day	Max Day	Peak Hour
Minimum Pressure	40 psi	69.5 psi	69.4 psi	69.2 psi
Meets Criteria?	-	Yes	Yes	Yes

Table 4b: Fire Flow Water Model Result Summary

Criteria	Constraint	Max Day+FF
Minimum System Pressure	20 psi	69.4 psi
Meets Criteria?	-	Yes

3.0 WASTEWATER COLLECTION SYSTEM

WASTEWATER COLLECTION SYSTEM

An 8" PVC sewer main exists at the southwest corner of the property. This sewer main includes an 8" PVC stub to the north. Additionally, a 12" PVC sewer main exists in 74th Street with an 8" PVC stub extending onto the proposed site. Three new 8" PVC private sewer mains along with sewer services are proposed on-site. Two of the sewer mains will connect to the 8" sewer main near the southwest corner of the property, and the third private sewer main will connect to the stub along 74th Street. Refer to Appendix C for the Utility Plan. The following demand calculations are based on Figure 7.1-2 of the City of Scottsdale *Design Standards and Policies Manual*. The number of dwelling units assigned to each existing sewer stub is based on preliminary site layout.

Table 5: Proposed Wastewater Demands

	Master Plan Assumed Dwelling Units	Proposed Dwelling Units (DU)	Demand* (GPD/DU)	ADD (GPM)	Peaking Factor	Peak Demand (GPM)	Max Day (GPM)	Master Plan Calculated Peak Demand (GPM)
SW Corner Stub	183	162	170	19.1	4.5	85.95	38.2	127
74 th Street Stub	79	100	170	11.8	4.5	53.10	23.6	55
TOTAL	262	262		30.9		149.05	61.8	182

*Demand is based on 1.7 persons/DU and 100 GPD/person

The Maximum Day Demand is two times the Average Day Demand (ADD). Refer to Appendix E for the Sewer Capacity Calculations.

As demonstrated in Table 5 above, the proposed wastewater demands for the proposed development are below the demands assumed in the *Silverstone 160-Acre Mixed Use Project Master Plan*. See Appendix F for excerpts from the *Silverstone 160-Acre Mixed Use Project Master Plan*.

4.0 CONCLUSION

Water

This development proposes to connect to City of Scottsdale water mains located adjacent to the site in Silverstone Drive and 74th Street. The water main serving the apartments will be a looped system.

The proposed on-site water system as outlined by this analysis appears adequate and sufficient to meet the required domestic and fire flow demands for the proposed Mark-Taylor Apartments development near the SEC of Scottsdale Road and Silverstone Drive. In addition, the proposed on-site water system conforms to the *Silverstone 160-Acre Mixed Use Project Master Plan*.

Wastewater

This development proposes to connect the building sewer services to the 8" PVC sewer main in 74th Street and the 8" PVC sewer main in the southwest corner of the site. Both 8" PVC sanitary sewer mains have capacity for the site based upon a full flow capacity of 383 gpm utilizing a Manning's N value of 0.013. In addition, the proposed on-site wastewater demands conform to the *Silverstone 160-Acre Mixed Use Project Master Plan*.

Appendix A
IFC Appendix B

SECTION B105 FIRE-FLOW REQUIREMENTS FOR BUILDINGS

B105.1 One- and two-family dwellings.

The minimum fire-flow and flow duration requirements for one- and two-family *dwellings* having a fire-flow calculation area that does not exceed 3,600 square feet (344.5 m²) shall be 1,000 gallons per minute (3785.4 L/min) for 1 hour. Fire-flow and flow duration for *dwellings* having a fire-flow calculation area in excess of 3,600 square feet (344.5m²) shall not be less than that specified in Table B105.1.

Exception: A reduction in required fire-flow of 50 percent, as *approved*, is allowed when the building is equipped with an *approved automatic sprinkler system*.

TABLE B105.1 MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS

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-	92,401-	59,101-	42,701-	26,301-	4,500	

183,400	103,100	66,000	47,700	29,300	
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- Greater	166,501- Greater	106,501- 115,800	77,001- 83,700	47,401- 51,500	6,000
—	—	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

For SI: 1 square foot = 0.0929 m², 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

- a. Types of construction are based on the *International Building Code*.
- b. Measured at 20 psi residual pressure.

B105.2 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 B105.1.

Exception: A reduction in required fire-flow of up to 75 percent, as *approved*, is allowed when the building is provided with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2. The resulting fire-flow shall not be less than 1,500 gallons per minute (5678 L/min) for the prescribed duration as specified in Table B105.1.

Appendix B
Fire Flow Tests



Flow
Tests

FLOW TESTING SERVICES

Flow Test Summary

EJ Flow Tests Project Name: Mark Taylor Apartments - Rawhide
EJ Flow Tests Project No.: 14075
Project Address: North Scottsdale Road & East Silverstone Drive, Scottsdale, Arizona 85255
Date of Flow Test: July 11, 2014
Time of Flow Test: 7:50 AM
Data is Current and Reliable Until: January 11, 2015

Raw Test Data:

Static Pressure: 75.0 psi
(measured in pounds per square inch)

Residual Pressure: 48.0 psi
(measured in pounds per square inch)

Pitot Pressure: 29.0 psi
(measured in pounds per square inch)

Number of Outlets Flowed: 2

Fire Hydrant Orifice Diameter: 2.5 inches
(measured in inches)

Coefficient of Discharge: 0.9
(0.9 smooth/round outlet, 0.8 square/sharp outlet,
0.7 square/raised outlet)

Flowing GPM: 1,808
(measured in gallons per minute)

GPM at 20 PSI: 2,655

Data with minimum safety factor of: 10% :

Static Pressure: 67.5 psi
(measured in pounds per square inch)

Residual Pressure: 40.5 psi
(measured in pounds per square inch)

Main Size: 8 & 12 inches
(measured in inches)

Approximate Distance Between Hydrants: 400 ft
(measured in feet)

Approx. Static/Residual Hydrant Elevation: 1,817 ft
(measured above sea level)

Approx. Flow Hydrant Elevation: 1,825 ft
(measured above sea level)

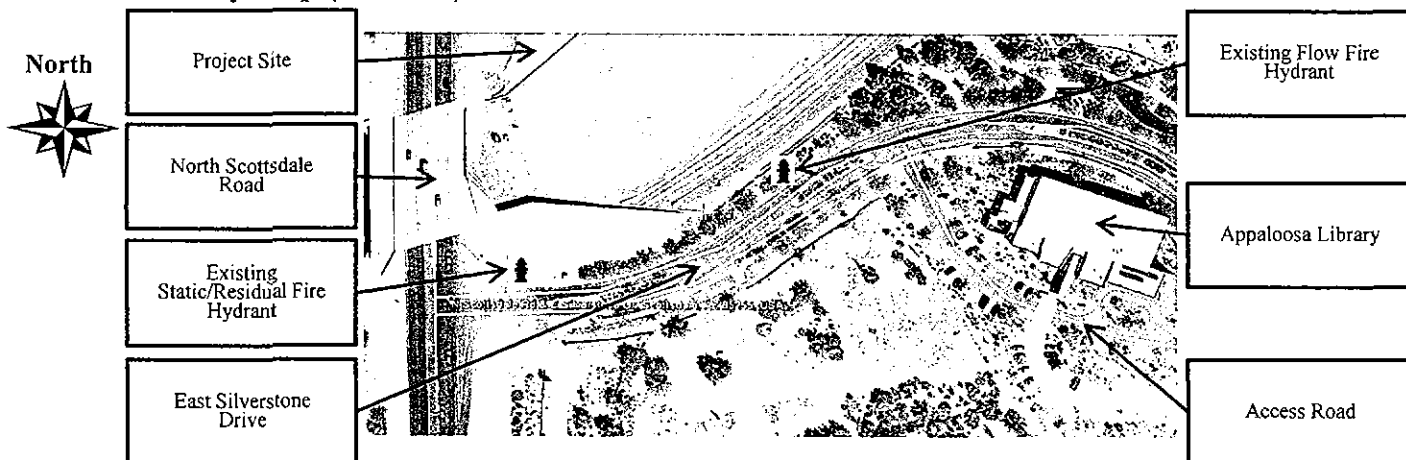
Flowing GPM: 1,808
(measured in gallons per minute)

GPM at 20 PSI: 2,453

Conducted by/Witnessed by/City Forces Contacted:

Conducted by: Eric S. & Austin G. (EJ Flow Tests) 602.999.7637
Witnessed by: Larry Frandle (City of Scottsdale) 480.312.5774
City Forces Contacted: City of Scottsdale

Flow Test Vicinity Map (No Scale)



E J Flow Tests, LLC

21505 North 78th Ave. • Suite 125 • Peoria, Arizona 85382 • 602.999.7637 • www.ejflowtests.com



Flow
Tests

FLOW TESTING SERVICES

Flow Test Summary

EJ Flow Tests Project Name: Mark Taylor Apt - Rawhide - Test 2
EJ Flow Tests Project No.: 15011
Project Address: North Scottsdale Road & East Silverstone Drive, Scottsdale, Arizona 85255
Date of Flow Test: February 9, 2015
Time of Flow Test: 8:10 AM
Data is Current and Reliable Until: August 9, 2015

City of Scottsdale requires a Maximum Static Pressure of 72 PSI for use as a Safety Factor.

Raw Test Data:

Static Pressure: 82.0 psi
(measured in pounds per square inch)

Residual Pressure: 50.0 psi
(measured in pounds per square inch)

Pitot Pressure: 27.5 psi
(measured in pounds per square inch)

Number of Outlets Flowed: 2

Fire Hydrant Orifice Diameter: 2.5 inches
(measured in inches)

Coefficient of Discharge: 0.9
(0.9 smooth/round outlet, 0.8 square/sharp outlet, 0.7 square/raised outlet)

Flowing GPM: 1,760
(measured in gallons per minute)

GPM at 20 PSI: 2,516

Data with minimum safety factor of: 10 PSI :

Static Pressure: 72.0 psi
(measured in pounds per square inch)

Residual Pressure: 40.0 psi
(measured in pounds per square inch)

Main Size: 8
(measured in inches)

Approximate Distance Between Hydrants: 250 ft
(measured in feet)

Approx. Static/Residual Hydrant Elevation: 1,819 ft
(measured above sea level)

Approx. Flow Hydrant Elevation: 1,814 ft
(measured above sea level)

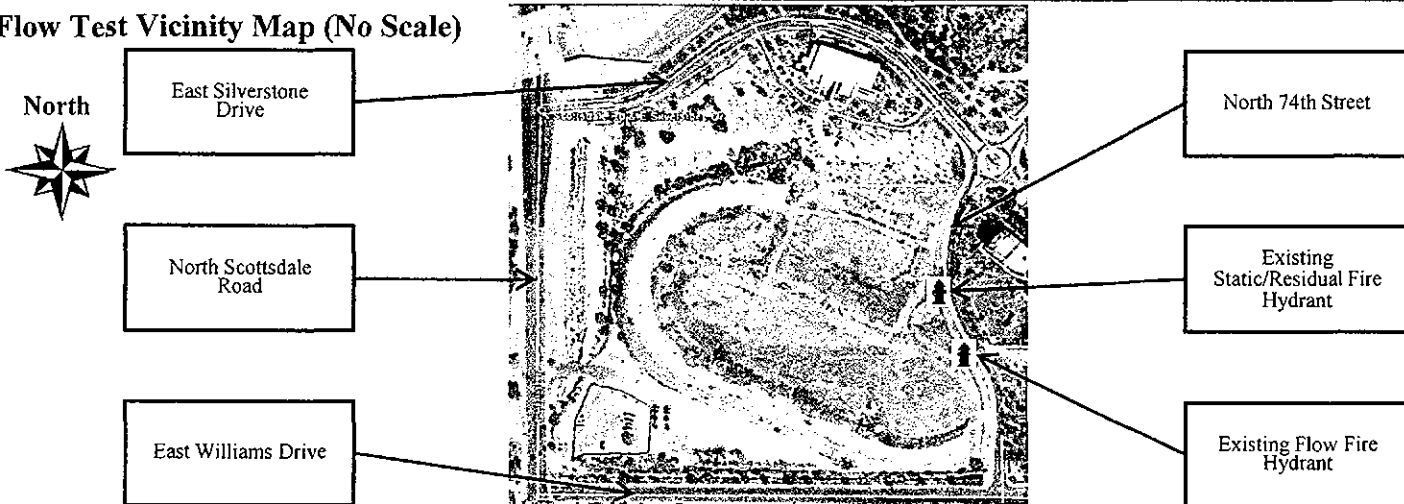
Flowing GPM: 1,760
(measured in gallons per minute)

GPM at 20 PSI: 2,288

Conducted by/Witnessed by/City Forces Contacted:

Conducted by: Cesar Reyna & Austin Gourley (EJ Flow Tests) 602.999.7637
Witnessed by: Larry Frandle (City of Scottsdale) 602.541.4942
City Forces Contacted: City of Scottsdale (Permit #: C46990)

Flow Test Vicinity Map (No Scale)

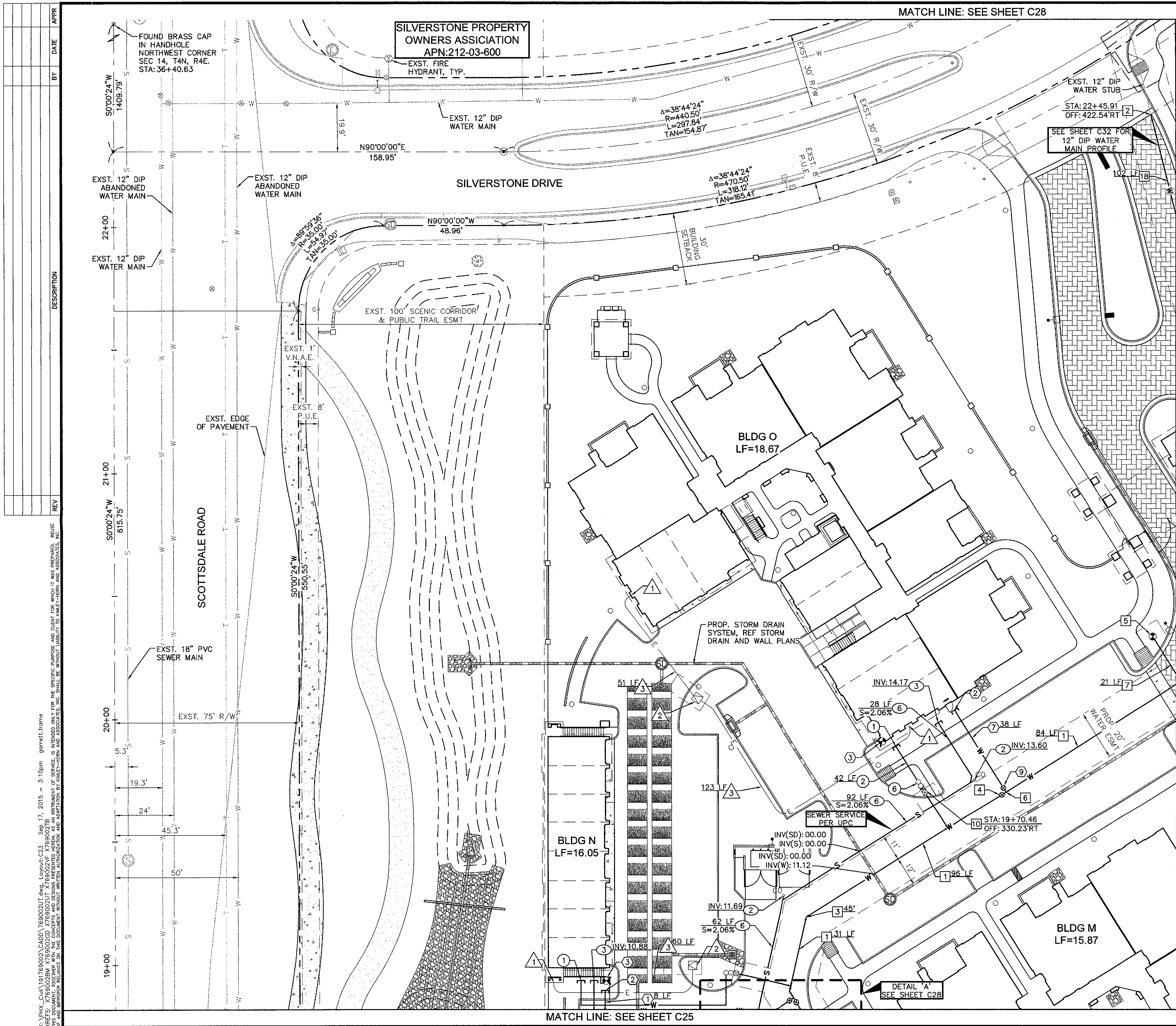


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John L. Echeverri • NICET Level IV 078493 SME • C-16 FP Contractor ROC 271705 AZ • NFPA CFPS 1915

Appendix C
Utility Plan



PUBLIC WATER MAIN NOTES

- 1. INSTALL 8" CLASS 350 DIP WATER MAIN POLYWRAPPED, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
- 2. REMOVE CAP AND CONNECT TO EXISTING 12" WATER STUB.
- 3. INSTALL 8" BEND WITH RESTRAINED JOINTS PER MAG STD DET 303, ANGLE PER PLAN.
- 4. INSTALL 8" WATER MAIN GATE VALVE PER MAG STD DET 391-1 TYPE 'C'.
- 5. INSTALL FIRE HYDRANT ASSEMBLY PER MAG STD DET 360.
- 6. INSTALL 8"x6" TEE WITH RESTRAINED JOINTS PER MAG STD DET 303.
- 7. INSTALL 6" CLASS 350 DIP WATER MAIN POLYWRAPPED WITH TRACER WIRE, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
- 10. INSTALL 2" WATER SERVICE LINE CONNECTION PER COS STD DET 2330. METER TO BE INSTALLED BY CITY FORCES.
- 18. INSTALL 12" CLASS 350 DIP WATER MAIN POLYWRAPPED WITH TRACER WIRE, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.

PRIVATE FIRELINE NOTES

- 1. INSTALL 4" CLASS 350 DIP WATER MAIN POLYWRAPPED WITH TRACER WIRE, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
- 2. BUILDING FIRELINE CONNECTION, REF MEP PLANS FOR CONTINUATION. FIRELINE RISER AND BACKFLOW PREVENTOR PER COS STD DET 2368 TO BE LOCATED IN FIRE RISER ROOM.
- 3. FDC PER COS STD DET 2367.
- 7. INSTALL 6" CLASS 350 DIP WATER MAIN POLYWRAPPED WITH TRACER WIRE, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
- 9. INSTALL 6" GATE VALVE PER MAG STD DET 391-1 TYPE 'C'.

PRIVATE SEWER NOTES

- 2. INSTALL SEWER CLEANOUT PER MAG STD DET 441, INVERT PER PLAN.
- 3. CONNECT TO BUILDING SEWER AT TWO-WAY CLEANOUT, INVERT PER PLAN.
- 6. INSTALL 6" SDR 35 PVC SEWER SERVICE, LENGTH AND SLOPE PER PLAN.

PRIVATE DOMESTIC WATER NOTES

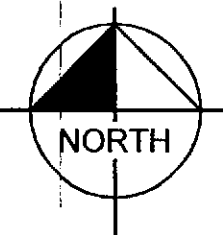
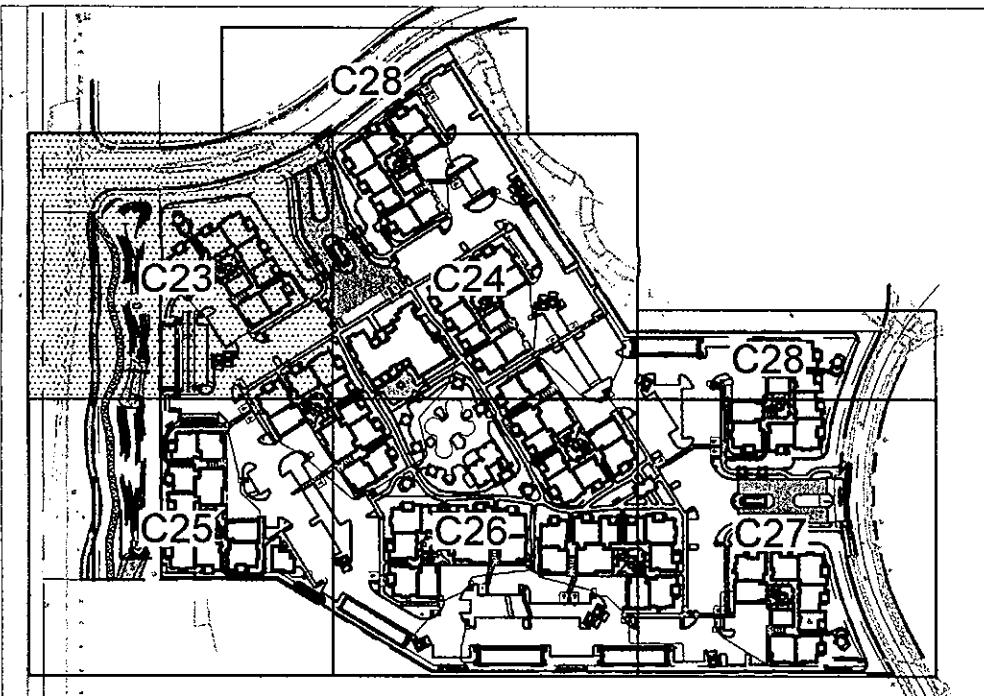
- 1. BUILDING DOMESTIC WATER CONNECTION, REF MEP PLANS FOR CONTINUATION.
- 2. INSTALL 2" SCH 40 PVC DOMESTIC WATER SERVICE, LENGTH PER PLAN.
- 6. ISNTALL 2" DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY PER COS STD DET 2352.

DRY UTILITY CONSTRUCTION NOTES

- 1. PROPOSED SES LOCATION, REF MEP PLANS FOR CONTINUATION.
- 2. PROPOSED TRANSFORMER LOCATION, REF APS PLANS FOR TRANSFORMER DETAILS.
- 3. ELECTRICAL SECONDARY ROUTING, REF APS PLANS FOR TRENCHING AND CONDUIT DETAILS.

NOTES

- 1. ADD 1800 TO ALL ELEVATIONS.
- 2. ALL ELEVATIONS ARE INVERT ELEVATIONS, UNLESS OTHERWISE NOTED.
- 3. REFER TO SHEET C2 FOR LEGEND.
- 4. ALL MATERIALS COMING INTO CONTACT WITH POTABLE WATER MUST MEET NSF STANDARDS 60/61 IN ACCORDANCE WITH AAC R18-4-213.



PROJECT No.
191769002
SCALE (H): 1"=20'
SCALE (V): NONE
DRAWN BY: CGF
DESIGN BY: TMJ
CHECK BY: SEH
DATE: 09/17/15



Mark Taylor

UTILITY PLAN
SCOTTSDALE, ARIZONA

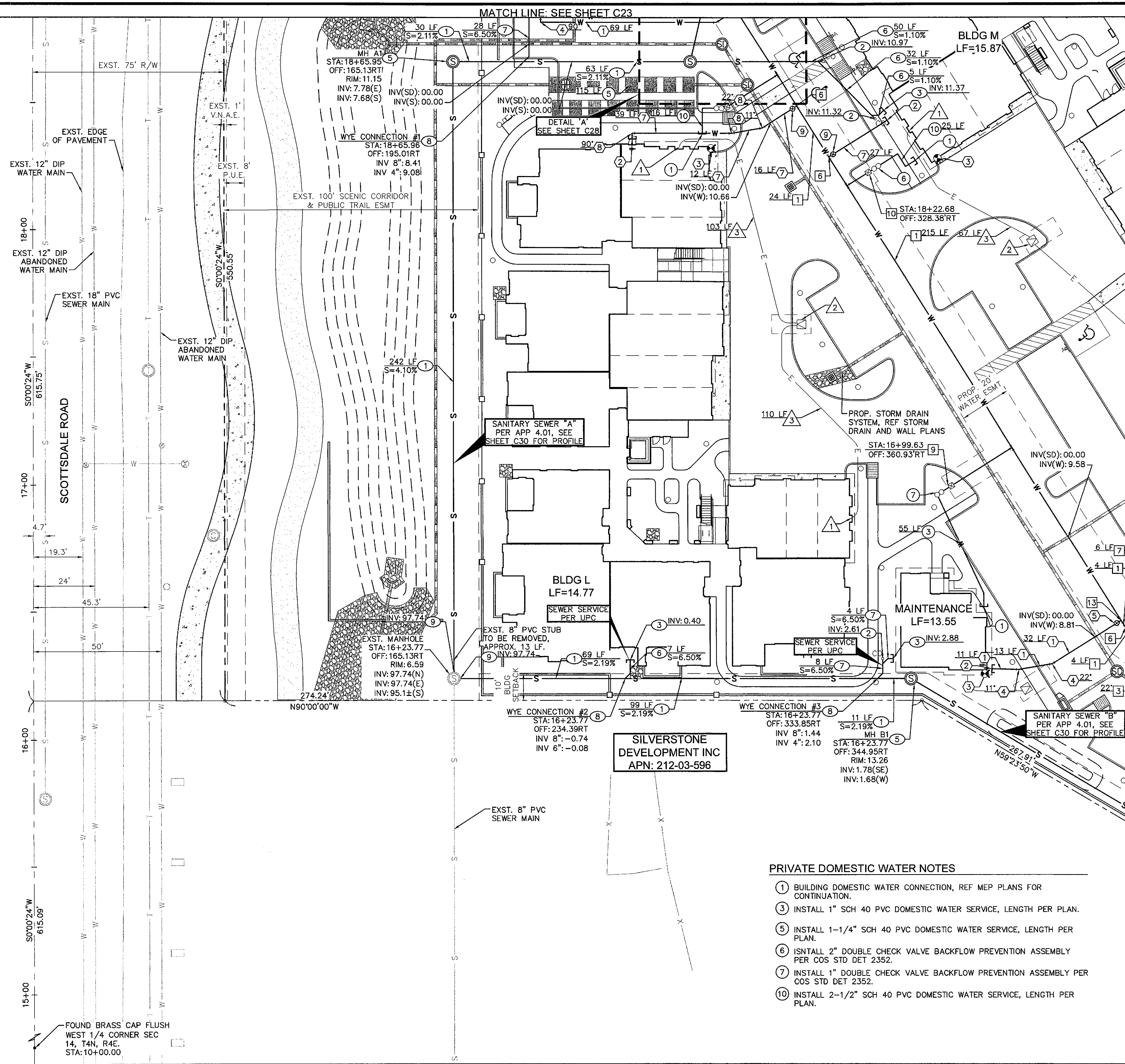
SEC SCOTTSDALE ROAD AND SILVERSTONE DRIVE

Kimley-Horn
7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

K:\PWA_Silverstone\191769002.dwg, 15:01:03, Sep 17, 2015 - 3:10pm garratt:frank

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FIRM.



1. INSTALL 8" CLASS 350 DIP WATER MAIN POLYWRAPPED, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
3. INSTALL 8" BEND WITH RESTRAINED JOINTS PER MAG STD DET 303, ANGLE PER PLAN.
6. INSTALL 8"x8" TEE WITH RESTRAINED JOINTS PER MAG STD DET 303.
7. INSTALL 6" CLASS 350 DIP WATER MAIN POLYWRAPPED WITH TRACER WIRE, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
9. INSTALL 1" WATER SERVICE LINE CONNECTION PER COS STD DET 2330. METER TO BE INSTALLED BY CITY FORCES.
10. INSTALL 2" WATER SERVICE LINE CONNECTION PER COS STD DET 2330. METER TO BE INSTALLED BY CITY FORCES.
13. INSTALL 8"x4" TEE WITH RESTRAINED JOINTS PER MAG STD DET 303.

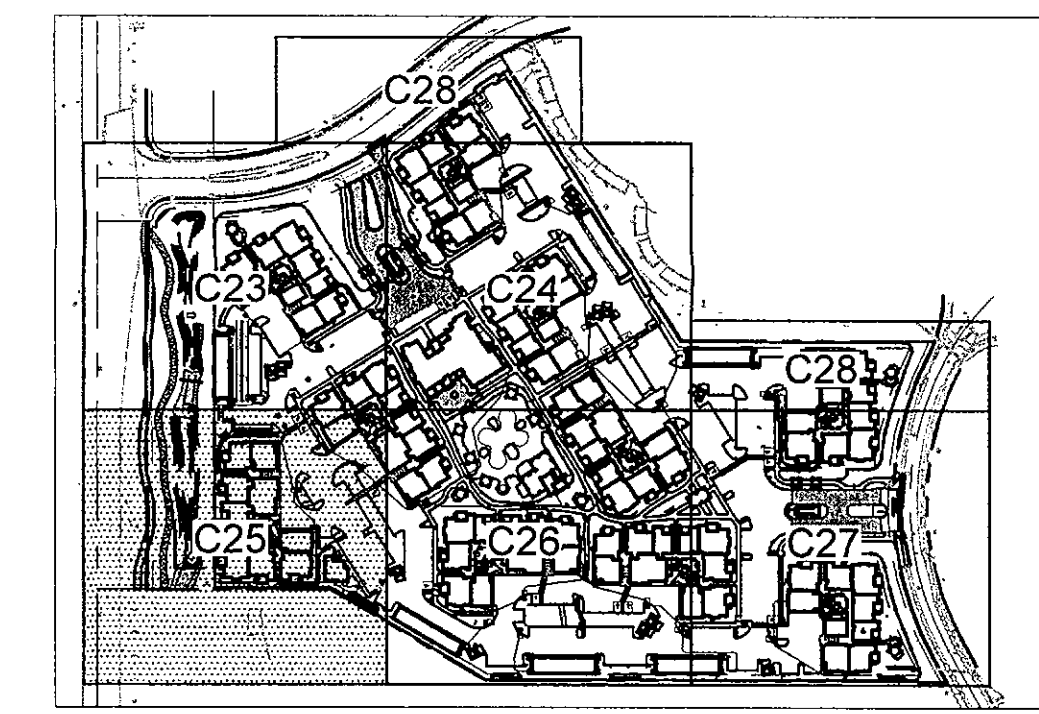
- ③ INSTALL 4" CLASS 350 DIP WATER MAIN POLYWRAPPED WITH TRACER WIRE, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
- ② BUILDING FIRELINE CONNECTION. REF MEP PLANS FOR CONTINUATION. FIRELINE RISER AND BACKFLOW PREVENTOR PER COS STD DET 2368 TO BE LOCATED IN FIRE RISER ROOM.
- ③ FDC PER COS STD DET 2367.
- ④ INSTALL 4" BEND WITH RESTRAINED JOINTS PER MAG STD DET 303, ANGLE PER PLAN.
- ⑤ INSTALL 4" GATE VALVE PER MAG STD DET 391-1 TYPE 'C'.
- ⑦ INSTALL 6" CLASS 350 DIP WATER MAIN POLYWRAPPED WITH TRACER WIRE, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
- ⑧ INSTALL 6" BEND WITH RESTRAINED JOINTS PER MAG STD DET 303, ANGLE PER PLAN.
- ⑨ INSTALL 6" GATE VALVE PER MAG STD DET 391-1 TYPE 'C'.

ATCH LINE: SEE SHEET C26

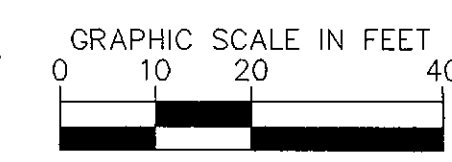
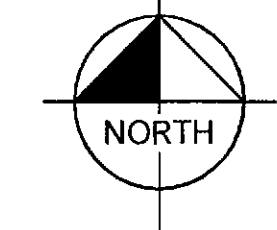
- ① INSTALL 8" SDR 35 PVC PRIVATE SEWER MAIN, LENGTH AND SLOPE PER PLAN.
- ② INSTALL SEWER CLEANOUT PER MAG STD DET 441, INVERT PER PLAN.
- ③ CONNECT TO BUILDING SEWER AT TWO-WAY CLEANOUT, INVERT PER PLAN.
- ⑤ INSTALL 48" SEWER MANHOLE PER MAG STD DET 420-2, INVERTS PER PLAN.
- ⑥ INSTALL 6" SDR 35 PVC SEWER SERVICE, LENGTH AND SLOPE PER PLAN.
- ⑦ INSTALL 4" SDR 35 PVC SEWER SERVICE, LENGTH AND SLOPE PER PLAN.
- ⑧ INSTALL "WYE" CONNECTION, INVERT PER PLAN.
- ⑨ CONNECT TO EXISTING MANHOLE, INVERT PER PLAN.

- 1 PROPOSED SES LOCATION. REF MEP PLANS FOR CONTINUATION.
- 2 PROPOSED TRANSFORMER LOCATION, REF APS PLANS FOR TRANSFORMER DETAILS.
- 3 ELECTRICAL SECONDARY ROUTING, REF APS PLANS FOR TRENCHING AND CONDUIT DETAILS.

1. ADD 1800 TO ALL ELEVATIONS.
2. ALL ELEVATIONS ARE INVERT ELEVATIONS, UNLESS OTHERWISE NOTED.
3. REFER TO SHEET C2 FOR LEGEND.
4. ALL MATERIALS COMING INTO CONTACT WITH POTABLE WATER MUST MEET NSF STANDARDS 60/61 IN ACCORDANCE WITH AAC R18-4-213.



KEY MAP
N.T.S.



**CALL TWO WORKING DAYS
BEFORE YOU DIE**

602-263-1100

1-800-STAKE-IT

(OUTSIDE MARICOPA COUNTY)

Kimley»»Horn © 2015
7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

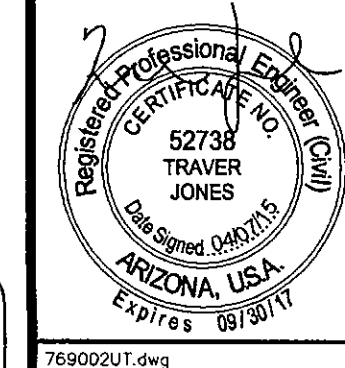
Mark  Taylor

SEC SCOTTSDALE ROAD AND SILVERSTONE DRIVE

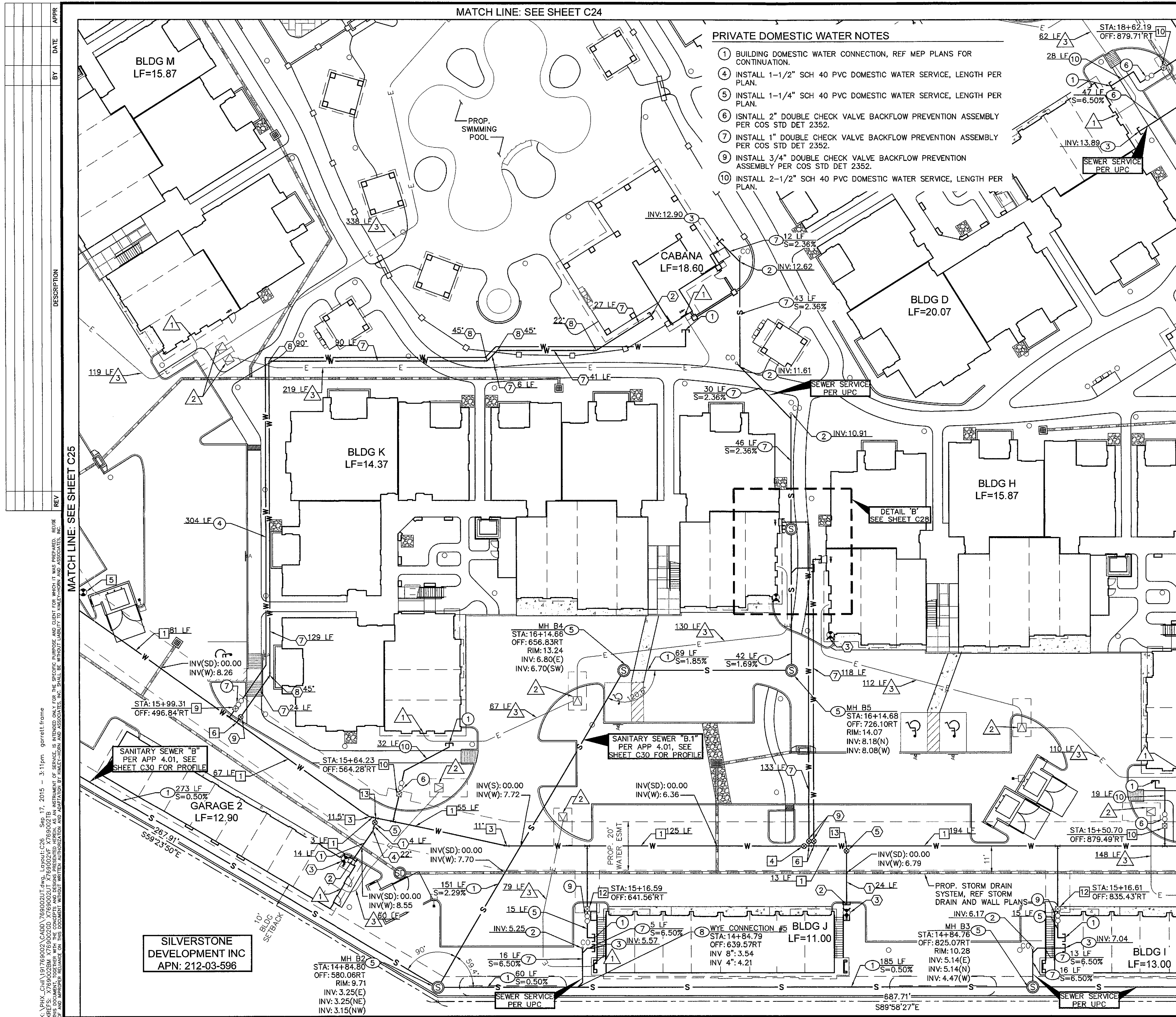
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SCOTTSDALE, ARIZONA

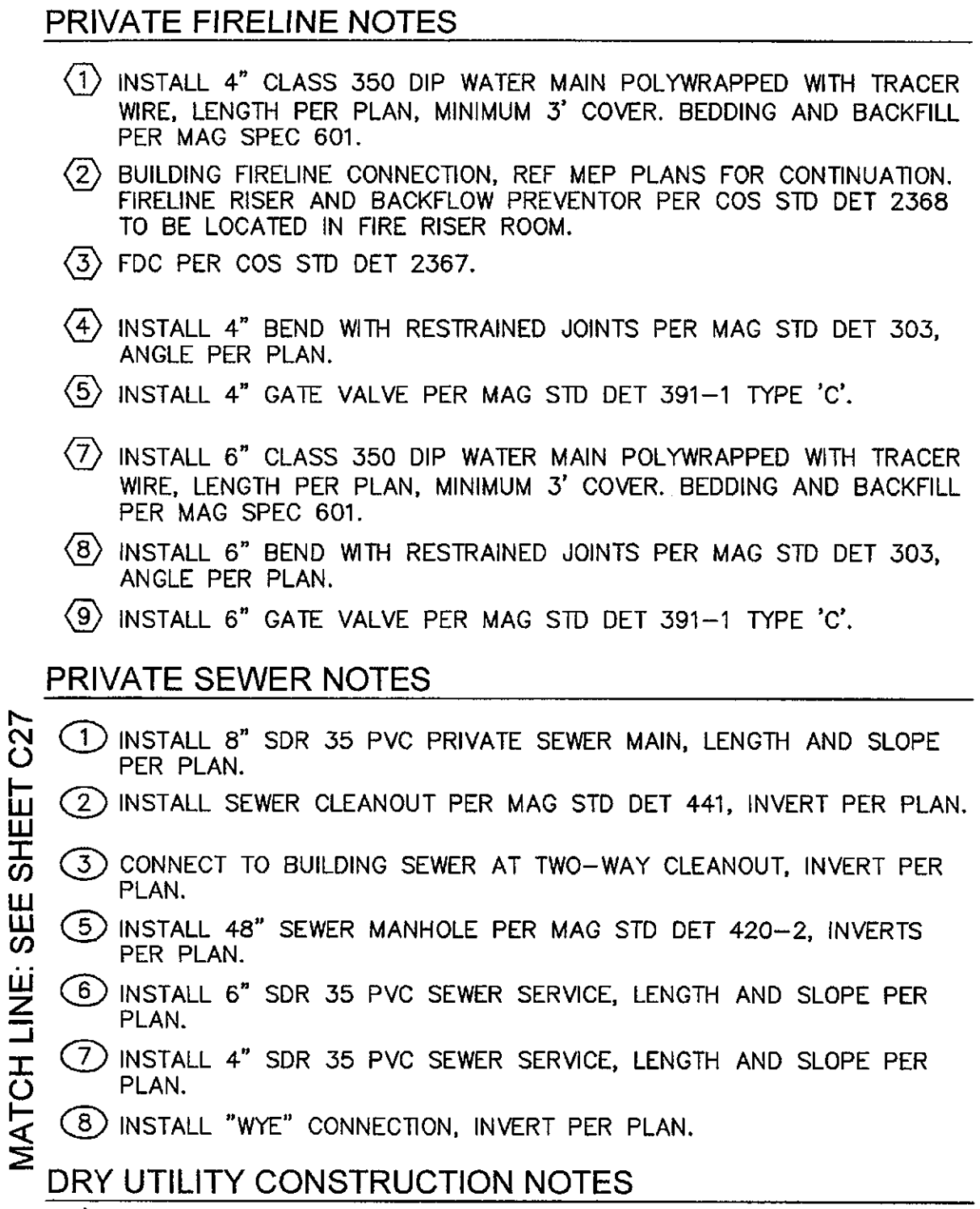
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DESIGN BY: TMJ
CHECK BY: SEH
DATE: 09/17/15



C25
25 OF 44 SHEETS



- PUBLIC WATER MAIN NOTES**
1. INSTALL 8" CLASS 350 DIP WATER MAIN POLYWRAPPED, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
 3. INSTALL 8" BEND WITH RESTRAINED JOINTS PER MAG STD DET 303, ANGLE PER PLAN.
 4. INSTALL 8" WATER MAIN GATE VALVE PER MAG STD DET 391-1 TYPE 'C'.
 5. INSTALL FIRE HYDRANT ASSEMBLY PER MAG STD DET 360.
 6. INSTALL 8"x6" TEE WITH RESTRAINED JOINTS PER MAG STD DET 303.
 9. INSTALL 1" WATER SERVICE LINE CONNECTION PER COS STD DET 2330. METER TO BE INSTALLED BY CITY FORCES.
 10. INSTALL 2" WATER SERVICE LINE CONNECTION PER COS STD DET 2330. METER TO BE INSTALLED BY CITY FORCES.
 12. INSTALL 3/4" WATER SERVICE LINE CONNECTION PER COS STD DET 2330. METER TO BE INSTALLED BY CITY FORCES.
 13. INSTALL 8"x4" TEE WITH RESTRAINED JOINTS PER MAG STD DET 303.
- PRIVATE FIRELINE NOTES**
1. INSTALL 4" CLASS 350 DIP WATER MAIN POLYWRAPPED WITH TRACER WIRE, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
 2. BUILDING FIRELINE CONNECTION, REF MEP PLANS FOR CONTINUATION. FIRELINE RISER AND BACKFLOW PREVENTOR PER COS STD DET 2368 TO BE LOCATED IN FIRE RISER ROOM.
 3. FDC PER COS STD DET 2367.
 4. INSTALL 4" BEND WITH RESTRAINED JOINTS PER MAG STD DET 303, ANGLE PER PLAN.
 5. INSTALL 4" GATE VALVE PER MAG STD DET 391-1 TYPE 'C'.
 7. INSTALL 6" CLASS 350 DIP WATER MAIN POLYWRAPPED WITH TRACER WIRE, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
 8. INSTALL 6" BEND WITH RESTRAINED JOINTS PER MAG STD DET 303, ANGLE PER PLAN.
 9. INSTALL 6" GATE VALVE PER MAG STD DET 391-1 TYPE 'C'.
- PRIVATE SEWER NOTES**
1. INSTALL 8" SDR 35 PVC PRIVATE SEWER MAIN, LENGTH AND SLOPE PER PLAN.
 2. INSTALL SEWER CLEANOUT PER MAG STD DET 441, INVERT PER PLAN.
 3. CONNECT TO BUILDING SEWER AT TWO-WAY CLEANOUT, INVERT PER PLAN.
 5. INSTALL 48" SEWER MANHOLE PER MAG STD DET 420-2, INVERTS PER PLAN.
 6. INSTALL 6" SDR 35 PVC SEWER SERVICE, LENGTH AND SLOPE PER PLAN.
 7. INSTALL 4" SDR 35 PVC SEWER SERVICE, LENGTH AND SLOPE PER PLAN.
 8. INSTALL "WYE" CONNECTION, INVERT PER PLAN.
- DRY UTILITY CONSTRUCTION NOTES**
1. PROPOSED SES LOCATION, REF MEP PLANS FOR CONTINUATION.
 2. PROPOSED TRANSFORMER LOCATION, REF APS PLANS FOR TRANSFORMER DETAILS.
 3. ELECTRICAL SECONDARY ROUTING, REF APS PLANS FOR TRENCHING AND CONDUIT DETAILS.



NOTES

1. ADD 1800 TO ALL ELEVATIONS.
2. ALL ELEVATIONS ARE INVERT ELEVATIONS, UNLESS OTHERWISE NOTED.
3. REFER TO SHEET C2 FOR LEGEND.
4. ALL MATERIALS COMING INTO CONTACT WITH POTABLE WATER MUST MEET NSF STANDARDS 60/61 IN ACCORDANCE WITH AAC R18-4-213.

KEY MAP
N.T.S.

GRAPHIC SCALE IN FEET
0 10 20 40

602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

Kimley»Horn
©2015
7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

Mark Taylor

UTILITY PLAN
SCOTTSDALE, ARIZONA

PROJECT No.
191769002

SCALE (H): 1"=20'

SCALE (V): NONE

DRAWN BY: CGF

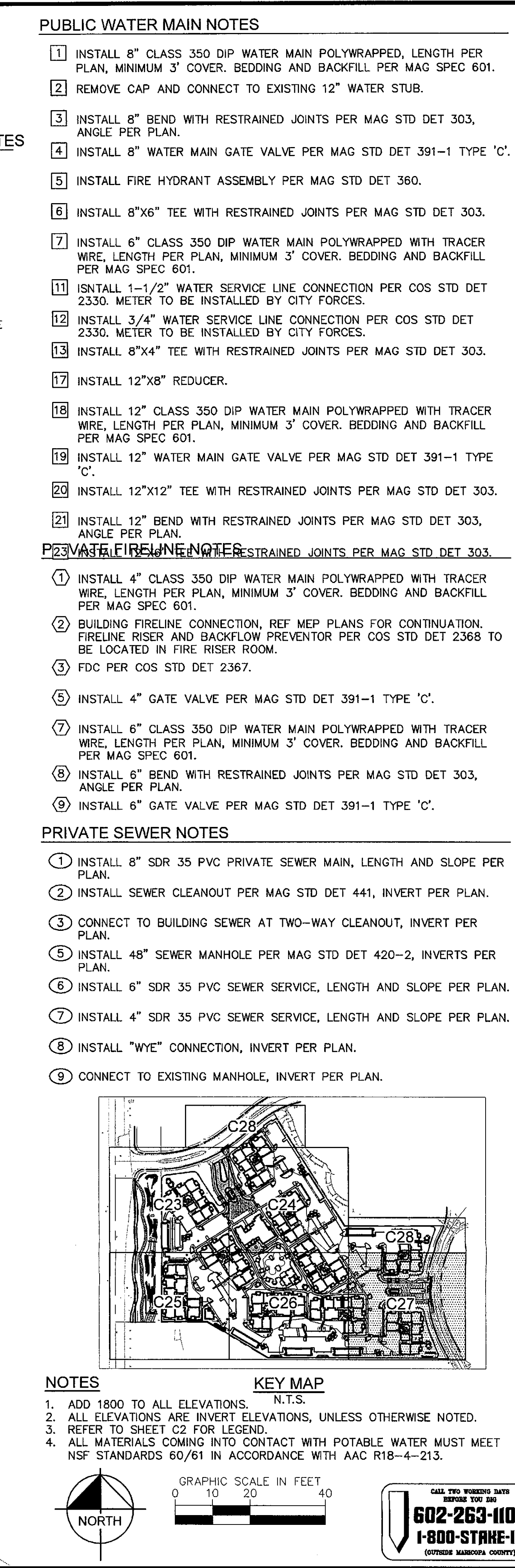
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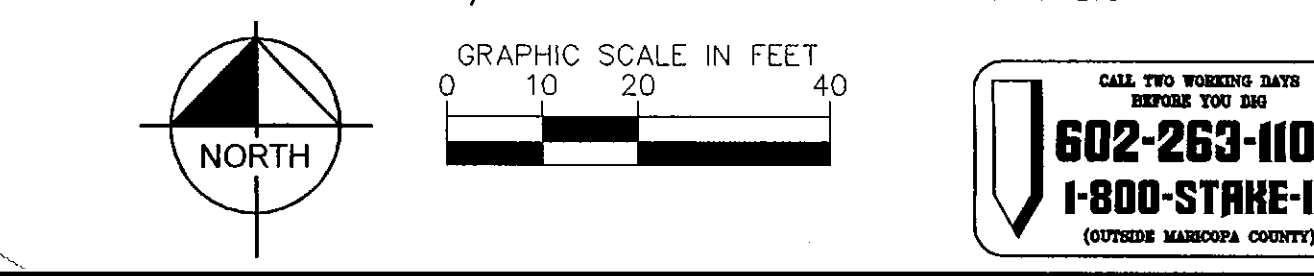
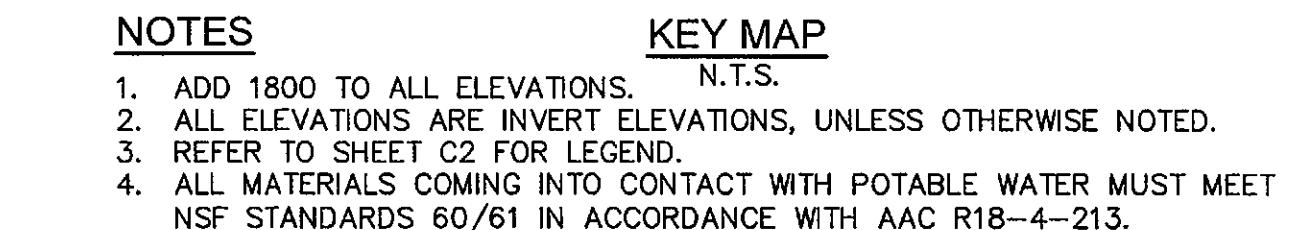
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C26
26 OF 44 SHEETS

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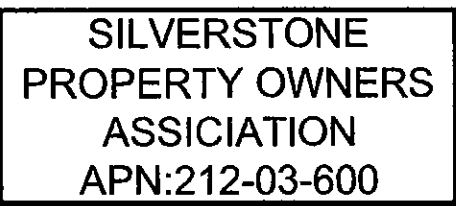


- ① INSTALL 8" SDR 35 PVC PRIVATE SEWER MAIN, LENGTH AND SLOPE PER PLAN.
- ② INSTALL SEWER CLEANOUT PER MAG STD DET 441, INVERT PER PLAN.
- ③ CONNECT TO BUILDING SEWER AT TWO-WAY CLEANOUT, INVERT PER PLAN.
- ⑤ INSTALL 48" SEWER MANHOLE PER MAG STD DET 420-2, INVERTS PER PLAN.
- ⑥ INSTALL 6" SDR 35 PVC SEWER SERVICE, LENGTH AND SLOPE PER PLAN.
- ⑦ INSTALL 4" SDR 35 PVC SEWER SERVICE, LENGTH AND SLOPE PER PLAN.
- ⑧ INSTALL "WYE" CONNECTION, INVERT PER PLAN.
- ⑨ CONNECT TO EXISTING MANHOLE, INVERT PER PLAN.



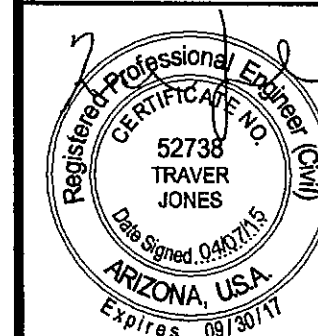
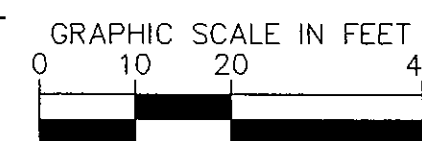
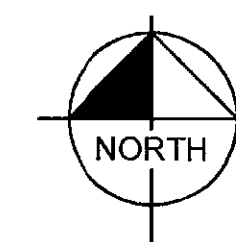
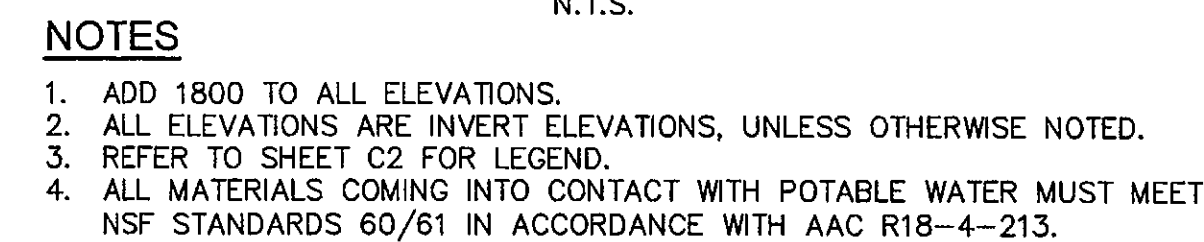
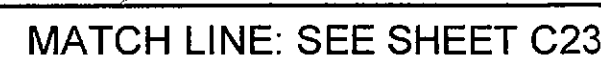
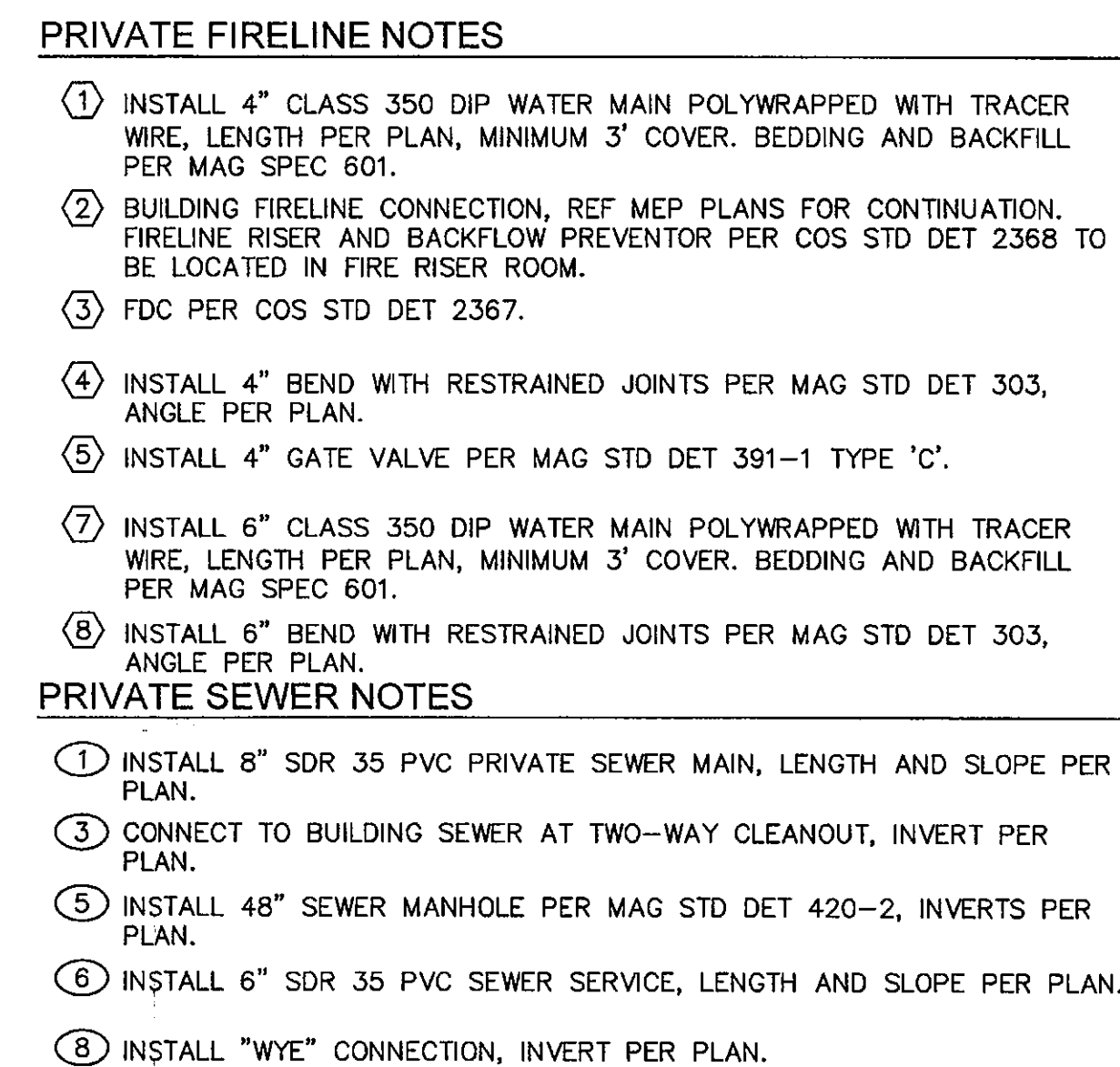
0 T	SEC SCOTTSDALE ROAD AND SILVERSTONE DRIVE		Kimley»»Horn^{©2015} 7740 North 16th Street, Suite 300 Phoenix, Arizona 85020 (602) 944-5500	
	UTILITY PLAN		Mark Taylor	
	SCOTTSDALE, ARIZONA			
	PROJECT NO. 191769002			
	SCALE (H): 1"=20'			
	SCALE (V): NONE			
	DRAWN BY: CGF			
	DESIGN BY: TMJ			
	CHECK BY: SEH			
	DATE: 09/17/15			
76900201.dwg				
C27				
27 OF 44 SHEETS				

KIMLEY-HORN AND ASSOCIATES, INC., SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.



- PRIVATE DOMESTIC WATER NOTES

- ## DRY UTILITY CONSTRUCTION NOTES



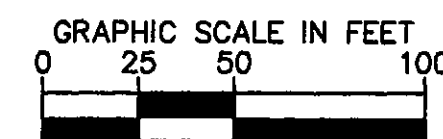
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SCALE (V): NONE
DRAWN BY: CGF
DESIGN BY: TMJ
CHECK BY: SEH
DATE: 09/17/15

SCOTTSDALE ROAD AND SILVER
UTILITY PLAN
SCOTTSDALE, ARIZONA

Mark Taylor

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Phoenix, Arizona 85020 (602) 944-5500

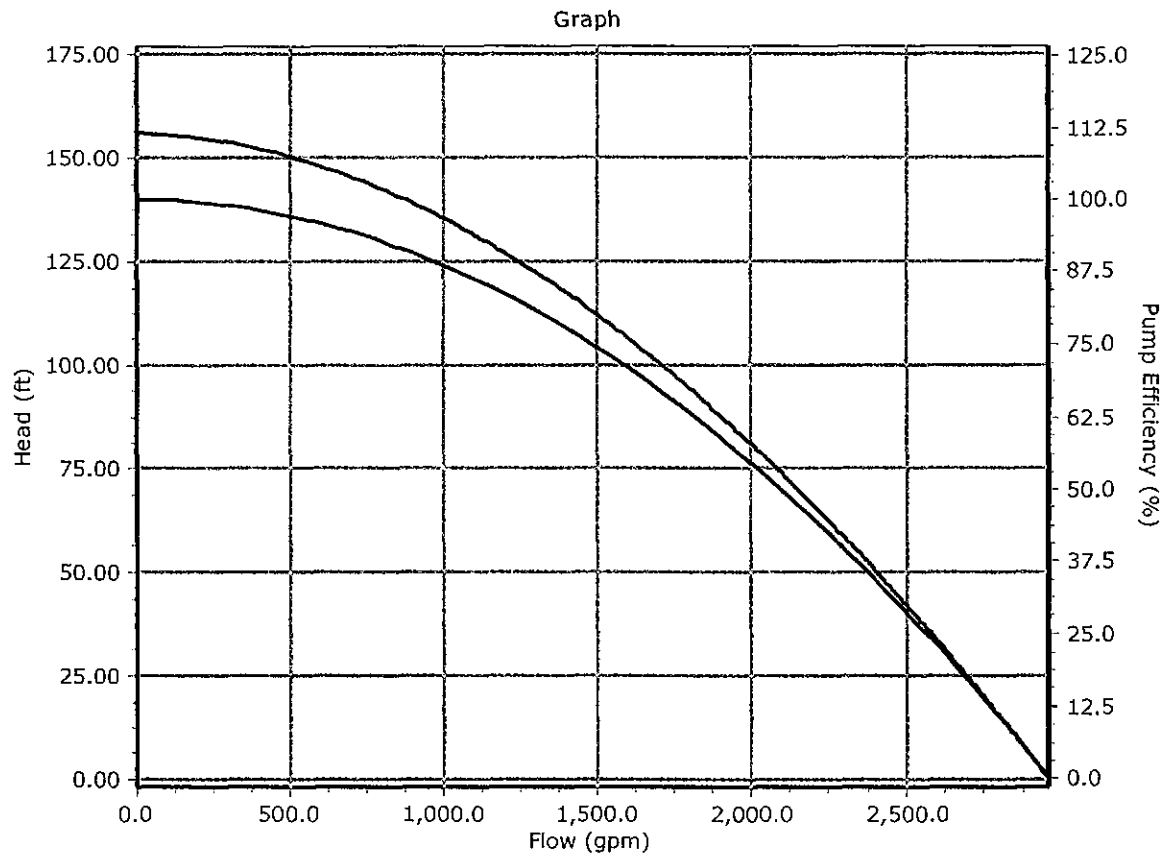
Appendix D
WaterCAD Analysis



07-11-2014 Fire Flow Test **Pump Report**

Element Details			
ID	42	Notes	
Label	07-11-2014 Flow Test		
Pump Definition Type			
Pump Definition Type	Standard (3 Point)	Design Head	93.60 ft
Shutoff Flow	0.0 gpm	Maximum Operating Flow	2,453.0 gpm
Shutoff Head	155.90 ft	Maximum Operating Head	46.20 ft
Design Flow	1,808.0 gpm		
Pump Efficiency			
Pump Efficiency	Best Efficiency Point	Motor Efficiency	100.0 %
BEP Efficiency	100.0 %	Is Variable Speed Drive?	False
BEP Flow	0.0 gpm		
Transient (Physical)			
Inertia (Pump and Motor)	0.000 lb·ft ²	Specific Speed	SI=25, US=1280
Speed (Full)	0 rpm	Reverse Spin Allowed?	True

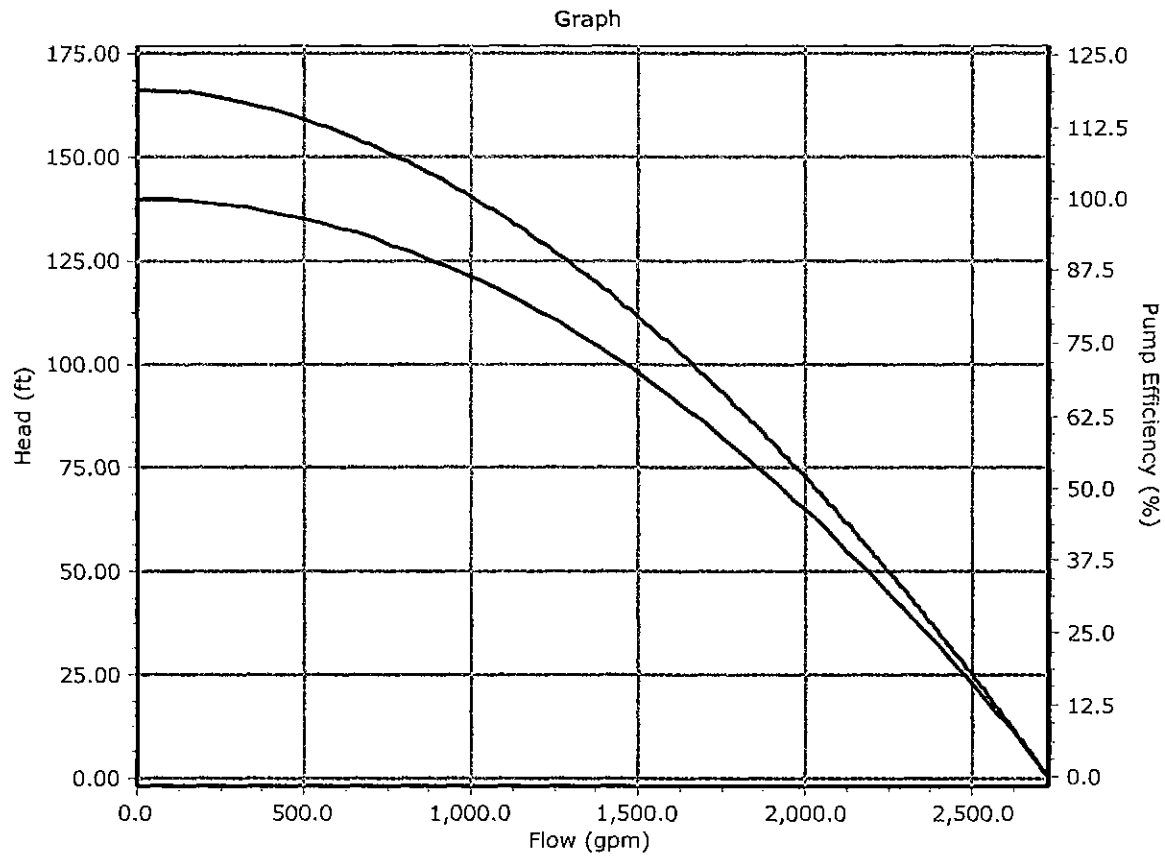
07-11-2014 Fire Flow Test Pump Report



02-09-2015 Fire Flow Test Pump Report

Element Details			
ID	166	Notes	
Label	02-09-2015 Flow Test		
Pump Definition Type			
Pump Definition Type	Standard (3 Point)	Design Head	92.40 ft
Shutoff Flow	0.0 gpm	Maximum Operating Flow	2,288.0 gpm
Shutoff Head	166.32 ft	Maximum Operating Head	46.20 ft
Design Flow	1,760.0 gpm		
Pump Efficiency			
Pump Efficiency	Best Efficiency Point	Motor Efficiency	100.0 %
BEP Efficiency	100.0 %	Is Variable Speed Drive?	False
BEP Flow	0.0 gpm		
Transient (Physical)			
Inertia (Pump and Motor)	0.000 lb·ft²	Specific Speed	SI=25, US=1280
Speed (Full)	0 rpm	Reverse Spin Allowed?	True

02-09-2015 Fire Flow Test Pump Report



Average Day Demand Node Report

Current Time: 0.000 hours

Label	Demand (gpm)	Pressure (psi)	Elevation (ft)	Flow (Total Available) (gpm)	Velocity (Upper Limit) (ft/s)
BLDG A	5	71.4	20.10	881	10.00
BLDG B	3	69.5	24.70	881	10.00
BLDG C	3	71.0	21.17	881	10.00
BLDG D	4	71.5	20.07	881	10.00
BLDG E	0	71.2	20.60	392	10.00
BLDG F	3	69.5	24.57	881	10.00
BLDG G	3	72.2	18.37	881	10.00
BLDG H	4	73.3	15.87	881	10.00
BLDG I	0	74.5	13.10	392	10.00
BLDG J	0	75.4	11.00	392	10.00
BLDG K	4	73.8	14.77	881	10.00
BLDG L	2	73.0	16.47	881	10.00
BLDG M	4	71.9	18.97	881	10.00
BLDG N	0	73.0	16.60	881	10.00
BLDG O	3	72.1	18.67	881	10.00
CABANA	0	72.1	18.60	881	10.00
J-1	5	75.8	10.00	3,195	10.00
J-2	0	73.9	14.50	3,132	10.00
J-3	0	72.8	17.00	2,101	10.00
J-4	0	73.4	15.60	3,093	10.00
J-5	0	74.0	14.30	3,090	10.00
J-6	0	75.0	11.80	3,084	10.00
J-6	0	74.5	13.00	3,088	10.00
J-7	0	75.2	11.40	3,084	10.00
J-8	0	75.5	10.70	2,304	10.00
J-9	0	75.7	10.30	2,396	10.00
J-10	0	75.9	9.90	2,488	10.00
J-11	0	76.5	8.40	2,699	10.00
J-12	0	76.6	8.20	2,864	10.00
J-13	0	77.2	6.80	2,746	10.00
J-14	0	76.2	9.00	2,382	10.00
J-15	0	76.1	9.30	2,266	10.00
J-16	0	75.1	11.70	2,132	10.00
J-17	0	75.0	11.90	2,011	10.00
J-18	0	75.0	11.80	3,049	10.00
J-19	0	75.1	11.60	3,055	10.00
J-20	0	75.0	12.00	3,056	10.00
J-21	0	74.1	14.00	3,064	10.00
J-22	0	73.4	15.50	3,069	10.00
J-23	0	72.8	17.00	3,072	10.00
J-24	0	72.4	18.00	3,073	10.00
J-25	0	72.3	18.20	3,076	10.00
J-26	0	73.2	16.10	3,089	10.00
J-45	0	70.8	21.66	2,511	10.00
J-46	0	71.3	20.50	3,036	10.00
J-47	0	73.9	14.40	3,018	10.00
J-48	0	74.3	13.50	3,269	10.00
J-49	0	76.7	7.90	1,567	10.00
MAINTENANCE	1	73.9	14.50	392	10.00

Average Day Demand Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Diameter (in)	Length (ft)	Material	Hazen- Williams C	Velocity (ft/s)	Headloss Gradient (ft/ft)	Flow (gpm)	Is Open?
P-1	H-1	J-1	185.24	185.24	6.0	18	Ductile Iron	130.0	0.00	0.000	0.0	True
P-2	J-1	J-2	185.24	185.24	12.0	295	Ductile Iron	130.0	0.01	0.000	-4.7	True
P-3	J-2	J-3	185.24	185.24	8.0	132	Ductile Iron	130.0	0.04	0.000	-7.0	True
P-4	J-3	H-2	185.24	185.24	6.0	19	Ductile Iron	130.0	0.00	0.000	0.0	True
P-5	PMP-1	J-1	185.24	185.24	100.0	1	Ductile Iron	130.0	0.00	0.000	0.0	True
P-6	R-1	PMP-1	17.00	17.00	100.0	1	Ductile Iron	130.0	0.00	0.000	0.0	True
P-7	J-2	J-4	185.24	185.24	12.0	277	Ductile Iron	130.0	0.01	0.000	2.3	True
P-8	J-4	J-5	185.24	185.24	12.0	81	Ductile Iron	130.0	0.03	0.000	9.2	True
P-10	J-6	J-7	185.24	185.24	12.0	29	Ductile Iron	130.0	0.02	0.000	5.8	True
P-11	J-7	J-8	185.24	185.24	8.0	145	Ductile Iron	130.0	0.01	0.000	2.1	True
P-12	J-8	J-9	185.24	185.24	8.0	39	Ductile Iron	130.0	0.00	0.000	-0.2	True
P-13	J-9	J-10	185.24	185.24	8.0	39	Ductile Iron	130.0	0.01	0.000	-0.8	True
P-14	J-10	J-11	185.24	185.24	8.0	85	Ductile Iron	130.0	0.01	0.000	-0.8	True
P-15	J-11	J-12	185.24	185.24	8.0	61	Ductile Iron	130.0	0.01	0.000	-1.1	True
P-16	J-12	J-13	185.24	185.24	8.0	209	Ductile Iron	130.0	0.03	0.000	-4.8	True
P-17	J-13	J-14	185.24	185.24	8.0	146	Ductile Iron	130.0	0.03	0.000	-5.1	True
P-18	J-14	J-15	185.24	185.24	8.0	48	Ductile Iron	130.0	0.06	0.000	-8.8	True
P-19	J-15	J-16	185.24	185.24	8.0	55	Ductile Iron	130.0	0.06	0.000	-9.1	True
P-20	J-16	J-17	185.24	185.24	8.0	46	Ductile Iron	130.0	0.06	0.000	-9.1	True
P-21	J-17	J-18	185.24	185.24	8.0	84	Ductile Iron	130.0	0.08	0.000	-12.2	True
P-22	J-18	J-19	185.24	185.24	12.0	64	Ductile Iron	130.0	0.07	0.000	24.9	True
P-23	J-19	J-20	185.24	185.24	12.0	14	Ductile Iron	130.0	0.07	0.000	24.9	True
P-24	J-20	J-21	185.24	185.24	12.0	105	Ductile Iron	130.0	0.06	0.000	21.8	True
P-25	J-21	J-22	185.24	185.24	12.0	97	Ductile Iron	130.0	0.05	0.000	18.1	True
P-26	J-22	J-23	185.24	185.24	12.0	113	Ductile Iron	130.0	0.05	0.000	17.8	True
P-27	J-23	J-24	185.24	185.24	12.0	87	Ductile Iron	130.0	0.05	0.000	17.8	True
P-28	J-24	J-25	185.24	185.24	12.0	97	Ductile Iron	130.0	0.04	0.000	14.7	True
P-29	J-25	J-26	185.24	185.24	12.0	178	Ductile Iron	130.0	0.03	0.000	11.6	True

Average Day Demand Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Diameter (in)	Length (ft)	Material	Hazen- Williams C	Velocity (ft/s)	Headloss Gradient (ft/ft)	Flow (gpm)	Is Open?
P-30	J-26	J-4	185.24	185.24	12.0	42	Ductile Iron	130.0	0.02	0.000	6.9	True
P-31	J-5	J-6	185.24	185.24	12.0	84	Ductile Iron	130.0	0.03	0.000	9.2	True
P-32	J-6	J-6	185.24	185.24	12.0	171	Ductile Iron	130.0	0.02	0.000	6.1	True
P-33	J-6	BLDG O	185.24	185.24	6.0	30	Ductile Iron	130.0	0.04	0.000	3.1	True
P-34	J-6	BLDG N	185.24	185.24	6.0	153	Ductile Iron	130.0	0.00	0.000	0.3	True
P-35	J-7	BLDG M	185.24	185.24	6.0	32	Ductile Iron	130.0	0.04	0.000	3.7	True
P-36	J-8	BLDG L	185.24	185.24	6.0	75	Ductile Iron	130.0	0.03	0.000	2.3	True
P-37	J-9	MAINTENANCE	185.24	185.24	4.0	48	Ductile Iron	130.0	0.02	0.000	0.6	True
P-38	J-11	CABANA	185.24	185.24	6.0	312	Ductile Iron	130.0	0.00	0.000	0.3	True
P-39	J-12	BLDG K	185.24	185.24	6.0	31	Ductile Iron	130.0	0.04	0.000	3.7	True
P-40	J-13	BLDG J	185.24	185.24	4.0	34	Ductile Iron	130.0	0.01	0.000	0.3	True
P-41	J-14	BLDG H	185.24	185.24	6.0	27	Ductile Iron	130.0	0.04	0.000	3.7	True
P-42	J-15	BLDG I	185.24	185.24	4.0	32	Ductile Iron	130.0	0.01	0.000	0.3	True
P-43	J-16	H-5	185.24	185.24	6.0	23	Ductile Iron	130.0	0.00	0.000	0.0	True
P-44	J-10	H-4	185.24	185.24	6.0	6	Ductile Iron	130.0	0.00	0.000	0.0	True
P-45	H-3	J-5	185.24	185.24	6.0	12	Ductile Iron	130.0	0.00	0.000	0.0	True
P-46	J-17	BLDG G	185.24	185.24	6.0	29	Ductile Iron	130.0	0.04	0.000	3.1	True
P-47	J-19	H-6	185.24	185.24	6.0	58	Ductile Iron	130.0	0.00	0.000	0.0	True
P-48	J-20	BLDG F	185.24	185.24	6.0	132	Ductile Iron	130.0	0.04	0.000	3.1	True
P-49	BLDG D	J-21	185.24	185.24	6.0	27	Ductile Iron	130.0	0.04	0.000	-3.7	True
P-50	BLDG E	J-22	185.24	185.24	4.0	40	Ductile Iron	130.0	0.01	0.000	-0.3	True
P-51	H-7	J-23	185.24	185.24	6.0	8	Ductile Iron	130.0	0.00	0.000	0.0	True
P-52	BLDG C	J-24	185.24	185.24	6.0	31	Ductile Iron	130.0	0.04	0.000	-3.1	True
P-53	BLDG B	J-25	185.24	185.24	6.0	190	Ductile Iron	130.0	0.04	0.000	-3.1	True
P-54	BLDG A	J-26	185.24	185.24	6.0	83	Ductile Iron	130.0	0.05	0.000	-4.7	True
P-55	J-3	J-45	185.24	185.24	8.0	217	Ductile Iron	130.0	0.04	0.000	-7.0	True
P-56	J-45	J-46	185.24	185.24	8.0	854	Ductile Iron	130.0	0.04	0.000	-7.0	True
P-57	J-46	J-47	185.24	185.24	12.0	426	Ductile Iron	130.0	0.02	0.000	-7.0	True

Average Day Demand Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Diameter (in)	Length (ft)	Material	Hazen- Williams C	Velocity (ft/s)	Headloss Gradient (ft/ft)	Flow (gpm)	Is Open?
P-58	J-47	J-18	185.24	185.24	12.0	229	Ductile Iron	130.0	0.11	0.000	37.1	True
P-59	H-8	J-48	185.24	185.24	6.0	54	Ductile Iron	130.0	0.00	0.000	0.0	True
P-60	J-48	J-49	185.24	185.24	8.0	259	Ductile Iron	130.0	0.00	0.000	0.0	True
P-61	J-49	H-9	185.24	185.24	6.0	31	Ductile Iron	130.0	0.00	0.000	0.0	True
P-62	PMP-2	J-48	185.24	185.24	100.0	1	Ductile Iron	130.0	0.00	0.000	44.1	True
P-63	R-2	PMP-2	19.00	19.00	100.0	1	Ductile Iron	130.0	0.00	0.000	44.1	True
P-64	J-47	J-48	185.24	185.24	8.0	32	Ductile Iron	130.0	0.28	0.000	-44.1	True

Max Day Demand Node Report

Current Time: 0.000 hours

Label	Demand (gpm)	Pressure (psi)	Elevation (ft)	Flow (Total Available) (gpm)	Velocity (Upper Limit) (ft/s)
BLDG A	9.4	71.4	20.10	881.3	10.00
BLDG B	6.2	69.4	24.70	881.3	10.00
BLDG C	6.2	70.9	21.17	881.3	10.00
BLDG D	7.4	71.4	20.07	881.3	10.00
BLDG E	0.6	71.1	20.60	391.7	10.00
BLDG F	6.2	69.4	24.57	881.3	10.00
BLDG G	6.2	72.1	18.37	881.3	10.00
BLDG H	7.4	73.2	15.87	881.3	10.00
BLDG I	0.6	74.4	13.10	391.7	10.00
BLDG J	0.6	75.3	11.00	391.7	10.00
BLDG K	7.4	73.7	14.77	881.3	10.00
BLDG L	4.6	72.9	16.47	881.3	10.00
BLDG M	7.4	71.8	18.97	881.3	10.00
BLDG N	0.6	72.9	16.60	881.3	10.00
BLDG O	6.2	72.0	18.67	881.3	10.00
CABANA	0.6	72.0	18.60	881.3	10.00
J-1	9.4	75.7	10.00	3,152.8	10.00
J-2	0.0	73.8	14.50	3,086.4	10.00
J-3	0.0	72.7	17.00	2,100.9	10.00
J-4	0.0	73.3	15.60	3,048.6	10.00
J-5	0.0	73.9	14.30	3,045.8	10.00
J-6	0.0	74.9	11.80	3,040.1	10.00
J-6	0.0	74.4	13.00	3,043.5	10.00
J-7	0.0	75.1	11.40	3,039.7	10.00
J-8	0.0	75.4	10.70	2,297.0	10.00
J-9	0.0	75.6	10.30	2,388.4	10.00
J-10	0.0	75.8	9.90	2,480.1	10.00
J-11	0.0	76.4	8.40	2,690.3	10.00
J-12	0.0	76.5	8.20	2,853.9	10.00
J-13	0.0	77.1	6.80	2,731.7	10.00
J-14	0.0	76.2	9.00	2,369.7	10.00
J-15	0.0	76.0	9.30	2,255.4	10.00
J-16	0.0	75.0	11.70	2,121.7	10.00
J-17	0.0	74.9	11.90	2,001.5	10.00
J-18	0.0	74.9	11.80	3,005.6	10.00
J-19	0.0	75.0	11.60	3,011.6	10.00
J-20	0.0	74.9	12.00	3,012.8	10.00
J-21	0.0	74.0	14.00	3,020.4	10.00
J-22	0.0	73.3	15.50	3,025.3	10.00
J-23	0.0	72.7	17.00	3,028.0	10.00
J-24	0.0	72.3	18.00	3,029.2	10.00
J-25	0.0	72.2	18.20	3,032.5	10.00
J-26	0.0	73.1	16.10	3,044.7	10.00
J-45	0.0	70.7	21.66	2,511.2	10.00
J-46	0.0	71.2	20.50	2,992.9	10.00
J-47	0.0	73.8	14.40	2,975.4	10.00
J-48	0.0	74.2	13.50	3,304.7	10.00
J-49	0.0	76.6	7.90	1,566.7	10.00
MAINTENANCE	1.2	73.8	14.50	391.7	10.00

Max Day Demand Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Diameter (in)	Length (ft)	Material	Hazen- Williams C	Velocity (ft/s)	Headloss Gradient (ft/ft)	Flow (gpm)	Is Open?
P-1	H-1	J-1	185.01	185.01	6.0	18	Ductile Iron	130.0	0.00	0.000	0.0	True
P-2	J-1	J-2	185.01	185.01	12.0	295	Ductile Iron	130.0	0.03	0.000	-9.4	True
P-3	J-2	J-3	185.01	185.02	8.0	132	Ductile Iron	130.0	0.09	0.000	-14.1	True
P-4	J-3	H-2	185.02	185.02	6.0	19	Ductile Iron	130.0	0.00	0.000	0.0	True
P-5	PMP-1	J-1	185.01	185.01	100.0	1	Ductile Iron	130.0	0.00	0.000	0.0	True
P-6	R-1	PMP-1	17.00	17.00	100.0	1	Ductile Iron	130.0	0.00	0.000	0.0	True
P-7	J-2	J-4	185.01	185.01	12.0	277	Ductile Iron	130.0	0.01	0.000	4.7	True
P-8	J-4	J-5	185.01	185.01	12.0	81	Ductile Iron	130.0	0.05	0.000	18.4	True
P-10	J-6	J-7	185.01	185.01	12.0	29	Ductile Iron	130.0	0.03	0.000	11.6	True
P-11	J-7	J-8	185.01	185.01	8.0	145	Ductile Iron	130.0	0.03	0.000	4.2	True
P-12	J-8	J-9	185.01	185.01	8.0	39	Ductile Iron	130.0	0.00	0.000	-0.4	True
P-13	J-9	J-10	185.01	185.01	8.0	39	Ductile Iron	130.0	0.01	0.000	-1.6	True
P-14	J-10	J-11	185.01	185.01	8.0	85	Ductile Iron	130.0	0.01	0.000	-1.6	True
P-15	J-11	J-12	185.01	185.01	8.0	61	Ductile Iron	130.0	0.01	0.000	-2.2	True
P-16	J-12	J-13	185.01	185.01	8.0	209	Ductile Iron	130.0	0.06	0.000	-9.6	True
P-17	J-13	J-14	185.01	185.02	8.0	146	Ductile Iron	130.0	0.07	0.000	-10.2	True
P-18	J-14	J-15	185.02	185.02	8.0	48	Ductile Iron	130.0	0.11	0.000	-17.6	True
P-19	J-15	J-16	185.02	185.02	8.0	55	Ductile Iron	130.0	0.12	0.000	-18.2	True
P-20	J-16	J-17	185.02	185.02	8.0	46	Ductile Iron	130.0	0.12	0.000	-18.2	True
P-21	J-17	J-18	185.02	185.02	8.0	84	Ductile Iron	130.0	0.16	0.000	-24.4	True
P-22	J-18	J-19	185.02	185.02	12.0	64	Ductile Iron	130.0	0.14	0.000	49.7	True
P-23	J-19	J-20	185.02	185.02	12.0	14	Ductile Iron	130.0	0.14	0.000	49.7	True
P-24	J-20	J-21	185.02	185.02	12.0	105	Ductile Iron	130.0	0.12	0.000	43.5	True
P-25	J-21	J-22	185.02	185.02	12.0	97	Ductile Iron	130.0	0.10	0.000	36.1	True
P-26	J-22	J-23	185.02	185.02	12.0	113	Ductile Iron	130.0	0.10	0.000	35.5	True
P-27	J-23	J-24	185.02	185.02	12.0	87	Ductile Iron	130.0	0.10	0.000	35.5	True
P-28	J-24	J-25	185.02	185.01	12.0	97	Ductile Iron	130.0	0.08	0.000	29.3	True
P-29	J-25	J-26	185.01	185.01	12.0	178	Ductile Iron	130.0	0.07	0.000	23.1	True

Max Day Demand

Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Diameter (in)	Length (ft)	Material	Hazen- Williams C	Velocity (ft/s)	Headloss Gradient (ft/ft)	Flow (gpm)	Is Open?
P-30	J-26	J-4	185.01	185.01	12.0	42	Ductile Iron	130.0	0.04	0.000	13.7	True
P-31	J-5	J-6	185.01	185.01	12.0	84	Ductile Iron	130.0	0.05	0.000	18.4	True
P-32	J-6	J-6	185.01	185.01	12.0	171	Ductile Iron	130.0	0.03	0.000	12.2	True
P-33	J-6	BLDG O	185.01	185.01	6.0	30	Ductile Iron	130.0	0.07	0.000	6.2	True
P-34	J-6	BLDG N	185.01	185.01	6.0	153	Ductile Iron	130.0	0.01	0.000	0.6	True
P-35	J-7	BLDG M	185.01	185.01	6.0	32	Ductile Iron	130.0	0.08	0.000	7.4	True
P-36	J-8	BLDG L	185.01	185.01	6.0	75	Ductile Iron	130.0	0.05	0.000	4.6	True
P-37	J-9	MAINTENANCE	185.01	185.01	4.0	48	Ductile Iron	130.0	0.03	0.000	1.2	True
P-38	J-11	CABANA	185.01	185.01	6.0	312	Ductile Iron	130.0	0.01	0.000	0.6	True
P-39	J-12	BLDG K	185.01	185.01	6.0	31	Ductile Iron	130.0	0.08	0.000	7.4	True
P-40	J-13	BLDG J	185.01	185.01	4.0	34	Ductile Iron	130.0	0.02	0.000	0.6	True
P-41	J-14	BLDG H	185.02	185.02	6.0	27	Ductile Iron	130.0	0.08	0.000	7.4	True
P-42	J-15	BLDG I	185.02	185.02	4.0	32	Ductile Iron	130.0	0.02	0.000	0.6	True
P-43	J-16	H-5	185.02	185.02	6.0	23	Ductile Iron	130.0	0.00	0.000	0.0	True
P-44	J-10	H-4	185.01	185.01	6.0	6	Ductile Iron	130.0	0.00	0.000	0.0	True
P-45	H-3	J-5	185.01	185.01	6.0	12	Ductile Iron	130.0	0.00	0.000	0.0	True
P-46	J-17	BLDG G	185.02	185.02	6.0	29	Ductile Iron	130.0	0.07	0.000	6.2	True
P-47	J-19	H-6	185.02	185.02	6.0	58	Ductile Iron	130.0	0.00	0.000	0.0	True
P-48	J-20	BLDG F	185.02	185.02	6.0	132	Ductile Iron	130.0	0.07	0.000	6.2	True
P-49	BLDG D	J-21	185.02	185.02	6.0	27	Ductile Iron	130.0	0.08	0.000	-7.4	True
P-50	BLDG E	J-22	185.02	185.02	4.0	40	Ductile Iron	130.0	0.02	0.000	-0.6	True
P-51	H-7	J-23	185.02	185.02	6.0	8	Ductile Iron	130.0	0.00	0.000	0.0	True
P-52	BLDG C	J-24	185.02	185.02	6.0	31	Ductile Iron	130.0	0.07	0.000	-6.2	True
P-53	BLDG B	J-25	185.01	185.01	6.0	190	Ductile Iron	130.0	0.07	0.000	-6.2	True
P-54	BLDG A	J-26	185.01	185.01	6.0	83	Ductile Iron	130.0	0.11	0.000	-9.4	True
P-55	J-3	J-45	185.02	185.02	8.0	217	Ductile Iron	130.0	0.09	0.000	-14.1	True
P-56	J-45	J-46	185.02	185.02	8.0	854	Ductile Iron	130.0	0.09	0.000	-14.1	True
P-57	J-46	J-47	185.02	185.02	12.0	426	Ductile Iron	130.0	0.04	0.000	-14.1	True

Max Day Demand Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Diameter (in)	Length (ft)	Material	Hazen- Williams C	Velocity (ft/s)	Headloss Gradient (ft/ft)	Flow (gpm)	Is Open?
P-58	J-47	J-18	185.02	185.02	12.0	229	Ductile Iron	130.0	0.21	0.000	74.1	True
P-59	H-8	J-48	185.03	185.03	6.0	54	Ductile Iron	130.0	0.00	0.000	0.0	True
P-60	J-48	J-49	185.03	185.03	8.0	259	Ductile Iron	130.0	0.00	0.000	0.0	True
P-61	J-49	H-9	185.03	185.03	6.0	31	Ductile Iron	130.0	0.00	0.000	0.0	True
P-62	PMP-2	J-48	185.03	185.03	100.0	1	Ductile Iron	130.0	0.00	0.000	88.2	True
P-63	R-2	PMP-2	19.00	19.00	100.0	1	Ductile Iron	130.0	0.00	0.000	88.2	True
P-64	J-47	J-48	185.02	185.03	8.0	32	Ductile Iron	130.0	0.56	0.000	-88.2	True

Peak Hour Demand

Node Report

Current Time: 0.000 hours

Label	Demand (gpm)	Pressure (psi)	Elevation (ft)	Flow (Total Available) (gpm)	Velocity (Upper Limit) (ft/s)
BLDG A	16.5	71.2	20.10	881.3	10.00
BLDG B	10.8	69.2	24.70	881.3	10.00
BLDG C	10.8	70.7	21.17	881.3	10.00
BLDG D	12.9	71.2	20.07	881.3	10.00
BLDG E	1.0	71.0	20.60	391.7	10.00
BLDG F	10.8	69.2	24.57	881.3	10.00
BLDG G	10.8	71.9	18.37	881.3	10.00
BLDG H	12.9	73.0	15.87	881.3	10.00
BLDG I	1.0	74.2	13.10	391.7	10.00
BLDG J	1.0	75.1	11.00	391.7	10.00
BLDG K	12.9	73.5	14.77	881.3	10.00
BLDG L	8.1	72.8	16.47	881.3	10.00
BLDG M	12.9	71.7	18.97	881.3	10.00
BLDG N	1.0	72.7	16.60	881.3	10.00
BLDG O	10.8	71.8	18.67	881.3	10.00
CABANA	1.0	71.8	18.60	881.3	10.00
J-1	0.0	75.6	10.00	3,089.9	10.00
J-2	0.0	73.6	14.50	3,034.5	10.00
J-3	0.0	72.5	17.00	2,100.3	10.00
J-4	0.0	73.1	15.60	2,997.6	10.00
J-5	0.0	73.7	14.30	2,994.9	10.00
J-6	0.0	74.8	11.80	2,989.4	10.00
J-6	0.0	74.3	13.00	2,992.7	10.00
J-7	0.0	74.9	11.40	2,989.0	10.00
J-8	0.0	75.2	10.70	2,286.7	10.00
J-9	0.0	75.4	10.30	2,377.4	10.00
J-10	0.0	75.6	9.90	2,468.4	10.00
J-11	0.0	76.2	8.40	2,677.1	10.00
J-12	0.0	76.3	8.20	2,839.2	10.00
J-13	0.0	76.9	6.80	2,709.9	10.00
J-14	0.0	76.0	9.00	2,352.0	10.00
J-15	0.0	75.9	9.30	2,238.7	10.00
J-16	0.0	74.8	11.70	2,106.1	10.00
J-17	0.0	74.7	11.90	1,986.8	10.00
J-18	0.0	74.8	11.80	2,956.2	10.00
J-19	0.0	74.9	11.60	2,962.0	10.00
J-20	0.0	74.7	12.00	2,963.1	10.00
J-21	0.0	73.8	14.00	2,970.4	10.00
J-22	0.0	73.2	15.50	2,975.3	10.00
J-23	0.0	72.5	17.00	2,977.9	10.00
J-24	0.0	72.1	18.00	2,979.1	10.00
J-25	0.0	72.0	18.20	2,982.2	10.00
J-26	0.0	72.9	16.10	2,993.9	10.00
J-45	0.0	70.5	21.66	2,510.9	10.00
J-46	0.0	71.0	20.50	2,943.7	10.00
J-47	0.0	73.7	14.40	2,926.7	10.00
J-48	0.0	74.1	13.50	3,346.4	10.00
J-49	0.0	76.5	7.90	1,566.7	10.00
MAINTENANCE	2.1	73.6	14.50	391.7	10.00

Peak Hour Demand

Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Diameter (in)	Length (ft)	Material	Hazen- Williams C	Velocity (ft/s)	Headloss Gradient (ft/ft)	Flow (gpm)	Is Open?
P-1	H-1	J-1	184.62	184.62	6.0	18	Ductile Iron	130.0	0.00	0.000	0.0	True
P-2	J-1	J-2	184.62	184.62	12.0	295	Ductile Iron	130.0	0.00	0.000	0.0	True
P-3	J-2	J-3	184.62	184.62	8.0	132	Ductile Iron	130.0	0.14	0.000	-21.2	True
P-4	J-3	H-2	184.62	184.62	6.0	19	Ductile Iron	130.0	0.00	0.000	0.0	True
P-5	PMP-1	J-1	184.62	184.62	100.0	1	Ductile Iron	130.0	0.00	0.000	0.0	True
P-6	R-1	PMP-1	17.00	17.00	100.0	1	Ductile Iron	130.0	0.00	0.000	0.0	True
P-7	J-2	J-4	184.62	184.62	12.0	277	Ductile Iron	130.0	0.06	0.000	21.2	True
P-8	J-4	J-5	184.62	184.62	12.0	81	Ductile Iron	130.0	0.10	0.000	35.3	True
P-10	J-6	J-7	184.62	184.62	12.0	29	Ductile Iron	130.0	0.07	0.000	23.4	True
P-11	J-7	J-8	184.62	184.62	8.0	145	Ductile Iron	130.0	0.07	0.000	10.4	True
P-12	J-8	J-9	184.62	184.62	8.0	39	Ductile Iron	130.0	0.02	0.000	2.4	True
P-13	J-9	J-10	184.62	184.62	8.0	39	Ductile Iron	130.0	0.00	0.000	0.3	True
P-14	J-10	J-11	184.62	184.62	8.0	85	Ductile Iron	130.0	0.00	0.000	0.3	True
P-15	J-11	J-12	184.62	184.62	8.0	61	Ductile Iron	130.0	0.00	0.000	-0.8	True
P-16	J-12	J-13	184.62	184.62	8.0	209	Ductile Iron	130.0	0.09	0.000	-13.7	True
P-17	J-13	J-14	184.62	184.62	8.0	146	Ductile Iron	130.0	0.09	0.000	-14.8	True
P-18	J-14	J-15	184.62	184.62	8.0	48	Ductile Iron	130.0	0.18	0.000	-27.7	True
P-19	J-15	J-16	184.62	184.63	8.0	55	Ductile Iron	130.0	0.18	0.000	-28.8	True
P-20	J-16	J-17	184.63	184.63	8.0	46	Ductile Iron	130.0	0.18	0.000	-28.8	True
P-21	J-17	J-18	184.63	184.63	8.0	84	Ductile Iron	130.0	0.25	0.000	-39.6	True
P-22	J-18	J-19	184.63	184.63	12.0	64	Ductile Iron	130.0	0.22	0.000	77.1	True
P-23	J-19	J-20	184.63	184.63	12.0	14	Ductile Iron	130.0	0.22	0.000	77.1	True
P-24	J-20	J-21	184.63	184.63	12.0	105	Ductile Iron	130.0	0.19	0.000	66.2	True
P-25	J-21	J-22	184.63	184.63	12.0	97	Ductile Iron	130.0	0.15	0.000	53.3	True
P-26	J-22	J-23	184.63	184.62	12.0	113	Ductile Iron	130.0	0.15	0.000	52.2	True
P-27	J-23	J-24	184.62	184.62	12.0	87	Ductile Iron	130.0	0.15	0.000	52.2	True
P-28	J-24	J-25	184.62	184.62	12.0	97	Ductile Iron	130.0	0.12	0.000	41.4	True
P-29	J-25	J-26	184.62	184.62	12.0	178	Ductile Iron	130.0	0.09	0.000	30.5	True

Peak Hour Demand Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Diameter (in)	Length (ft)	Material	Hazen- Williams C	Velocity (ft/s)	Headloss Gradient (ft/ft)	Flow (gpm)	Is Open?
P-30	J-26	J-4	184.62	184.62	12.0	42	Ductile Iron	130.0	0.04	0.000	14.1	True
P-31	J-5	J-6	184.62	184.62	12.0	84	Ductile Iron	130.0	0.10	0.000	35.3	True
P-32	J-6	J-6	184.62	184.62	12.0	171	Ductile Iron	130.0	0.07	0.000	24.4	True
P-33	J-6	BLDG O	184.62	184.62	6.0	30	Ductile Iron	130.0	0.12	0.000	10.8	True
P-34	J-6	BLDG N	184.62	184.62	6.0	153	Ductile Iron	130.0	0.01	0.000	1.0	True
P-35	J-7	BLDG M	184.62	184.62	6.0	32	Ductile Iron	130.0	0.15	0.000	12.9	True
P-36	J-8	BLDG L	184.62	184.62	6.0	75	Ductile Iron	130.0	0.09	0.000	8.1	True
P-37	J-9	MAINTENANCE	184.62	184.62	4.0	48	Ductile Iron	130.0	0.05	0.000	2.1	True
P-38	J-11	CABANA	184.62	184.62	6.0	312	Ductile Iron	130.0	0.01	0.000	1.0	True
P-39	J-12	BLDG K	184.62	184.62	6.0	31	Ductile Iron	130.0	0.15	0.000	12.9	True
P-40	J-13	BLDG J	184.62	184.62	4.0	34	Ductile Iron	130.0	0.03	0.000	1.0	True
P-41	J-14	BLDG H	184.62	184.62	6.0	27	Ductile Iron	130.0	0.15	0.000	12.9	True
P-42	J-15	BLDG I	184.62	184.62	4.0	32	Ductile Iron	130.0	0.03	0.000	1.0	True
P-43	J-16	H-5	184.63	184.63	6.0	23	Ductile Iron	130.0	0.00	0.000	0.0	True
P-44	J-10	H-4	184.62	184.62	6.0	6	Ductile Iron	130.0	0.00	0.000	0.0	True
P-45	H-3	J-5	184.62	184.62	6.0	12	Ductile Iron	130.0	0.00	0.000	0.0	True
P-46	J-17	BLDG G	184.63	184.63	6.0	29	Ductile Iron	130.0	0.12	0.000	10.8	True
P-47	J-19	H-6	184.63	184.63	6.0	58	Ductile Iron	130.0	0.00	0.000	0.0	True
P-48	J-20	BLDG F	184.63	184.63	6.0	132	Ductile Iron	130.0	0.12	0.000	10.8	True
P-49	BLDG D	J-21	184.63	184.63	6.0	27	Ductile Iron	130.0	0.15	0.000	-12.9	True
P-50	BLDG E	J-22	184.63	184.63	4.0	40	Ductile Iron	130.0	0.03	0.000	-1.0	True
P-51	H-7	J-23	184.62	184.62	6.0	8	Ductile Iron	130.0	0.00	0.000	0.0	True
P-52	BLDG C	J-24	184.62	184.62	6.0	31	Ductile Iron	130.0	0.12	0.000	-10.8	True
P-53	BLDG B	J-25	184.62	184.62	6.0	190	Ductile Iron	130.0	0.12	0.000	-10.8	True
P-54	BLDG A	J-26	184.62	184.62	6.0	83	Ductile Iron	130.0	0.19	0.000	-16.5	True
P-55	J-3	J-45	184.62	184.63	8.0	217	Ductile Iron	130.0	0.14	0.000	-21.2	True
P-56	J-45	J-46	184.63	184.64	8.0	854	Ductile Iron	130.0	0.14	0.000	-21.2	True
P-57	J-46	J-47	184.64	184.64	12.0	426	Ductile Iron	130.0	0.06	0.000	-21.2	True

Peak Hour Demand

Pipe Report

Current Time: 0.000 hours

Label	Start Node	Stop Node	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Diameter (in)	Length (ft)	Material	Hazen- Williams C	Velocity (ft/s)	Headloss Gradient (ft/ft)	Flow (gpm)	Is Open?
P-58	J-47	J-18	184.64	184.63	12.0	229	Ductile Iron	130.0	0.33	0.000	116.7	True
P-59	H-8	J-48	184.66	184.66	6.0	54	Ductile Iron	130.0	0.00	0.000	0.0	True
P-60	J-48	J-49	184.66	184.66	8.0	259	Ductile Iron	130.0	0.00	0.000	0.0	True
P-61	J-49	H-9	184.66	184.66	6.0	31	Ductile Iron	130.0	0.00	0.000	0.0	True
P-62	PMP-2	J-48	184.66	184.66	100.0	1	Ductile Iron	130.0	0.01	0.000	137.9	True
P-63	R-2	PMP-2	19.00	19.00	100.0	1	Ductile Iron	130.0	0.01	0.000	137.9	True
P-64	J-47	J-48	184.64	184.66	8.0	32	Ductile Iron	130.0	0.88	0.000	-137.9	True

Max Day + Fire Flow Demand

Fire Flow Report

Current Time: 0.000 hours

Label	Demand (gpm)	Pressure (psi)	Elevation (ft)	Junction w/ Minimum Pressure (System)	Pressure (Minimum) (psi)	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Satisfies Fire Flow Constraints?
BLDG A	9.4	71.4	20.10	BLDG B	71.4	2,250.0	3,136.2	True
BLDG B	6.2	69.4	24.70	BLDG F	69.4	2,250.0	2,375.4	True
BLDG C	6.2	70.9	21.17	BLDG B	70.9	2,250.0	3,736.6	True
BLDG D	7.4	71.4	20.07	BLDG F	71.4	2,250.0	3,827.2	True
BLDG E	0.6	71.1	20.60	BLDG B	71.1	1,500.0	2,073.8	True
BLDG F	6.2	69.4	24.57	BLDG B	69.4	2,250.0	2,690.3	True
BLDG G	6.2	72.1	18.37	H-5	72.1	2,250.0	3,671.0	True
BLDG H	7.4	73.2	15.87	J-14	73.2	2,250.0	3,563.3	True
BLDG I	0.6	74.4	13.10	BLDG F	74.4	1,500.0	2,278.2	True
BLDG J	0.6	75.3	11.00	CABANA	75.3	1,500.0	2,218.8	True
BLDG K	7.4	73.7	14.77	CABANA	73.7	2,250.0	3,438.7	True
BLDG L	4.6	72.9	16.47	CABANA	72.9	2,250.0	3,068.1	True
BLDG M	7.4	71.8	18.97	BLDG B	71.8	2,250.0	3,678.9	True
BLDG N	0.6	72.9	16.60	BLDG B	72.9	1,500.0	2,634.0	True
BLDG O	6.2	72.0	18.67	BLDG B	72.0	2,250.0	3,772.1	True
CABANA	0.6	72.0	18.60	BLDG B	72.0	1,500.0	1,950.4	True
H-3	0.0	71.8	19.00	BLDG B	71.8	2,250.0	4,000.0	True
H-4	0.0	74.0	14.00	CABANA	74.0	2,250.0	3,868.1	True
H-5	0.0	73.0	16.30	BLDG H	73.0	2,250.0	3,720.1	True
H-6	0.0	72.5	17.50	BLDG F	72.5	2,250.0	3,453.3	True
H-7	0.0	70.8	21.30	BLDG B	70.8	2,250.0	4,000.0	True
MAINTENANCE	1.2	73.8	14.50	BLDG B	73.8	1,500.0	1,920.7	True

Appendix E
8" PVC Sewer Capacity Calculations

Worksheet for Mark Taylor Apt Sewer Main

Project Description

Friction Method Manning Formula
Solve For Full Flow Capacity

Input Data

Roughness Coefficient 0.013
Channel Slope 0.00500 ft/ft
Normal Depth 8.00 in
Diameter 8.00 in
Discharge 383 gal/min

Results

Discharge 383 gal/min
Normal Depth 8.00 in
Flow Area 0.35 ft²
Wetted Perimeter 2.09 ft
Hydraulic Radius 2.00 in
Top Width 0.00 ft
Critical Depth 0.44 ft
Percent Full 100.0 %
Critical Slope 0.00848 ft/ft
Velocity 2.45 ft/s
Velocity Head 0.09 ft
Specific Energy 0.76 ft
Froude Number 0.00
Maximum Discharge 0.92 ft³/s
Discharge Full 0.85 ft³/s
Slope Full 0.00500 ft/ft
Flow Type SubCritical

GVF Input Data

Downstream Depth 0.00 in
Length 0.00 ft
Number Of Steps 0

GVF Output Data

Upstream Depth 0.00 in
Profile Description
Profile Headloss 0.00 ft
Average End Depth Over Rise 0.00 %

Worksheet for Mark Taylor Apt Sewer Main

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.00	in
Critical Depth	0.44	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00848	ft/ft

Appendix F
Excerpts from the *Silverstone 160-Acre Mixed Use Project Master Plan*
prepared by Wood/Patel

Project: SEC Pinnacle Peak and Scottsdale Road Mixed Land Use
Location: City of Scottsdale, Arizona
Date: 8-Nov-07
References: City of Scottsdale Design Standards and Policy Manual

Project Number: 042309.07
Project Engineer: Darrel Wood, P.E., R.L.S.

WATERCAD NODE	PARCEL	ZONING	LAND USE	AREA OF CONTRIBUTING PARCEL (AC)	ELEV.	RESIDENTIAL		NON-RESIDENTIAL		PARKS/LANDSCAPE		AVERAGE DAY DEMAND		MAXIMUM DAY DEMAND		PEAK HOUR DEMAND	
						UNITS ⁽¹⁾	ADD/ UNIT (GPD)	AREA (SQ.FT.) ⁽²⁾	ADD/ SQ.FT. (GPD)	AREA (ACRES)	ADD/AC (GPD)	(GPD)	(GPM)	(GPD)	(GPM)	(GPD)	(GPM)
J-10	C	C-2	Retail	6.3	1,828			47,500	0.8			38,000	26.4	76,000	52.8	133,000	92.4
J-20	C	C-2	Retail	6.3	1,847			47,500	0.8			39,000	26.4	76,000	52.8	133,000	92.4
J-30	No Demand				1,818												
J-40	E	R-5	Residential	8.8	1,822	131.0	228					28,888	20.7	59,738	41.5	104,538	72.6
J-40	E	R-5	Residential	8.8	1,822	131.0	228					28,888	20.7	59,738	41.5	104,538	72.6
J-50	B	C-O	Municipal	2.2				22,500	0.8			18,000	12.5	36,000	25.0	63,000	43.8
J-50	Park		Park	12.9						12.9	1,786.0	23,075	16.0	46,150	32.0	80,763	56.1
J-50	No Demand			15.2				22,500				41,075	28.5	82,150	57.0	143,783	99.8
J-60	No Demand				1,870												
J-70	F	R-5	Residential	21.8		188	228					42,408	29.5	84,816	58.9	148,428	103.1
J-70	G	R-5	Residential	23.8		258	228					58,824	40.9	117,648	81.7	205,884	143.0
J-70	No Demand			4.6	1,955							101,232	70.3	202,464	140.6	354,372	248.1
J-80	No Demand				1,893												
J-90	No Demand				1,845												
J-100	H	R-5	Residential	8.8		68	228					15,504	10.8	31,008	21.5	54,264	37.7
J-100	A	C-O	Municipal	2.2	1,898							18,000	12.5	36,000	25.0	63,000	43.8
J-110	E	R-5	Residential	8.8	1,837	131.0	228					28,888	20.7	59,738	41.5	104,538	72.6
J-120	H	R-5	Residential	8.6		68	228					15,504	10.8	31,008	21.5	54,264	37.7
J-120	H	R-5	Residential	8.6	1,817	68	228					15,504	10.8	31,008	21.5	54,264	37.7
J-130	D	C-O	Office	6.2				82,500	0.6			49,500	34.4	99,000	68.6	173,250	120.3
J-130	D	C-O	Office	6.2				82,500	0.6			49,500	34.4	99,000	68.6	173,250	120.3
J-140	D	C-O	Office	6.2				82,500	0.6			49,500	34.4	99,000	68.6	173,250	120.3
J-140	H	R-5	Residential	8.6		67	228					15,276	10.6	30,552	21.2	53,468	37.1
J-140	H	R-5	Residential	8.6	1,810	67	228					15,276	10.6	30,552	21.2	53,468	37.1
J-150	No Demand				1,806												
J-160	H	R-5	Residential	8.6	1,814	67	228					15,276	10.6	30,552	21.2	53,468	37.1
J-170					1,800												
Total				140		976		305,000				456,803	317	913,206	634	1,598,111	1,110

Notes:
(1) Multi-family dwelling units is the proposed dwelling units
(2) Area of non-residential land use is the proposed building area in square feet

**Scenario: Average Day Demand
Steady State Analysis
Junction Report**

Label	Elevation (ft)	Zone	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	1,828	Zone 6W	26.4	2,020	83.1
J-20	1,847	Zone 6W	26.4	2,050	87.8
J-30	1,818	Zone 6W	0.0	2,020	87.4
J-40	1,822	Zone 6W	20.7	2,020	85.7
J-50	1,840	Zone 6W	28.5	2,020	77.9
J-60	1,870	Zone 6W	0.0	2,050	77.9
J-70	1,855	Zone 6W	70.3	2,020	71.4
J-100	1,838	Zone 6W	10.8	2,020	78.7
J-110	1,837	Zone 6W	12.5	2,020	79.2
J-120	1,817	Zone 6W	31.5	2,020	87.8
J-130	1,805	Zone 6W	34.4	2,020	93.0
J-140	1,810	Zone 6W	45.0	2,020	90.9
J-150	1,806	Zone 6W	0.0	2,020	92.6
J-160	1,814	Zone 6W	10.6	2,020	89.1
J-170	1,800	Zone 6W	0.0	2,020	95.2

Scenario: Peak Hour Demand
Steady State Analysis
Junction Report

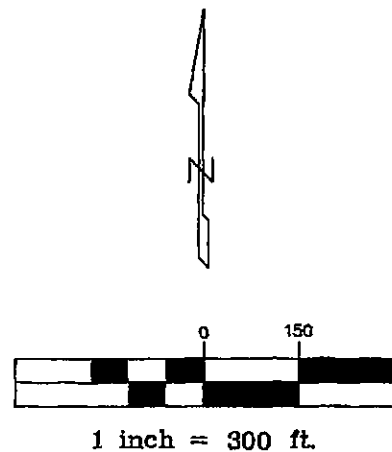
Label	Elevation (ft)	Zone	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	1,828	Zone 6W	92.4	2,020	83.1
J-20	1,847	Zone 6W	92.4	2,050	87.8
J-30	1,818	Zone 6W	0.0	2,020	87.4
J-40	1,822	Zone 6W	72.6	2,020	85.6
J-50	1,840	Zone 6W	99.8	2,020	77.8
J-60	1,870	Zone 6W	0.0	2,050	77.9
J-70	1,855	Zone 6W	246.1	2,020	71.4
J-100	1,838	Zone 6W	37.7	2,020	78.7
J-110	1,837	Zone 6W	43.8	2,020	79.1
J-120	1,817	Zone 6W	110.3	2,020	87.8
J-130	1,805	Zone 6W	120.3	2,020	93.0
J-140	1,810	Zone 6W	157.0	2,020	90.8
J-150	1,806	Zone 6W	0.0	2,020	92.6
J-160	1,814	Zone 6W	37.1	2,020	89.1
J-170	1,800	Zone 6W	0.0	2,020	95.2

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Fire Flow Analysis

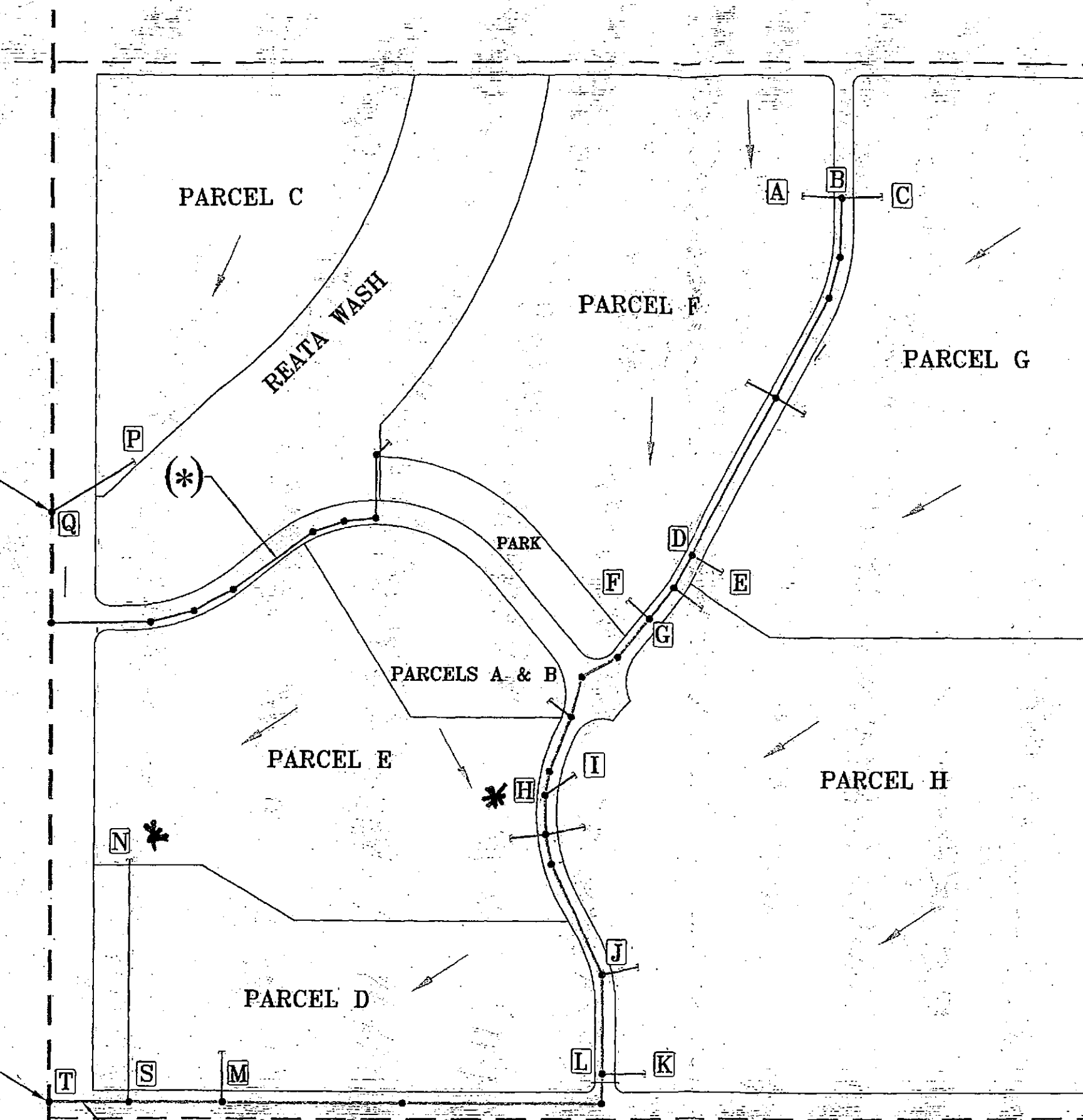
Fire Flow Report

Label	Elevation (ft)	Zone	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Pressure (psi)	Calculated Hydraulic Grade (ft)	Calculated Residual Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction
J-10	1,828	Zone 6W	true	1,500.0	1,552.8	1,652.8	83.1	2,020	83.0	71.4	J-70
J-20	1,847	Zone 6W	true	1,500.0	1,552.8	1,652.8	87.8	2,050	87.8	71.4	J-70
J-30	1,818	Zone 6W	true	1,500.0	1,500.0	1,600.0	87.4	2,020	87.3	71.4	J-70
J-40	1,822	Zone 6W	true	1,500.0	1,541.5	1,641.5	85.7	2,020	85.2	71.3	J-70
J-50	1,840	Zone 6W	true	1,500.0	1,557.0	1,657.0	77.9	2,020	75.8	71.1	J-70
J-60	1,870	Zone 6W	true	1,500.0	1,500.0	1,600.0	77.9	2,050	77.8	71.4	J-70
J-70	1,855	Zone 6W	true	1,500.0	1,640.6	1,740.6	71.4	2,020	70.9	77.6	J-50
J-80	1,863	No-Service	true	1,500.0	1,500.0	1,600.0	67.9	2,020	67.9	75.3	J-90
J-90	1,846	No-Service	true	1,500.0	1,500.0	1,600.0	75.3	2,020	75.3	67.9	J-80
J-100	1,838	Zone 6W	true	1,500.0	1,521.5	1,621.5	78.7	2,020	76.6	71.3	J-70
J-110	1,837	Zone 6W	true	1,500.0	1,525.0	1,625.0	79.2	2,020	78.5	71.1	J-70
J-120	1,817	Zone 6W	true	1,500.0	1,563.0	1,663.0	87.8	2,020	87.1	71.2	J-70
J-130	1,805	Zone 6W	true	1,500.0	1,568.8	1,668.8	93.0	2,020	89.2	71.4	J-70
J-140	1,810	Zone 6W	true	1,500.0	1,590.0	1,690.0	90.8	2,020	89.3	71.3	J-70
J-150	1,806	Zone 6W	true	1,500.0	1,500.0	1,600.0	92.6	2,020	92.3	71.4	J-70
J-160	1,814	Zone 6W	true	1,500.0	1,521.2	1,621.2	89.1	2,020	88.8	71.4	J-70
J-170	1,800	Zone 6W	true	1,500.0	1,500.0	1,600.0	95.2	2,020	94.9	71.4	J-70



CONNECT TO
SEWER LINE
IN SCOTTSDALE
ROAD

CONNECT TO
SEWER LINE
IN SCOTTSDALE
ROAD



(*) THIS LINE MAY OR MAY NOT BE INSTALLED.
THE DEVELOPER OF PARCEL F IS TO PROVIDE DOCUMENTATION
SUFFICIENT TO SATISFY THE TECHNICAL CONCERNS OF THE CITY
OF SCOTTSDALE THAT THE PARCEL WILL GENERATE ENOUGH
EFFLUENT, IN SUFFICIENT TIME TO SUBMITT, PROCESS AND
OBTAIN CITY APPROVAL TO ALLOW THE MASTER DEVELOPER
REASONABLE COORDINATION OF THE IMPROVEMENTS, MEANING
BEFORE THE START OF CONSTRUCTION OF SILVERSTONE DRIVE.

(**) SEE TABLE 2.2 MINIMUM SLOPES FOR SANITARY SEWER.

LEGEND

- 8" PROPOSED SANITARY SEWER
- 12" PROPOSED SANITARY SEWER
- - - 8" EXISTING SANITARY SEWER
- == 15" EXISTING SANITARY SEWER
- PARCEL BOUNDARY
- ↗ FLOW ARROW

NOTE: THE LOCATION AND SIZES OF THESE
SEWER LINES ARE A CONCEPTUAL DESIGN AND
SHOULD NOT BE USED FOR CONSTRUCTION.

PLATE 2
MASTER WASTEWATER SYSTEM
SILVERSTONE
160-ACRE MIXED USE PROJECT

WOOD/PATEL

LAND DEVELOPMENT • WATER RESOURCES
TRANSPORTATION / TRAFFIC
WATER / WASTEWATER • SURVEYING
CONSTRUCTION MANAGEMENT

(602) 335-8500

Table 1-Estimated Wastewater Design Flow Calculations

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: SILVERSTONE - 160 ACRE MIXED USE PROJECT
Location: City of Scottsdale, Arizona
Date: 20-Jun-07
References: City of Scottsdale Design Standards and Policy Manual

Project Number: 062731
Project Engineer: Darrel Wood, P.E., R.L.S.
Jason M. Casuga, E.I.T.

SEGMENT	PARCEL	ZONING	LAND USE	AREA OF CONTRIBUTING PARCEL	RESIDENTIAL			COMMERCIAL-OFFICE			COMMERCIAL-RETAIL			PARCEL ADF (GPD)	PARCEL PEAK FLOW (GPD)	CUMULATIVE ADF (GPD)	CUMULATIVE PEAK FLOW (GPD)
					NUMBER OF DWELLING UNITS	ADF / UNIT (GPD)	RESIDENTIAL PEAKING FACTOR	OFFICE SPACE (SQ FT)	OFFICE ADF / SQ FT (GPD)	OFFICE PEAKING FACTOR	RETAIL SPACE (SQ FT)	RETAIL ADF / SQ FT (GPD)	RETAIL PEAKING FACTOR				
A-B	F	R-5	Residential	14.55	124	250	4.0			4.0			4.0	31,000	124,000		
Total for Segment A-B				15	124									31,000	124,000	31,000	124,000
C-B	G	R-5	Residential	15.85	172	250	4.0			4.0			4.0	43,000	172,000		
Total for Segment C-B				16	172									43,000	172,000	43,000	172,000
Total for Segment B-D							4.0			4.0			4.0			74,000	296,000
E-D	G	R-5	Residential	7.93	86	250	4.0			4.0			4.0	21,500	86,000		
Total for Segment E-D				8	86									21,500	86,000	21,500	86,000
D-G	H	R-5	Residential	5.71	45	250	4.0			4.0			4.0	11,250	45,000		
Total for Segment D-G				6	45									11,250	45,000	106,750	427,000
F-G	F	R-5	Residential	7.28	62.0	250	4.0			4.0			4.0	15,500	62,000		
Total for Segment F-G				7	62									15,500	62,000	15,500	62,000
G-H	A & B	C-O	Municipal	4.48			4.0	45,000	0.100	4.0			4.0	4,500	18,000		
Total for Segment G-H				4				45,000						4,500	18,000	126,750	507,000
I-H	H	R-5	Residential	17.13	135	250	4.0			4.0			4.0	33,750	135,000		
Total for Segment I-H				17	135									33,750	135,000	33,750	135,000
H-J	E	R-5	Residential	5.24	79	250	4.0			4.0			4.0	19,750	79,000		
Total for Segment H-J				5	79									19,750	79,000	180,250	721,000
J-L	H	R-5	Residential	5.71	45	250	4.0			4.0			4.0	11,250	45,000		
Total for Segment J-L				6	45									11,250	45,000	191,500	766,000
K-L	H	R-5	Residential	5.71	45	250	4.0			4.0			4.0	11,250	45,000		
Total for Segment K-L				6	45									11,250	45,000	11,250	45,000
L-M	D	C-O	Office	6.21			4.0	82,500	0.100	4.0			4.0	8,250	33,000		
Total for Segment L-M				6				82,500						8,250	33,000	211,000	844,000
M-S	D	C-O	Office	6.21			4.0	82,500	0.100	4.0			4.0	8,250	33,000		
Total for Segment M-S				6				82,500						8,250	33,000	219,250	877,000
N-S	E	R-5	Residential	12.23	183	250	4.0			4.0			4.0	45,750	183,000		
Total for Segment N-S				12	183									45,750	183,000	45,750	183,000
S-T							4.0			4.0			4.0				
Total for Segment S-T																265,000	1,080,000
P-Q	C	C-2	Retail	12.47			4.0			4.0	95,000	0.71	4.0	67,450	269,800		
Total for Segment P-Q				12							95,000			67,450	269,800	67,450	269,800
Development Total				127	976			210,000			95,000			332,450	1,329,800	332,450	1,329,800