

**SENIOR LIVING
NEC PINNACLE PEAK & SCOTTSDALE ROAD
SCOTTSDALE, ARIZONA
COS # 159 – PA - 2016**

WATER DISTRIBUTION SYSTEM DESIGN REPORT

October 5th, 2016

Project No.: 2098

Prepared for:

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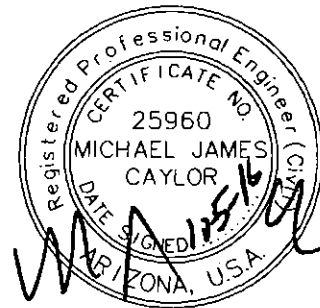
**30-DR-2016
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Expires 3-31-2019

1.0 INTRODUCTION AND SCOPE OF WORK

This report presents the results of a limited water distribution system pressure and flow analysis conducted by Site Consultants, Inc. at the request of Investments Property Associates, LLC. (Client) for the "Senior Living Facility" project (site). The purpose of this report is to document and present a water distribution analysis that will provide data to assist in the design of a water distribution system serving the proposed development.

1.1 Scope of Work and Limitations

This report focuses on providing practical design information, evaluation, and calculations for the water distribution system studied. The procedures used herein are derived from and performed with, currently accepted engineering methodologies and practices. Additionally, the criteria for this evaluation are designed to conform to currently applicable ordinances, regulations and policies affected by the appropriate jurisdictional regulatory authorities for the site.

The analysis presented herein focuses on developing design estimates of water distribution system performance under expected demand conditions and criteria. Demand conditions exceeding those presented herein may cause or create the risk of reduced system performance beyond what is addressed and presented herein. However, the scope of this assessment does not include, nor did the client request, evaluation of system performance resulting from demand conditions exceeding those presented herein. Site Consultants, Inc. assumes no responsibility for reduced system performance or increased construction or development cost resulting from or related to any such events, nor shall Site Consultants, Inc. be responsible for any changes in or additions to, regulatory requirements, which may result from, be related to, any such events or changes in distribution system conditions.

In performing the services contained herein, Site Consultants, Inc. has received or will receive information prepared or compiled by others. Site Consultants, Inc. as engineering professionals, are not required to verify the information, but may rely on the information unless actual knowledge concerning the validity of the information is known or is obvious to the professional. Therefore, Site Consultants, Inc. is entitled to rely upon the accuracy and completeness of this information without independent evaluation or verification.

1.2 Site Location

The approximately 4.5 net acres project is approximately located at the northeast corner of Scottsdale and Pinnacle Peak Road, north of the existing Crown West (Safeway) shopping center.

The subject property lies within the SW $\frac{1}{4}$ of Section 11, Township 4 North, Range 4 East, of the Gila and Salt River Base and Meridian, Maricopa County (MCR), Scottsdale, Arizona. The site is Parcel 'B' and a portion of Parcel 'A' of the Crown West Land Division Land Map, as recorded in the Bk. 857, Pg. 19, and MCR.

Residential subdivisions borders the site to the north and east; commercial developments borders the site to the south and west.

See Appendix 1: Site Vicinity Map.

1.3 Site Description

The proposed project development will consist of the construction of a Senior Living facility that consist of both independent living and memory care units. The building is subdivided into three section; 1) a memory care unit at the northwest corner of the building, 2) a main two-story independent living facility that includes reception, meal kitchen / lounge areas, miscellaneous indoor activity amenities and two outdoor courtyard amenity areas and 3) a lower level independent living area that connects to an outdoor dog park amenity area.

The site is zoned C-2 ESL, the existing zoning is acceptable for the proposed project use and will not be changed.

1.4 Proposed Development

The project site will serve as a senior living facility. The site plan development includes all required site access and landscaping improvements required for a project of this size.

The site consists of approximately 4.5 acres. Construction will consist of an approximate 160,000 square-foot senior living facility that includes a commercial kitchen and a separate memory care facility building.

1.5 Regulatory Jurisdiction and Project Criteria

The criteria used in the water system design and analyses were established using the guidelines as described in the following:

- *City of Scottsdale, Design Standards & Policies Manual, Dated January 2010, Section 6-1.000 (Reference 2)*
- *International Fire Code, 2012*

2.0 PHYSICAL SETTING

2.1 Site Topography and Existing Conditions

The site is currently developed as a commercial office building. The existing building will be demolished in conjunction with the proposed site development.

2.2 Existing Infrastructure

There is currently public water utility infrastructure, located in water easements at or adjacent to the subject site's west and south property lines.

See Appendix 2: City of Scottsdale ¼ Section Map

3.0 WATER DISTRIBUTION SYSTEM DESIGN

3.1 Proposed Water Distribution System

The proposed water system consists of an onsite water main loop extension along with onsite potable water, landscape irrigation, and fire protection services.

A proposed 8-inch public water main extension will be constructed that will loop through the site connection the existing 8-inch public water main located along the site's west property line to the existing 8-inch public water main located along the site's southerly property line.

Domestic, fire and landscaping services will tap directly into the 8-inch proposed public water main line extension.

The domestic water line will consist of a 3-inch service line, 3-inch meter and 3-inch backflow preventer. This private onsite water service line connects at the north side of the proposed building.

The landscaping service will consist of a 1-inch water tap, meter, and backflow preventer.

Two private fire line services will be connected to the proposed 8-inch public water main line extension. The proposed 8-inch water main line extension will also provide service to five (5) new onsite fire hydrants. These hydrants along with the one existing on-site fire hydrants have sufficient coverage to meet the required fire protection guidelines per City of Scottsdale and 2012 International Fire Code.

See Appendix 3: Proposed Water Main line Exhibit.

4.0 WATER DISTRIBUTION SYSTEM MODEL

The hydraulic model developed for this report is based on the fire flow results per the test conducted by the Arizona Flow Testing (see Appendix 5). Two fire hydrants were utilized to determine flow and pressure data. Both fire hydrants are located on the east side of Scottsdale road. The hydrant utilized for the flow data is located at the northeast corner of East Los Patron Drive and Scottsdale Road. The pressure hydrant is located at the entry drive to the Safeway shopping center which lies south of the proposed site. The two hydrants utilized for flow data are located approximately 500 feet west of the site. The two hydrants are served by a 12-inch water main running in Scottsdale Road.

The analysis for the expected flow and pressure for these hydrants are per the fire flow test results and are included in the appendices.

The model is based on the utility layouts for the waterline alignments and elevations at key points. A reservoir and pump were included in the model to simulate the pressure provided by the rest of the water network at the point of connection. The pump curve was calculated from data obtained from the fire flow test results to calibrate the system to the appropriate pressures.

In order to provide information for comparison with the system performance criteria established for this analysis, the proposed water distribution system has been modeled under flow conditions corresponding to three scenarios:

- | | | |
|-----|--|---------------------|
| 1.) | Average Daily Flow | [0:00 in the model] |
| 2.) | Required Fire Flow Demand (Max. Day + Fire Flow) | [1:00 in the model] |
| 3.) | Peak Hour Demand (3.5 x Average Day) | [2:00 in the model] |

4.1 Water Supply System Demands

Water system demands are based on the planned commercial use of the buildings in the development. City of Scottsdale Design Standards for Water and Wastewater systems specifies an Average Daily Flow of 185.3 gal/day for High Density Residential (Reference 2). Peak Hour Demand is computed by multiplying Average Daily Demand, times 3.5.

A Base Fire Flow demand is 2,375 gpm at a residual pressure of 20 psi for the duration of use per the City of Scottsdale based on the 2012 International Fire Code (IFC) for Fire Flow determination.

A table of the Hydraulic Demand Calculations is included in the Appendix 4.

The model components shown on the attached Appendix 3, *Proposed Water System Map*.

4.2 Water Supply System Performance Criteria

Water supply system performance have been modeled for the proposed development. The following design criteria were used in developing the water distribution system:

- No water distribution lines shall be less than 8-inches in diameter.
- All calculations of water demand for a property shall include fire flows in accordance with the International Fire Code Appendix III-A.
- The system shall provide the capacity for fire Flow Demand.
- The minimum required pressure throughout the water distribution system is 50 psi under static conditions, and 40 psi during the peak hour. A residual pressure of 30 psi is allowable under fire flow conditions.
- Velocity will not exceed 10 fps within the system.
- NOTE: Per City of Scottsdale Water Department stipulation, a second fire flow analysis was preform using a residual pressure of 30 psi. 30-psi results are included in Appendix's five, six and 7.

4.3 Water Supply System Model Representation

In order to create an efficient model, the components of the distribution system are represented schematically to show only the distribution mains within the system. Distribution piping within the system has been represented in the model using node locations at points of interest in the system. Additionally, for the purpose of this analysis, all node elevations correspond to three feet under finished ground elevations (existing ground for existing pipes) which is approximately the top of the pipe. The schematic distribution system is shown on the *Proposed Water System Map* (see Appendix 3). The individual pipes and junctions were assigned unique identification numbers and demand flows were then assigned to the system. EPANET was then used to simulate the behavior of the distribution system under selected demand conditions. Junction identifiers were labeled numerically with a "J" prefix. Pipe (Link) identifiers have the prefix "P" to distinguish Pipes from Junction labels.

4.4 Software

This analysis utilized a computer program called EPANET (Reference 3) to simulate pressure and flow conditions in the distribution system. EPANET performs extended period simulation of hydraulic and water quality behavior within pressurized pipe networks. EPANET simulates the performance of pipe networks and provides data on flow, pressure, reservoir and tank conditions, and the concentration of a substance within the network.

EPANET uses a method known as the gradient algorithm to solve a system of equations hydraulically balancing the network. EPANET monitors the flow of water in each pipe, the pressure at each pipe junction, the height of water in each storage tank, and the concentration of a substance throughout a distribution system during a multi-time period simulation.

Additional fire flow analysis was performed using FireFlow, an EPANET-based freeware tool from OptiWater that calculates the available flow at network junctions while a minimal pressure (20 psi and 30 psi) is maintained at demand junctions.

See Appendix No. 7 for Optiwater fire flow results.

5.0 RESULTS

The results of the hydraulic model conducted for this study are presented in **Appendix 6**. These results show calculated low pressures for the Senior Living site to be above the minimum criteria for all the modeled demand scenarios. Calculated high pressures are within the pressure criteria for all demand conditions.

20 PSI RESIDUAL PRESSURE RESULTS

Average Day Flow (0:00 in model): No pressures within the development were observed to be below the minimum residual pressure criteria (50 psi minimum static) during average day demand, a steady pressure of 106.97 psi at all nodes was observed. All pressures in this scenario were greater than the 50 psi (static) minimum allowed.

Fire Flow Demand (1:00 in model): No pressures within the development were observed to be below the minimum residual pressure criteria (30 psi minimum static) during fire flow demand. The six proposed onsite hydrants, flowing 401.33 gpm each, had a minimum pressure of 25.81 psi and a maximum pressure of 27.98 psi. Six hydrants provided for the total required fire flow of 2408.00 gpm.

Peak Hour Demand (2:00 in model): No pressures within the development were observed to be below the minimum residual pressure criteria (50 psi minimum static) peak hour demand, a steady pressure of 106.82 psi minimum was observed. All pressures in this scenario were greater than the 55 psi (static) minimum allowed.

Observations

Pipe velocities for Average Daily Flow and Peak Hour Demand scenarios were below the 10 fps (feet per second) maximum allowable. During the Fire Flow demand, three pipe segments reached a velocity of 10.18 psi but this velocity would only occur under extreme fire flow conditions, therefore it is not a continuous condition that would degrade pipes.

30 PSI RESIDUAL PRESSURE RESULTS

Average Day Flow (0:00 in model): No pressures within the development were observed to be below the minimum residual pressure criteria (50 psi minimum static) during average day demand, a steady pressure of 106.97 psi at all nodes was observed. All pressures in this scenario were greater than the 50 psi (static) minimum allowed.

Fire Flow Demand (1:00 in model): No pressures within the development were observed to be below the minimum residual pressure criteria (30 psi minimum static) during fire flow demand. The six proposed onsite hydrants, flowing 388 gpm each, had a minimum pressure of 30.31 psi and a maximum pressure of 32.68 psi. Six hydrants provided for the total required fire flow of 2360.96 gpm.

Peak Hour Demand (2:00 in model): No pressures within the development were observed to be below the minimum residual pressure criteria (50 psi minimum static) peak hour demand, a steady pressure of 106.84 psi minimum was observed. All pressures in this scenario were greater than the 55 psi (static) minimum allowed.

Observations

Pipe velocities for Average Daily Flow and Peak Hour Demand scenarios were below the 10 fps (feet per second) maximum allowable. During the Fire Flow demand, three pipe segments reached a velocity of 9.84 psi but this velocity would only occur under extreme fire flow conditions, therefore it is not a continuous condition that would degrade pipes

6.0 SUMMARY AND CONCLUSIONS

1. Hydraulic modeling conducted as part of this study identified water distribution performance that complies with the criteria established by the City of Scottsdale.
2. The design of the water distribution system presented in this report is based on generally accepted engineering practices along with City of Scottsdale guidelines.
3. Based on the design criteria represented in this report the water system design meets the City of Scottsdale requirements

7.0 REFERENCES CITED AND REVIEWED

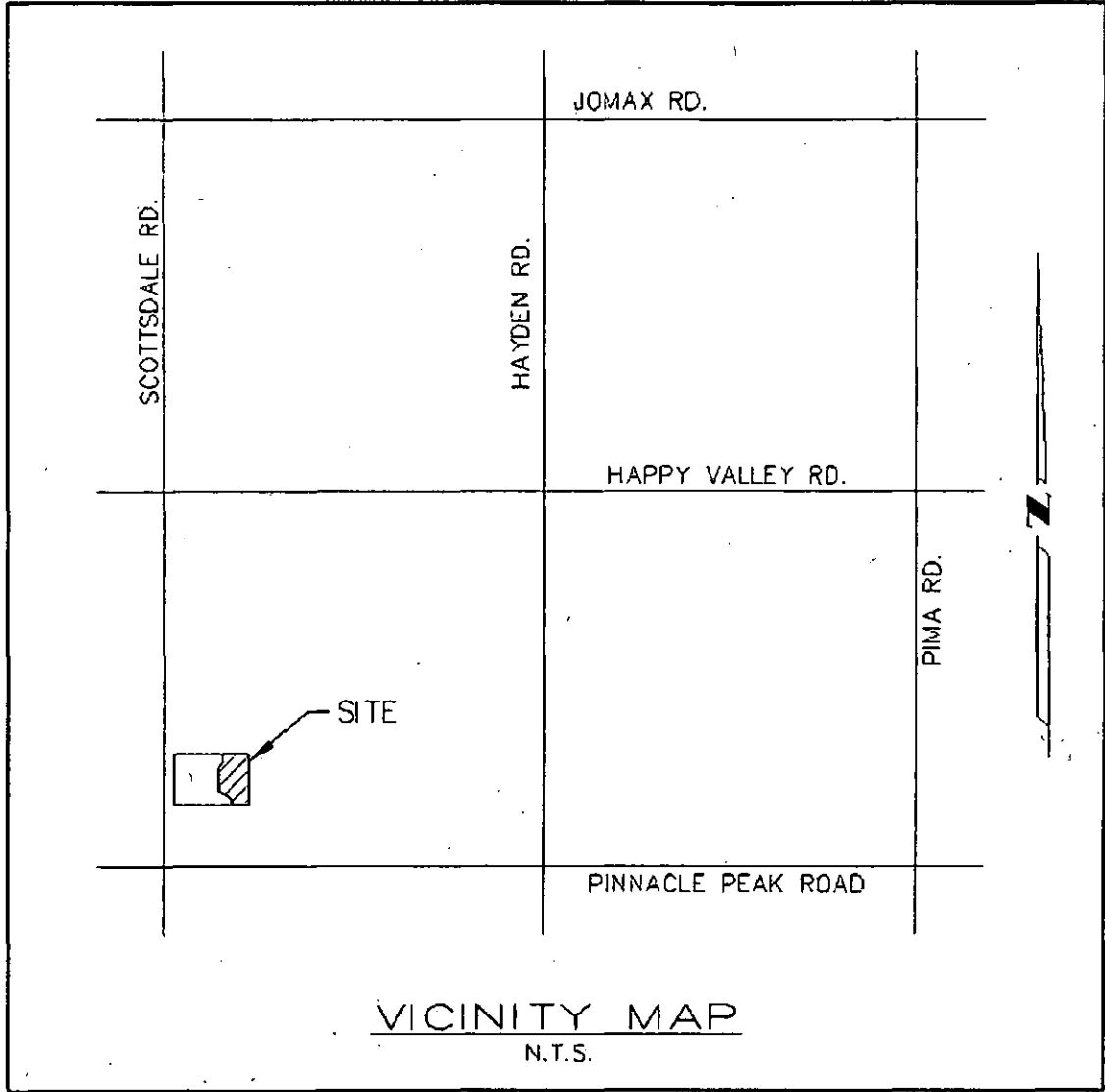
1. *City of Scottsdale, Design Standards & Policies Manual, Dated January 2010, Section 6-1.000*
2. *EPANet*
3. *Fire Flow by Optiwater*

This document was respectfully prepared and submitted by:

Michael J. Caylor, P.E

APPENDIX 1

Site Vicinity Map



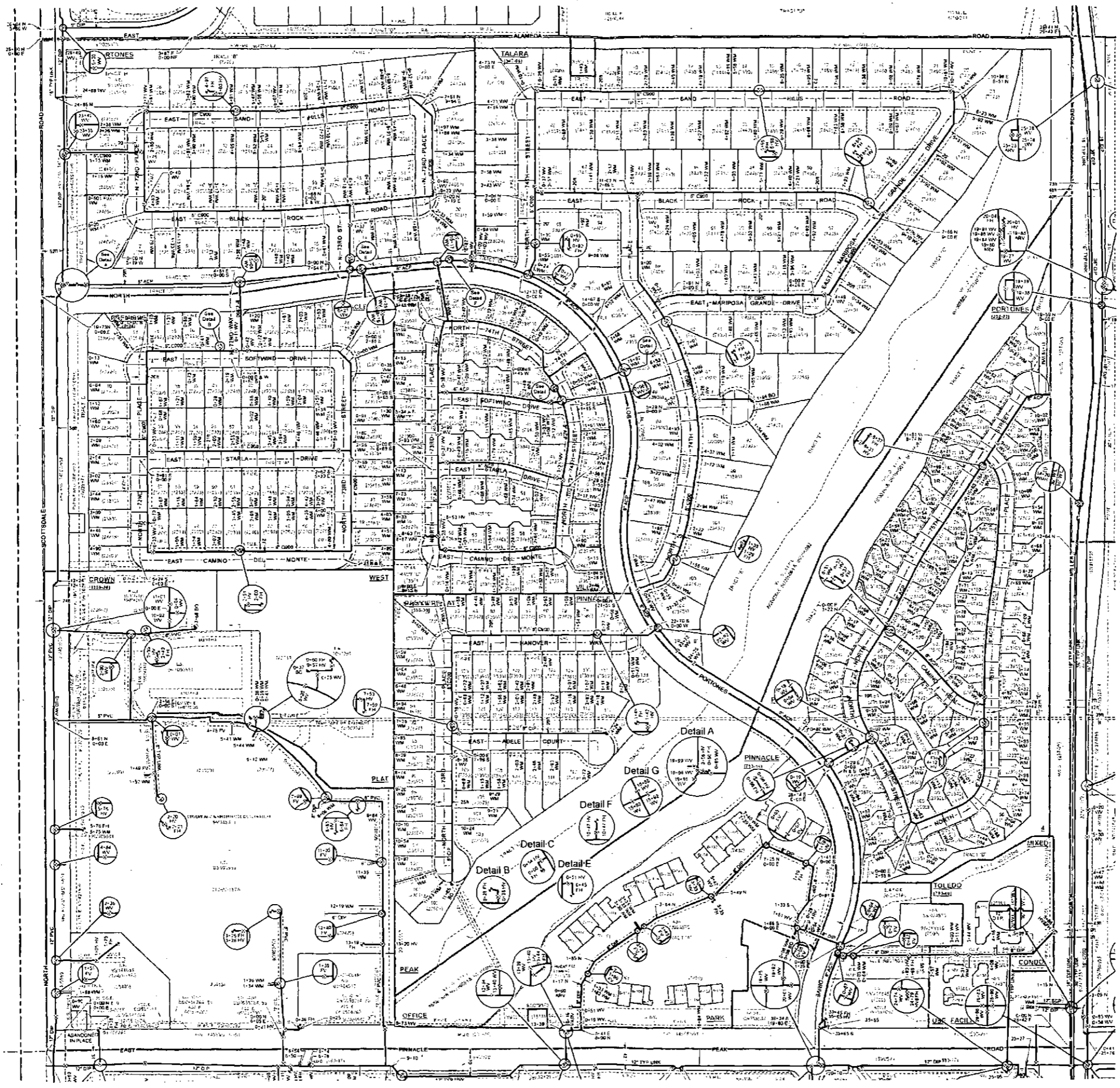
APPENDIX 2

City of Scottsdale ¼ Map

NOTICE

THIS DOCUMENT IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY. THE CITY OF SCOTTSDALE DOES NOT WARRANT THE ACCURACY OF THE INFORMATION CONTAINED HEREIN. THE CITY OF SCOTTSDALE IS NOT RESPONSIBLE FOR ANY DAMAGE OR LOSS OF ANY KIND, INCLUDING BUT NOT LIMITED TO, DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, ARISING FROM THE USE OF THIS INFORMATION. IT SHOULD NOT BE RELIED UPON WITHOUT FIELD VERIFICATION.

THE CITY OF SCOTTSDALE

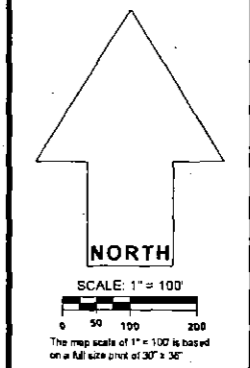
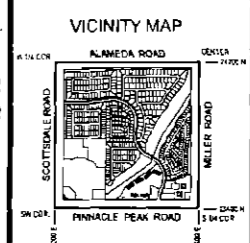


GENERAL NOTES:

1. THIS IS A COMPUTER GENERATED DRAWING FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 310-1771.

2. THE SECTION LINE BEARINGS AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GIS SURVEY OF 2011. BEARINGS ARE IN DEGREES AND DISTANCES ARE IN FEET TO TWO DECIMAL PLACES. THESE MEASUREMENTS WERE FOUND TO BE WITHIN THE TOLERANCES OF THE SURVEY. THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOT TO BE CALCULATED ON THE MAP.

- LEGEND:**
- Air Release Valve
 - Non-potable Air Release Valve
 - Blowoff
 - Cap
 - Cathodic Protection
 - Fill Drum
 - Fire Hydrant
 - Non-GPS Point
 - Pressure Reducing Valve
 - Pump
 - Reducer
 - Sample Station
 - Water Manhole
 - Non-Potable Manhole
 - Well
 - Valve
 - Non-potable Valve
 - Vault
 - Water Man
 - Non-Potable Man
 - Fire / Private Man
 - Non-Scottsdale Man



WATER

QUARTER SECTION MAP

45-45

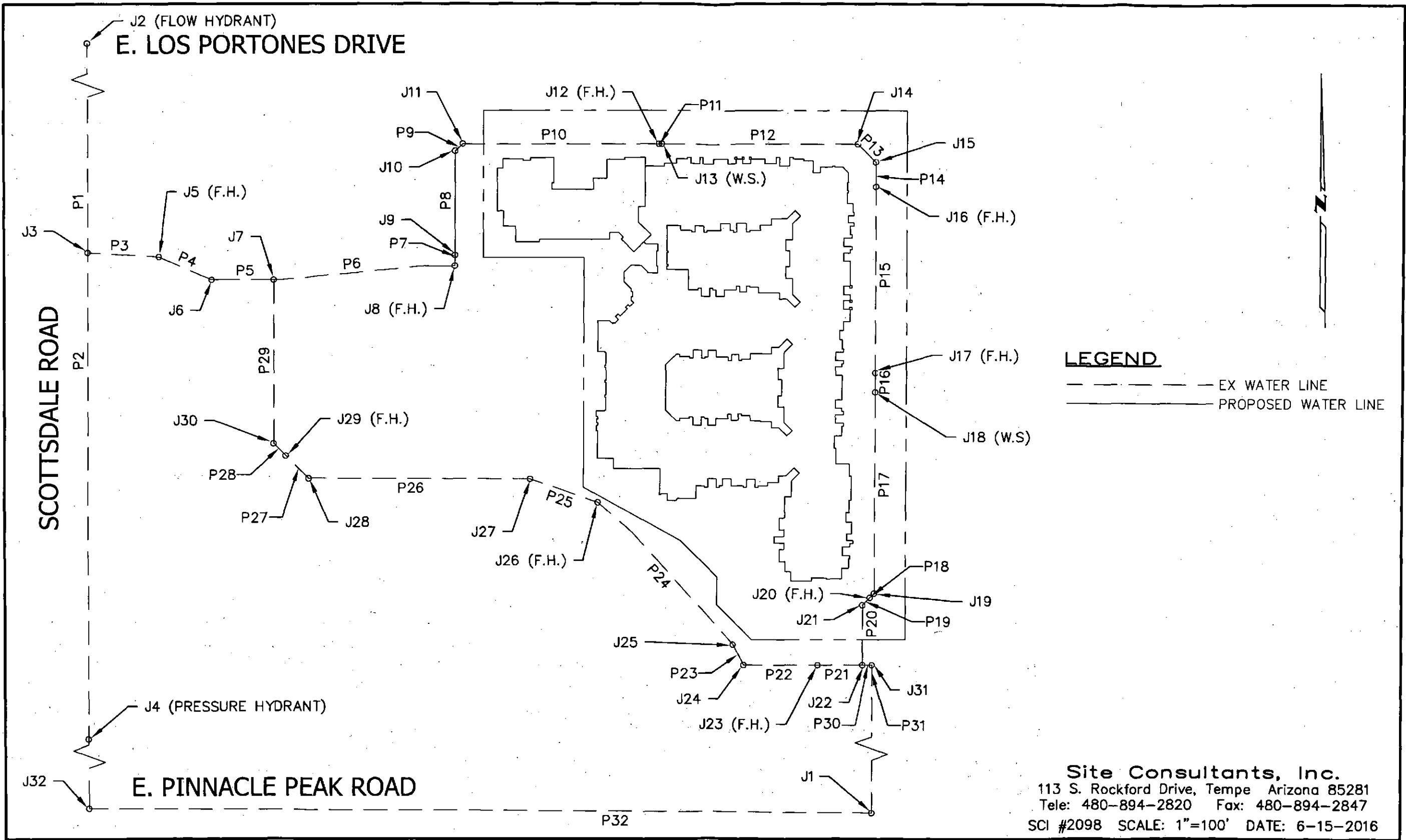
SW 1/4 SEC. 11 T4N R4E

SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS

3628 North Christmas Boulevard
Scottsdale, Arizona 85251

APPENDIX 3

Proposed Water System Map / Pipe Table / Improvement Plans



Site Consultants, Inc.
 113 S. Rockford Drive, Tempe Arizona 85281
 Tele: 480-894-2820 Fax: 480-894-2847
 SCI #2098 SCALE: 1"=100' DATE: 6-15-2016

Pipe Table

Junction ID	Junction ID	Link ID	Length (ft.)	Diameter (in.)
J2	J3	P1	904.9	12
J3	J4	P2	524.3	12
J3	J5	P3	75.9	8
J5	J6	P4	61.9	8
J6	J7	P5	66.1	8
J7	J8	P6	194.6	8
J8	J9	P7	11.5	8
J9	J10	P8	112.2	8
J10	J11	P9	11.0	8
J11	J12	P10	209.8	8
J12	J13	P11	3.0	8
J13	J14	P12	210.2	8
J14	J15	P13	27.6	8
J15	J16	P14	26.5	8
J16	J17	P15	200.5	8
J17	J18	P16	20.6	8
J18	J19	P17	217.1	8
J19	J20	P18	6.6	8
J20	J21	P19	11.3	8
J21	J22	P20	64.7	8
J22	J23	P21	47.6	8
J23	J24	P22	79.7	8
J24	J25	P23	24.7	8
J25	J26	P24	210.9	8
J26	J27	P25	77.4	8
J27	J28	P26	236.9	8
J28	J29	P27	34.7	8
J29	J30	P28	18.7	8
J30	J7	P29	176.6	8
J22	J31	P30	10.1	8
J31	J1	P31	694.5	8
J1	J32	P32	839.7	12
J32	J4	P33	610.1	12
		Pump PUMP1	#N/A	#N/A

LEGAL DESCRIPTION

PARCEL NO. 1
LOT 2, MINOR LAND DIVISION OF CROWN WEST PLAT, A DIVISION LAND MAP RECORDED IN BOOK 1259 OF MAPS, 28, RECORDS OF MARICOPA COUNTY, ARIZONA.

PARCEL NO. 2
EASEMENTS FOR ACCESS AND PARKING AS SET FORTH IN DECLARATION OF ESTABLISHMENT OF RESTRICTIONS AND GRANTS OF EASEMENTS RECORDED AS 89-265868 OF OFFICIAL RECORDS; SECOND AMENDMENT TO DECLARATION OF ESTABLISHMENT OF RESTRICTIONS AND GRANTS OF EASEMENTS RECORDED AS 2016-0100026 OF OFFICIAL RECORDS; AND AMENDED AND RESTATED DECLARATION OF CROSS EASEMENTS AND PARKING RECORDED AS 2007-251301 OF OFFICIAL RECORDS; AND FIRST AMENDMENT TO AMENDED AND RESTATED DECLARATION OF CROSS EASEMENTS AND PARKING RECORDED AS 2016-0100025 OF OFFICIAL RECORDS.

BENCHMARK

CITY OF SCOTTSDALE BRASS CAP IN HANDHOLE LOCATED AT THE INTERSECTION OF SCOTTSDALE ROAD & ALAMEDA DRIVE. ELEVATION = 1887.415 NAVD88 DATUM.

BENCHMARK CERTIFICATION STATEMENT

I HEREBY CERTIFY THAT ALL ELEVATIONS REPRESENTED ON THIS PLAN ARE BASED ON THE ELEVATION DATUM FOR THE CITY OF SCOTTSDALE BENCHMARK PROVIDED ABOVE.

LEGEND

---	PROPERTY LINE	C.O.S.	CITY OF SCOTTSDALE
---	RIGHT OF WAY LINE	R.O.W.	RIGHT OF WAY
---	CENTER LINE	M.C.R.	MARICOPA COUNTY RECORDER OFFICE
---	EASEMENT LINE	D.E.	DRAINAGE EASEMENT
---	CONTOUR LINE	W.L.E.	WATERLINE EASEMENT
---	UNDERGROUND UTILITY	C.A.E.	CROSS ACCESS EASEMENT
---	EDGE OF PAVEMENT		
E	UNDERGROUND ELECTRIC	TC	TOP CURB ELEVATION
E.CAB	ELECTRIC CABINET	G	GUTTER ELEVATION
E.J.B	ELECTRIC J-BOX	P	PAVEMENT ELEVATION
E.T.	ELECTRIC TRANSFORMER	C	CONCRETE ELEVATION
E.VLT.	ELECTRIC VULT	NG	NATURAL GROUND
OHE	OVERHEAD ELECTRIC	INV	INVERT
S	UNDERGROUND SEWER	TB	TOP BANK
SM	SEWER MANHOLE	BB	BOTTOM BANK
UD	UNDERGROUND STORM DRAIN	TW	TOP WALL
R.D.	ROOF DRAIN	GB	GRADE BREAK
T	UNDERGROUND TELEPHONE		
W	UNDERGROUND WATER		
W.V.	WATER VALVE		
F.H.	FIRE HYDRANT		

NO CONFLICT SIGNATURE BLOCK

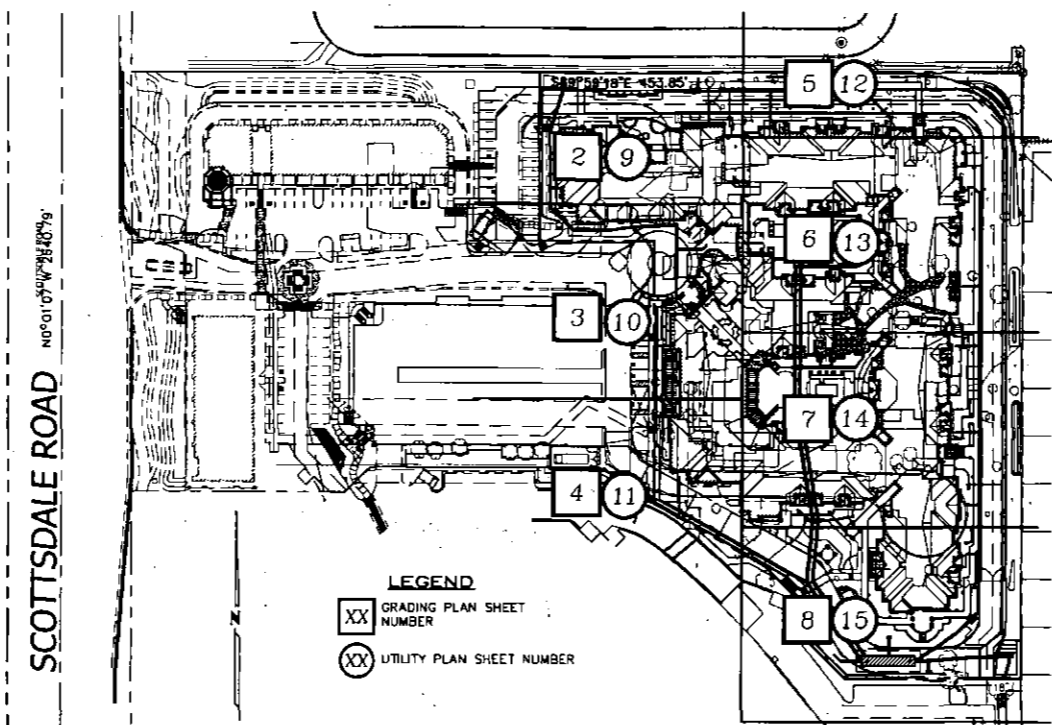
UTILITY	UTILITY COMPANY	NAME OF COMPANY REPRESENTATIVE	TELEPHONE NUMBER	DATE SIGNED
ELECTRIC	ARIZONA PUBLIC SERVICE	CONFLICT REVIEWER	602-493-4460	
TELEPHONE	CENTURY LINK	CONFLICT REVIEWER	480-768-4567	
NATURAL GAS	SOUTHWEST GAS	CONFLICT REVIEWER	480-730-3843	
CABLE TV	COX COMMUNICATIONS	CONFLICT REVIEWER	602-328-3535	
OTHER				

ENGINEER'S CERTIFICATION

I, MICHAEL J. CAYLOR, AS THE ENGINEER OF RECORD FOR THIS DEVELOPMENT, HEREBY CERTIFY THAT ALL UTILITY COMPANIES LISTED ABOVE HAVE BEEN PROVIDED FINAL IMPROVEMENT PLANS FOR REVIEW, AND THAT ALL CONFLICTS IDENTIFIED BY THE UTILITIES HAVE BEEN RESOLVED. IN ADDITION, "NO CONFLICT" FORMS HAVE BEEN OBTAINED FROM EACH UTILITY COMPANY AND ARE INCLUDED IN THIS SUBMITTAL.

SIGNATURE _____ DATE _____

PRELIMINARY CIVIL IMPROVEMENT PLANS
SENIOR LIVING
BEING A PORTION OF THE SOUTHWEST QUARTER OF SECTION 11, TOWNSHIP 4 NORTH, RANGE 4 EAST, OF THE GILA & SALT RIVER BASE & MERIDIAN, MARICOPA COUNTY, ARIZONA



GENERAL CONSTRUCTION NOTES FOR CAPITAL PROJECTS

- ALL IMPROVEMENT CONSTRUCTION SHALL COMPLY WITH THE LATEST MARICOPA COUNTY ASSOCIATION OF GOVERNMENTS STANDARD SPECIFICATIONS AND DETAILS FOR PUBLIC WORKS CONSTRUCTION AS AMENDED BY THE LATEST VERSION OF THE CITY OF SCOTTSDALE SUPPLEMENTAL STANDARD SPECIFICATIONS AND DETAILS AND CITY OF SCOTTSDALE'S DESIGN STANDARDS & POLICIES MANUAL (DS&PM). IF THERE IS A CONFLICT, THE LATTER SHALL APPLY. ALL FACILITIES CONSTRUCTION SHALL COMPLY WITH THE 2006 IBC, 2006 IPC, 2006 IFC AND THE 2005 NEC.
- THE ENGINEERING DESIGNS ON THESE PLANS ARE APPROVED BY THE CITY IN SCOPE AND NOT IN DETAIL IF CONSTRUCTION QUANTITIES ARE SHOWN ON THESE PLANS, THEY ARE NOT VERIFIED BY THE CITY.
- BASED ON THE INFORMATION SUBMITTED ON THE PLANS AND ASSOCIATED DOCUMENTS, THE CITY HAS REVIEWED AND FOUND THEM TO BE IN ACCORDANCE WITH THE CITY'S MUNICIPAL CODE AND ARE ACCEPTABLE FOR PERMIT ISSUANCE. THIS ACCEPTANCE BY THE CITY DOES NOT AUTHORIZE VIOLATIONS OF ANY APPLICABLE CODE, ORDINANCE OR STANDARD AS ADOPTED BY THE MUNICIPAL CODE.
- APPROVAL OF THE PLANS BY THE CITY IS VALID FOR SIX MONTHS. IF A PERMIT FOR THE CONSTRUCTION HAS NOT BEEN ISSUED WITHIN SIX MONTHS OF REVIEW, THE PLANS SHALL BE RESUBMITTED TO THE CITY FOR REAPPROVAL.
- ANY DEVIATION FROM THE APPROVED PLANS SHALL BE REVIEWED AND APPROVED BY THE CITY PRIOR TO THAT CHANGE BEING INCORPORATED INTO THE PROJECT.
- A CITY CAPITAL PROJECTS INSPECTOR WILL INSPECT ALL WORK WITHIN THE CITY RIGHTS-OF-WAY, EASEMENTS AND FACILITIES.
- ANY SPECIAL INSPECTION REQUIRED SHALL BE IN ADDITION TO ANY ROUTINE INSPECTION BY THE CITY.
- CITY ENCROACHMENT AND BUILDING PERMITS ARE REQUIRED FOR WORK IN PUBLIC RIGHTS-OF-WAY, EASEMENTS GRANTED FOR PUBLIC PURPOSES AND FACILITIES. PERMITS WILL BE ISSUED BY THE CITY THROUGH THE CITY'S ONE STOP SHOP. COPIES OF ALL PERMITS SHALL BE RETAINED ON-SITE AND SHALL BE AVAILABLE FOR INSPECTION AT ALL TIMES. FAILURE TO PRODUCE THE REQUIRED PERMITS WILL RESULT IN IMMEDIATE WORK STOPPAGE UNTIL THE PROPER PERMIT DOCUMENTATION IS OBTAINED.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FOR SALVAGING PROTECTED NATIVE PLANTS PRIOR TO THE START OF CONSTRUCTION.
- WHEREVER EXCAVATION IS DONE CONTACT THE BLUE STAKE CENTER AT (602) 263-1100 TWO WORKING DAYS BEFORE EXCAVATION IS TO BEGIN. THE CENTER WILL SEE THAT THE LOCATION OF THE UNDERGROUND UTILITY LINES IS IDENTIFIED FOR THE PROJECT.
- ALL EXCAVATION AND GRADING WHICH IS NOT IN PUBLIC RIGHTS-OF-WAY OR IN EASEMENTS GRANTED FOR PUBLIC PURPOSES MUST CONFORM TO SECTION 1803 AND APPENDIX J OF THE 2006 EDITION OF THE INTERNATIONAL BUILDING CODE PREPARED BY THE INTERNATIONAL CODE COUNCIL. A PERMIT FOR THIS GRADING MUST BE SECURED FROM THE CITY.
- THRUST RESTRAINT, WHERE REQUIRED, ON ALL CITY WATER LINES SHALL BE PROVIDED USING MEGALUG MECHANICAL JOINT RESTRAINTS OR CITY-APPROVED EQUAL.
- ANY ASPHALT MIX DESIGN USED ON CITY PROJECTS SHALL HAVE BEEN APPROVED FOR THAT USE PER SECTION 5-10 THE CITY'S DS&PM AND APPEAR ON THE "APPROVED LIST OF ASPHALT MIXES" AS DISTRIBUTED BY THE EAST VALLEY ASPHALT COMMITTEE (EVAC).
- THE CONTRACTOR SHALL BE RESPONSIBLE TO REMOVE AND REPLACE, AT NO ADDITIONAL COST TO THE CITY, ANY AND ALL PAVEMENT, SIDEWALK, CURB AND GUTTER, DRAINAGE STRUCTURES, ETC. OUTSIDE THE PAY LIMIT THAT ARE DAMAGED DUE TO THEIR ACTIVITIES ON THE PROJECT. THIS INCLUDES, BUT IS NOT LIMITED TO, THE REMOVAL AND REPLACEMENT OF NEWLY CRACKED ROADWAY INFRASTRUCTURE. THE REMOVAL AND REPLACEMENT OF EXISTING CRACKED ROADWAY INFRASTRUCTURE WHERE THE CRACKS HAVE BEEN ENLARGED DUE TO THE CONTRACTOR'S OPERATIONS, THE REMOVAL AND REPLACEMENT OF DEFORMED ROADWAY INFRASTRUCTURE. ALL SAWCUTS USED FOR THE REMOVAL OF THESE ITEMS SHALL BE PERPENDICULAR AND PARALLEL TO THE CENTERLINE CONTROLLING THAT ITEM, OR AT THE DIRECTION OF THE CITY'S CAPITAL PROJECTS INSPECTOR.
- ALL CAPITAL IMPROVEMENT PROJECTS SHALL MEET THE PROCEDURES AND STANDARDS FOR THE USE OF TEMPORARY/SECURITY FENCING AROUND THE PERIMETER OF CONSTRUCTION SITES, AS DEFINED IN THE CITY'S ZONING ORDINANCE, ARTICLE VII, SECTION 7.700.

SHEET INDEX

COVER SHEET	C-1
PRELIMINARY GRADING PLANS	C-2 TO C-8
PRELIMINARY UTILITY PLAN	C-9 TO C-21
SECTIONS	C-22 TO C-23
DETAILS	C-24 TO C-27

SITE INFORMATION

ADDRESS: 23733 N. SCOTTSDALE ROAD
SCOTTSDALE AZ. 85255

SITE AREA: NET 195,956 S.F. (4.4985 ACRES)

DISTURBANCE AREA: 195,956 S.F. (4.4985 ACRES)

ZONING: C-2 ESL

ASSESSORS PARCEL NUMBER: 212-05-574

QUARTER SECTION: 45-45

GENERAL NOTES FOR PUBLIC WORKS CONSTRUCTION

- ALL CONSTRUCTION IN THE PUBLIC RIGHT-OF-WAY OR IN EASEMENT GRANTED FOR PUBLIC USE MUST CONFORM TO THE LATEST MARICOPA ASSOCIATION OF GOVERNMENTS (MAG) UNIFORM STANDARD SPECIFICATIONS AND UNIFORM STANDARDS DETAILS FOR PUBLIC WORKS CONSTRUCTION AS AMENDED BY THE LATEST VERSION OF THE CITY OF SCOTTSDALE SUPPLEMENTAL STANDARD SPECIFICATIONS AND SUPPLEMENTAL STANDARD DETAILS. IF THERE IS A CONFLICT, THE CITY'S SUPPLEMENTAL STANDARD DETAILS WILL GOVERN.
- THE CITY ONLY APPROVES THE SCOPE, NOT THE DETAIL, OF ENGINEERING DESIGNS; THEREFORE, IF CONSTRUCTION QUANTITIES ARE SHOWN ON THESE PLANS, THEY ARE NOT VERIFIED BY THE CITY.
- THE APPROVAL OF PLANS IS VALID FOR SIX (6) MONTHS. IF AN ENCROACHMENT PERMIT FOR THE CONSTRUCTION HAS NOT BEEN ISSUED WITHIN SIX MONTHS, THE PLANS MUST BE RESUBMITTED TO THE CITY FOR REAPPROVAL.
- A PUBLIC WORKS INSPECTOR WILL INSPECT ALL WORKS WITHIN THE CITY OF SCOTTSDALE RIGHTS-OF-WAY AND IN EASEMENTS. NOTIFY INSPECTION SERVICES 24 HOURS PRIOR TO BEGINNING CONSTRUCTION BY CALLING 480-312-5750.
- WHENEVER EXCAVATION IS NECESSARY, CALL THE BLUE STAKE CENTER, 602-263-1100, TWO WORKING DAYS BEFORE EXCAVATION BEGINS. THE CENTER WILL SEE THAT THE LOCATION OF THE UNDERGROUND UTILITY LINES IS IDENTIFIED FOR THE PROJECT. CALL "COLLECT" IF NECESSARY.
- ENCROACHMENT PERMITS ARE REQUIRED FOR ALL WORK IN PUBLIC RIGHTS-OF-WAY AND EASEMENTS GRANTED FOR PUBLIC PURPOSES. AN ENCROACHMENT PERMIT WILL BE ISSUED BY THE CITY ONLY AFTER THE REGISTRANT HAS PAID A BASE FEE PLUS A FEE FOR INSPECTION SERVICES. COPIES OF ALL PERMITS MUST BE RETAINED ON-SITE AND BE AVAILABLE FOR INSPECTION AT ALL TIMES. FAILURE TO PRODUCE THE REQUIRED PERMITS WILL RESULT IN IMMEDIATE SUSPENSION OF ALL WORK UNTIL THE PROPER PERMIT DOCUMENTATION IS OBTAINED.
- ALL EXCAVATION AND GRADING THAT IS NOT IN THE PUBLIC RIGHTS-OF-WAY OR NOT IN EASEMENTS GRANTED FOR PUBLIC USE MUST CONFORM TO CHAPTER 70, EXCAVATION AND GRADING, OF THE LATEST EDITION OF THE UNIFORM BUILDING CODE PREPARED BY THE INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS. A PERMIT FOR THIS GRADING MUST BE SECURED FROM THE CITY FOR A FEE ESTABLISHED BY UNIFORM BUILDING CODE.

FEMA

COMMUNITY NUMBER	PANEL #	SUFFIX	DATE OF FIRM (INDEX DATE)	FIRM ZONE	BASE FLOOD ELEVATION (IN AO ZONE, USE DEPTH)
045012	1310	L	10-16-2013	AO	1

ENGINEERS CERTIFICATION:

THE LOWEST FLOOR ELEVATION(S) AND/OR FLOOD PROOFING ELEVATION(S) ON THIS PLAN ARE SUFFICIENTLY HIGH TO PROVIDE PROTECTION FROM FLOODING CAUSED BY A 100-YEAR STORM, AND ARE IN ACCORDANCE WITH SCOTTSDALE REVISED CODE, CHAPTER 37 - FLOODPLAIN AND STORMWATER REGULATION.

DRAINAGE NOTE

THE PAD ELEVATIONS OF ALL NEW A/C AND/OR ELECTRO-MECHANICAL UNITS WILL BE SET AT OR ABOVE RFE TO PROVIDE FLOOD PROTECTION UNDER THE 100 YEAR STORM EVENT.

HIGHEST ADJACENT GRADE/FINISH FLOOR ELEVATION

MINIMUM FINISH FLOOR ELEVATION FOR NORTHERN BUILDING IS BASED ON HIGHEST ADJACENT GRADE (HAG) LOCATED AT NORTHEAST CORNER OF BUILDING. HAG ELEVATION IS 1871.83 FEET, THEREFORE FINISH FLOOR ELEVATION IS 1873.83 (1871.83 + 2 = 1873.83 FEET).

MINIMUM FINISH FLOOR ELEVATION FOR SOUTHERN BUILDING IS BASED ON HAG LOCATED AT NORTHEAST CORNER OF THE BUILDING. HAG ELEVATION IS 1867.40 FEET, THEREFORE MINIMUM FINISH FLOOR ELEVATION IS 1869.40 (1867.40 + 2=1869.40 FEET), HOWEVER, DUE TO CONSTRUCTION CONSTRAINTS USE 1869.86 ELEVATION.

AS-BUILT CERTIFICATION

I HEREBY CERTIFY THAT THE AS-BUILT IMPROVEMENTS AS SHOWN HEREON ARE LOCATED AS NOTED, AND THE LOCATIONS ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR _____ DATE _____

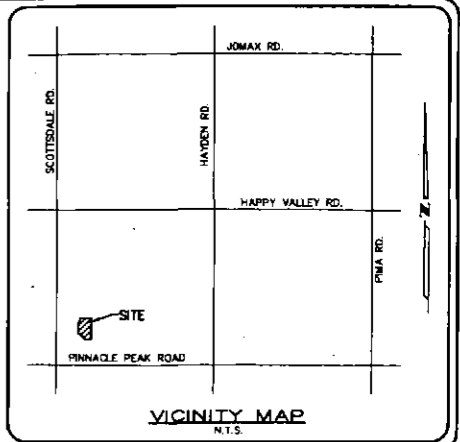
CITY OF SCOTTSDALE

REVIEW AND RECOMMENDED APPROVAL BY:

PAVING	TRAFFIC
G & D	PLANNING
W & S	FIRE
RET. WALLS	

APPROVED BY: _____ DATE _____

ENGINEERING COORDINATION MANAGER (OR DESIGNEE) _____ DATE _____



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6909 East Greenway Parkway, Suite 250, Scottsdale, AZ 85254
westwoodps.com (888) 937-5150

COVER SHEET
SENIOR LIVING FACILITY
23733 N. SCOTTSDALE ROAD
SCOTTSDALE, AZ.

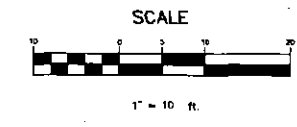


PROJECT NO.: 2009
SCALE: PER PLAN
DRAWN BY: WLC
CHECKED BY: MJC
DATE: 10-5-2016
DWG: 2008-C-05-P18

C-1
of
27

PRELIMINARY NOT FOR CONSTRUCTION





PUBLIC WATER MAIN CONSTRUCTION NOTES

- 1 SAWCUT & REMOVE EXISTING ASPHALT PAVEMENT. REPLACE IN LIKE KIND PER C.O.S. DTL. 2200.
- 2 SAWCUT & REMOVE EXISTING CONCRETE PAVEMENT. REPLACE IN LIKE KIND PER C.O.S. DTL. 2200.
- 3 CONNECT TO EXISTING 8" WATER LINE.
- 4 INSTALL 8"x8" T.S. &V. WITH BOX & COVER PER M.A.G. DETAIL 340. CONTRACTOR TO VERIFY SIZE AND LOCATION OF EXISTING WATER LINE PRIOR TO PROCEEDING WITH BALANCE OF CONSTRUCTION.
- 5 INSTALL 8" D.I.P. WATER PIPE (MIN. CLASS 350). TRENCH PER C.O.S. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 6 INSTALL 8" D.I.P. FIRE LINE CONNECTION PER C.O.S. DTL. 2362-2. INSTALL TEMPORARY TAP FOR CHLORINE INJECTION PER C.O.S. DTL. 2399.
- 7 INSTALL 6" D.I.P. FIRE LINE (MIN. CLASS 350). TRENCH PER C.O.S. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601. RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
- 8 INSTALL 3" SERVICE WITH 3" TEE AND SHUT OFF VALVE PER M.A.G. STD. DTL. 340 AND 341-1 TYPE 'C'; INSTALL WATER METER AND VAULT PER C.O.S. DTL. 2345-2.
- 9 INSTALL FIRE HYDRANT ASSEMBLY PER M.A.G. STD. DTL. 360-1.
- 10 INSTALL 3" TYPE 'K' COPPER LINE (FROM MAIN TO WATER METER). TRENCH PER C.O.S. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 11 INSTALL 8"-45° BEND WITH RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
- 12 INSTALL 8"x6" TEE WITH RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
- 13 INSTALL 6" VALVE BOX AND COVER PER M.A.G. STD. DTL. 391-1 TYPE 'C'. VALVE BOX FRAME AND COVER ADJUSTMENT PER C.O.S. DTL. 2270.
- 14 INSTALL 8" D.I.P. FIRE LINE (MIN. CLASS 350). TRENCH PER C.O.S. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601. RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
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- 17 INSTALL CAP IF OFFSITE CONSTRUCTION IS NOT CONCURRENT WITH ONSITE CONSTRUCTION.
- 18 INSTALL 2" SERVICE WITH 2" TEE AND SHUT OFF VALVE PER M.A.G. STD. DTL. 340 AND 341-1 TYPE 'C'; INSTALL WATER METER AND VAULT PER C.O.S. STD. DTL. 2330 (FOR LANDSCAPE USE).
- 19 INSTALL 8"-90° BEND.

PRIVATE FIRE LINE CONSTRUCTION NOTES

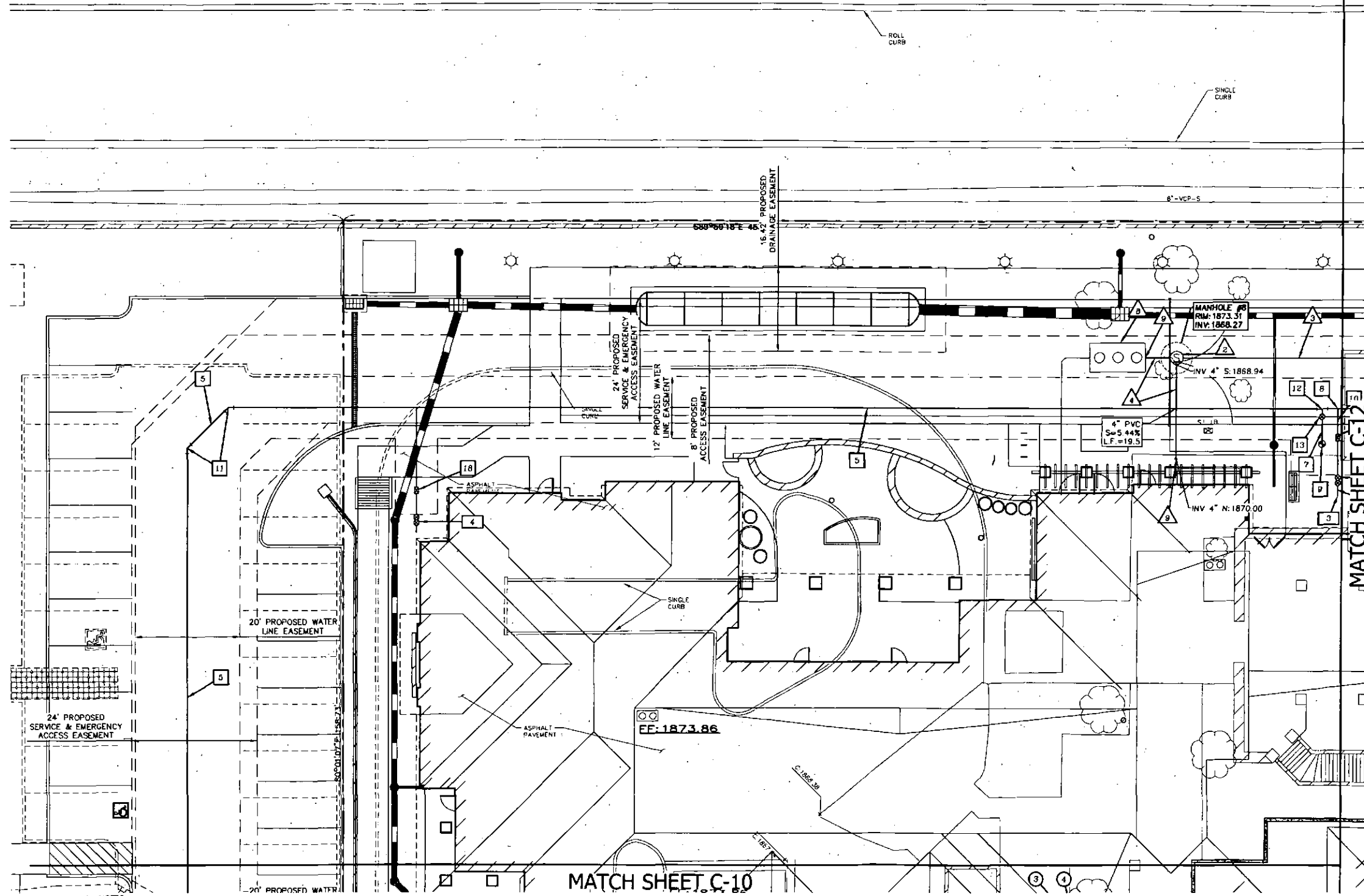
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- 2 INSTALL 8"-45° BEND WITH RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
- 3 INSTALL FIRE DEPARTMENT CONNECTION PER CITY OF SCOTTSDALE REQUIREMENTS.
- 4 FIRE SPRINKLER CONTRACTOR TO CONNECT TO FIRE LINE STUB; FIRE SPRINKLER RISER PER C.O.S. DTL. 2369. SEE FIRE SPRINKLER PLANS FOR CONTINUATION.

PRIVATE WATER CONSTRUCTION NOTES

- 1 INSTALL 3" BACKFLOW PREVENTOR PER C.O.S. DTL. 2353.
- 2 INSTALL 3" K-COPPER LINE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 3 CONNECT TO BUILDING DOMESTIC WATER SYSTEM. COORDINATE WITH PLUMBING PLANS FOR CONTINUATION.
- 4 INSTALL 2" PRESSURE VACUUM BREAKER ASSEMBLY PER C.O.S. STD. DT. 2355.

PRIVATE SEWER CONSTRUCTION NOTES

- 1 CONNECT TO PUBLIC SEWER MANHOLE.
- 2 INSTALL SEWER MANHOLE PER M.A.G. STD. DTL. 420-1.
- 3 INSTALL 8" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 4 INSTALL 6" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 5 INSTALL 4" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 6 INSTALL CLEANOUT PER M.A.G. STD. DTL. 441.
- 7 SEWER TAP FOR BUILDING SERVICE PER M.A.G. STD. DTL. 440-1.
- 8 INSTALL GREASE INTERCEPTOR. SEE PLUMBING PLANS FOR DETAILS.
- 9 CONNECT TO BUILDING SEWER. COORDINATE WITH PLUMBING PLANS FOR CONTINUATION.
- 10 SEWER TAP FOR ENCLOSURE SERVICE PER M.A.G. STD. DTL. 440-1.
- 11 CUT AND CAP EXISTING 6" PVC SEWER SERVICE.
- 12 SEWER TAP FOR TRASH COMPACTOR PER M.A.G. STD. DTL. 440-1.



- NOTES**
1. ALL DUCTILE IRON WATER LINES ARE TO BE POLYETHYLENE WRAPPING WITH POLYETHYLENE LOCATING TAPE (COLOR CODED BLUE) WILL BE PLACED ABOVE ALL PUBLIC WATER LINES PER M.A.G. DETAILS.
 2. DESIGN JOINT DEFLECTION SHALL NOT EXCEED 4 DEGREES FOR WATER LINES 12 INCHES AND SMALLER.
 3. FOR PURPOSES OF HORIZONTAL SEPARATION, STORM DRAINS AND NON-POTABLE WATER LINES SHALL BE TREATED AS SEWER LINES.
 4. ELECTRONIC MARKERS ARE TO BE LOCATED AT ALL FITTINGS (EXCLUDING VALVES).
 5. MINIMUM COVER OF 36 INCHES TO THE TOP OF PIPES.
 6. SEPARATION OF WATER FROM ELECTRICAL OR GAS LINES WILL CONFORM TO C.O.S. STD. DTL. 2372 AND SHALL INCLUDE A PRESSURE REGULATING VALVE.
 7. FOR MINIMUM CLEARANCE UNDER CULVERTS, STORM DRAINS, AND OTHER UTILITIES SEE C.O.S. STD. DTL. 2370 AND 2372.

MATCH SHEET C-10

MATCH SHEET C-12

PRELIMINARY NOT FOR CONSTRUCTION

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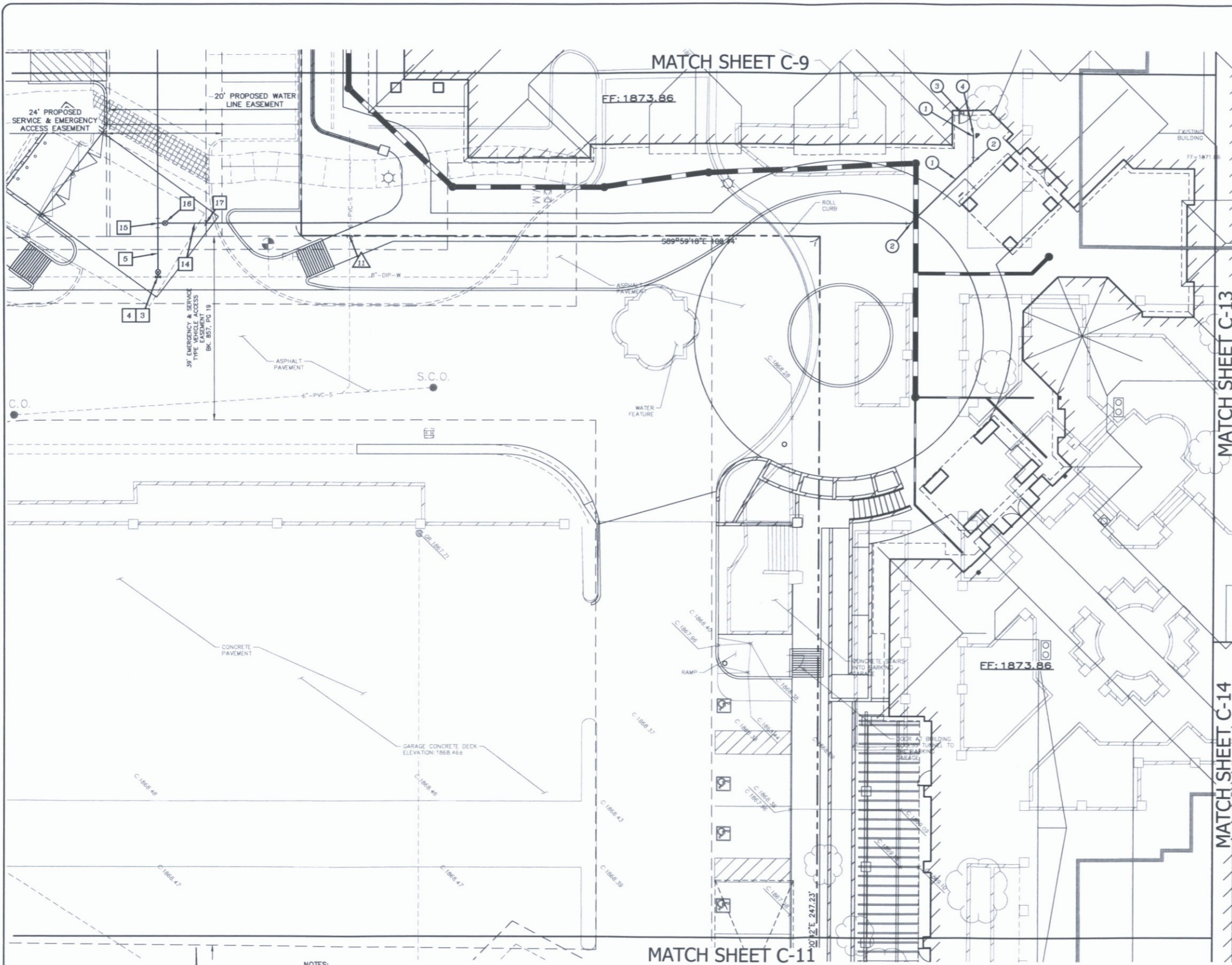
PRELIMINARY UTILITY PLAN
SENIOR LIVING FACILITY
23733 N. SCOTTSDALE ROAD
SCOTTSDALE, ARIZONA

PROJECT NO.: 2098
SCALE: 1" = 10'
DRAWN BY: MJC
CHECKED BY: MJC
DATE: 10-05-2016
DWG: 2098-C-01-P-01

C-9
OF
27



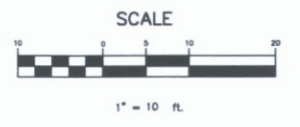
EXPIRES 3-31-2018



- PUBLIC WATER MAIN CONSTRUCTION NOTES**
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7. FOR MINIMUM CLEARANCE UNDER CULVERTS, STORM DRAINS, AND OTHER UTILITIES SEE C.O.S. STD. DTL. 2370 AND 2372.



MATCH SHEET C-11

PRELIMINARY NOT FOR CONSTRUCTION

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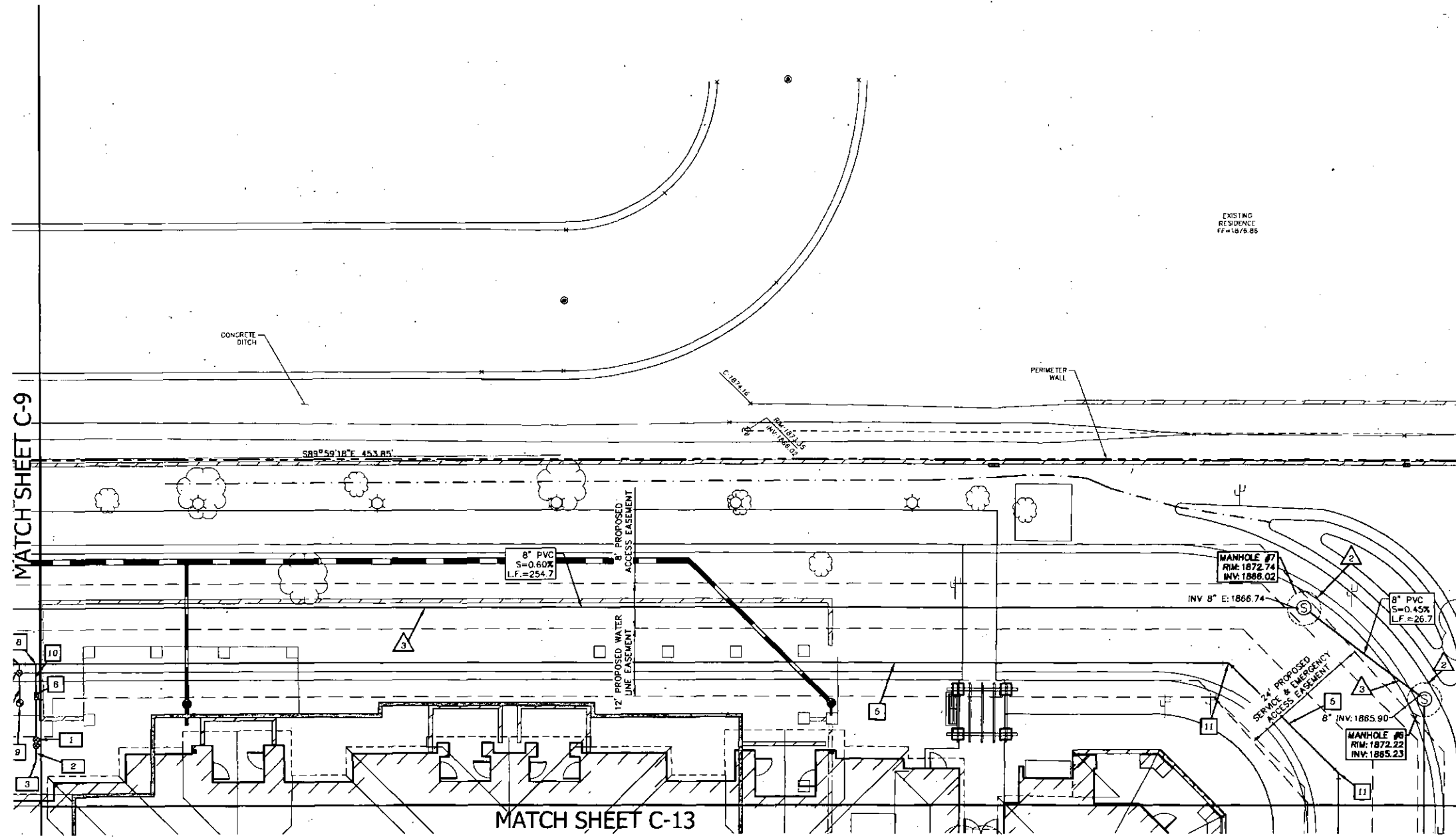


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PRELIMINARY UTILITY PLAN
 SENIOR LIVING FACILITY
 23733 N. SCOTTSDALE ROAD
 SCOTTSDALE, ARIZONA

PROJECT NO.: 2098
 SCALE: 1" = 10'
 DRAWN BY: WLG
 CHECKED BY: MJC
 DATE: 10-05-2016
 DWG: 2098-C-GP-Prel

C-10
 OF
27



PUBLIC WATER MAIN CONSTRUCTION NOTES

- 1 SAWCUT & REMOVE EXISTING ASPHALT PAVEMENT. REPLACE IN LIKE KIND PER C.O.S. DTL. 2200.
- 2 SAWCUT & REMOVE EXISTING CONCRETE PAVEMENT. REPLACE IN LIKE KIND PER C.O.S. DTL. 2200.
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- 16 INSTALL 8" VALVE BOX AND COVER PER M.A.G. STD. DTL. 391-1 TYPE 'C'. VALVE BOX FRAME AND COVER ADJUSTMENT PER C.O.S. DTL. 2270.
- 17 INSTALL CAP IF OFFSITE CONSTRUCTION IS NOT CONCURRENT WITH ONSITE CONSTRUCTION.
- 18 INSTALL 2" SERVICE WITH 2" TEE AND SHUT OFF VALVE PER M.A.G. STD. DTL. 340 AND 341-1 TYPE 'C'. INSTALL WATER METER AND VAULT PER C.O.S. STD. DTL. 2330 (FOR LANDSCAPE USE).
- 19 INSTALL 8"-90° BEND.

PRIVATE FIRE LINE CONSTRUCTION NOTES

- 1 INSTALL 8" D.I.P. FIRE LINE (MIN. CLASS 350). TRENCH PER C.O.S. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601. RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
- 2 INSTALL 8"-45° BEND WITH RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
- 3 INSTALL FIRE DEPARTMENT CONNECTION PER CITY OF SCOTTSDALE REQUIREMENTS.
- 4 FIRE SPRINKLER CONTRACTOR TO CONNECT TO FIRE LINE STUB; FIRE SPRINKLER RISER PER C.O.S. DTL. 2369. SEE FIRE SPRINKLER PLANS FOR CONTINUATION.

PRIVATE WATER CONSTRUCTION NOTES

- 1 INSTALL 3" BACKFLOW PREVENTOR PER C.O.S. DTL. 2353.
- 2 INSTALL 3" K-COPPER LINE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 3 CONNECT TO BUILDING DOMESTIC WATER SYSTEM. COORDINATE WITH PLUMBING PLANS FOR CONTINUATION.
- 4 INSTALL 2" PRESSURE VACUUM BREAKER ASSEMBLY PER C.O.S. STD. DT. 2355.

PRIVATE SEWER CONSTRUCTION NOTES

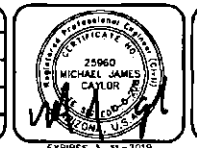
- 1 CONNECT TO PUBLIC SEWER MANHOLE.
- 2 INSTALL SEWER MANHOLE PER M.A.G. STD. DTL. 420-1.
- 3 INSTALL 8" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 4 INSTALL 6" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 5 INSTALL 4" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 6 INSTALL CLEANOUT PER M.A.G. STD. DTL. 441.
- 7 SEWER TAP FOR BUILDING SERVICE PER M.A.G. STD. DTL. 440-1.
- 8 INSTALL GREASE INTERCEPTOR. SEE PLUMBING PLANS FOR DETAILS.
- 9 CONNECT TO BUILDING SEWER. COORDINATE WITH PLUMBING PLANS FOR CONTINUATION.
- 10 SEWER TAP FOR ENCLOSURE SERVICE PER M.A.G. STD. DTL. 440-1.
- 11 CUT AND CAP EXISTING 6" PVC SEWER SERVICE.
- 12 SEWER TAP FOR TRASH COMPACTOR PER M.A.G. STD. DTL. 440-1.

- NOTES**
1. ALL DUCTILE IRON WATER LINES ARE TO BE POLYETHYLENE WRAPPING WITH POLYETHYLENE LOCATING TAPE (COLOR CODED BLUE) WILL BE PLACED ABOVE ALL PUBLIC WATER LINES PER M.A.G. DETAILS.
 2. DESIGN JOINT DEFLECTION SHALL NOT EXCEED 4 DEGREES FOR WATER LINES 12 INCHES AND SMALLER.
 3. FOR PURPOSES OF HORIZONTAL SEPARATION, STORM DRAINS AND NON-POTABLE WATER LINES SHALL BE TREATED AS SEWER LINES.
 4. ELECTRONIC MARKERS ARE TO BE LOCATED AT ALL FITTINGS (EXCLUDING VALVES).
 5. MINIMUM COVER OF 36 INCHES TO THE TOP OF PIPES.
 6. SEPARATION OF WATER FROM ELECTRICAL OR GAS LINES WILL CONFORM TO C.O.S. STD. DTL. 2372 AND SHALL INCLUDE A PRESSURE REGULATING VALVE.
 7. FOR MINIMUM CLEARANCE UNDER CULVERTS, STORM DRAINS, AND OTHER UTILITIES SEE C.O.S. STD. DTL. 2370 AND 2372.

PRELIMINARY NOT FOR CONSTRUCTION



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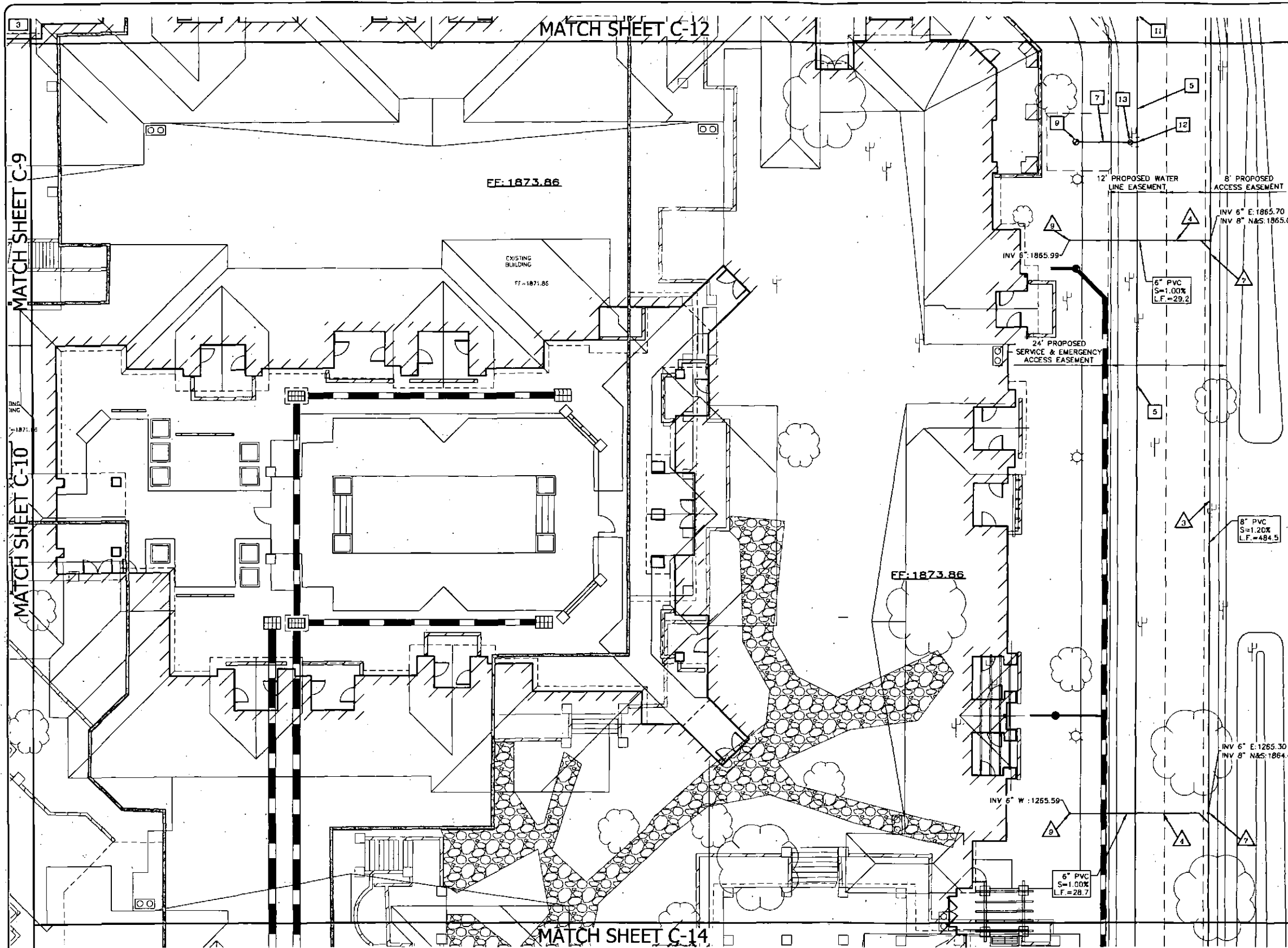


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PRELIMINARY UTILITY PLAN
 SENIOR LIVING FACILITY
 23733 N. SCOTTSDALE ROAD
 SCOTTSDALE, ARIZONA

PROJECT NO. 2098
SCALE: 1" = 10'
DRAWN BY: MJC
CHECKED BY: MJC
DATE: 10-05-2016
DWG: 2098-C-CP-Plan

C-12
 OF
27



PUBLIC WATER MAIN CONSTRUCTION NOTES

- 1 SAWCUT & REMOVE EXISTING ASPHALT PAVEMENT. REPLACE IN LIKE KIND PER C.O.S. DTL 2200.
- 2 SAWCUT & REMOVE EXISTING CONCRETE PAVEMENT. REPLACE IN LIKE KIND PER C.O.S. DTL 2200.
- 3 CONNECT TO EXISTING 8" WATER LINE.
- 4 INSTALL 8"x8" T.S.&V. WITH BOX & COVER PER M.A.G. DETAIL 340. CONTRACTOR TO VERIFY SIZE AND LOCATION OF EXISTING WATER LINE PRIOR TO PROCEEDING WITH BALANCE OF CONSTRUCTION.
- 5 INSTALL 8" D.I.P. WATER PIPE (MIN. CLASS 350). TRENCH PER C.O.S. DTL 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 6 INSTALL 8" D.I.P. FIRE LINE CONNECTION PER C.O.S. DTL 2362-2. INSTALL TEMPORARY TAP FOR CHLORINE INJECTION PER C.O.S. DTL 2399.
- 7 INSTALL 6" D.I.P. FIRE LINE (MIN. CLASS 350). TRENCH PER C.O.S. DTL 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601. RESTRAIN JOINTS PER M.A.G. STD. DTL 303.
- 8 INSTALL 3" SERVICE WITH 3" TEE AND SHUT OFF VALVE PER M.A.G. STD. DTL 340 AND 341-1 TYPE 'C'. INSTALL WATER METER AND VAULT PER C.O.S. STD. DTL 2345-2.
- 9 INSTALL FIRE HYDRANT ASSEMBLY PER M.A.G. STD. DTL 360-1.
- 10 INSTALL 3" TYPE 'K' COPPER LINE (FROM MAIN TO WATER METER). TRENCH PER C.O.S. DTL 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 11 INSTALL 8"-45° BEND WITH RESTRAIN JOINTS PER M.A.G. STD. DTL 303.
- 12 INSTALL 8"x6" TEE WITH RESTRAIN JOINTS PER M.A.G. STD. DTL 303.
- 13 INSTALL 6" VALVE BOX AND COVER PER M.A.G. STD. DTL 391-1 TYPE 'C'. VALVE BOX FRAME AND COVER ADJUSTMENT PER C.O.S. DTL 2270.
- 14 INSTALL 8" D.I.P. FIRE LINE (MIN. CLASS 350). TRENCH PER C.O.S. DTL 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601. RESTRAIN JOINTS PER M.A.G. STD. DTL 303.
- 15 INSTALL 8"x8" TEE WITH RESTRAIN JOINTS PER M.A.G. STD. DTL 303.
- 16 INSTALL 8" VALVE BOX AND COVER PER M.A.G. STD. DTL 391-1 TYPE 'C'. VALVE BOX FRAME AND COVER ADJUSTMENT PER C.O.S. DTL 2270.
- 17 INSTALL CAP IF OFFSITE CONSTRUCTION IS NOT CONCURRENT WITH ONSITE CONSTRUCTION.
- 18 INSTALL 2" SERVICE WITH 2" TEE AND SHUT OFF VALVE PER M.A.G. STD. DTL 340 AND 341-1 TYPE 'C'. INSTALL WATER METER AND VAULT PER C.O.S. STD. DTL 2330 (FOR LANDSCAPE USE).
- 19 INSTALL 8"-90° BEND.

PRIVATE FIRE LINE CONSTRUCTION NOTES

- 1 INSTALL 8" D.I.P. FIRE LINE (MIN. CLASS 350). TRENCH PER C.O.S. DTL 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601. RESTRAIN JOINTS PER M.A.G. STD. DTL 303.
- 2 INSTALL 8"-45° BEND WITH RESTRAIN JOINTS PER M.A.G. STD. DTL 303.
- 3 INSTALL FIRE DEPARTMENT CONNECTION PER CITY OF SCOTTSDALE REQUIREMENTS.
- 4 FIRE SPRINKLER CONTRACTOR TO CONNECT TO FIRE LINE STUB. FIRE SPRINKLER RISER PER C.O.S. DTL 2369. SEE FIRE SPRINKLER PLANS FOR CONTINUATION.

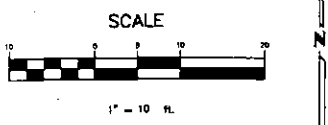
PRIVATE WATER CONSTRUCTION NOTES

- 1 INSTALL 3" BACKFLOW PREVENTOR PER C.O.S. DTL 2353.
- 2 INSTALL 3" K-COPPER LINE. TRENCH PER C.O.S. STD. DTL 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 3 CONNECT TO BUILDING DOMESTIC WATER SYSTEM. COORDINATE WITH PLUMBING PLANS FOR CONTINUATION.
- 4 INSTALL 2" PRESSURE VACUUM BREAKER ASSEMBLY PER C.O.S. STD. DTL 2355.

PRIVATE SEWER CONSTRUCTION NOTES

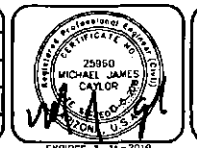
- 1 CONNECT TO PUBLIC SEWER MANHOLE.
- 2 INSTALL SEWER MANHOLE PER M.A.G. STD. DTL 420-1.
- 3 INSTALL 8" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 4 INSTALL 6" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 5 INSTALL 4" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 6 INSTALL CLEANOUT PER M.A.G. STD. DTL 441.
- 7 SEWER TAP FOR BUILDING SERVICE PER M.A.G. STD. DTL 440-1.
- 8 INSTALL GREASE INTERCEPTOR. SEE PLUMBING PLANS FOR DETAILS.
- 9 CONNECT TO BUILDING SEWER. COORDINATE WITH PLUMBING PLANS FOR CONTINUATION.
- 10 SEWER TAP FOR ENCLOSURE SERVICE PER M.A.G. STD. DTL 440-1.
- 11 CUT AND CAP EXISTING 6" PVC SEWER SERVICE.
- 12 SEWER TAP FOR TRASH COMPACTOR PER M.A.G. STD. DTL 440-1.

- NOTES**
1. ALL DUCTILE IRON WATER LINES ARE TO BE POLYETHYLENE WRAPPING WITH POLYETHYLENE LOCATING TAPE (COLOR CODED BLUE) WILL BE PLACED ABOVE ALL PUBLIC WATER LINES PER M.A.G. DETAILS.
 2. DESIGN JOINT DEFLECTION SHALL NOT EXCEED 4 DEGREES FOR WATER LINES 12 INCHES AND SMALLER.
 3. FOR PURPOSES OF HORIZONTAL SEPARATION, STORM DRAINS AND NON-POTABLE WATER LINES SHALL BE TREATED AS SEWER LINES.
 4. ELECTRONIC MARKERS ARE TO BE LOCATED AT ALL FITTINGS (EXCLUDING VALVES).
 5. MINIMUM COVER OF 36 INCHES TO THE TOP OF PIPES.
 6. SEPARATION OF WATER FROM ELECTRICAL OR GAS LINES WILL CONFORM TO C.O.S. STD. DTL 2372 AND SHALL INCLUDE A PRESSURE REGULATING VALVE.
 7. FOR MINIMUM CLEARANCE UNDER CULVERTS, STORM DRAINS, AND OTHER UTILITIES SEE C.O.S. STD. DTL 2370 AND 2372.



PRELIMINARY NOT FOR CONSTRUCTION

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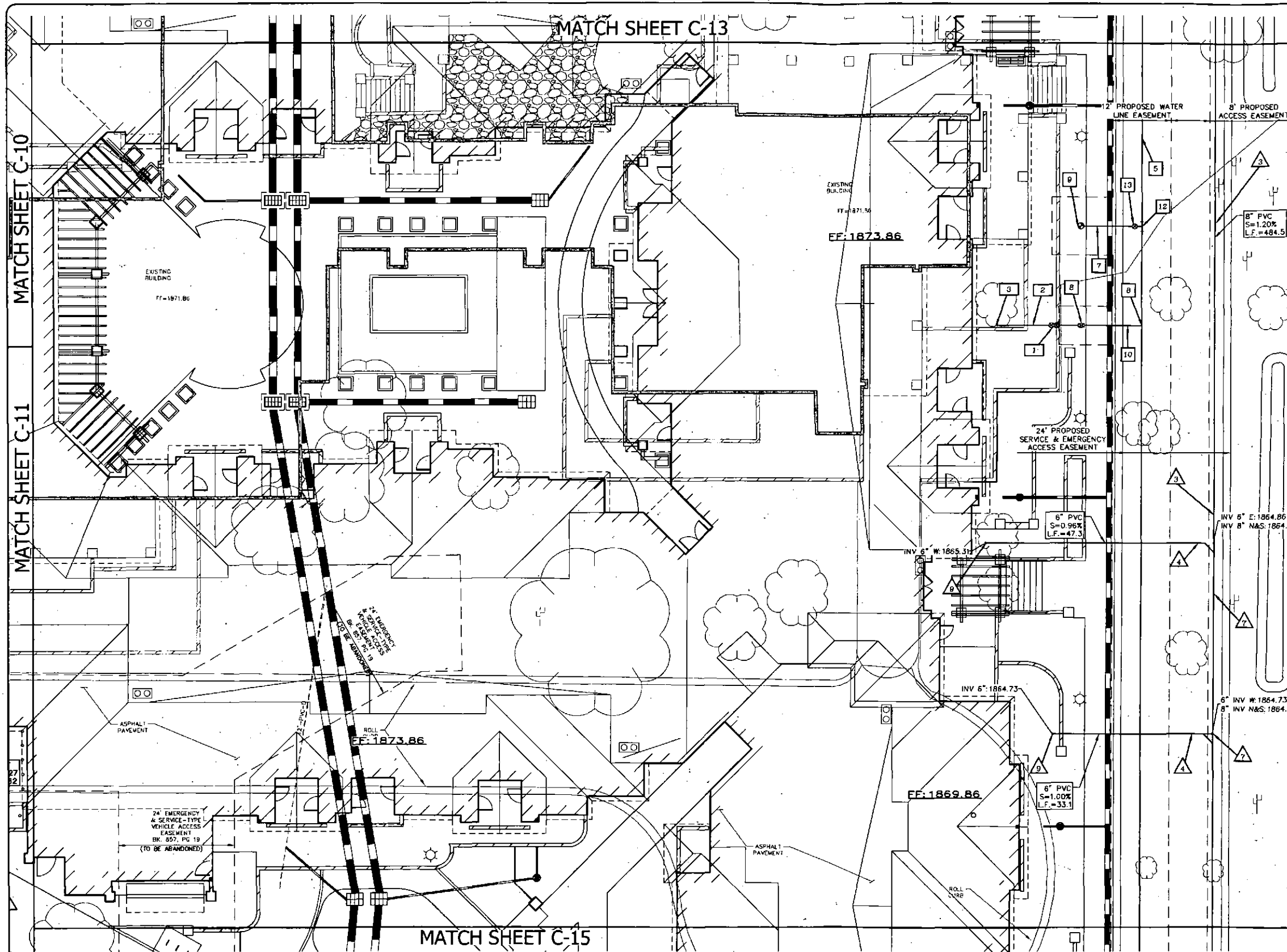


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PRELIMINARY UTILITY PLAN
 SENIOR LIVING FACILITY
 23733 N. SCOTTSDALE ROAD
 SCOTTSDALE, ARIZONA

PROJECT NO: 2098
 SCALE: 1" = 10'
 DRAWN BY: WJC
 CHECKED BY: MJC
 DATE: 10-05-2016
 DWG: 2098-C-13-P14

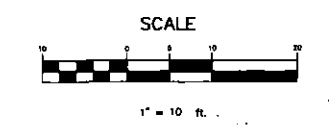
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- PUBLIC WATER MAIN CONSTRUCTION NOTES**
- SAWCUT & REMOVE EXISTING ASPHALT PAVEMENT. REPLACE IN LIKE KIND PER C.O.S. DTL. 2200.
 - SAWCUT & REMOVE EXISTING CONCRETE PAVEMENT. REPLACE IN LIKE KIND PER C.O.S. DTL. 2200.
 - CONNECT TO EXISTING 8" WATER LINE.
 - INSTALL 8"x8" T.S.&V. WITH BOX & COVER PER M.A.G. DETAIL 340. CONTRACTOR TO VERIFY SIZE AND LOCATION OF EXISTING WATER LINE PRIOR TO PROCEEDING WITH BALANCE OF CONSTRUCTION.
 - INSTALL 8" D.I.P. WATER PIPE (MIN. CLASS 350). TRENCH PER C.O.S. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
 - INSTALL 8" D.I.P. FIRE LINE CONNECTION PER C.O.S. DTL. 2362-2. INSTALL TEMPORARY TAP FOR CHLORINE INJECTION PER C.O.S. DTL. 2399.
 - INSTALL 6" D.I.P. FIRE LINE (MIN. CLASS 350). TRENCH PER C.O.S. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601. RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
 - INSTALL 3" SERVICE WITH 3" TEE AND SHUT OFF VALVE PER M.A.G. STD. DTL. 340 AN 341-1 TYPE 'C'. INSTALL WATER METER AND VAULT PER C.O.S. STD. DTL. 2345-2.
 - INSTALL FIRE HYDRANT ASSEMBLY PER M.A.G. STD. DTL. 360-1.
 - INSTALL 3" TYPE 'K' COPPER LINE (FROM MAIN TO WATER METER). TRENCH PER C.O.S. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
 - INSTALL 8"-45° BEND WITH RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
 - INSTALL 8"x6" TEE WITH RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
 - INSTALL 6" VALVE BOX AND COVER PER M.A.G. STD. DTL. 391-1 TYPE 'C'. VALVE BOX FRAME AND COVER ADJUSTMENT PER C.O.S. DTL. 2270.
 - INSTALL 8" D.I.P. FIRE LINE (MIN. CLASS 350). TRENCH PER C.O.S. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601. RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
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 - INSTALL CAP IF OFFSITE CONSTRUCTION IS NOT CONCURRENT WITH ONSITE CONSTRUCTION.
 - INSTALL 2" SERVICE WITH 2" TEE AND SHUT OFF VALVE PER M.A.G. STD. DTL. 340 AND 341-1 TYPE 'C'. INSTALL WATER METER AND VAULT PER C.O.S. STD. DTL. 2330 (FOR LANDSCAPE USE).
 - INSTALL 8"-90° BEND.
- PRIVATE FIRE LINE CONSTRUCTION NOTES**
- INSTALL 8" D.I.P. FIRE LINE (MIN. CLASS 350). TRENCH PER C.O.S. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601. RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
 - INSTALL 8"-45° BEND WITH RESTRAIN JOINTS PER M.A.G. STD. DTL. 303.
 - INSTALL FIRE DEPARTMENT CONNECTION PER CITY OF SCOTTSDALE REQUIREMENTS.
 - FIRE SPRINKLER CONTRACTOR TO CONNECT TO FIRE LINE STUB; FIRE SPRINKLER RISER PER C.O.S. DTL. 2369. SEE FIRE SPRINKLER PLANS FOR CONTINUATION.
- PRIVATE WATER CONSTRUCTION NOTES**
- INSTALL 3" BACKFLOW PREVENTOR PER C.O.S. DTL. 2353.
 - INSTALL 3" K-COPPER LINE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
 - CONNECT TO BUILDING DOMESTIC WATER SYSTEM. COORDINATE WITH PLUMBING PLANS FOR CONTINUATION.
 - INSTALL 2" PRESSURE VACUUM BREAKER ASSEMBLY PER C.O.S. STD. DT. 2355.
- PRIVATE SEWER CONSTRUCTION NOTES**
- CONNECT TO PUBLIC SEWER MANHOLE.
 - INSTALL SEWER MANHOLE PER M.A.G. STD. DTL. 420-1.
 - INSTALL 8" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
 - INSTALL 8" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
 - INSTALL 4" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
 - INSTALL CLEANOUT PER M.A.G. STD. DTL. 441.
 - SEWER TAP FOR BUILDING SERVICE PER M.A.G. STD. DTL. 440-1.
 - INSTALL GREASE INTERCEPTOR. SEE PLUMBING PLANS FOR DETAILS.
 - CONNECT TO BUILDING SEWER. COORDINATE WITH PLUMBING PLANS FOR CONTINUATION.
 - SEWER TAP FOR ENCLOSURE SERVICE PER M.A.G. STD. DTL. 440-1.
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NOTES:

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- DESIGN JOINT DEFLECTION SHALL NOT EXCEED 4 DEGREES FOR WATER LINES 12 INCHES AND SMALLER.
- FOR PURPOSES OF HORIZONTAL SEPARATION, STORM DRAINS AND NON-POTABLE WATER LINES SHALL BE TREATED AS SEWER LINES.
- ELECTRONIC MARKERS ARE TO BE LOCATED AT ALL FITTINGS (EXCLUDING VALVES).
- MINIMUM COVER OF 36 INCHES TO THE TOP OF PIPES.
- SEPARATION OF WATER FROM ELECTRICAL OR GAS LINES WILL CONFORM TO C.O.S. STD. DTL. 2372 AND SHALL INCLUDE A PRESSURE REGULATING VALVE.
- FOR MINIMUM CLEARANCE UNDER CULVERTS, STORM DRAINS, AND OTHER UTILITIES SEE C.O.S. STD. DTL. 2370 AND 2372.



PRELIMINARY NOT FOR CONSTRUCTION

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PRELIMINARY UTILITY PLAN
 SENIOR LIVING FACILITY
 23733 N. SCOTTSDALE ROAD
 SCOTTSDALE, ARIZONA

PROJECT NO.: 2098
 SCALE: 1" = 10'
 DRAWN BY: WJC
 CHECKED BY: MJC
 DATE: 10-05-2016
 DWG: 2098-C-02-Pr6

C-14
 OF
27

MATCH SHEET C-14

MATCH SHEET C-11

MATCH SHEET C-16

PUBLIC WATER MAIN CONSTRUCTION NOTES

- 1 SAWCUT & REMOVE EXISTING ASPHALT PAVEMENT. REPLACE IN LIKE KIND PER C.O.S. DTL. 2200.
- 2 SAWCUT & REMOVE EXISTING CONCRETE PAVEMENT. REPLACE IN LIKE KIND PER C.O.S. DTL. 2200.
- 3 CONNECT TO EXISTING 8" WATER LINE.
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- 8 INSTALL 3" SERVICE WITH 3" TEE AND SHUT OFF VALVE PER M.A.G. STD. DTL. 340 AN 341-1 TYPE 'C'. INSTALL WATER METER AND VAULT PER C.O.S. STD. DTL. 2345-2.
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- 19 INSTALL 8"-90° BEND.

PRIVATE FIRE LINE CONSTRUCTION NOTES

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- 4 FIRE SPRINKLER CONTRACTOR TO CONNECT TO FIRE LINE STUB. FIRE SPRINKLER RISER PER C.O.S. DTL. 2369. SEE FIRE SPRINKLER PLANS FOR CONTINUATION.

PRIVATE WATER CONSTRUCTION NOTES

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- 2 INSTALL 3" K-COPPER LINE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
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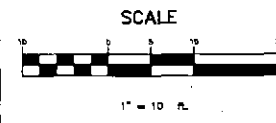
PRIVATE SEWER CONSTRUCTION NOTES

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- 2 INSTALL SEWER MANHOLE PER M.A.G. STD. DTL. 420-1.
- 3 INSTALL 8" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 4 INSTALL 6" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 5 INSTALL 4" PVC SDR 35 OR EQUAL SEWER PIPE. TRENCH PER C.O.S. STD. DTL. 2201 TYPE 'A' AND M.A.G. SPEC. 336 AND 601.
- 6 INSTALL CLEANOUT PER M.A.G. STD. DTL. 441.
- 7 SEWER TAP FOR BUILDING SERVICE PER M.A.G. STD. DTL. 440-1.
- 8 INSTALL GREASE INTERCEPTOR. SEE PLUMBING PLANS FOR DETAILS.
- 9 CONNECT TO BUILDING SEWER. COORDINATE WITH PLUMBING PLANS FOR CONTINUATION.
- 10 SEWER TAP FOR ENCLOSURE SERVICE PER M.A.G. STD. DTL. 440-1.
- 11 CUT AND CAP EXISTING 6" PVC SEWER SERVICE.
- 12 SEWER TAP FOR TRASH COMPACTOR PER M.A.G. STD. DTL. 440-1.

PUBLIC SEWER CONSTRUCTION NOTES

- 1 INSTALL NEW 5' DIAMETER MANHOLE PER M.A.G. STD. DTL. 420 WITH 30 FRAME AND COVER PER C.O.S. STD. DTL. 2270 AND 2421.
- 2 INSTALL 8" F-679, T-1, 46-PSI PVC SEWER PIPE, BACKFILL, BEDDING AND FOUNDATION PER DETAIL ON SHEET 2.
- 3 SAWCUT REMOVE AND REPLACE EXISTING ASPHALT PAVEMENT IN LIKE KIND.

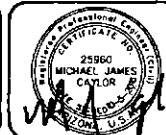
- NOTES:**
1. ALL DUCTILE IRON WATER LINES ARE TO BE POLYETHYLENE WRAPPING WITH POLYETHYLENE LOCATING TAPE (COLOR CODED BLUE) WILL BE PLACED ABOVE ALL PUBLIC WATER LINES PER M.A.G. DETAILS.
 2. DESIGN JOINT DEFLECTION SHALL NOT EXCEED 4 DEGREES FOR WATER LINES 12 INCHES AND SMALLER.
 3. FOR PURPOSES OF HORIZONTAL SEPARATION, STORM DRAINS AND NON-POTABLE WATER LINES SHALL BE TREATED AS SEWER LINES.
 4. ELECTRONIC MARKERS ARE TO BE LOCATED AT ALL FITTINGS (EXCLUDING VALVES).
 5. MINIMUM COVER OF 36 INCHES TO THE TOP OF PIPES.
 6. SEPARATION OF WATER FROM ELECTRICAL OR GAS LINES WILL CONFORM TO C.O.S. STD. DTL. 2372 AND SHALL INCLUDE A PRESSURE REGULATING VALVE.
 7. FOR MINIMUM CLEARANCE UNDER CULVERTS, STORM DRAINS, AND OTHER UTILITIES SEE C.O.S. STD. DTL. 2370 AND 2372.



PRELIMINARY NOT FOR CONSTRUCTION



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Site Consultants, Inc.
 ENGINEERS • SURVEYORS • CONSULTANTS
 a division of Westwood
 6909 East Greenway Parkway, Suite 250, Scottsdale, AZ. 85254
 westwoodps.com (888) 937-5150

PRELIMINARY UTILITY PLAN
 SENIOR LIVING FACILITY
 23733 N. SCOTTSDALE ROAD
 SCOTTSDALE, ARIZONA

PROJECT NO.: 2098
 SCALE: 1" = 10'
 DRAWN BY: WLC
 CHECKED BY: MJC
 DATE: 10-05-2016
 DWG: 2098-C-00-Plan

C-15
 OF
27

APPENDIX 4

Hydraulic Demand Calculations

HYDRAULIC CALCULATION SHEET

Water Demand and Fire Flow Calculations

Site Consultants, Inc.

Project Name: Senior Living
Project No.: 2098

Prepared by: MGO
 Checked by: MJC

Date: 09/06/16
 Date:

Purpose: Calculate water demand (Average Day, Maximum Day, and Peak Hour) and required Fire Flow for each building for use in water distribution system model.

Methodology: Using Building Area (SF) and Construction Type from Architect, locate the required Fire Flow in Table B105.1. Calculate Average Day Flow (ADD), Max Day Demand (MDD), Peak Hour Demand (PHD), and Maximum Day *plus* Fire Flow demand scenarios.

- References:** 1. International Fire Code, 2012 Edition. Appendix B Table B105.1
 2. City of Scottsdale, Design Standards & Policies Manual, dated January 2010, Section 6-1.000 Water

	110	number of dwelling units	
	185.3	gal/day	(Reference 2, Table 6.1-2; High Density Residential)
	20,383.0		
	2,580.0	sq. ft Kitchen	
	1.3	gal/day	(Reference 2, Table 6.1-2; Restaurant)
	3,354.0		
Avg Day Flow =	23,737.0	gal/day/per dwelling unit	

Units	Building Sq. Ft.	Construction Type	Sprinklered?	Required FF (GPM)		WATER DEMAND SCENARIOS				
				Full IFC FF	50% Reduction*	ADF (gpd)	ADF (gpm)	MDD (2.0 x ADD) gpm	PHD (3.5 x ADD) gpm	MDD+FF gpm
114	71,500	V-A	Y	4,750	2,375	23,737	16.48	32.97	57.69	2,407.97

* Minimum allowed Fire Flow after 50% Reduction is 1,500 gpm.

5. Show in calculations that the minimum water pressure requirements are met at the highest proposed finish floor elevation (with and without fire flow).

AVERAGE DAY WATER DEMANDS				
Land Use	Inside Use	Outside Use	Total Use	
Residential Demand per Dwelling Unit:				
< 2 DU/ac	208.9	276.7	485.6	per unit
2 – 2.9 DU/ac	193.7	276.7	470.4	per unit
3 – 7.9 DU/ac	175.9	72.3	248.2	per unit
8 – 11.9 DU/ac	155.3	72.3	227.6	per unit
12 – 22 DU/ac	155.3	72.3	227.6	per unit
High Density Condominium	155.3	30	185.3	per unit
Resort Hotel (includes site amenities)	401.7	44.6	446.3	per room
Service and Employment:				
Restaurant	1.2	0.1	1.3	per sq.ft.
Commercial/Retail	0.7	0.1	0.8	per sq.ft.
Commercial High Rise	0.5	0.1	0.6	per sq.ft.
Office	0.5	0.1	0.6	per sq.ft.
Institutional	670	670	1340	per acre
Industrial	873	154	1027	per acre
Research and Development	1092	192	1284	per acre
Special Use Areas:				
Natural Area Open Space	0	0	0	per acre
Developed Open Space – Parks	0	1786	1786	per acre
Developed Open Space – Golf Course	0	4285	4285	per acre

FIGURE 6.1-2 AVERAGE DAY WATER DEMANDS IN GALLONS PER DAY

6. Pipes and nodes - ID, demand, pressure, elevation, hydraulic grades, length, status, diameter, velocity, headloss / 1000 ft.
7. Reservoirs and pumps - ID, elevation, hydraulic grade, inflow, outflow.
8. PRVs - ID, elevation, upstream and downstream hydraulic grade.
9. Include diagrams clearly showing all water pipe and node references.
10. Pay particular attention to water demand factors used for restaurants or specialty developments.
11. Use scour analysis where surface flows exceed 500 cubic feet per second (cfs).

F. Summary

1. Provide a summary of the proposed water improvements stating that all the city's design standards and policies have been met or indicate any variance or exception. Note why the developer is requesting any variance or exception.
2. Include a brief project schedule indicating the proposed start and completion of the developments improvements.

APPENDIX 5

20 PSI Residual Pressure

Flow Test / Pump Curve

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name: Assisted Living Facility
Project Address: 23733 North Scottsdale Road, Scottsdale, Arizona, 85255
Arizona Flow Testing Project No.: 16065
Client Project No.: 2098
Flow Test Permit No.: C50450
Date and time flow test conducted: May 5, 2016 at 8:00 AM
Data is current and reliable until: November 5, 2016
Conducted by: Floyd Vaughan - Arizona Flow Testing, LLC (480-250-8154)
Witnessed by: Larry Frandle - City of Scottsdale-Inspector (602-541-4942)

Raw Test Data

Static Pressure: **107.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **58.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **25.0 PSI**
(Measured in pounds per square inch)

Diffuser Orifice Diameter: **One (4 inch)**
(Measured in inches)

Coefficient of Diffuser: .9

Flowing GPM: **2,148 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **2,929 GPM**

Data with 35 PSI Safety Factor

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **23.0 PSI**
(Measured in pounds per square inch)

Distance between hydrants: Approx. 1,450 Feet

Main size: 12 Inch

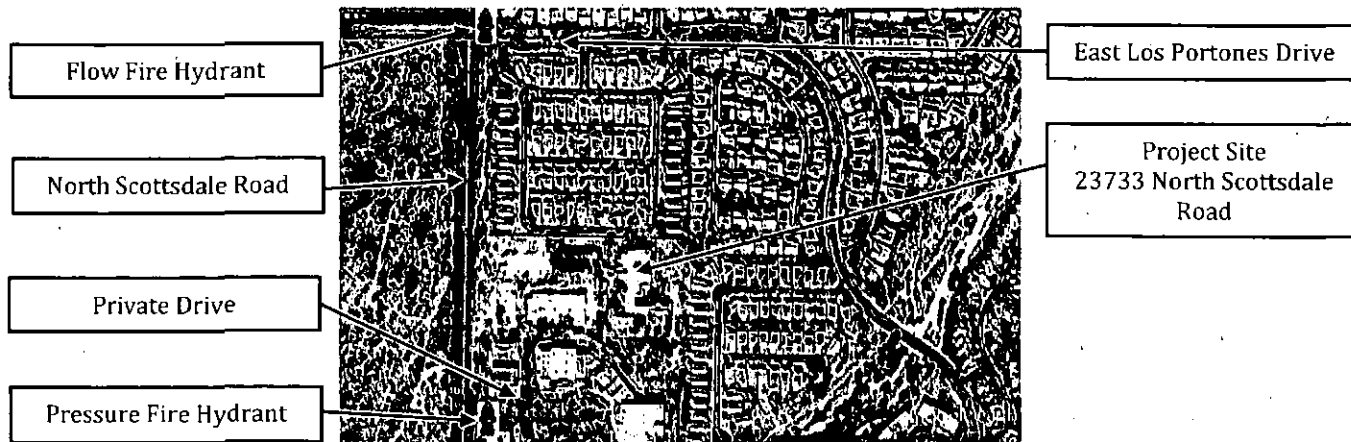
Flowing GPM: **2,148 GPM**

GPM @ 20 PSI: **2,219 GPM**

Scottsdale requires a maximum Static Pressure of 72 PSI for AFES Design.

Flow Test Location

North ↑



HYDRAULIC CALCULATION SHEET
Fire Flow Calculations
Site Consultants, Inc.

Project Name: Senior Living
Project No.: 2098

Prepared by: MGO
Checked by:

Date: 06/15/16
Date:

Purpose: Using fire hydrant test data (Reference 2), calculate the flow at the minimum residual pressure criteria (20 psi)

Methodology: Computations for discharge at residual pressure (Fire Flow Testing and Marking of Hydrants, Reference 1)

References: NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants, 2007 Edition.

Arizona Flow Testing Flow Report; Project 16065, Permit C50450; May 5, 2016 8:00 A.M.

Calculations:

$$Q_R = Q_F * h_r^{0.54} / h_f^{0.54}$$

Q_R = Flow Predicted at desired residual pressure (flow available)

Q_F = Total flow measured during test

h_r = Pressure drop to desired residual pressure = $P_{Static} - P_r$

h_f = Pressure drop measured during test = $P_{Static} - P_f$

P_{Static} = Observed static pressure

P_f = Observed pressure at test flow.

P_r = Desired residual pressure

$$P_{Static} = 107 \quad [psi]$$

$$P_r = 20 \quad [psi]$$

$$P_f = 58 \quad [psi]$$

$$Q_F = 2,148 \quad [gpm]$$

$$h_r = 87 \quad [psi]$$

$$h_f = 49 \quad [psi]$$

$$Q_R = 2928.66 \quad [gpm]$$

Graph of Available Flow vs. Pressure

Fire Flow Calculations

Site Consultants, Inc.

Project Name: Senior Living
Project No.: 2098

Prepared by: MGO
Checked by:

Date: 06/15/16
Date:

Purpose: Create a graph of available flow and pressure, based on Fire Flow data and calculations.

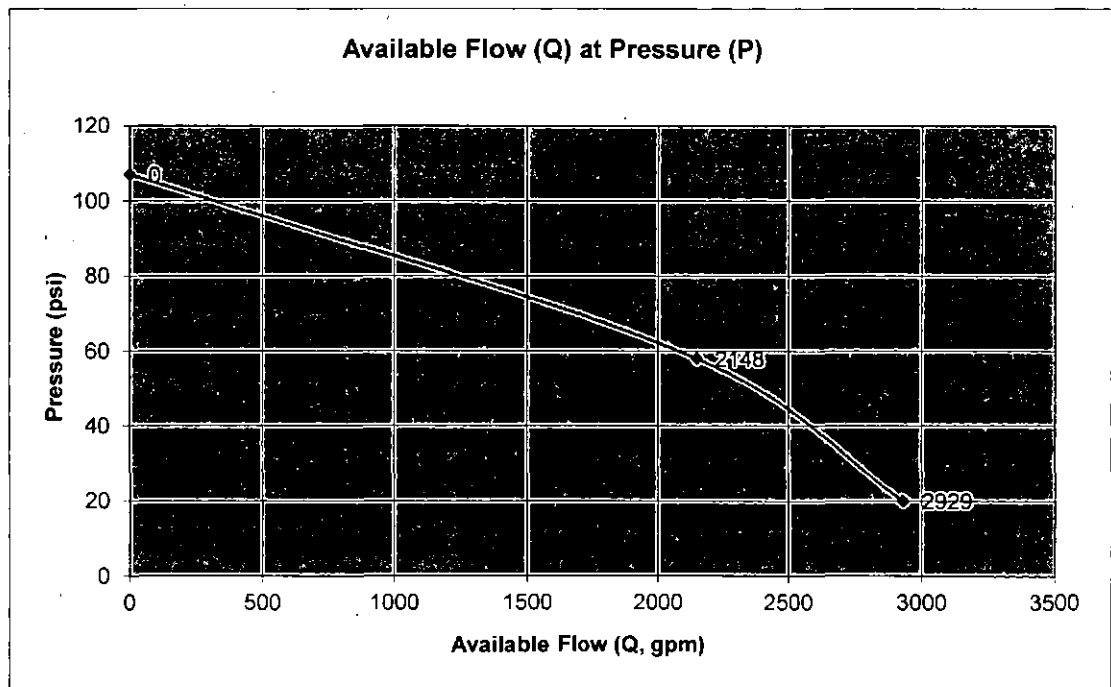
Methodology: Computations for discharge at residual pressure (Fire Flow Testing and Marking of Hydrants, Reference 1)

References: NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants, 2007 Edition.

Arizona Flow Testing Flow Report; Project 16065, Permit C50450; May 5, 2016 8:00 A.M.

Calculations:

	P (psi)	Q (gpm)
Static	107	0
Flow Test	58	2148
Predicted	20	2929



HYDRAULIC CALCULATION SHEET
Pump Curve Calculations
Site Consultants, Inc.

Project Name: Senior Living
Project No.: 2098

Prepared by: MGO
Checked by:

Date: 06/15/16
Date:

Purpose: Develop pump curve for use in water distribution system model.

Methodology: Use fire hydrant flow test data to establish two points of the pump curve. Use regression calculations to establish the head and flow at the upper end of the normal operating range.

References:

Arizona Flow Testing Flow Report; Project 16065, Permit C50450; May 5, 2016 8:00 A.M.

Calculations:

Flow Test Results:

Static Pressure = 107 [psi]
Static Flow = 0 [gpm]

Residual Pressure = 58 [psi]
Measured Flow = 2148 [gpm]

Pressure At Available Flow = 20 [psi]
Available Flow 2928.66 [gpm]

Establish Pump Curve Points:

Shutoff Head (H_0) = Static Pressure

Design Head (H_1) = Residual Pressure

Design Flow (Q_1) = Measured Flow

Head At Upper End of Operating Range (H_2) = Pressure At Available Flow

Flow At Upper End of Operating Range (Q_2) = Available Flow

Convert pressure (psi) to ft_{H_2O} :

$$H(\text{psi}) * 144/62.4 = H(ft_{H_2O})$$

$H_0 = 246.92$ ft_{H_2O}

$H_1 = 133.85$ ft_{H_2O}

$H_2 = 46.15$ ft_{H_2O}

APPENDIX 5

30 PSI Residual Pressure

Flow Test / Pump Curve

HYDRAULIC CALCULATION SHEET
Pump Curve Calculations
Site Consultants, Inc.

Project Name: Senior Living
Project No.: 2098

Prepared by: MGO
Checked by:

Date: 09/07/16
Date:

Purpose: Develop pump curve for use in water distribution system model.

Methodology: Use fire hydrant flow test data to establish two points of the pump curve. Use regression calculations to establish the head and flow at the upper end of the normal operating range.

References:

Arizona Flow Testing Flow Report; Project 16065, Permit C50450; May 5, 2016 8:00 A.M.

Calculations:

Flow Test Results:

Static Pressure = 107 [psi]
Static Flow = 0 [gpm]

Residual Pressure = 58 [psi]
Measured Flow = 2148 [gpm]

Pressure At Available Flow = 30 [psi]
Available Flow 2741.78 [gpm]

Establish Pump Curve Points:

Shutoff Head (H_0) = Static Pressure

Design Head (H_1) = Residual Pressure

Design Flow (Q_1) = Measured Flow

Head At Upper End of Operating Range (H_2) = Pressure At Available Flow

Flow At Upper End of Operating Range (Q_2) = Available Flow

Convert pressure (psi) to ft_{H_2O} :

$$H(\text{psi}) * 144/62.4 = H(ft_{H_2O})$$

$H_0 = 246.92$ ft_{H_2O}

$H_1 = 133.85$ ft_{H_2O}

$H_2 = 69.23$ ft_{H_2O}

Graph of Available Flow vs. Pressure Fire Flow Calculations Site Consultants, Inc.

Project Name: Senior Living
Project No.: 2098

Prepared by: MGO
Checked by:

Date: 09/07/16
Date:

Purpose: Create a graph of available flow and pressure, based on Fire Flow data and calculations.

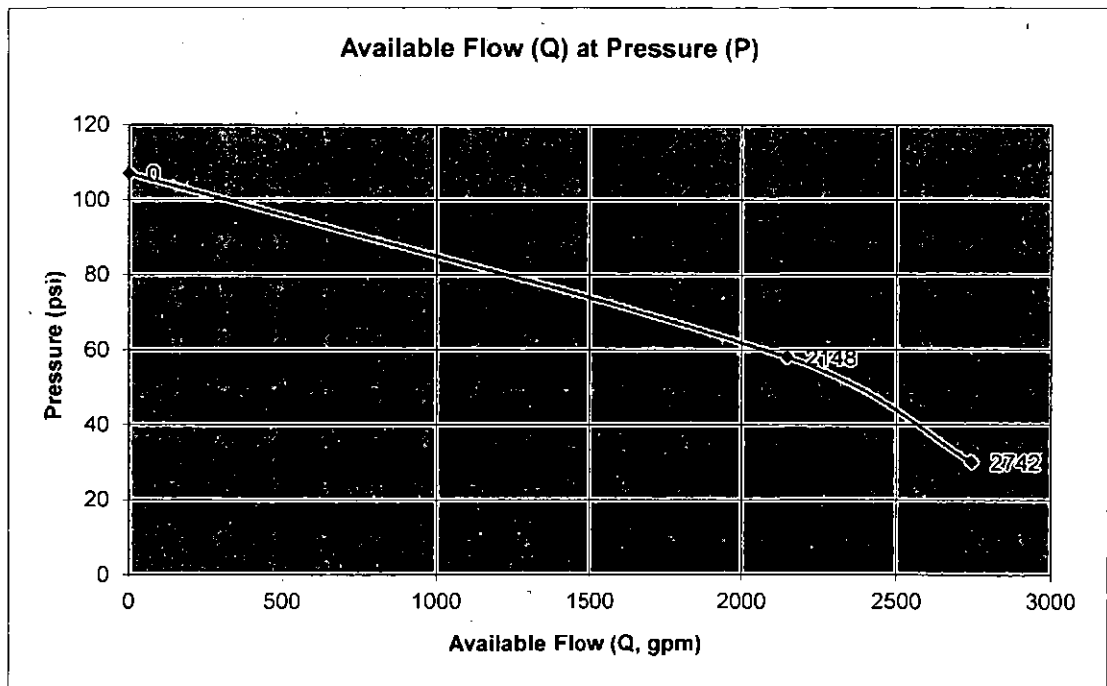
Methodology: Computations for discharge at residual pressure (Fire Flow Testing and Marking of Hydrants, Reference 1)

References: NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants, 2007 Edition.

Arizona Flow Testing Flow Report; Project 16065, Permit C50450; May 5, 2016 8:00 A.M.

Calculations:

	P (psi)	Q (gpm)
Static	107	0
Flow Test	58	2148
Predicted	30	2742



HYDRAULIC CALCULATION SHEET
Pump Curve Calculations
Site Consultants, Inc.

Project Name: Senior Living
Project No.: 2098

Prepared by: MGO
Checked by:

Date: 09/07/16
Date:

Purpose: Develop pump curve for use in water distribution system model.

Methodology: Use fire hydrant flow test data to establish two points of the pump curve. Use regression calculations to establish the head and flow at the upper end of the normal operating range.

References:

Arizona Flow Testing Flow Report; Project 16065, Permit C50450; May 5, 2016 8:00 A.M.

Calculations:

Flow Test Results:

Static Pressure = 107 [psi]
Static Flow = 0 [gpm]

Residual Pressure = 58 [psi]
Measured Flow = 2148 [gpm]

Pressure At Available Flow = 30 [psi]
Available Flow 2741.78 [gpm]

Establish Pump Curve Points:

Shutoff Head (H_0) = Static Pressure

Design Head (H_1) = Residual Pressure

Design Flow (Q_1) = Measured Flow

Head At Upper End of Operating Range (H_2) = Pressure At Available Flow

Flow At Upper End of Operating Range (Q_2) = Available Flow

Convert pressure (psi) to ft_{H_2O} :

$$H(\text{psi}) * 144/62.4 = H(ft_{H_2O})$$

$H_0 = 246.92 \quad ft_{H_2O}$

$H_1 = 133.85 \quad ft_{H_2O}$

$H_2 = 69.23 \quad ft_{H_2O}$

APPENDIX 6

20 PSI Residual Pressure

Water Model Results

 * E P A N E T *
 * Hydraulic and Water Quality *
 * Analysis for Pipe Networks *
 * Version 2.0 *

Input File: 2098-20 PSI REVISED.net

Link - Node Table:

Link ID	Start Node	End Node	Length ft	Diameter in
P1	J2	J3	904.9	12
P2	J3	J4	524.3	12
P3	J3	J5	75.9	8
P4	J5	J6	61.9	8
P5	J6	J7	66.1	8
P6	J7	J8	194.6	8
P7	J8	J9	11.5	8
P8	J9	J10	112.2	8
P9	J10	J11	11	8
P10	J11	J12	209.8	8
P11	J12	J13	3	8
P12	J13	J14	210.2	8
P13	J14	J15	27.6	8
P14	J15	J16	26.5	8
P15	J16	J17	200.5	8
P16	J17	J18	20.6	8
P17	J18	J19	217.1	8
P18	J19	J20	6.6	8
P19	J20	J21	11.3	8
P20	J21	J22	64.7	8
P21	J22	J23	47.6	8
P22	J23	J24	79.7	8
P23	J24	J25	24.7	8
P24	J25	J26	210.9	8
P25	J26	J27	77.4	8
P26	J27	J28	236.9	8
P27	J28	J29	34.7	8
P28	J29	J30	18.7	8
P29	J30	J7	176.6	8
P31	J31	J1	694.5	8
P32	J1	J32	839.7	12
P33	J4	J32	610.1	12
P30	J22	J31	10.1	8
PUMP1	R1	J2	#N/A	#N/A Pump

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Page 2

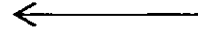
Energy Usage:

Pump	Usage Factor	Avg. Effic.	Kw-hr /Mgal	Avg. Kw	Peak Kw	Cost /day
PUMP1	100.00	75.00	736.02	32.76	64.13	0.00
Demand Charge:						0.00

Node Results at 0:00 Hrs:

Average Daily Flow

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J2	0.00	246.89	106.98	0.00
J3	0.00	246.89	106.98	0.00
J4	0.00	246.89	106.98	0.00
J5	0.00	246.89	106.98	0.00
J6	0.00	246.88	106.98	0.00
J7	0.00	246.88	106.97	0.00
J8	1.00	246.88	106.97	0.00
J9	0.00	246.88	106.97	0.00
J10	0.00	246.88	106.97	0.00
J11	0.00	246.88	106.97	0.00
J12	1.00	246.88	106.97	0.00
J13	16.48	246.88	106.97	0.00
J14	0.00	246.88	106.97	0.00
J15	0.00	246.88	106.97	0.00
J16	1.00	246.88	106.97	0.00
J17	1.00	246.88	106.97	0.00
J18	0.00	246.88	106.97	0.00
J19	0.00	246.88	106.97	0.00
J20	1.00	246.88	106.97	0.00
J21	0.00	246.88	106.97	0.00
J22	0.00	246.88	106.97	0.00
J23	0.00	246.88	106.97	0.00
J24	0.00	246.88	106.97	0.00
J25	0.00	246.88	106.97	0.00
J26	1.00	246.88	106.97	0.00
J27	0.00	246.88	106.97	0.00
J28	0.00	246.88	106.97	0.00
J29	0.00	246.88	106.97	0.00
J30	0.00	246.88	106.97	0.00
J1	0.00	246.89	106.98	0.00
J32	0.00	246.89	106.98	0.00
J31	0.00	246.88	106.97	0.00
R1	-22.48	0.00	0.00	0.00 Reservoir



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Page 3

Link Results at 0:00 Hrs:

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
P1	22.48	0.06	0.00	Open
P2	7.33	0.02	0.00	Open
P3	15.15	0.10	0.01	Open
P4	15.15	0.10	0.01	Open
P5	15.15	0.10	0.01	Open
P6	11.59	0.07	0.01	Open
P7	10.59	0.07	0.01	Open
P8	10.59	0.07	0.01	Open
P9	10.59	0.07	0.01	Open
P10	10.59	0.07	0.01	Open
P11	9.59	0.06	0.01	Open
P12	-6.89	0.04	0.00	Open
P13	-6.89	0.04	0.00	Open
P14	-6.89	0.04	0.00	Open

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P15	-7.89	0.05	0.00	Open
P16	-8.89	0.06	0.00	Open
P17	-8.89	0.06	0.00	Open
P18	-8.89	0.06	0.00	Open
P19	-9.89	0.06	0.01	Open
P20	-9.89	0.06	0.01	Open
P21	-2.56	0.02	0.00	Open
P22	-2.56	0.02	0.00	Open
P23	-2.56	0.02	0.00	Open
P24	-2.56	0.02	0.00	Open
P25	-3.56	0.02	0.00	Open
P26	-3.56	0.02	0.00	Open
P27	-3.56	0.02	0.00	Open
P28	-3.56	0.02	0.00	Open
P29	-3.56	0.02	0.00	Open
P31	-7.33	0.05	0.00	Open
P32	-7.33	0.02	0.00	Open
P33	7.33	0.02	0.00	Open
P30	-7.33	0.05	0.00	Open
PUMP1	22.48	0.00	-246.89	Open Pump

Node Results at 1:00 Hrs:

Maximum Daily Demand

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J2	0.00	104.53	45.29	0.00
J3	0.00	85.06	36.86	0.00
J4	0.00	83.53	36.19	0.00
J5	0.00	79.62	34.50	0.00
J6	0.00	75.18	32.57	0.00
J7	0.00	70.43	30.52	0.00
J8	401.33	64.16	27.80	0.00

← **Fire Hydrant**

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Page 4

Node Results at 1:00 Hrs: (continued)

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J9	0.00	64.01	27.73	0.00
J10	0.00	62.53	27.10	0.00
J11	0.00	62.39	27.03	0.00
J12	401.33	59.63	25.84	0.00
J13	32.96	59.62	25.83	0.00
J14	0.00	59.28	25.68	0.00
J15	0.00	59.23	25.66	0.00
J16	401.33	59.19	25.65	0.00
J17	401.33	59.46	25.77	0.00
J18	0.00	59.70	25.87	0.00
J19	0.00	62.14	26.93	0.00
J20	401.33	62.22	26.96	0.00
J21	0.00	62.55	27.10	0.00
J22	0.00	64.45	27.93	0.00
J23	0.00	64.50	27.95	0.00
J24	0.00	64.58	27.98	0.00
J25	0.00	64.61	27.99	0.00
J26	401.33	64.83	28.09	0.00
J27	0.00	65.62	28.43	0.00
J28	0.00	68.06	29.49	0.00
J29	0.00	68.42	29.65	0.00
J30	0.00	68.61	29.73	0.00

← **Fire Hydrant**

← **Maximum Daily Demand**

← **Fire Hydrant**

← **Fire Hydrant**

← **Fire Hydrant**

← **Fire Hydrant**

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J1	0.00	79.29	34.36	0.00
J32	0.00	81.75	35.42	0.00
J31	0.00	64.66	28.02	0.00
R1	-2440.94	0.00	0.00	0.00 Reservoir

Link Results at 1:00 Hrs:

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
P1	2440.94	6.92	21.51	Open
P2	830.78	2.36	2.92	Open
P3	1610.16	10.28	71.75	Open
P4	1610.16	10.28	71.75	Open
P5	1610.16	10.28	71.75	Open
P6	1045.53	6.67	32.25	Open
P7	644.20	4.11	13.15	Open
P8	644.20	4.11	13.15	Open
P9	644.20	4.11	13.15	Open
P10	644.20	4.11	13.15	Open
P11	242.87	1.55	2.16	Open
P12	209.91	1.34	1.65	Open
P13	209.91	1.34	1.65	Open
P14	209.91	1.34	1.65	Open
P15	-191.42	1.22	1.39	Open

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Link Results at 1:00 Hrs: (continued)

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
P16	-592.75	3.78	11.27	Open
P17	-592.75	3.78	11.27	Open
P18	-592.75	3.78	11.27	Open
P19	-994.08	6.34	29.37	Open
P20	-994.08	6.34	29.37	Open
P21	-163.30	1.04	1.04	Open
P22	-163.30	1.04	1.04	Open
P23	-163.30	1.04	1.04	Open
P24	-163.30	1.04	1.04	Open
P25	-564.63	3.60	10.30	Open
P26	-564.63	3.60	10.30	Open
P27	-564.63	3.60	10.30	Open
P28	-564.63	3.60	10.30	Open
P29	-564.63	3.60	10.30	Open
P31	-830.78	5.30	21.06	Open
P32	-830.78	2.36	2.92	Open
P33	830.78	2.36	2.92	Open
P30	-830.78	5.30	21.06	Open
PUMP1	2440.94	0.00	-104.53	Open Pump

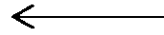
Node Results at 2:00 Hrs:

Peak Hour Demand

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J2	0.00	246.63	106.86	0.00
J3	0.00	246.60	106.85	0.00
J4	0.00	246.59	106.85	0.00
J5	0.00	246.59	106.85	0.00
J6	0.00	246.58	106.84	0.00

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J7	0.00	246.57	106.84	0.00
J8	3.50	246.55	106.83	0.00
J9	0.00	246.55	106.83	0.00
J10	0.00	246.55	106.83	0.00
J11	0.00	246.55	106.83	0.00
J12	3.50	246.53	106.82	0.00
J13	57.68	246.53	106.82	0.00
J14	0.00	246.54	106.82	0.00
J15	0.00	246.54	106.83	0.00
J16	3.50	246.54	106.83	0.00
J17	3.50	246.55	106.83	0.00
J18	0.00	246.55	106.83	0.00
J19	0.00	246.56	106.83	0.00
J20	3.50	246.56	106.83	0.00
J21	0.00	246.56	106.83	0.00
J22	0.00	246.56	106.84	0.00
J23	0.00	246.56	106.84	0.00



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Node Results at 2:00 Hrs: (continued)

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J24	0.00	246.56	106.84	0.00
J25	0.00	246.56	106.84	0.00
J26	3.50	246.56	106.84	0.00
J27	0.00	246.57	106.84	0.00
J28	0.00	246.57	106.84	0.00
J29	0.00	246.57	106.84	0.00
J30	0.00	246.57	106.84	0.00
J1	0.00	246.59	106.85	0.00
J32	0.00	246.59	106.85	0.00
J31	0.00	246.56	106.84	0.00
R1	-78.68	0.00	0.00	0.00 Reservoir

Link Results at 2:00 Hrs:

Link ID	Flow GPM	Velocity Unit fps	Headloss ft/kft	Status
P1	78.68	0.22	0.04	Open
P2	25.64	0.07	0.00	Open
P3	53.04	0.34	0.13	Open
P4	53.04	0.34	0.13	Open
P5	53.04	0.34	0.13	Open
P6	40.58	0.26	0.08	Open
P7	37.08	0.24	0.07	Open
P8	37.08	0.24	0.07	Open
P9	37.08	0.24	0.07	Open
P10	37.08	0.24	0.07	Open
P11	33.58	0.21	0.06	Open
P12	-24.10	0.15	0.03	Open
P13	-24.10	0.15	0.03	Open
P14	-24.10	0.15	0.03	Open
P15	-27.60	0.18	0.04	Open
P16	-31.10	0.20	0.05	Open
P17	-31.10	0.20	0.05	Open
P18	-31.10	0.20	0.05	Open
P19	-34.60	0.22	0.06	Open
P20	-34.60	0.22	0.06	Open
P21	-8.96	0.06	0.00	Open

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P22	-8.96	0.06	0.00	Open
P23	-8.96	0.06	0.00	Open
P24	-8.96	0.06	0.00	Open
P25	-12.46	0.08	0.01	Open
P26	-12.46	0.08	0.01	Open
P27	-12.46	0.08	0.01	Open
P28	-12.46	0.08	0.01	Open
P29	-12.46	0.08	0.01	Open
P31	-25.64	0.16	0.03	Open

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Link Results at 2:00 Hrs: (continued)

Link ID	Flow GPM	velocity fps	Unit Headloss ft/kft	Status
P32	-25.64	0.07	0.00	Open
P33	25.64	0.07	0.00	Open
P30	-25.64	0.16	0.03	Open
PUMP1	78.68	0.00	-246.63	Open Pump

APPENDIX 6
30 PSI Residual Pressure

Water Model Results

 * E P A N E T *
 * Hydraulic and Water Quality *
 * Analysis for Pipe Networks *
 * Version 2.0 *

Input File: 2098-30 PSI REVISED.net

Link - Node Table:

Link ID	Start Node	End Node	Length ft	Diameter in
P1	J2	J3	904.9	12
P2	J3	J4	524.3	12
P3	J3	J5	75.9	8
P4	J5	J6	61.9	8
P5	J6	J7	66.1	8
P6	J7	J8	194.6	8
P7	J8	J9	11.5	8
P8	J9	J10	112.2	8
P9	J10	J11	11	8
P10	J11	J12	209.8	8
P11	J12	J13	3	8
P12	J13	J14	210.2	8
P13	J14	J15	27.6	8
P14	J15	J16	26.5	8
P15	J16	J17	200.5	8
P16	J17	J18	20.6	8
P17	J18	J19	217.1	8
P18	J19	J20	6.6	8
P19	J20	J21	11.3	8
P20	J21	J22	64.7	8
P21	J22	J23	47.6	8
P22	J23	J24	79.7	8
P23	J24	J25	24.7	8
P24	J25	J26	210.9	8
P25	J26	J27	77.4	8
P26	J27	J28	236.9	8
P27	J28	J29	34.7	8
P28	J29	J30	18.7	8
P29	J30	J7	176.6	8
P31	J31	J1	694.5	8
P32	J1	J32	839.7	12
P33	J4	J32	610.1	12
P30	J22	J31	10.1	8
PUMP1	R1	J2	#N/A	#N/A Pump

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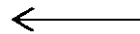
Energy Usage:

Pump	Usage Factor	Avg. Effic.	Kw-hr /Mgal	Avg. Kw	Peak Kw	Cost /day
PUMP1	100.00	75.00	752.13	33.99	66.59	0.00
Demand Charge:						0.00

Node Results at 0:00 Hrs:

Average Daily Flow

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J2	0.00	246.90	106.98	0.00
J3	0.00	246.89	106.98	0.00
J4	0.00	246.89	106.98	0.00
J5	0.00	246.89	106.98	0.00
J6	0.00	246.89	106.98	0.00
J7	0.00	246.89	106.98	0.00
J8	1.00	246.89	106.98	0.00
J9	0.00	246.89	106.98	0.00
J10	0.00	246.89	106.98	0.00
J11	0.00	246.89	106.98	0.00
J12	1.00	246.89	106.98	0.00
J13	16.48	246.89	106.98	0.00
J14	0.00	246.89	106.98	0.00
J15	0.00	246.89	106.98	0.00
J16	1.00	246.89	106.98	0.00
J17	1.00	246.89	106.98	0.00
J18	0.00	246.89	106.98	0.00
J19	1.00	246.89	106.98	0.00
J20	0.00	246.89	106.98	0.00
J21	0.00	246.89	106.98	0.00
J22	0.00	246.89	106.98	0.00
J23	0.00	246.89	106.98	0.00
J24	0.00	246.89	106.98	0.00
J25	0.00	246.89	106.98	0.00
J26	1.00	246.89	106.98	0.00
J27	0.00	246.89	106.98	0.00
J28	0.00	246.89	106.98	0.00
J29	0.00	246.89	106.98	0.00
J30	0.00	246.89	106.98	0.00
J1	0.00	246.89	106.98	0.00
J32	0.00	246.89	106.98	0.00
J31	0.00	246.89	106.98	0.00
R1	-22.48	0.00	0.00	0.00 Reservoir



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Link Results at 0:00 Hrs:

Link ID	Flow GPM	velocity fps	unit Headloss ft/kft	Status
P1	22.48	0.06	0.00	Open
P2	7.32	0.02	0.00	Open
P3	15.16	0.10	0.01	Open
P4	15.16	0.10	0.01	Open
P5	15.16	0.10	0.01	Open
P6	11.60	0.07	0.01	Open
P7	10.60	0.07	0.01	Open
P8	10.60	0.07	0.01	Open
P9	10.60	0.07	0.01	Open
P10	10.60	0.07	0.01	Open
P11	9.60	0.06	0.01	Open
P12	-6.88	0.04	0.00	Open
P13	-6.88	0.04	0.00	Open
P14	-6.88	0.04	0.00	Open

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P15	-7.88	0.05	0.00	Open
P16	-8.88	0.06	0.01	Open
P17	-8.88	0.06	0.00	Open
P18	-9.88	0.06	0.00	Open
P19	-9.88	0.06	0.01	Open
P20	-9.88	0.06	0.01	Open
P21	-2.56	0.02	0.00	Open
P22	-2.56	0.02	0.00	Open
P23	-2.56	0.02	0.00	Open
P24	-2.56	0.02	0.00	Open
P25	-3.56	0.02	0.00	Open
P26	-3.56	0.02	0.00	Open
P27	-3.56	0.02	0.00	Open
P28	-3.56	0.02	0.00	Open
P29	-3.56	0.02	0.00	Open
P31	-7.32	0.05	0.00	Open
P32	-7.32	0.02	0.00	Open
P33	7.32	0.02	0.00	Open
P30	-7.32	0.05	0.00	Open
PUMP1	22.48	0.00	-246.90	Open Pump

Node Results at 1:00 Hrs:

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J2	0.00	112.22	48.62	0.00
J3	0.00	93.91	40.69	0.00
J4	0.00	92.47	40.07	0.00
J5	0.00	88.79	38.47	0.00
J6	0.00	84.61	36.66	0.00
J7	0.00	80.15	34.73	0.00
J8	388.00	74.23	32.16	0.00

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Node Results at 1:00 Hrs: (continued)

Maximum Daily Demand

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J9	0.00	74.09	32.10	0.00
J10	0.00	72.69	31.50	0.00
J11	0.00	72.55	31.44	0.00
J12	388.00	69.94	30.31	0.00
J13	32.96	69.94	30.30	0.00
J14	0.00	69.61	30.16	0.00
J15	0.00	69.56	30.14	0.00
J16	388.00	69.52	30.12	0.00
J17	388.00	69.78	30.24	0.00
J18	0.00	70.00	30.33	0.00
J19	388.00	72.29	31.32	0.00
J20	0.00	72.47	31.40	0.00
J21	0.00	72.78	31.53	0.00
J22	0.00	74.56	32.31	0.00
J23	0.00	74.60	32.33	0.00
J24	0.00	74.68	32.36	0.00
J25	0.00	74.70	32.37	0.00
J26	388.00	74.91	32.46	0.00
J27	0.00	75.65	32.78	0.00
J28	0.00	77.94	33.77	0.00
J29	0.00	78.27	33.91	0.00
J30	0.00	78.45	33.99	0.00



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J1	0.00	88.50	38.35	0.00
J32	0.00	90.80	39.34	0.00
J31	0.00	74.76	32.39	0.00
R1	-2360.96	0.00	0.00	0.00 Reservoir

Link Results at 1:00 Hrs:

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
P1	2360.96	6.70	20.22	Open
P2	803.03	2.28	2.74	Open
P3	1557.93	9.94	67.49	Open
P4	1557.93	9.94	67.49	Open
P5	1557.93	9.94	67.49	Open
P6	1013.29	6.47	30.43	Open
P7	625.29	3.99	12.45	Open
P8	625.29	3.99	12.45	Open
P9	625.29	3.99	12.45	Open
P10	625.29	3.99	12.45	Open
P11	237.29	1.51	2.07	Open
P12	204.33	1.30	1.57	Open
P13	204.33	1.30	1.57	Open
P14	204.33	1.30	1.57	Open
P15	-183.67	1.17	1.29	Open

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Link Results at 1:00 Hrs: (continued)

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
P16	-571.67	3.65	10.54	Open
P17	-571.67	3.65	10.54	Open
P18	-959.67	6.13	27.51	Open
P19	-959.67	6.13	27.51	Open
P20	-959.67	6.13	27.51	Open
P21	-156.64	1.00	0.96	Open
P22	-156.64	1.00	0.96	Open
P23	-156.64	1.00	0.96	Open
P24	-156.64	1.00	0.96	Open
P25	-544.64	3.48	9.64	Open
P26	-544.64	3.48	9.64	Open
P27	-544.64	3.48	9.64	Open
P28	-544.64	3.48	9.64	Open
P29	-544.64	3.48	9.64	Open
P31	-803.03	5.13	19.78	Open
P32	-803.03	2.28	2.74	Open
P33	803.03	2.28	2.74	Open
P30	-803.03	5.13	19.78	Open
PUMP1	2360.96	0.00	-112.22	Open Pump

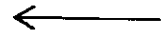
Node Results at 2:00 Hrs:

Peak Hour Demand

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J2	0.00	246.67	106.88	0.00
J3	0.00	246.64	106.87	0.00
J4	0.00	246.64	106.87	0.00
J5	0.00	246.63	106.86	0.00
J6	0.00	246.62	106.86	0.00

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J7	0.00	246.61	106.86	0.00
J8	3.50	246.60	106.85	0.00
J9	0.00	246.60	106.85	0.00
J10	0.00	246.59	106.85	0.00
J11	0.00	246.59	106.85	0.00
J12	3.50	246.57	106.84	0.00
J13	57.68	246.57	106.84	0.00
J14	0.00	246.58	106.84	0.00
J15	0.00	246.58	106.84	0.00
J16	3.50	246.58	106.84	0.00
J17	3.50	246.59	106.85	0.00
J18	0.00	246.59	106.85	0.00
J19	3.50	246.60	106.85	0.00
J20	0.00	246.60	106.85	0.00
J21	0.00	246.60	106.85	0.00
J22	0.00	246.61	106.85	0.00
J23	0.00	246.61	106.85	0.00



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Node Results at 2:00 Hrs: (continued)

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J24	0.00	246.61	106.85	0.00
J25	0.00	246.61	106.85	0.00
J26	3.50	246.61	106.86	0.00
J27	0.00	246.61	106.86	0.00
J28	0.00	246.61	106.86	0.00
J29	0.00	246.61	106.86	0.00
J30	0.00	246.61	106.86	0.00
J1	0.00	246.63	106.86	0.00
J32	0.00	246.63	106.87	0.00
J31	0.00	246.61	106.85	0.00
R1	-78.68	0.00	0.00	0.00 Reservoir

Link Results at 2:00 Hrs:

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/kft	Status
P1	78.68	0.22	0.04	Open
P2	25.64	0.07	0.00	Open
P3	53.04	0.34	0.13	Open
P4	53.04	0.34	0.13	Open
P5	53.04	0.34	0.13	Open
P6	40.59	0.26	0.08	Open
P7	37.09	0.24	0.07	Open
P8	37.09	0.24	0.07	Open
P9	37.09	0.24	0.07	Open
P10	37.09	0.24	0.07	Open
P11	33.59	0.21	0.06	Open
P12	-24.09	0.15	0.03	Open
P13	-24.09	0.15	0.03	Open
P14	-24.09	0.15	0.03	Open
P15	-27.59	0.18	0.04	Open
P16	-31.09	0.20	0.05	Open
P17	-31.09	0.20	0.05	Open
P18	-34.59	0.22	0.06	Open
P19	-34.59	0.22	0.06	Open
P20	-34.59	0.22	0.06	Open
P21	-8.95	0.06	0.00	Open

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P22	-8.95	0.06	0.00	Open
P23	-8.95	0.06	0.00	Open
P24	-8.95	0.06	0.00	Open
P25	-12.45	0.08	0.01	Open
P26	-12.45	0.08	0.01	Open
P27	-12.45	0.08	0.01	Open
P28	-12.45	0.08	0.01	Open
P29	-12.45	0.08	0.01	Open
P31	-25.64	0.16	0.03	Open

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Link Results at 2:00 Hrs: (continued)

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
P32	-25.64	0.07	0.00	Open
P33	25.64	0.07	0.00	Open
P30	-25.64	0.16	0.03	Open
PUMP1	78.68	0.00	-246.67	Open Pump

APPENDIX 7

20 PSI Residual Pressure

Optiwater Fire Flow Analysis

Check_Node	Maximal_Flow	Violating_Node	Minimal_pressure
J2	2940	J2	19.50371
J3	2730	J3	19.83203
J4	2660	J4	19.7082
J5	2660	J5	19.5254
J6	2610	J6	19.97797
J7	2580	J7	19.6521
J8	2470	J8	19.49215
J9	2460	J9	19.77987
J10	2430	J10	19.42695
J11	2420	J11	19.89454
J12	2390	J12	19.56813
J13	2400	J12	19.97633
J14	2380	J14	19.62365
J15	2380	J15	19.66965
J16	2380	J16	19.8045
J17	2400	J17	19.82286
J18	2400	J18	19.98058
J19	2460	J19	19.62671
J20	2460	J19	19.88519
J21	2470	J19	19.51958
J22	2490	J22	19.7676
J23	2480	J23	19.52811
J24	2460	J24	19.65659
J25	2460	J25	19.37374
J26	2440	J26	19.54281
J27	2440	J27	19.57029
J28	2470	J28	19.83268
J29	2480	J29	19.81455
J30	2490	J28	19.99788
J1	2550	J1	19.77821
J32	2600	J32	19.96437
J31	2490	J22	19.93087

APPENDIX 7

30 PSI Residual Pressure

Optiwater Fire Flow Analysis

Check_Node	Maximal_Flow	Violating_Node	Minimal_pressure
J2	2720	J2	29.96095
J3	2540	J3	29.83279
J4	2480	J4	29.5494
J5	2470	J5	29.95979
J6	2440	J6	29.47823
J7	2400	J7	29.94199
J8	2300	J8	29.82362
J9	2300	J8	29.88384
J10	2260	J10	29.98672
J11	2260	J11	29.82752
J12	2230	J12	29.70841
J13	2250	J12	29.46261
J14	2220	J14	29.80988
J15	2220	J15	29.85059
J16	2220	J16	29.97499
J17	2240	J17	29.88178
J18	2250	J17	29.59251
J19	2300	J19	29.43812
J20	2300	J19	29.54819
J21	2300	J19	29.84398
J22	2320	J22	29.95002
J23	2310	J23	29.79641
J24	2300	J24	29.40437
J25	2290	J25	29.77471
J26	2280	J26	29.4192
J27	2280	J27	29.43815
J28	2310	J28	29.50655
J29	2320	J28	29.70796
J30	2320	J29	29.90215
J1	2380	J1	29.63233
J32	2430	J32	29.52407
J31	2320	J31	29.86679

APPENDIX 8

IPC Fire Flow Table B105.1

APPENDIX B

**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 IIA ^a	Type IV and V-A ^a	Type IIB and IIB ^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	3
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	
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-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.