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BEFORE THE ARIZONA CORPORATION COMMISSION

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IN THE MATTER OF THE APPLICATION OF ARIZONA WATER COMPANY, AN ARIZONA CORPORATION, TO EXTEND ITS EXISTING CERTIFICATE OF CONVENIENCE AND NECESSITY AT CASA GRANDE, PINAL COUNTY, ARIZONA	DOCKET NO. W-01445A-06-0662 RESPONSE TO INSUFFICIENCY LETTER

Arizona Water Company (the "Company") submits the following responses to the Staff's inquiries as contained in the Staff's November 14, 2006 Insufficiency Letter to the Company in the above-captioned Docket. The Staff's inquiries, and the Company's responses are presented below.

1. **Please submit a drinking water design report, which clarifies how water will be provided to the proposed CC&N area.**

Response:

See attached Final Water Improvement Report (Attachment 1).

The report should identify existing and future sources, the capacities of existing sources, the estimated capacities of future sources and any existing demand on the present water sources.

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Response:

See attached Pinal Valley Master Plan (Attachment 2).

The report should include the estimated water demand from a typical dwelling unit, the estimated demand from the proposed CC&N area.

Response:

See Attachment 1.

The report should identify the location of future and existing transmission mains and include the timing or construction phasing of facilities.

Response:

See Attachment 2.

The design report should describe water quality and address any water quality problems with the existing and future sources of water (as an example, will extra treatment costs arise in order to meet existing or future maximum contaminant levels for arsenic, nitrates or fluorides in the drinking water and if so, how does the applicant plan to fund the necessary treatment plant additions).

Response:

Arsenic treatment was addressed in the Company's most recent rate proceeding for its Western Group, which includes the Casa Grande water system (see Decision No.

68302). The Company is in the process of installing new arsenic treatment facilities as described in the Decision. No new arsenic or other treatment facilities are needed as a result of serving the Ghost Hollow Estates development.

Please provide any other information, which will allow the Commission to analyze and conclude that the company has sufficient water production capacity, or can develop enough drinking water capacity to service the existing and future demands from the proposed CC&N area.

Response:

Sufficient groundwater sources are available to serve Ghost Hollow. See attached storage and supply calculations for the Casa Grande system (Attachment 3) and Arizona Department of Water Resources Report (Attachment 4).

2. **Please provide a set of design plans for the proposed water facilities. The plan should include the proposed water source, distribution facilities and show the site map of the proposed water treatment plant. If final design plans are not available, please provide preliminary plans.**

Response:

See attached plans for Ghost Hollow Estates Phases 1 and 2 (Attachment 5).

3. **Please provide an estimate of the water construction costs to the Applicant, necessary to serve the proposed CC&N. The costs should include a description of the major components with the cost of the component (i.e., wells, number and size of storage tanks, water treatment plant, etc.). The method of financing for the major components should be specified.**

Response:

See attached Cost Estimates (Attachment 6).

4. **Please provide a copy of the Arizona Department of Environmental Quality's Approval to Construct the water facilities to serve the proposed extension area. If the Approval to Construct has not been issued, please inform Staff of the status of the application for the Approval to Construct.**

Response:

Morrison Maierle is the Developer's Engineer working on the project. Morrison Maierle has been waiting on the City of Casa Grande sewer plans comments since August 2006. Once Morrison Maierle receives the City's comments, it plans to incorporate them with the water plans and submit them to ADEQ.

.5. **Please provide a copy of the proposed construction schedule for the various phase of the project.**

Response:

The Developer will be ready to begin construction of the project when all of the necessary approvals are finished: The tentative schedule to begin construction on Phase I (130 units) is in May 2007 and in February or March 2008 on Phase II (130 units).

6. **Exhibit 7 that was submitted with the application is a resolution by the City Council that deemed the granting of a certain water franchise beneficial for the City and ordered special election for the voters to decide whether or not the franchise shall be granted to the Company. Please provide a copy of the City of Casa Grande franchise agreement that includes the proposed extension area.**

Response:

See attached Franchise Agreement (Attachment 7).

7. **Is the requested area part of *CMR/Casa Grande L.L.C. v. City of Casa Grande et al.,* CV05 9472 PHX-SMMM, the litigation in the United States District Court for the District of Arizona. Please explain.**

Response:

No. The requested area is not a part of the Copper Mountain Ranch development, which this litigation concerned. In addition, the litigation between the Copper Mountain Ranch Developer and the City of Casa Grande has apparently been resolved. The parties are scheduled to attend a Procedural Conference on January 15, 2007, at which time the lawsuit is expected to be dismissed.

8. **According to the application, "AWC is aware of no existing or planned high water use amenities such as golf courses or turf areas." Please the following information with the assistance of the builder or developer: (1) Will any artificial lakes, golf courses, ornamental structures, open spaces, and any other aesthetic water features be built in the requested area? If so, does AWC plan to use groundwater at the beginning of the project for artificial lakes, golf courses, ornamental structures, open spaces, and any other aesthetic water features, and if so, for how long? Please explain in detail. (2) At what point in time does AWC intend to utilize effluent for artificial lakes, golf courses, ornamental structures, open spaces, and any other aesthetic water features? Please explain in detail. Please be sure to include the number of houses that would have to be built in order to generate enough effluent for such uses.**

Response:

1. Arizona Water Company talked to the Developer about water features for Ghost Hollow Estates development. The Developer informed the Company that the development will have no such features and the water plans included in this

response confirm this information. Wastewater flows from this development will provide quantities of treated effluent or reclaimed water from the City of Casa Grande. The Company is working with the City to ensure maximum use for either direct delivery or recharge and recovery.

2. Since no high water use amenities are planned for this development, effluent will not be utilized within the development.

RESPECTFULLY SUBMITTED this 10th day of January, 2007.

ARIZONA WATER COMPANY

By: Robert W. Geake

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Original and thirteen (13) copies of the foregoing filed this 10th day of January 2007 with:

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A copy of the foregoing was hand-delivered this 10th day of January 2007 to:

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By: Robert W. Geake

ATTACHMENT 1

FINAL WATER IMPROVEMENT REPORT
FOR
GHOST HOLLOW ESTATES
CASA GRANDE, AZ

Prepared for:
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PO Box 20926
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480-786-1104

Prepared by:
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Douglas Pike, P.E.
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Registered Professional Engineer (Civil)
CERTIFICATE NO.
18614
DOUGLAS FRANKLIN
PIKE
Date Signed 8-29-06
ARIZONA, U.S.A.

August 2006
MMI Project No: 8582.001

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A. INTRODUCTION

1. Purpose

The purpose of this report is to propose water system improvements needed to service the Ghost Hollow Estates development. Proposed improvements include water mains, pipe alignments, and additional associated appurtenances. Both onsite and offsite improvements will be detailed.

Additionally, this report will present design criteria used to determine proposed improvements. The anticipated project water demands are summarized and organized by project phase. These improvements are proposed to be completed in phases in accordance with the phased construction of the project.

2. Project Description

The proposed project is located at the northwest corner of Pinal Avenue/SR-387 and the Ghost Ranch Road alignment. The project is west of Pinal Avenue in the south half of the southeast quarter of Section 17, Township 5 South, Range 6 east of the Gila and Salt River Base and Meridian in the City of Casa Grande, Arizona. The site generally slopes from the northwest to the southeast at approximately 1.0%. See Figure 1.

Ghost Hollow Estates is approximately 80 acres in size consisting of 260 single-family residential units. The project is proposed to be completed in two (2) phases. See Figure 4 for the phasing plan.

The first phase encompasses the eastern portion of the site. Phase 1 includes development of 130 single-family residential lots. Phase 2 is planned with 130 single-family residential units and is located in the western of the site.

B. WATER SYSTEM DESIGN

1. Existing System

The Ghost Hollow Estates development lies within the Arizona Water Company service area. Currently, there are two existing water mains in the immediate area. These two lines will provide the proposed site with the water required.

The first line is a 12-inch line located east of Pinal Avenue/SR-387 along Ghost Ranch Road. This main currently services the Ghost Ranch development. A crossing permit will be utilized to extend this line beneath the road to our site.

The next line is a 6-inch main located approximately 200 feet from the southwest corner of the property along Tuzigoot Drive. This main currently services Deer Run Peak. This main will be extended to the Ghost Ranch development to

provide redundancy and loop the system providing adequate water supply to the site.

2. Design Criteria

The proposed water system will be designed in accordance with Arizona Water Company and City of Casa Grande standards and specifications. Table B.1 summarizes the criteria used.

TABLE B.1 DESIGN CRITERIA	
Capita Per Dwelling Unit	3.3
Maximum Day Factor	1.8
Peak Hour Factor	3.0
Residential Demand (gallons/capita/day)	125
Commercial Demand (gallons/acre/day)	2000
Fire Flow (gallons/minute)	1500 gpm for 2 hours

The standards for design of the water distribution system are shown below.

TABLE B.2 WATER SYSTEM STANDARDS SUMMARY	
Description	**Requirement**
Minimum Pipe Size	6-inch
Minimum Service Line Size	3/4-inch
Minimum Meter Size	5/8-inch
Pipe Material	Ductile Iron Pipe, CL 350
Service Lateral Material	Copper, Type K
Maximum Fire Hydrant Spacing	500 feet
Residual Pressure during Maximum Daily Demand	50-90 psi
Residual Pressure during Maximum Daily Demand with Fire Flow	20 psi (minimum)
Maximum Flow Velocity	< 10 feet/second
Maximum Headloss	< 10 feet/1,000 feet

3. Proposed System Demands

The proposed project consists of approximately 80 acres of single-family residential use. The anticipated demands are based on criteria referenced in Table B.1. Factors of 1.8 and 3.0 are applied to average daily demands to determine the maximum daily and peak hour demands, respectively. The following table summarizes the water demands associated with the proposed development.

TABLE B.3 WATER DEMAND SUMMARY					
Land Use	**Acres**	**Dwelling Units**	**Avg Day (gpd)**	**Max Day (gpd)**	**Peak Hour (gpd)**
Single Family Residential	80*	260	107,250	193,050	321,750
TOTAL	**80**	**260**	**107,250**	**193,050**	**321,750**

*NOTE: Open space and road rights-of-way are included.

The following table is a water demand summary by phase. In addition to the demands listed, a fire flow demand of 1,500 gpm for the duration of 2 hours will be needed. See Figure 4 for the site phasing plan.

TABLE B.4 WATER DEMAND SUMMARY BY PHASE				
Phase	**Dwelling Units (DU)**	**Avg Day (gpd)**	**Max Day (gpd)**	**Peak Hour (gpd)**
SFR - Phase 1	130	53,625	96,525	160,875
SFR - Phase 2	130	53,625	96,525	160,875
TOTAL	**260**	**107,250**	**193,050**	**321,750**

C. WATER SYSTEM MODELING

The computer-modeling program, WaterCAD by Haestad Methods, was utilized to model both existing and proposed conditions. The modeled system used an elevated reservoir with a pipe network to represent existing conditions.

1. Model Set-up and Calibration

The first stage of modeling was to set up and model the water system surrounding Ghost Hollow Estates. A field survey of the project vicinity located existing water system facilities. A fire hydrant was field tested at the intersection of Creosote Drive and Creosote Court, just east of Pinal Avenue and Phantom Drive. The data from this hydrant was obtained from the fire department to set-up and calibrate the model.

With the above information, the model was established as one independent water system. A pipe network for this system was developed to closely resemble the field survey results. The flow and pressure data from the field test was used to establish a baseline and represent existing conditions. See Appendix A for fire hydrant flow data.

The calibration process involved adjusting modeling parameters to simulate field conditions. The flow data from the hydrant flow test was input as a demand to verify system residual pressures. Table C.1 shows the static and residual

pressures for the hydrant from both the field-testing and calibrated model. As shown, the modeling results closely match the field test results, which suggest the model closely represents the field conditions.

TABLE C.1 HYDRANT FIELD AND MODELED PRESSURES		
	Hydrant Flow Testing	**Modeled Pressure**
Hydrant 1		
Static	88	86
Residual	62	63

2. Modeling Summary

After the calibration was completed, the system was modeled to verify pressures during various water demand scenarios. Two models were established to represent the two proposed construction phases. Within in each phase, four demand scenarios were modeled. These scenarios include: a) Average Daily Demand; b) Maximum Daily Demand; c) Peak Hour Demand; and d) Maximum Daily Demand plus Fire Flow Demand.

The first model included both phases of Ghost Hollow Estates. The second model was setup with the demands from the 130 lots in Phase 1.

The analyses evaluated the existing water system capacity to support the project during each model. Two design criteria needed to be satisfied: 1) Residual Pressure during Maximum Daily Demand to range from 50 to 90 pounds per square inch (psi); and 2) Minimum Residual Pressure during Maximum Day plus Fire Flow to be 20 psi. From these analyses, onsite and offsite improvements to the existing water system were developed. These recommendations are detailed in Section D.

The following section summarizes the results of the analyses. Complete WaterCAD reports are located in the attached Appendices.

Model 1 - Entire Site

A total of 51 nodes were established for this model. The total water demand was divided by the total nodes to calculate individual residential demands for each node.

A total site summary of the four scenarios is as follows:

- Average Day Demand:
  - Maximum Pressure: 83.90 psi @ Node 34
  - Minimum Pressure: 75.45 psi @ Node 16
- Maximum Day Demand:
  - Maximum Pressure: 83.85 psi @ Node 34

- o Minimum Pressure: 75.36 psi @ Node 16
- Peak Hour Demand:
  - o Maximum Pressure: 83.71 psi @ Node 34
  - o Minimum Pressure: 75.14 psi @ Node 16
- Maximum Day Plus Fire Flow:
  - o Residual Pressure (Min.): 20.00 psi @ Multiple Nodes

Based upon the analysis, the proposed system satisfies pressure requirements per the design criteria. The results of the described above are shown in Appendix A.

Model 2 - Phase 1 only

For this model, the system was analyzed using the demands associated with Phase 1 development only. Phase 1 is in the northeastern portion of the site and includes 140 residential lots. See Figure 4.

The model was established using only the water infrastructure associated with Phase 1. The modeling scenarios described above were used to verify flows within this phase of development. Complete WaterCAD results are in Appendix A.

The Phase 1 summary of the four scenarios is as follows:

- Average Day Demand:
  - o Maximum Pressure: 83.45 psi @ Node 3
  - o Minimum Pressure: 78.73 psi @ Node 47
- Maximum Day Demand:
  - o Maximum Pressure: 83.44 psi @ Node 3
  - o Minimum Pressure: 78.70 psi @ Node 47
- Peak Hour Demand:
  - o Maximum Pressure: 83.41 psi @ Node 3
  - o Minimum Pressure: 78.64 psi @ Node 47
- Maximum Day Plus Fire Flow:
  - o Residual Pressure (Min.): 20.00 psi @ Multiple Nodes

D. PROPOSED WATER SYSTEM IMPROVEMENTS

1. Onsite Improvements

The onsite water distribution system will consist of 8-inch mains throughout the property. The system will include isolation valves, fire hydrants and appurtenances. Isolation valves are proposed to be located at curb returns along collectors and arterials to facilitate access. Fire hydrants will be spaced every 500 feet to provide adequate fire protection. See Figure 3 for onsite water improvements.

The proposed system will be constructed per the previously described criteria. Water mains less than 12 inches in diameter will be constructed with a minimum of 3 feet of cover. Proposed single-family residential lots will typically be served with 1-inch double services. Single services will be a minimum of ¾-inch. Proposed service lateral material will be copper. Residential meters will be 5/8-inch.

2. Offsite Improvements

Offsite improvements will be required to service Ghost Hollow Estates. The improvements will include extending the existing waterlines to the site. Approximately 1,200 feet of 12-inch pipe along Pinal Avenue and an additional 1,800 feet of 6-inch along Tuzigoot Drive are proposed. See Figure 2.

Based on the completed modeling, the proposed improvements will provide the project with the required water supply and maintain minimum pressures for proper operation. This intertie will provide a source redundancy for the area and promote system circulation.

The proposed offsite improvements will also include a 75-foot crossing of Pinal Avenue. A crossing permit will be obtained from ADOT to make the necessary connection.

3. 100-Year Water Assurance

The developer will submit an application for certification of assured water supply and provide a 100-year Assured Water Supply Certificate prior to Final Plat recording.

E. CONCLUSION

Both onsite and offsite improvements are proposed for Ghost Hollow Estates. Offsite waterline extensions consisting of approximately 1,200 feet of 12-inch pipe and 1,800 feet of 6-inch pipe are proposed and will be completed as part of Phase 1. Onsite improvements will be constructed in phases consistent with the overall phasing of the project. Facilities including 8-inch pipe, fire hydrants, isolation valves, and associated appurtenances are proposed onsite.

At full build-out, the project requires approximately 107,250 gpd during average daily demand. Maximum daily demand is anticipated at 193,050 gpd. From our analyses, the existing water system can accommodate the project provided the improvements presented in this report are completed. Such improvements will enable the system to provide adequate flows and maintaining satisfactory pressures. No additional improvements are anticipated for this project.

Appendix A

Fire Hydrant Flow Data

FIRE HYDRANT FLOW DATA

Hydrant 1

Location: Entrance to Ghost Ranch Subdivision

Flow (GPM): 710

Pressures (psi):

Static:	88
Residual:	62

Appendix B

WaterCAD Reports

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,699.99	83.93
J-2	1,506.20	Zone	Demand	1.52	Fixed	1.52	1,699.97	83.84
J-3	1,507.10	Zone	Demand	1.52	Fixed	1.52	1,699.95	83.44
J-4	1,508.00	Zone	Demand	1.52	Fixed	1.52	1,699.93	83.04
J-5	1,509.30	Zone	Demand	1.52	Fixed	1.52	1,699.91	82.47
J-6	1,509.60	Zone	Demand	1.52	Fixed	1.52	1,699.91	82.34
J-7	1,510.00	Zone	Demand	1.52	Fixed	1.52	1,699.90	82.16
J-8	1,510.30	Zone	Demand	1.52	Fixed	1.52	1,699.90	82.03
J-9	1,511.90	Zone	Demand	1.52	Fixed	1.52	1,699.89	81.34
J-10	1,513.10	Zone	Demand	1.52	Fixed	1.52	1,699.89	80.82
J-11	1,514.30	Zone	Demand	1.52	Fixed	1.52	1,699.89	80.30
J-12	1,515.40	Zone	Demand	1.52	Fixed	1.52	1,699.89	79.82
J-13	1,520.00	Zone	Demand	1.52	Fixed	1.52	1,699.89	77.83
J-14	1,525.20	Zone	Demand	1.52	Fixed	1.52	1,699.89	75.58
J-15	1,525.40	Zone	Demand	1.52	Fixed	1.52	1,699.89	75.49
J-16	1,525.50	Zone	Demand	1.52	Fixed	1.52	1,699.89	75.45
J-17	1,525.00	Zone	Demand	1.52	Fixed	1.52	1,699.89	75.67
J-18	1,523.30	Zone	Demand	1.52	Fixed	1.52	1,699.89	76.40
J-19	1,521.60	Zone	Demand	1.52	Fixed	1.52	1,699.89	77.14
J-20	1,520.50	Zone	Demand	1.52	Fixed	1.52	1,699.89	77.61
J-21	1,519.70	Zone	Demand	1.52	Fixed	1.52	1,699.89	77.96
J-22	1,518.30	Zone	Demand	1.52	Fixed	1.52	1,699.89	78.57
J-23	1,518.30	Zone	Demand	1.52	Fixed	1.52	1,699.89	78.57
J-24	1,516.00	Zone	Demand	1.52	Fixed	1.52	1,699.89	79.56
J-25	1,516.30	Zone	Demand	1.52	Fixed	1.52	1,699.89	79.43
J-26	1,514.50	Zone	Demand	1.52	Fixed	1.52	1,699.89	80.21
J-27	1,511.70	Zone	Demand	1.52	Fixed	1.52	1,699.90	81.42
J-28	1,511.90	Zone	Demand	1.52	Fixed	1.52	1,699.90	81.34
J-29	1,511.70	Zone	Demand	1.52	Fixed	1.52	1,699.90	81.43
J-30	1,510.00	Zone	Demand	1.52	Fixed	1.52	1,699.90	82.16
J-31	1,509.50	Zone	Demand	1.52	Fixed	1.52	1,699.91	82.38
J-32	1,508.20	Zone	Demand	1.52	Fixed	1.52	1,699.91	82.94
J-33	1,507.70	Zone	Demand	1.52	Fixed	1.52	1,699.93	83.17
J-34	1,506.00	Zone	Demand	1.52	Fixed	1.52	1,699.93	83.90
J-36	1,520.60	Zone	Demand	1.52	Fixed	1.52	1,699.89	77.57
J-37	1,511.60	Zone	Demand	1.52	Fixed	1.52	1,699.89	81.47
J-38	1,510.50	Zone	Demand	1.52	Fixed	1.52	1,699.89	81.94
J-39	1,509.50	Zone	Demand	1.52	Fixed	1.52	1,699.89	82.37
J-40	1,509.00	Zone	Demand	1.52	Fixed	1.52	1,699.89	82.59
J-41	1,509.50	Zone	Demand	1.52	Fixed	1.52	1,699.89	82.37
J-42	1,510.60	Zone	Demand	1.52	Fixed	1.52	1,699.89	81.90
J-43	1,511.00	Zone	Demand	1.52	Fixed	1.52	1,699.89	81.73
J-44	1,511.30	Zone	Demand	1.52	Fixed	1.52	1,699.89	81.60
J-45	1,512.30	Zone	Demand	1.52	Fixed	1.52	1,699.89	81.16
J-46	1,514.10	Zone	Demand	1.52	Fixed	1.52	1,699.89	80.38
J-47	1,518.00	Zone	Demand	1.52	Fixed	1.52	1,699.89	78.70
J-48	1,517.10	Zone	Demand	1.52	Fixed	1.52	1,699.89	79.09
J-49	1,507.60	Zone	Demand	1.52	Fixed	1.52	1,699.90	83.20
J-50	1,519.80	Zone	Demand	1.52	Fixed	1.52	1,699.89	77.92
J-51	1,519.11	Zone	Demand	1.52	Fixed	1.52	1,699.89	78.22
J-52	1,504.80	Zone	Demand	0.00	Fixed	0.00	1,700.00	84.45
J-53	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,700.00	83.93

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-2	600.00	12.0	Ductile Iro	130.0	false	0.00	Open	74.48	1,699.99	1,699.97	0.01	0.02
P-3	164.00	8.0	Ductile Iro	130.0	false	0.00	Open	72.96	1,699.97	1,699.95	0.02	0.14
P-4	143.00	8.0	Ductile Iro	130.0	false	0.00	Open	71.44	1,699.95	1,699.93	0.02	0.14
P-5	150.00	8.0	Ductile Iro	130.0	false	0.00	Open	66.88	1,699.93	1,699.91	0.02	0.12
P-6	37.00	8.0	Ductile Iro	130.0	false	0.00	Open	65.36	1,699.91	1,699.91	0.00	0.12
P-7	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	37.00	1,699.91	1,699.90	0.01	0.04
P-8	34.00	8.0	Ductile Iro	130.0	false	0.00	Open	24.96	1,699.90	1,699.90	0.00	0.02
P-10	213.00	8.0	Ductile Iro	130.0	false	0.00	Open	10.51	1,699.89	1,699.89	0.00	0.00
P-11	174.00	8.0	Ductile Iro	130.0	false	0.00	Open	11.16	1,699.89	1,699.89	0.00	0.00
P-12	126.00	8.0	Ductile Iro	130.0	false	0.00	Open	9.64	1,699.89	1,699.89	0.00	0.00
P-13	618.00	8.0	Ductile Iro	130.0	false	0.00	Open	8.12	1,699.89	1,699.89	0.00	0.00
P-14	615.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.14	1,699.89	1,699.89	0.00	0.00
P-15	28.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.62	1,699.89	1,699.89	0.00	0.00
P-16	28.00	8.0	Ductile Iro	130.0	false	0.00	Open	0.10	1,699.89	1,699.89	0.00	0.00
P-17	228.00	8.0	Ductile Iro	130.0	false	0.00	Open	-1.42	1,699.89	1,699.89	0.00	0.00
P-18	264.00	8.0	Ductile Iro	130.0	false	0.00	Open	-1.00	1,699.89	1,699.89	0.00	0.00
P-19	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.04	1,699.89	1,699.89	0.00	0.00
P-20	277.00	8.0	Ductile Iro	130.0	false	0.00	Open	-8.60	1,699.89	1,699.89	0.00	0.00
P-21	275.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.52	1,699.89	1,699.89	0.00	0.00
P-22	285.00	8.0	Ductile Iro	130.0	false	0.00	Open	-11.64	1,699.89	1,699.89	0.00	0.00
P-23	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.52	1,699.89	1,699.89	0.00	0.00
P-24	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-14.68	1,699.89	1,699.89	0.00	0.01
P-25	291.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.52	1,699.89	1,699.89	0.00	0.00
P-26	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-17.72	1,699.89	1,699.90	0.00	0.01
P-27	275.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.52	1,699.90	1,699.90	0.00	0.00
P-28	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-20.76	1,699.90	1,699.90	0.00	0.01
P-29	268.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.52	1,699.90	1,699.90	0.00	0.00
P-30	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	-23.80	1,699.90	1,699.91	0.00	0.02
P-31	22.00	8.0	Ductile Iro	130.0	false	0.00	Open	26.84	1,699.91	1,699.91	0.00	0.02
P-32	262.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.52	1,699.91	1,699.91	0.00	0.00
P-33	99.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.04	1,699.93	1,699.93	0.00	0.00
P-34	173.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.52	1,699.93	1,699.93	0.00	0.00
P-37	48.00	6.0	Ductile Iro	130.0	false	0.00	Open	-1.52	1,699.89	1,699.89	0.00	0.00
P-38	110.00	8.0	Ductile Iro	130.0	false	0.00	Open	23.44	1,699.90	1,699.89	0.00	0.02
P-39	46.00	8.0	Ductile Iro	130.0	false	0.00	Open	12.03	1,699.89	1,699.89	0.00	0.01

Title: Ghost Hollow Estates
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Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-40	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.94	1,699.89	1,699.89	0.00	0.00
P-41	112.00	8.0	Ductile Iro	130.0	false	0.00	Open	8.37	1,699.89	1,699.89	0.00	0.00
P-42	295.00	8.0	Ductile Iro	130.0	false	0.00	Open	6.85	1,699.89	1,699.89	0.00	0.00
P-43	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	5.33	1,699.89	1,699.89	0.00	0.00
P-44	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.81	1,699.89	1,699.89	0.00	0.00
P-45	224.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.29	1,699.89	1,699.89	0.00	0.00
P-46	456.00	8.0	Ductile Iro	130.0	false	0.00	Open	0.77	1,699.89	1,699.89	0.00	0.00
P-47	174.00	8.0	Ductile Iro	130.0	false	0.00	Open	-0.75	1,699.89	1,699.89	0.00	0.00
P-48	190.00	8.0	Ductile Iro	130.0	false	0.00	Open	-2.27	1,699.89	1,699.89	0.00	0.00
P-49	165.00	8.0	Ductile Iro	130.0	false	0.00	Open	-4.44	1,699.89	1,699.89	0.00	0.00
P-50	459.00	8.0	Ductile Iro	130.0	false	0.00	Open	-5.96	1,699.89	1,699.89	0.00	0.00
P-51	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	-7.48	1,699.89	1,699.89	0.00	0.00
P-52	800.00	8.0	Ductile Iro	130.0	false	0.00	Open	-9.00	1,699.89	1,699.90	0.00	0.00
P-53	469.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.52	1,699.90	1,699.90	0.00	0.00
P-54	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.94	1,699.89	1,699.89	0.00	0.00
P-55	646.00	8.0	Ductile Iro	130.0	false	0.00	Open	-1.94	1,699.89	1,699.89	0.00	0.00
P-56	254.00	8.0	Ductile Iro	130.0	false	0.00	Open	-3.46	1,699.89	1,699.89	0.00	0.00
P-57	601.00	8.0	Ductile Iro	130.0	false	0.00	Open	-1.52	1,699.89	1,699.89	0.00	0.00
P-58	271.00	8.0	Ductile Iro	130.0	false	0.00	Open	-4.04	1,699.89	1,699.89	0.00	0.00
P-59	45.00	12.0	Ductile Iro	110.0	false	0.00	Open	74.48	1,700.00	1,700.00	0.00	0.03
P-60	555.00	12.0	Ductile Iro	120.0	false	0.00	Open	74.48	1,700.00	1,699.99	0.01	0.02
P-61	350.00	6.0	Ductile Iro	110.0	false	0.00	Open	0.00	1,700.00	1,700.00	0.00	0.00

Scenario: Max. Day
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-2	600.00	12.0	Ductile Iro	130.0	false	0.00	Open	131.52	1,699.96	1,699.92	0.04	0.06
P-3	164.00	8.0	Ductile Iro	130.0	false	0.00	Open	131.52	1,699.92	1,699.85	0.07	0.43
P-4	143.00	8.0	Ductile Iro	130.0	false	0.00	Open	128.78	1,699.85	1,699.79	0.06	0.41
P-5	150.00	8.0	Ductile Iro	130.0	false	0.00	Open	120.56	1,699.79	1,699.74	0.05	0.36
P-6	37.00	8.0	Ductile Iro	130.0	false	0.00	Open	117.82	1,699.74	1,699.73	0.01	0.35
P-7	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	66.69	1,699.73	1,699.70	0.03	0.12
P-8	34.00	8.0	Ductile Iro	130.0	false	0.00	Open	44.99	1,699.70	1,699.69	0.00	0.06
P-10	213.00	8.0	Ductile Iro	130.0	false	0.00	Open	18.95	1,699.69	1,699.69	0.00	0.01
P-11	174.00	8.0	Ductile Iro	130.0	false	0.00	Open	20.11	1,699.69	1,699.68	0.00	0.01
P-12	126.00	8.0	Ductile Iro	130.0	false	0.00	Open	17.37	1,699.68	1,699.68	0.00	0.01
P-13	618.00	8.0	Ductile Iro	130.0	false	0.00	Open	14.63	1,699.68	1,699.68	0.00	0.01
P-14	615.00	8.0	Ductile Iro	130.0	false	0.00	Open	5.65	1,699.68	1,699.68	0.00	0.00
P-15	28.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.91	1,699.68	1,699.68	0.00	0.00
P-16	28.00	8.0	Ductile Iro	130.0	false	0.00	Open	0.17	1,699.68	1,699.68	0.00	0.00
P-17	228.00	8.0	Ductile Iro	130.0	false	0.00	Open	-2.57	1,699.68	1,699.68	0.00	0.00
P-18	264.00	8.0	Ductile Iro	130.0	false	0.00	Open	-1.81	1,699.68	1,699.68	0.00	0.00
P-19	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	5.48	1,699.68	1,699.68	0.00	0.00
P-20	277.00	8.0	Ductile Iro	130.0	false	0.00	Open	-15.51	1,699.68	1,699.68	0.00	0.01
P-21	275.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.68	1,699.68	0.00	0.00
P-22	285.00	8.0	Ductile Iro	130.0	false	0.00	Open	-20.99	1,699.68	1,699.68	0.00	0.01
P-23	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.68	1,699.68	0.00	0.00
P-24	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-26.47	1,699.68	1,699.69	0.01	0.02
P-25	291.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.69	1,699.69	0.00	0.00
P-26	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-31.95	1,699.69	1,699.70	0.01	0.03
P-27	275.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.70	1,699.70	0.00	0.00
P-28	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-37.43	1,699.70	1,699.71	0.01	0.04
P-29	268.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.71	1,699.71	0.00	0.00
P-30	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	-42.91	1,699.71	1,699.73	0.01	0.05
P-31	22.00	8.0	Ductile Iro	130.0	false	0.00	Open	48.39	1,699.73	1,699.73	0.00	0.07
P-32	262.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.73	1,699.73	0.00	0.00
P-33	99.00	8.0	Ductile Iro	130.0	false	0.00	Open	5.48	1,699.79	1,699.79	0.00	0.00
P-34	173.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.79	1,699.79	0.00	0.00
P-37	48.00	6.0	Ductile Iro	130.0	false	0.00	Open	-2.74	1,699.68	1,699.68	0.00	0.00
P-38	110.00	8.0	Ductile Iro	130.0	false	0.00	Open	42.25	1,699.69	1,699.69	0.01	0.05
P-39	46.00	8.0	Ductile Iro	130.0	false	0.00	Open	21.69	1,699.69	1,699.69	0.00	0.02

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Scenario: Max. Day
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-40	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	8.91	1,699.69	1,699.69	0.00	0.00
P-41	112.00	8.0	Ductile Iro	130.0	false	0.00	Open	15.08	1,699.69	1,699.69	0.00	0.01
P-42	295.00	8.0	Ductile Iro	130.0	false	0.00	Open	12.34	1,699.69	1,699.69	0.00	0.01
P-43	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	9.60	1,699.69	1,699.69	0.00	0.00
P-44	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	6.86	1,699.69	1,699.69	0.00	0.00
P-45	224.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.12	1,699.69	1,699.69	0.00	0.00
P-46	456.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.38	1,699.69	1,699.69	0.00	0.00
P-47	174.00	8.0	Ductile Iro	130.0	false	0.00	Open	-1.36	1,699.69	1,699.69	0.00	0.00
P-48	190.00	8.0	Ductile Iro	130.0	false	0.00	Open	-4.10	1,699.69	1,699.69	0.00	0.00
P-49	165.00	8.0	Ductile Iro	130.0	false	0.00	Open	-8.00	1,699.69	1,699.69	0.00	0.00
P-50	459.00	8.0	Ductile Iro	130.0	false	0.00	Open	-10.74	1,699.69	1,699.69	0.00	0.00
P-51	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	-13.48	1,699.69	1,699.69	0.00	0.01
P-52	800.00	8.0	Ductile Iro	130.0	false	0.00	Open	-16.22	1,699.69	1,699.70	0.01	0.01
P-53	469.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.70	1,699.70	0.00	0.00
P-54	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	8.91	1,699.69	1,699.69	0.00	0.00
P-55	646.00	8.0	Ductile Iro	130.0	false	0.00	Open	-3.50	1,699.68	1,699.68	0.00	0.00
P-56	254.00	8.0	Ductile Iro	130.0	false	0.00	Open	-6.24	1,699.68	1,699.68	0.00	0.00
P-57	601.00	8.0	Ductile Iro	130.0	false	0.00	Open	-2.74	1,699.68	1,699.68	0.00	0.00
P-58	271.00	8.0	Ductile Iro	130.0	false	0.00	Open	-7.29	1,699.68	1,699.68	0.00	0.00
P-59	45.00	12.0	Ductile Iro	110.0	false	0.00	Open	131.52	1,700.00	1,700.00	0.00	0.08
P-60	555.00	12.0	Ductile Iro	120.0	false	0.00	Open	131.52	1,700.00	1,699.96	0.04	0.07
P-61	350.00	6.0	Ductile Iro	110.0	false	0.00	Open	0.00	1,700.00	1,700.00	0.00	0.00

Scenario: Max. Day
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,699.96	83.92
J-2	1,506.20	Zone	Demand	0.00	Fixed	0.00	1,699.92	83.81
J-3	1,507.10	Zone	Demand	2.74	Fixed	2.74	1,699.85	83.40
J-4	1,508.00	Zone	Demand	2.74	Fixed	2.74	1,699.79	82.98
J-5	1,509.30	Zone	Demand	2.74	Fixed	2.74	1,699.74	82.39
J-6	1,509.60	Zone	Demand	2.74	Fixed	2.74	1,699.73	82.26
J-7	1,510.00	Zone	Demand	2.74	Fixed	2.74	1,699.70	82.07
J-8	1,510.30	Zone	Demand	2.74	Fixed	2.74	1,699.69	81.94
J-9	1,511.90	Zone	Demand	2.74	Fixed	2.74	1,699.69	81.25
J-10	1,513.10	Zone	Demand	2.74	Fixed	2.74	1,699.69	80.73
J-11	1,514.30	Zone	Demand	2.74	Fixed	2.74	1,699.68	80.21
J-12	1,515.40	Zone	Demand	2.74	Fixed	2.74	1,699.68	79.73
J-13	1,520.00	Zone	Demand	2.74	Fixed	2.74	1,699.68	77.74
J-14	1,525.20	Zone	Demand	2.74	Fixed	2.74	1,699.68	75.49
J-15	1,525.40	Zone	Demand	2.74	Fixed	2.74	1,699.68	75.40
J-16	1,525.50	Zone	Demand	2.74	Fixed	2.74	1,699.68	75.36
J-17	1,525.00	Zone	Demand	2.74	Fixed	2.74	1,699.68	75.57
J-18	1,523.30	Zone	Demand	2.74	Fixed	2.74	1,699.68	76.31
J-19	1,521.60	Zone	Demand	2.74	Fixed	2.74	1,699.68	77.05
J-20	1,520.50	Zone	Demand	2.74	Fixed	2.74	1,699.68	77.52
J-21	1,519.70	Zone	Demand	2.74	Fixed	2.74	1,699.68	77.87
J-22	1,518.30	Zone	Demand	2.74	Fixed	2.74	1,699.68	78.47
J-23	1,518.30	Zone	Demand	2.74	Fixed	2.74	1,699.68	78.48
J-24	1,516.00	Zone	Demand	2.74	Fixed	2.74	1,699.68	79.47
J-25	1,516.30	Zone	Demand	2.74	Fixed	2.74	1,699.69	79.34
J-26	1,514.50	Zone	Demand	2.74	Fixed	2.74	1,699.69	80.12
J-27	1,511.70	Zone	Demand	2.74	Fixed	2.74	1,699.70	81.34
J-28	1,511.90	Zone	Demand	2.74	Fixed	2.74	1,699.70	81.25
J-29	1,511.70	Zone	Demand	2.74	Fixed	2.74	1,699.71	81.34
J-30	1,510.00	Zone	Demand	2.74	Fixed	2.74	1,699.71	82.08
J-31	1,509.50	Zone	Demand	2.74	Fixed	2.74	1,699.73	82.30
J-32	1,508.20	Zone	Demand	2.74	Fixed	2.74	1,699.73	82.86
J-33	1,507.70	Zone	Demand	2.74	Fixed	2.74	1,699.79	83.11
J-34	1,506.00	Zone	Demand	2.74	Fixed	2.74	1,699.79	83.85
J-36	1,520.60	Zone	Demand	2.74	Fixed	2.74	1,699.68	77.48
J-37	1,511.60	Zone	Demand	2.74	Fixed	2.74	1,699.69	81.38
J-38	1,510.50	Zone	Demand	2.74	Fixed	2.74	1,699.69	81.85
J-39	1,509.50	Zone	Demand	2.74	Fixed	2.74	1,699.69	82.29
J-40	1,509.00	Zone	Demand	2.74	Fixed	2.74	1,699.69	82.50
J-41	1,509.50	Zone	Demand	2.74	Fixed	2.74	1,699.69	82.28
J-42	1,510.60	Zone	Demand	2.74	Fixed	2.74	1,699.69	81.81
J-43	1,511.00	Zone	Demand	2.74	Fixed	2.74	1,699.69	81.64
J-44	1,511.30	Zone	Demand	2.74	Fixed	2.74	1,699.69	81.51
J-45	1,512.30	Zone	Demand	2.74	Fixed	2.74	1,699.69	81.07
J-46	1,514.10	Zone	Demand	2.74	Fixed	2.74	1,699.69	80.29
J-47	1,518.00	Zone	Demand	2.74	Fixed	2.74	1,699.69	78.61
J-48	1,517.10	Zone	Demand	2.74	Fixed	2.74	1,699.69	79.00
J-49	1,507.60	Zone	Demand	2.74	Fixed	2.74	1,699.70	83.11
J-50	1,519.80	Zone	Demand	2.74	Fixed	2.74	1,699.68	77.82
J-51	1,519.11	Zone	Demand	2.74	Fixed	2.74	1,699.68	78.12
J-52	1,504.80	Zone	Demand	0.00	Fixed	0.00	1,700.00	84.45
J-53	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,700.00	83.93

Scenario: Max Day Plus Fire Flow
Fire Flow Analysis
Fire Flow Report

Label	Zone	Fire Flow Iterations	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Minimum System Pressure (psi)	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	Zone	2	true	true	1,500.00	5,000.00	1,500.00	5,000.00	20.00	67.95	20.00	59.39	J-16	N/A	59.39	J-16
J-2	Zone	2	true	true	1,500.00	5,000.00	1,500.00	5,000.00	20.00	54.27	20.00	45.81	J-16	N/A	45.81	J-16
J-3	Zone	4	true	true	1,500.00	4,953.01	1,502.74	4,955.75	20.00	28.04	20.00	20.00	J-16	N/A	20.00	J-16
J-4	Zone	6	true	true	1,500.00	4,086.79	1,502.74	4,089.53	20.00	27.62	20.00	20.00	J-16	N/A	20.00	J-16
J-5	Zone	6	true	true	1,500.00	3,521.83	1,502.74	3,524.57	20.00	27.04	20.00	20.00	J-16	N/A	20.00	J-16
J-6	Zone	6	true	true	1,500.00	3,413.18	1,502.74	3,415.92	20.00	26.90	20.00	20.00	J-16	N/A	20.00	J-16
J-7	Zone	6	true	true	1,500.00	3,129.82	1,502.74	3,132.56	20.00	23.20	20.00	20.00	J-47	N/A	20.00	J-47
J-8	Zone	6	true	true	1,500.00	3,120.31	1,502.74	3,123.05	20.00	22.15	20.00	20.00	J-47	N/A	20.00	J-47
J-9	Zone	4	true	true	1,500.00	3,065.29	1,502.74	3,068.03	20.00	20.00	20.00	20.00	J-16	N/A	20.00	J-16
J-10	Zone	6	true	true	1,500.00	3,021.10	1,502.74	3,023.84	20.00	20.65	20.00	20.00	J-16	N/A	20.00	J-16
J-11	Zone	4	true	true	1,500.00	2,910.24	1,502.74	2,912.98	20.00	20.00	20.00	20.18	J-16	N/A	20.18	J-16
J-12	Zone	4	true	true	1,500.00	2,833.53	1,502.74	2,836.27	20.00	20.00	20.00	20.51	J-15	N/A	20.51	J-15
J-13	Zone	6	true	true	1,500.00	2,583.81	1,502.74	2,586.55	20.00	20.76	20.00	20.00	J-15	N/A	20.00	J-15
J-14	Zone	3	true	true	1,500.00	2,442.78	1,502.74	2,445.52	20.00	20.01	20.00	20.34	J-15	N/A	20.34	J-15
J-15	Zone	3	true	true	1,500.00	2,444.36	1,502.74	2,447.10	20.00	20.01	20.00	20.32	J-14	N/A	20.32	J-14
J-16	Zone	3	true	true	1,500.00	2,447.68	1,502.74	2,450.42	20.00	20.01	20.00	20.27	J-15	N/A	20.27	J-15
J-17	Zone	3	true	true	1,500.00	2,517.37	1,502.74	2,520.11	20.00	20.02	20.00	20.70	J-16	N/A	20.70	J-16
J-18	Zone	3	true	true	1,500.00	2,522.54	1,502.74	2,525.28	20.00	20.02	20.00	21.83	J-51	N/A	21.83	J-51
J-19	Zone	3	true	true	1,500.00	2,545.60	1,502.74	2,548.34	20.00	20.02	20.00	20.45	J-36	N/A	20.45	J-36
J-20	Zone	21	true	true	1,500.00	2,293.67	1,502.74	2,296.41	20.00	20.07	20.00	20.02	J-36	N/A	20.02	J-36
J-21	Zone	3	true	true	1,500.00	2,591.34	1,502.74	2,594.08	20.00	20.02	20.00	20.62	J-22	N/A	20.62	J-22
J-22	Zone	3	true	true	1,500.00	2,334.42	1,502.74	2,337.16	20.00	20.01	20.00	29.87	J-21	N/A	29.87	J-21
J-23	Zone	4	true	true	1,500.00	2,657.54	1,502.74	2,660.28	20.00	20.00	20.00	21.00	J-24	N/A	21.00	J-24
J-24	Zone	3	true	true	1,500.00	2,394.51	1,502.74	2,397.25	20.00	20.01	20.00	29.95	J-23	N/A	29.95	J-23
J-25	Zone	4	true	true	1,500.00	2,762.17	1,502.74	2,764.91	20.00	20.00	20.00	20.78	J-26	N/A	20.78	J-26
J-26	Zone	3	true	true	1,500.00	2,452.61	1,502.74	2,455.35	20.00	20.01	20.00	31.37	J-25	N/A	31.37	J-25
J-27	Zone	22	true	true	1,500.00	2,932.00	1,502.74	2,934.74	20.00	20.49	20.00	20.01	J-25	N/A	20.01	J-25
J-28	Zone	3	true	true	1,500.00	2,585.75	1,502.74	2,588.49	20.00	20.01	20.00	31.95	J-25	N/A	31.95	J-25
J-29	Zone	22	true	true	1,500.00	3,156.70	1,502.74	3,159.44	20.00	20.10	20.00	20.02	J-25	N/A	20.02	J-25
J-30	Zone	3	true	true	1,500.00	2,759.93	1,502.74	2,762.67	20.00	20.02	20.00	32.56	J-23	N/A	32.56	J-23
J-31	Zone	6	true	true	1,500.00	3,386.95	1,502.74	3,389.69	20.00	26.17	20.00	20.00	J-16	N/A	20.00	J-16
J-32	Zone	4	true	true	1,500.00	3,048.95	1,502.74	3,051.69	20.00	20.00	20.00	29.46	J-16	N/A	29.46	J-16
J-33	Zone	4	true	true	1,500.00	3,986.88	1,502.74	3,989.62	20.00	20.00	20.00	20.74	J-34	N/A	20.74	J-34
J-34	Zone	4	true	true	1,500.00	3,500.08	1,502.74	3,502.82	20.00	20.00	20.00	33.20	J-33	N/A	33.20	J-33
J-36	Zone	3	true	true	1,500.00	2,148.79	1,502.74	2,151.53	20.00	20.01	20.00	26.41	J-20	N/A	26.41	J-20

Title: Ghost Hollow Estates
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Scenario: Max Day Plus Fire Flow
Fire Flow Analysis
Fire Flow Report

Label	Zone	Fire Flow Iterations	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Minimum System Pressure (psi)	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-37	Zone	6	true	true	1,500.00	3,077.73	1,502.74	3,080.47	20.00	20.69	20.00	20.00	J-16	N/A	20.00	J-16
J-38	Zone	4	true	true	1,500.00	3,045.63	1,502.74	3,048.37	20.00	20.00	20.00	20.67	J-39	N/A	20.67	J-39
J-39	Zone	4	true	true	1,500.00	2,964.37	1,502.74	2,967.11	20.00	20.00	20.00	21.05	J-42	N/A	21.05	J-42
J-40	Zone	22	true	true	1,500.00	2,835.77	1,502.74	2,838.51	20.00	20.21	20.00	20.02	J-42	N/A	20.02	J-42
J-41	Zone	22	true	true	1,500.00	2,823.16	1,502.74	2,825.90	20.00	20.24	20.00	20.02	J-42	N/A	20.02	J-42
J-42	Zone	4	true	true	1,500.00	2,811.20	1,502.74	2,813.94	20.00	20.00	20.00	21.03	J-41	N/A	21.03	J-41
J-43	Zone	4	true	true	1,500.00	2,781.06	1,502.74	2,783.80	20.00	20.00	20.00	23.63	J-42	N/A	23.63	J-42
J-44	Zone	4	true	true	1,500.00	2,839.03	1,502.74	2,841.77	20.00	20.00	20.00	23.77	J-45	N/A	23.77	J-45
J-45	Zone	4	true	true	1,500.00	2,902.40	1,502.74	2,905.14	20.00	20.00	20.00	21.37	J-44	N/A	21.37	J-44
J-46	Zone	4	true	true	1,500.00	2,917.12	1,502.74	2,919.86	20.00	20.00	20.00	21.11	J-47	N/A	21.11	J-47
J-47	Zone	4	true	true	1,500.00	2,743.98	1,502.74	2,746.72	20.00	20.00	20.00	23.35	J-48	N/A	23.35	J-48
J-48	Zone	4	true	true	1,500.00	2,749.09	1,502.74	2,751.83	20.00	20.00	20.00	22.80	J-47	N/A	22.80	J-47
J-49	Zone	3	true	true	1,500.00	2,577.69	1,502.74	2,580.43	20.00	20.01	20.00	36.29	J-16	N/A	36.29	J-16
J-50	Zone	3	true	true	1,500.00	2,510.29	1,502.74	2,513.03	20.00	20.02	20.00	22.20	J-16	N/A	22.20	J-16
J-51	Zone	3	true	true	1,500.00	2,074.78	1,502.74	2,077.52	20.00	20.00	20.00	36.59	J-18	N/A	36.59	J-18
J-52	Zone	2	true	true	1,500.00	5,000.00	1,500.00	5,000.00	20.00	83.06	20.00	73.97	J-16	N/A	73.97	J-16
J-53	Zone	2	true	true	1,500.00	2,158.18	1,500.00	2,158.18	20.00	20.01	20.00	75.05	J-16	N/A	75.05	J-16

Scenario: Peak Hour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand Calculated (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,699.89	83.89
J-2	1,506.20	Zone	Demand	0.00	Fixed	0.00	1,699.80	83.76
J-3	1,507.10	Zone	Demand	4.56	Fixed	4.56	1,699.62	83.30
J-4	1,508.00	Zone	Demand	4.56	Fixed	4.56	1,699.47	82.84
J-5	1,509.30	Zone	Demand	4.56	Fixed	4.56	1,699.33	82.22
J-6	1,509.60	Zone	Demand	4.56	Fixed	4.56	1,699.30	82.07
J-7	1,510.00	Zone	Demand	4.56	Fixed	4.56	1,699.22	81.87
J-8	1,510.30	Zone	Demand	4.56	Fixed	4.56	1,699.22	81.73
J-9	1,511.90	Zone	Demand	4.56	Fixed	4.56	1,699.20	81.04
J-10	1,513.10	Zone	Demand	4.56	Fixed	4.56	1,699.19	80.51
J-11	1,514.30	Zone	Demand	4.56	Fixed	4.56	1,699.19	79.99
J-12	1,515.40	Zone	Demand	4.56	Fixed	4.56	1,699.18	79.51
J-13	1,520.00	Zone	Demand	4.56	Fixed	4.56	1,699.17	77.52
J-14	1,525.20	Zone	Demand	4.56	Fixed	4.56	1,699.17	75.27
J-15	1,525.40	Zone	Demand	4.56	Fixed	4.56	1,699.17	75.18
J-16	1,525.50	Zone	Demand	4.56	Fixed	4.56	1,699.17	75.14
J-17	1,525.00	Zone	Demand	4.56	Fixed	4.56	1,699.17	75.36
J-18	1,523.30	Zone	Demand	4.56	Fixed	4.56	1,699.17	76.09
J-19	1,521.60	Zone	Demand	4.56	Fixed	4.56	1,699.17	76.83
J-20	1,520.50	Zone	Demand	4.56	Fixed	4.56	1,699.17	77.30
J-21	1,519.70	Zone	Demand	4.56	Fixed	4.56	1,699.18	77.65
J-22	1,518.30	Zone	Demand	4.56	Fixed	4.56	1,699.18	78.26
J-23	1,518.30	Zone	Demand	4.56	Fixed	4.56	1,699.19	78.26
J-24	1,516.00	Zone	Demand	4.56	Fixed	4.56	1,699.19	79.26
J-25	1,516.30	Zone	Demand	4.56	Fixed	4.56	1,699.20	79.13
J-26	1,514.50	Zone	Demand	4.56	Fixed	4.56	1,699.20	79.91
J-27	1,511.70	Zone	Demand	4.56	Fixed	4.56	1,699.23	81.13
J-28	1,511.90	Zone	Demand	4.56	Fixed	4.56	1,699.23	81.05
J-29	1,511.70	Zone	Demand	4.56	Fixed	4.56	1,699.26	81.15
J-30	1,510.00	Zone	Demand	4.56	Fixed	4.56	1,699.26	81.88
J-31	1,509.50	Zone	Demand	4.56	Fixed	4.56	1,699.29	82.12
J-32	1,508.20	Zone	Demand	4.56	Fixed	4.56	1,699.29	82.68
J-33	1,507.70	Zone	Demand	4.56	Fixed	4.56	1,699.47	82.97
J-34	1,506.00	Zone	Demand	4.56	Fixed	4.56	1,699.47	83.71
J-36	1,520.60	Zone	Demand	4.56	Fixed	4.56	1,699.17	77.26
J-37	1,511.60	Zone	Demand	4.56	Fixed	4.56	1,699.20	81.17
J-38	1,510.50	Zone	Demand	4.56	Fixed	4.56	1,699.20	81.64
J-39	1,509.50	Zone	Demand	4.56	Fixed	4.56	1,699.20	82.07
J-40	1,509.00	Zone	Demand	4.56	Fixed	4.56	1,699.19	82.29
J-41	1,509.50	Zone	Demand	4.56	Fixed	4.56	1,699.19	82.07
J-42	1,510.60	Zone	Demand	4.56	Fixed	4.56	1,699.19	81.60
J-43	1,511.00	Zone	Demand	4.56	Fixed	4.56	1,699.19	81.42
J-44	1,511.30	Zone	Demand	4.56	Fixed	4.56	1,699.19	81.29
J-45	1,512.30	Zone	Demand	4.56	Fixed	4.56	1,699.19	80.86
J-46	1,514.10	Zone	Demand	4.56	Fixed	4.56	1,699.19	80.08
J-47	1,518.00	Zone	Demand	4.56	Fixed	4.56	1,699.20	78.40
J-48	1,517.10	Zone	Demand	4.56	Fixed	4.56	1,699.20	78.79
J-49	1,507.60	Zone	Demand	4.56	Fixed	4.56	1,699.22	82.91
J-50	1,519.80	Zone	Demand	4.56	Fixed	4.56	1,699.17	77.61
J-51	1,519.11	Zone	Demand	4.56	Fixed	4.56	1,699.17	77.90
J-52	1,504.80	Zone	Demand	0.00	Fixed	0.00	1,699.99	84.45
J-53	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,699.99	83.93

Scenario: Peak Hour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-2	600.00	12.0	Ductile Iro	130.0	false	0.00	Open	218.88	1,699.89	1,699.80	0.09	0.15
P-3	164.00	8.0	Ductile Iro	130.0	false	0.00	Open	218.88	1,699.80	1,699.62	0.18	1.10
P-4	143.00	8.0	Ductile Iro	130.0	false	0.00	Open	214.32	1,699.62	1,699.47	0.15	1.05
P-5	150.00	8.0	Ductile Iro	130.0	false	0.00	Open	200.64	1,699.47	1,699.33	0.14	0.93
P-6	37.00	8.0	Ductile Iro	130.0	false	0.00	Open	196.08	1,699.33	1,699.30	0.03	0.89
P-7	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	110.99	1,699.30	1,699.22	0.08	0.31
P-8	34.00	8.0	Ductile Iro	130.0	false	0.00	Open	74.87	1,699.22	1,699.22	0.01	0.15
P-10	213.00	8.0	Ductile Iro	130.0	false	0.00	Open	31.53	1,699.20	1,699.19	0.01	0.03
P-11	174.00	8.0	Ductile Iro	130.0	false	0.00	Open	33.47	1,699.19	1,699.19	0.01	0.03
P-12	126.00	8.0	Ductile Iro	130.0	false	0.00	Open	28.91	1,699.19	1,699.18	0.00	0.03
P-13	618.00	8.0	Ductile Iro	130.0	false	0.00	Open	24.35	1,699.18	1,699.17	0.01	0.02
P-14	615.00	8.0	Ductile Iro	130.0	false	0.00	Open	9.41	1,699.17	1,699.17	0.00	0.00
P-15	28.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.85	1,699.17	1,699.17	0.00	0.00
P-16	28.00	8.0	Ductile Iro	130.0	false	0.00	Open	0.29	1,699.17	1,699.17	0.00	0.00
P-17	228.00	8.0	Ductile Iro	130.0	false	0.00	Open	-4.27	1,699.17	1,699.17	0.00	0.00
P-18	264.00	8.0	Ductile Iro	130.0	false	0.00	Open	-3.01	1,699.17	1,699.17	0.00	0.00
P-19	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	9.12	1,699.17	1,699.17	0.00	0.00
P-20	277.00	8.0	Ductile Iro	130.0	false	0.00	Open	-25.81	1,699.17	1,699.18	0.01	0.02
P-21	275.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.56	1,699.18	1,699.18	0.00	0.00
P-22	285.00	8.0	Ductile Iro	130.0	false	0.00	Open	-34.93	1,699.18	1,699.19	0.01	0.04
P-23	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.56	1,699.19	1,699.19	0.00	0.00
P-24	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-44.05	1,699.19	1,699.20	0.02	0.06
P-25	291.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.56	1,699.20	1,699.20	0.00	0.00
P-26	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-53.17	1,699.20	1,699.23	0.02	0.08
P-27	275.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.56	1,699.23	1,699.23	0.00	0.00
P-28	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-62.29	1,699.23	1,699.26	0.03	0.11
P-29	268.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.56	1,699.26	1,699.26	0.00	0.00
P-30	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	-71.41	1,699.26	1,699.29	0.04	0.14
P-31	22.00	8.0	Ductile Iro	130.0	false	0.00	Open	80.53	1,699.30	1,699.29	0.00	0.17
P-32	262.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.56	1,699.29	1,699.29	0.00	0.00
P-33	99.00	8.0	Ductile Iro	130.0	false	0.00	Open	9.12	1,699.47	1,699.47	0.00	0.00
P-34	173.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.56	1,699.47	1,699.47	0.00	0.00
P-37	48.00	6.0	Ductile Iro	130.0	false	0.00	Open	-4.56	1,699.17	1,699.17	0.00	0.00
P-38	110.00	8.0	Ductile Iro	130.0	false	0.00	Open	70.31	1,699.22	1,699.20	0.01	0.13
P-39	46.00	8.0	Ductile Iro	130.0	false	0.00	Open	36.09	1,699.20	1,699.20	0.00	0.04

Title: Ghost Hollow Estates
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Scenario: Peak Hour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-40	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	14.83	1,699.20	1,699.20	0.00	0.01
P-41	112.00	8.0	Ductile Iro	130.0	false	0.00	Open	25.10	1,699.20	1,699.20	0.00	0.02
P-42	295.00	8.0	Ductile Iro	130.0	false	0.00	Open	20.54	1,699.20	1,699.19	0.00	0.01
P-43	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	15.98	1,699.19	1,699.19	0.00	0.01
P-44	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	11.42	1,699.19	1,699.19	0.00	0.00
P-45	224.00	8.0	Ductile Iro	130.0	false	0.00	Open	6.86	1,699.19	1,699.19	0.00	0.00
P-46	456.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.30	1,699.19	1,699.19	0.00	0.00
P-47	174.00	8.0	Ductile Iro	130.0	false	0.00	Open	-2.26	1,699.19	1,699.19	0.00	0.00
P-48	190.00	8.0	Ductile Iro	130.0	false	0.00	Open	-6.82	1,699.19	1,699.19	0.00	0.00
P-49	165.00	8.0	Ductile Iro	130.0	false	0.00	Open	-13.32	1,699.19	1,699.19	0.00	0.01
P-50	459.00	8.0	Ductile Iro	130.0	false	0.00	Open	-17.88	1,699.19	1,699.20	0.00	0.01
P-51	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	-22.44	1,699.20	1,699.20	0.00	0.02
P-52	800.00	8.0	Ductile Iro	130.0	false	0.00	Open	-27.00	1,699.20	1,699.22	0.02	0.02
P-53	469.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.56	1,699.22	1,699.22	0.00	0.00
P-54	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	14.83	1,699.20	1,699.20	0.00	0.01
P-55	646.00	8.0	Ductile Iro	130.0	false	0.00	Open	-5.82	1,699.17	1,699.17	0.00	0.00
P-56	254.00	8.0	Ductile Iro	130.0	false	0.00	Open	-10.38	1,699.17	1,699.17	0.00	0.00
P-57	601.00	8.0	Ductile Iro	130.0	false	0.00	Open	-4.56	1,699.17	1,699.17	0.00	0.00
P-58	271.00	8.0	Ductile Iro	130.0	false	0.00	Open	-12.13	1,699.17	1,699.17	0.00	0.00
P-59	45.00	12.0	Ductile Iro	110.0	false	0.00	Open	218.88	1,700.00	1,699.99	0.01	0.21
P-60	555.00	12.0	Ductile Iro	120.0	false	0.00	Open	218.88	1,699.99	1,699.89	0.10	0.18
P-61	350.00	6.0	Ductile Iro	110.0	false	0.00	Open	0.00	1,699.99	1,699.99	0.00	0.00

Scenario: Base-Phase1
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand Calculated (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,700.00	83.93
J-2	1,506.20	Zone	Demand	0.00	Fixed	0.00	1,699.99	83.84
J-3	1,507.10	Zone	Demand	1.20	Fixed	1.20	1,699.99	83.45
J-4	1,508.00	Zone	Demand	1.20	Fixed	1.20	1,699.98	83.06
J-5	1,509.30	Zone	Demand	1.20	Fixed	1.20	1,699.98	82.50
J-6	1,509.60	Zone	Demand	1.20	Fixed	1.20	1,699.97	82.37
J-7	1,510.00	Zone	Demand	1.20	Fixed	1.20	1,699.97	82.19
J-8	1,510.30	Zone	Demand	1.20	Fixed	1.20	1,699.97	82.06
J-9	1,511.90	Zone	Demand	1.20	Fixed	1.20	1,699.97	81.37
J-10	1,513.10	Zone	Demand	1.20	Fixed	1.20	1,699.97	80.85
J-25	1,516.30	Zone	Demand	1.20	Fixed	1.20	1,699.97	79.47
J-26	1,514.50	Zone	Demand	1.20	Fixed	1.20	1,699.97	80.25
J-27	1,511.70	Zone	Demand	1.20	Fixed	1.20	1,699.97	81.46
J-28	1,511.90	Zone	Demand	1.20	Fixed	1.20	1,699.97	81.37
J-29	1,511.70	Zone	Demand	1.20	Fixed	1.20	1,699.97	81.46
J-30	1,510.00	Zone	Demand	1.20	Fixed	1.20	1,699.97	82.19
J-31	1,509.50	Zone	Demand	1.20	Fixed	1.20	1,699.97	82.41
J-32	1,508.20	Zone	Demand	1.20	Fixed	1.20	1,699.97	82.97
J-33	1,507.70	Zone	Demand	1.20	Fixed	1.20	1,699.98	83.19
J-34	1,506.00	Zone	Demand	1.20	Fixed	1.20	1,699.98	83.93
J-37	1,511.60	Zone	Demand	1.20	Fixed	1.20	1,699.97	81.50
J-38	1,510.50	Zone	Demand	1.20	Fixed	1.20	1,699.97	81.97
J-39	1,509.50	Zone	Demand	1.20	Fixed	1.20	1,699.97	82.41
J-40	1,509.00	Zone	Demand	1.20	Fixed	1.20	1,699.97	82.62
J-41	1,509.50	Zone	Demand	1.20	Fixed	1.20	1,699.97	82.41
J-42	1,510.60	Zone	Demand	1.20	Fixed	1.20	1,699.97	81.93
J-43	1,511.00	Zone	Demand	1.20	Fixed	1.20	1,699.97	81.76
J-44	1,511.30	Zone	Demand	1.20	Fixed	1.20	1,699.97	81.63
J-45	1,512.30	Zone	Demand	1.20	Fixed	1.20	1,699.97	81.20
J-46	1,514.10	Zone	Demand	1.20	Fixed	1.20	1,699.97	80.42
J-47	1,518.00	Zone	Demand	1.20	Fixed	1.20	1,699.97	78.73
J-48	1,517.10	Zone	Demand	1.20	Fixed	1.20	1,699.97	79.12
J-49	1,507.60	Zone	Demand	1.20	Fixed	1.20	1,699.97	83.23
J-52	1,504.80	Zone	Demand	0.00	Fixed	0.00	1,700.00	84.45
J-53	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,700.00	83.93

Scenario: Max. Day-Phase1
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand Calculated (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,699.99	83.93
J-2	1,506.20	Zone	Demand	0.00	Fixed	0.00	1,699.98	83.84
J-3	1,507.10	Zone	Demand	2.16	Fixed	2.16	1,699.96	83.44
J-4	1,508.00	Zone	Demand	2.16	Fixed	2.16	1,699.94	83.04
J-5	1,509.30	Zone	Demand	2.16	Fixed	2.16	1,699.93	82.48
J-6	1,509.60	Zone	Demand	2.16	Fixed	2.16	1,699.92	82.34
J-7	1,510.00	Zone	Demand	2.16	Fixed	2.16	1,699.91	82.17
J-8	1,510.30	Zone	Demand	2.16	Fixed	2.16	1,699.91	82.04
J-9	1,511.90	Zone	Demand	2.16	Fixed	2.16	1,699.91	81.34
J-10	1,513.10	Zone	Demand	2.16	Fixed	2.16	1,699.91	80.82
J-25	1,516.30	Zone	Demand	2.16	Fixed	2.16	1,699.92	79.44
J-26	1,514.50	Zone	Demand	2.16	Fixed	2.16	1,699.92	80.22
J-27	1,511.70	Zone	Demand	2.16	Fixed	2.16	1,699.92	81.43
J-28	1,511.90	Zone	Demand	2.16	Fixed	2.16	1,699.92	81.35
J-29	1,511.70	Zone	Demand	2.16	Fixed	2.16	1,699.92	81.43
J-30	1,510.00	Zone	Demand	2.16	Fixed	2.16	1,699.92	82.17
J-31	1,509.50	Zone	Demand	2.16	Fixed	2.16	1,699.92	82.39
J-32	1,508.20	Zone	Demand	2.16	Fixed	2.16	1,699.92	82.95
J-33	1,507.70	Zone	Demand	2.16	Fixed	2.16	1,699.94	83.17
J-34	1,506.00	Zone	Demand	2.16	Fixed	2.16	1,699.94	83.91
J-37	1,511.60	Zone	Demand	2.16	Fixed	2.16	1,699.91	81.47
J-38	1,510.50	Zone	Demand	2.16	Fixed	2.16	1,699.91	81.95
J-39	1,509.50	Zone	Demand	2.16	Fixed	2.16	1,699.91	82.38
J-40	1,509.00	Zone	Demand	2.16	Fixed	2.16	1,699.91	82.60
J-41	1,509.50	Zone	Demand	2.16	Fixed	2.16	1,699.91	82.38
J-42	1,510.60	Zone	Demand	2.16	Fixed	2.16	1,699.91	81.91
J-43	1,511.00	Zone	Demand	2.16	Fixed	2.16	1,699.91	81.73
J-44	1,511.30	Zone	Demand	2.16	Fixed	2.16	1,699.91	81.60
J-45	1,512.30	Zone	Demand	2.16	Fixed	2.16	1,699.91	81.17
J-46	1,514.10	Zone	Demand	2.16	Fixed	2.16	1,699.91	80.39
J-47	1,518.00	Zone	Demand	2.16	Fixed	2.16	1,699.91	78.70
J-48	1,517.10	Zone	Demand	2.16	Fixed	2.16	1,699.91	79.09
J-49	1,507.60	Zone	Demand	2.16	Fixed	2.16	1,699.91	83.21
J-52	1,504.80	Zone	Demand	0.00	Fixed	0.00	1,700.00	84.45
J-53	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,700.00	83.93

Scenario: Max. Day-Phase1
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-2	600.00	12.0	Ductile Iro	130.0	false	0.00	Open	84.94	1,699.98	1,699.97	0.02	0.03
P-3	164.00	8.0	Ductile Iro	130.0	false	0.00	Open	84.94	1,699.97	1,699.93	0.03	0.19
P-4	143.00	8.0	Ductile Iro	130.0	false	0.00	Open	82.20	1,699.93	1,699.91	0.03	0.18
P-5	150.00	8.0	Ductile Iro	130.0	false	0.00	Open	73.98	1,699.91	1,699.89	0.02	0.15
P-6	37.00	8.0	Ductile Iro	130.0	false	0.00	Open	71.24	1,699.89	1,699.88	0.01	0.14
P-7	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	46.58	1,699.88	1,699.87	0.02	0.06
P-8	34.00	8.0	Ductile Iro	130.0	false	0.00	Open	30.44	1,699.87	1,699.87	0.00	0.03
P-10	213.00	8.0	Ductile Iro	130.0	false	0.00	Open	8.53	1,699.86	1,699.86	0.00	0.00
P-25	291.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.88	1,699.88	0.00	0.00
P-26	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-5.48	1,699.88	1,699.88	0.00	0.00
P-27	275.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.88	1,699.88	0.00	0.00
P-28	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-10.96	1,699.88	1,699.88	0.00	0.00
P-29	268.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.88	1,699.88	0.00	0.00
P-30	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	-16.44	1,699.88	1,699.88	0.00	0.01
P-31	22.00	8.0	Ductile Iro	130.0	false	0.00	Open	21.92	1,699.88	1,699.88	0.00	0.02
P-32	262.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.88	1,699.88	0.00	0.00
P-33	99.00	8.0	Ductile Iro	130.0	false	0.00	Open	5.48	1,699.91	1,699.91	0.00	0.00
P-34	173.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.91	1,699.91	0.00	0.00
P-38	110.00	8.0	Ductile Iro	130.0	false	0.00	Open	27.70	1,699.87	1,699.86	0.00	0.02
P-39	46.00	8.0	Ductile Iro	130.0	false	0.00	Open	11.27	1,699.86	1,699.86	0.00	0.00
P-40	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	6.85	1,699.86	1,699.86	0.00	0.00
P-41	112.00	8.0	Ductile Iro	130.0	false	0.00	Open	10.95	1,699.86	1,699.86	0.00	0.00
P-42	295.00	8.0	Ductile Iro	130.0	false	0.00	Open	8.21	1,699.86	1,699.86	0.00	0.00
P-43	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	5.47	1,699.86	1,699.86	0.00	0.00
P-44	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.73	1,699.86	1,699.86	0.00	0.00
P-45	224.00	8.0	Ductile Iro	130.0	false	0.00	Open	-0.01	1,699.86	1,699.86	0.00	0.00
P-46	456.00	8.0	Ductile Iro	130.0	false	0.00	Open	-2.75	1,699.86	1,699.86	0.00	0.00
P-47	174.00	8.0	Ductile Iro	130.0	false	0.00	Open	-5.49	1,699.86	1,699.86	0.00	0.00
P-48	190.00	8.0	Ductile Iro	130.0	false	0.00	Open	-8.23	1,699.86	1,699.86	0.00	0.00
P-49	165.00	8.0	Ductile Iro	130.0	false	0.00	Open	-2.44	1,699.86	1,699.86	0.00	0.00
P-50	459.00	8.0	Ductile Iro	130.0	false	0.00	Open	-5.18	1,699.86	1,699.86	0.00	0.00
P-51	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	-7.92	1,699.86	1,699.86	0.00	0.00
P-52	800.00	8.0	Ductile Iro	130.0	false	0.00	Open	-10.66	1,699.86	1,699.87	0.00	0.00
P-53	469.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.74	1,699.87	1,699.87	0.00	0.00
P-54	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	6.85	1,699.86	1,699.86	0.00	0.00

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Scenario: Max. Day-Phase1
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-59	45.00	12.0	Ductile Iro	110.0	false	0.00	Open	84.94	1,700.00	1,700.00	0.00	0.04
P-60	555.00	12.0	Ductile Iro	120.0	false	0.00	Open	84.94	1,700.00	1,699.98	0.02	0.03
P-61	350.00	6.0	Ductile Iro	110.0	false	0.00	Open	0.00	1,700.00	1,700.00	0.00	0.00

Scenario: Max Day Plus Fire Flow-Phase1
Fire Flow Analysis
Fire Flow Report

Label	Zone	Fire Flow Iterations	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Minimum System Pressure (psi)	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	Zone	2	true	true	1,500.00	5,000.00	1,500.00	5,000.00	20.00	68.32	20.00	63.10	J-47	N/A	63.10	J-47
J-2	Zone	2	true	true	1,500.00	5,000.00	1,500.00	5,000.00	20.00	54.95	20.00	49.82	J-47	N/A	49.82	J-47
J-3	Zone	2	true	true	1,500.00	5,000.00	1,502.16	5,002.16	20.00	28.39	20.00	23.66	J-47	N/A	23.66	J-47
J-4	Zone	6	true	true	1,500.00	4,284.22	1,502.16	4,286.38	20.00	24.34	20.00	20.00	J-47	N/A	20.00	J-47
J-5	Zone	6	true	true	1,500.00	3,700.22	1,502.16	3,702.38	20.00	23.77	20.00	20.00	J-47	N/A	20.00	J-47
J-6	Zone	6	true	true	1,500.00	3,587.86	1,502.16	3,590.02	20.00	23.64	20.00	20.00	J-47	N/A	20.00	J-47
J-7	Zone	5	true	true	1,500.00	3,025.85	1,502.16	3,028.01	20.00	23.46	20.00	20.00	J-47	N/A	20.00	J-47
J-8	Zone	5	true	true	1,500.00	2,998.67	1,502.16	3,000.83	20.00	22.58	20.00	20.00	J-47	N/A	20.00	J-47
J-9	Zone	3	true	true	1,500.00	2,906.14	1,502.16	2,908.30	20.00	20.01	20.00	20.55	J-47	N/A	20.55	J-47
J-10	Zone	3	true	true	1,500.00	2,835.54	1,502.16	2,837.70	20.00	20.01	20.00	20.42	J-46	N/A	20.42	J-46
J-25	Zone	3	true	true	1,500.00	2,322.94	1,502.16	2,325.10	20.00	20.00	20.00	20.78	J-26	N/A	20.78	J-26
J-26	Zone	3	true	true	1,500.00	2,132.65	1,502.16	2,134.81	20.00	20.00	20.00	28.59	J-25	N/A	28.59	J-25
J-27	Zone	5	true	true	1,500.00	2,590.85	1,502.16	2,593.01	20.00	21.99	20.00	20.00	J-25	N/A	20.00	J-25
J-28	Zone	3	true	true	1,500.00	2,371.18	1,502.16	2,373.34	20.00	20.00	20.00	28.87	J-25	N/A	28.87	J-25
J-29	Zone	5	true	true	1,500.00	2,972.68	1,502.16	2,974.84	20.00	21.99	20.00	20.00	J-25	N/A	20.00	J-25
J-30	Zone	3	true	true	1,500.00	2,674.91	1,502.16	2,677.07	20.00	20.00	20.00	30.40	J-25	N/A	30.40	J-25
J-31	Zone	6	true	true	1,500.00	3,550.97	1,502.16	3,553.13	20.00	22.94	20.00	20.00	J-25	N/A	20.00	J-25
J-32	Zone	3	true	true	1,500.00	3,090.83	1,502.16	3,092.99	20.00	20.01	20.00	33.26	J-25	N/A	33.26	J-25
J-33	Zone	3	true	true	1,500.00	4,040.33	1,502.16	4,042.49	20.00	20.01	20.00	20.75	J-34	N/A	20.75	J-34
J-34	Zone	3	true	true	1,500.00	3,541.82	1,502.16	3,543.98	20.00	20.01	20.00	33.51	J-33	N/A	33.51	J-33
J-37	Zone	21	true	true	1,500.00	2,932.05	1,502.16	2,934.21	20.00	20.46	20.00	20.02	J-47	N/A	20.02	J-47
J-38	Zone	3	true	true	1,500.00	2,896.23	1,502.16	2,898.39	20.00	20.01	20.00	20.61	J-39	N/A	20.61	J-39
J-39	Zone	3	true	true	1,500.00	2,824.53	1,502.16	2,826.69	20.00	20.01	20.00	20.87	J-42	N/A	20.87	J-42
J-40	Zone	21	true	true	1,500.00	2,709.71	1,502.16	2,711.87	20.00	20.27	20.00	20.02	J-42	N/A	20.02	J-42
J-41	Zone	21	true	true	1,500.00	2,698.60	1,502.16	2,700.76	20.00	20.27	20.00	20.02	J-42	N/A	20.02	J-42
J-42	Zone	3	true	true	1,500.00	2,688.06	1,502.16	2,690.22	20.00	20.01	20.00	21.00	J-41	N/A	21.00	J-41
J-43	Zone	3	true	true	1,500.00	2,658.07	1,502.16	2,660.23	20.00	20.01	20.00	23.47	J-42	N/A	23.47	J-42
J-44	Zone	3	true	true	1,500.00	2,695.87	1,502.16	2,698.03	20.00	20.01	20.00	23.20	J-45	N/A	23.20	J-45
J-45	Zone	3	true	true	1,500.00	2,740.45	1,502.16	2,742.61	20.00	20.01	20.00	21.42	J-44	N/A	21.42	J-44
J-46	Zone	3	true	true	1,500.00	2,756.24	1,502.16	2,758.40	20.00	20.01	20.00	21.60	J-47	N/A	21.60	J-47
J-47	Zone	3	true	true	1,500.00	2,637.28	1,502.16	2,639.44	20.00	20.00	20.00	23.47	J-48	N/A	23.47	J-48
J-48	Zone	3	true	true	1,500.00	2,654.37	1,502.16	2,656.53	20.00	20.00	20.00	22.34	J-47	N/A	22.34	J-47
J-49	Zone	3	true	true	1,500.00	2,531.67	1,502.16	2,533.83	20.00	20.00	20.00	36.24	J-47	N/A	36.24	J-47
J-52	Zone	2	true	true	1,500.00	5,000.00	1,500.00	5,000.00	20.00	83.10	20.00	77.35	J-47	N/A	77.35	J-47
J-53	Zone	2	true	true	1,500.00	2,158.59	1,500.00	2,158.59	20.00	20.01	20.00	78.41	J-47	N/A	78.41	J-47

Title: Ghost Hollow Estates
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Scenario: Peak Hour-Phase1
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,699.97	83.92
J-2	1,506.20	Zone	Demand	0.00	Fixed	0.00	1,699.94	83.82
J-3	1,507.10	Zone	Demand	3.60	Fixed	3.60	1,699.89	83.41
J-4	1,508.00	Zone	Demand	3.60	Fixed	3.60	1,699.85	83.00
J-5	1,509.30	Zone	Demand	3.60	Fixed	3.60	1,699.81	82.43
J-6	1,509.60	Zone	Demand	3.60	Fixed	3.60	1,699.80	82.29
J-7	1,510.00	Zone	Demand	3.60	Fixed	3.60	1,699.78	82.11
J-8	1,510.30	Zone	Demand	3.60	Fixed	3.60	1,699.78	81.98
J-9	1,511.90	Zone	Demand	3.60	Fixed	3.60	1,699.77	81.28
J-10	1,513.10	Zone	Demand	3.60	Fixed	3.60	1,699.77	80.76
J-25	1,516.30	Zone	Demand	3.60	Fixed	3.60	1,699.80	79.39
J-26	1,514.50	Zone	Demand	3.60	Fixed	3.60	1,699.80	80.17
J-27	1,511.70	Zone	Demand	3.60	Fixed	3.60	1,699.80	81.38
J-28	1,511.90	Zone	Demand	3.60	Fixed	3.60	1,699.80	81.29
J-29	1,511.70	Zone	Demand	3.60	Fixed	3.60	1,699.80	81.38
J-30	1,510.00	Zone	Demand	3.60	Fixed	3.60	1,699.80	82.12
J-31	1,509.50	Zone	Demand	3.60	Fixed	3.60	1,699.80	82.34
J-32	1,508.20	Zone	Demand	3.60	Fixed	3.60	1,699.80	82.90
J-33	1,507.70	Zone	Demand	3.60	Fixed	3.60	1,699.85	83.13
J-34	1,506.00	Zone	Demand	3.60	Fixed	3.60	1,699.85	83.87
J-37	1,511.60	Zone	Demand	3.60	Fixed	3.60	1,699.77	81.41
J-38	1,510.50	Zone	Demand	3.60	Fixed	3.60	1,699.77	81.89
J-39	1,509.50	Zone	Demand	3.60	Fixed	3.60	1,699.77	82.32
J-40	1,509.00	Zone	Demand	3.60	Fixed	3.60	1,699.77	82.54
J-41	1,509.50	Zone	Demand	3.60	Fixed	3.60	1,699.77	82.32
J-42	1,510.60	Zone	Demand	3.60	Fixed	3.60	1,699.77	81.84
J-43	1,511.00	Zone	Demand	3.60	Fixed	3.60	1,699.77	81.67
J-44	1,511.30	Zone	Demand	3.60	Fixed	3.60	1,699.77	81.54
J-45	1,512.30	Zone	Demand	3.60	Fixed	3.60	1,699.77	81.11
J-46	1,514.10	Zone	Demand	3.60	Fixed	3.60	1,699.77	80.33
J-47	1,518.00	Zone	Demand	3.60	Fixed	3.60	1,699.77	78.64
J-48	1,517.10	Zone	Demand	3.60	Fixed	3.60	1,699.77	79.03
J-49	1,507.60	Zone	Demand	3.60	Fixed	3.60	1,699.78	83.15
J-52	1,504.80	Zone	Demand	0.00	Fixed	0.00	1,700.00	84.45
J-53	1,506.00	Zone	Demand	0.00	Fixed	0.00	1,700.00	83.93

Scenario: Peak Hour-Phase1
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-2	600.00	12.0	Ductile Iro	130.0	false	0.00	Open	111.60	1,699.97	1,699.94	0.03	0.04
P-3	164.00	8.0	Ductile Iro	130.0	false	0.00	Open	111.60	1,699.94	1,699.89	0.05	0.31
P-4	143.00	8.0	Ductile Iro	130.0	false	0.00	Open	108.00	1,699.89	1,699.85	0.04	0.30
P-5	150.00	8.0	Ductile Iro	130.0	false	0.00	Open	97.20	1,699.85	1,699.81	0.04	0.24
P-6	37.00	8.0	Ductile Iro	130.0	false	0.00	Open	93.60	1,699.81	1,699.80	0.01	0.23
P-7	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	61.20	1,699.80	1,699.78	0.03	0.10
P-8	34.00	8.0	Ductile Iro	130.0	false	0.00	Open	40.00	1,699.78	1,699.78	0.00	0.05
P-10	213.00	8.0	Ductile Iro	130.0	false	0.00	Open	11.21	1,699.77	1,699.77	0.00	0.00
P-25	291.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.60	1,699.80	1,699.80	0.00	0.00
P-26	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-7.20	1,699.80	1,699.80	0.00	0.00
P-27	275.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.60	1,699.80	1,699.80	0.00	0.00
P-28	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-14.40	1,699.80	1,699.80	0.00	0.01
P-29	268.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.60	1,699.80	1,699.80	0.00	0.00
P-30	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	-21.60	1,699.80	1,699.80	0.00	0.01
P-31	22.00	8.0	Ductile Iro	130.0	false	0.00	Open	28.80	1,699.80	1,699.80	0.00	0.03
P-32	262.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.60	1,699.80	1,699.80	0.00	0.00
P-33	99.00	8.0	Ductile Iro	130.0	false	0.00	Open	7.20	1,699.85	1,699.85	0.00	0.00
P-34	173.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.60	1,699.85	1,699.85	0.00	0.00
P-38	110.00	8.0	Ductile Iro	130.0	false	0.00	Open	36.40	1,699.78	1,699.77	0.00	0.04
P-39	46.00	8.0	Ductile Iro	130.0	false	0.00	Open	14.81	1,699.77	1,699.77	0.00	0.01
P-40	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	9.00	1,699.77	1,699.77	0.00	0.00
P-41	112.00	8.0	Ductile Iro	130.0	false	0.00	Open	14.39	1,699.77	1,699.77	0.00	0.01
P-42	295.00	8.0	Ductile Iro	130.0	false	0.00	Open	10.79	1,699.77	1,699.77	0.00	0.00
P-43	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	7.19	1,699.77	1,699.77	0.00	0.00
P-44	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.59	1,699.77	1,699.77	0.00	0.00
P-45	224.00	8.0	Ductile Iro	130.0	false	0.00	Open	-0.01	1,699.77	1,699.77	0.00	0.00
P-46	456.00	8.0	Ductile Iro	130.0	false	0.00	Open	-3.61	1,699.77	1,699.77	0.00	0.00
P-47	174.00	8.0	Ductile Iro	130.0	false	0.00	Open	-7.21	1,699.77	1,699.77	0.00	0.00
P-48	190.00	8.0	Ductile Iro	130.0	false	0.00	Open	-10.81	1,699.77	1,699.77	0.00	0.00
P-49	165.00	8.0	Ductile Iro	130.0	false	0.00	Open	-3.20	1,699.77	1,699.77	0.00	0.00
P-50	459.00	8.0	Ductile Iro	130.0	false	0.00	Open	-6.80	1,699.77	1,699.77	0.00	0.00
P-51	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	-10.40	1,699.77	1,699.77	0.00	0.00
P-52	800.00	8.0	Ductile Iro	130.0	false	0.00	Open	-14.00	1,699.77	1,699.78	0.01	0.01
P-53	469.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.60	1,699.78	1,699.78	0.00	0.00
P-54	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	9.00	1,699.77	1,699.77	0.00	0.00

Title: Ghost Hollow Estates
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Scenario: Peak Hour-Phase1
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-59	45.00	12.0	Ductile Iro	110.0	false	0.00	Open	111.60	1,700.00	1,700.00	0.00	0.06
P-60	555.00	12.0	Ductile Iro	120.0	false	0.00	Open	111.60	1,700.00	1,699.97	0.03	0.05
P-61	350.00	6.0	Ductile Iro	110.0	false	0.00	Open	0.00	1,700.00	1,700.00	0.00	0.00

Scenario: Base-Phase1
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-2	600.00	12.0	Ductile Iro	130.0	false	0.00	Open	37.20	1,700.00	1,699.99	0.00	0.01
P-3	164.00	8.0	Ductile Iro	130.0	false	0.00	Open	37.20	1,699.99	1,699.99	0.01	0.04
P-4	143.00	8.0	Ductile Iro	130.0	false	0.00	Open	36.00	1,699.99	1,699.98	0.01	0.04
P-5	150.00	8.0	Ductile Iro	130.0	false	0.00	Open	32.40	1,699.98	1,699.98	0.00	0.03
P-6	37.00	8.0	Ductile Iro	130.0	false	0.00	Open	31.20	1,699.98	1,699.97	0.00	0.03
P-7	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	20.40	1,699.97	1,699.97	0.00	0.01
P-8	34.00	8.0	Ductile Iro	130.0	false	0.00	Open	13.33	1,699.97	1,699.97	0.00	0.01
P-10	213.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.74	1,699.97	1,699.97	0.00	0.00
P-25	291.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.20	1,699.97	1,699.97	0.00	0.00
P-26	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-2.40	1,699.97	1,699.97	0.00	0.00
P-27	275.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.20	1,699.97	1,699.97	0.00	0.00
P-28	284.00	8.0	Ductile Iro	130.0	false	0.00	Open	-4.80	1,699.97	1,699.97	0.00	0.00
P-29	268.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.20	1,699.97	1,699.97	0.00	0.00
P-30	274.00	8.0	Ductile Iro	130.0	false	0.00	Open	-7.20	1,699.97	1,699.97	0.00	0.00
P-31	22.00	8.0	Ductile Iro	130.0	false	0.00	Open	9.60	1,699.97	1,699.97	0.00	0.00
P-32	262.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.20	1,699.97	1,699.97	0.00	0.00
P-33	99.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.40	1,699.98	1,699.98	0.00	0.00
P-34	173.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.20	1,699.98	1,699.98	0.00	0.00
P-38	110.00	8.0	Ductile Iro	130.0	false	0.00	Open	12.13	1,699.97	1,699.97	0.00	0.01
P-39	46.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.94	1,699.97	1,699.97	0.00	0.00
P-40	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.00	1,699.97	1,699.97	0.00	0.00
P-41	112.00	8.0	Ductile Iro	130.0	false	0.00	Open	4.80	1,699.97	1,699.97	0.00	0.00
P-42	295.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.60	1,699.97	1,699.97	0.00	0.00
P-43	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	2.40	1,699.97	1,699.97	0.00	0.00
P-44	27.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.20	1,699.97	1,699.97	0.00	0.00
P-45	224.00	8.0	Ductile Iro	130.0	false	0.00	Open	-0.00	1,699.97	1,699.97	0.00	0.00
P-46	456.00	8.0	Ductile Iro	130.0	false	0.00	Open	-1.20	1,699.97	1,699.97	0.00	0.00
P-47	174.00	8.0	Ductile Iro	130.0	false	0.00	Open	-2.40	1,699.97	1,699.97	0.00	0.00
P-48	190.00	8.0	Ductile Iro	130.0	false	0.00	Open	-3.60	1,699.97	1,699.97	0.00	0.00
P-49	165.00	8.0	Ductile Iro	130.0	false	0.00	Open	-1.07	1,699.97	1,699.97	0.00	0.00
P-50	459.00	8.0	Ductile Iro	130.0	false	0.00	Open	-2.27	1,699.97	1,699.97	0.00	0.00
P-51	249.00	8.0	Ductile Iro	130.0	false	0.00	Open	-3.47	1,699.97	1,699.97	0.00	0.00
P-52	800.00	8.0	Ductile Iro	130.0	false	0.00	Open	-4.67	1,699.97	1,699.97	0.00	0.00
P-53	469.00	8.0	Ductile Iro	130.0	false	0.00	Open	1.20	1,699.97	1,699.97	0.00	0.00
P-54	199.00	8.0	Ductile Iro	130.0	false	0.00	Open	3.00	1,699.97	1,699.97	0.00	0.00

Title: Ghost Hollow Estates
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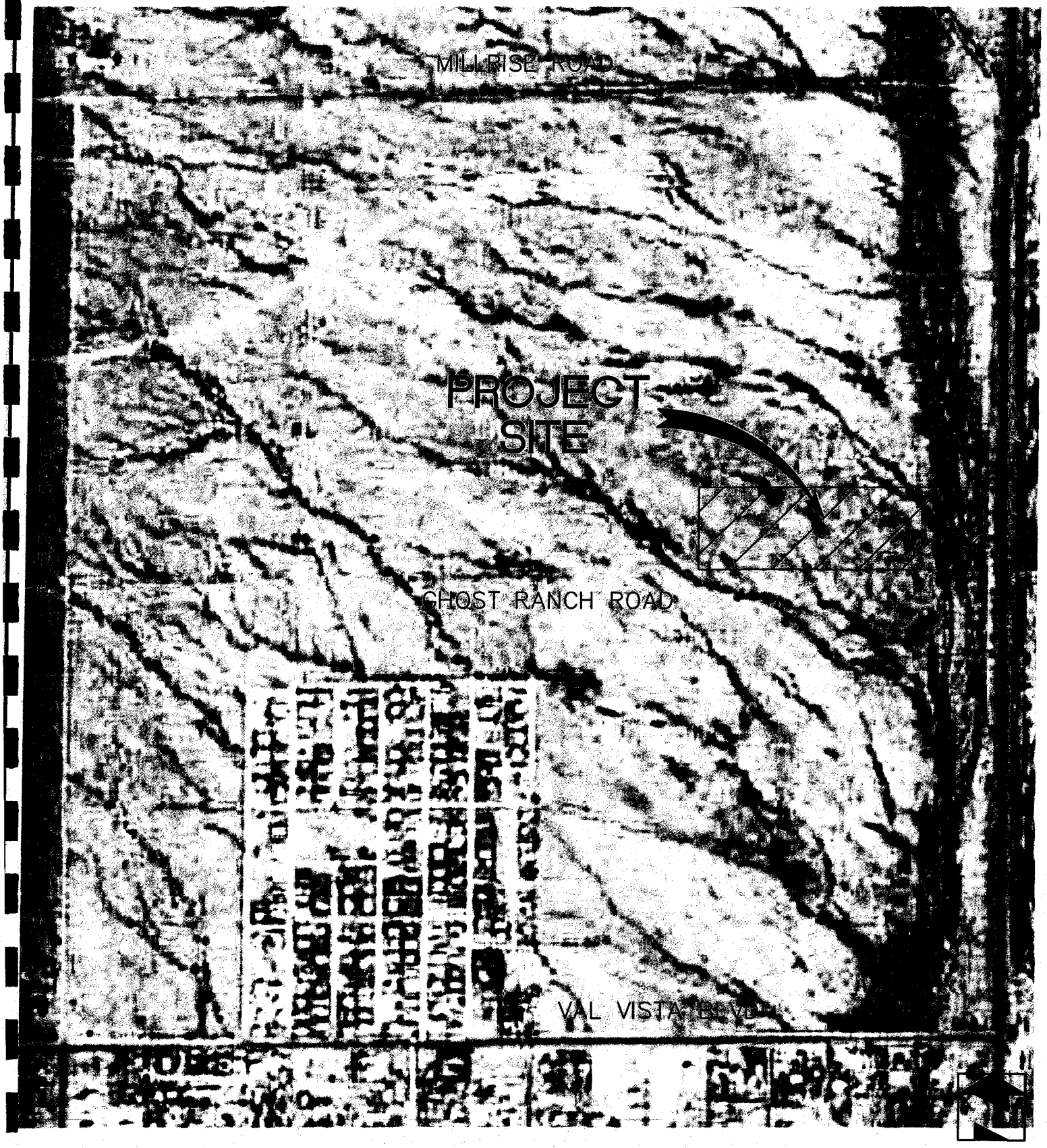
Scenario: Base-Phase1
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-59	45.00	12.0	Ductile Iro	110.0	false	0.00	Open	37.20	1,700.00	1,700.00	0.00	0.01
P-60	555.00	12.0	Ductile Iro	120.0	false	0.00	Open	37.20	1,700.00	1,700.00	0.00	0.01
P-61	350.00	6.0	Ductile Iro	110.0	false	0.00	Open	0.00	1,700.00	1,700.00	0.00	0.00

Figures



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CHK'D. BY: JDI
APPR. BY: DFP
DATE: 06/2006

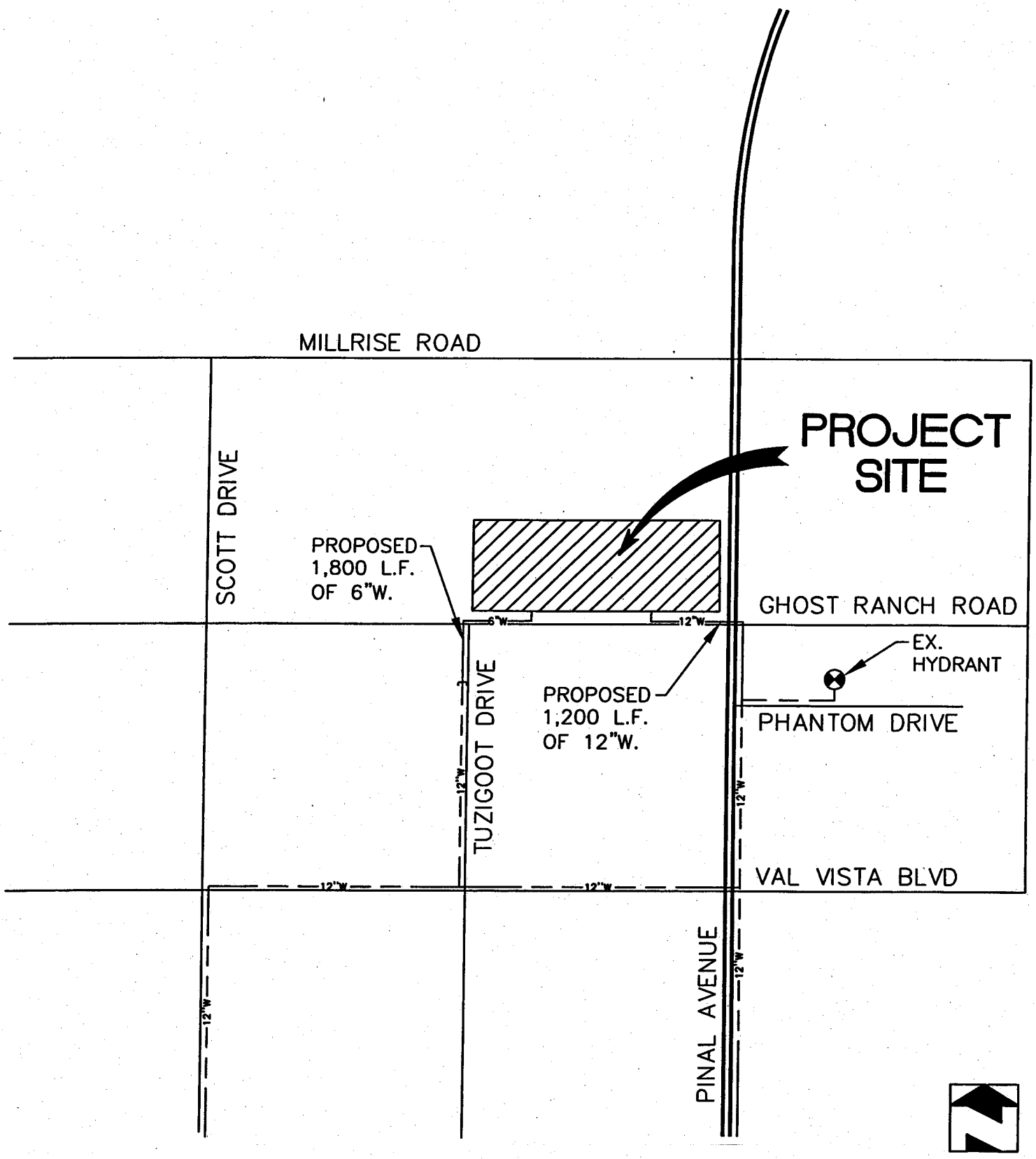
GHOST HOLLOW ESTATES
CASA GRANDE AZ

PROJECT VICINITY MAP

PROJECT NO. 8582.001

FIGURE NUMBER
FIG. 1

.8582\001\ACAD\Exhibits\Water\Figure 1-Vicinity Map.dwg Plotted by heide on Aug/7/2006



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GHOST HOLLOW ESTATES
CASA GRANDE AZ

PROJECT NO. 8582.001

OFFSITE WATER IMPROVEMENTS

FIGURE NUMBER FIG. 2

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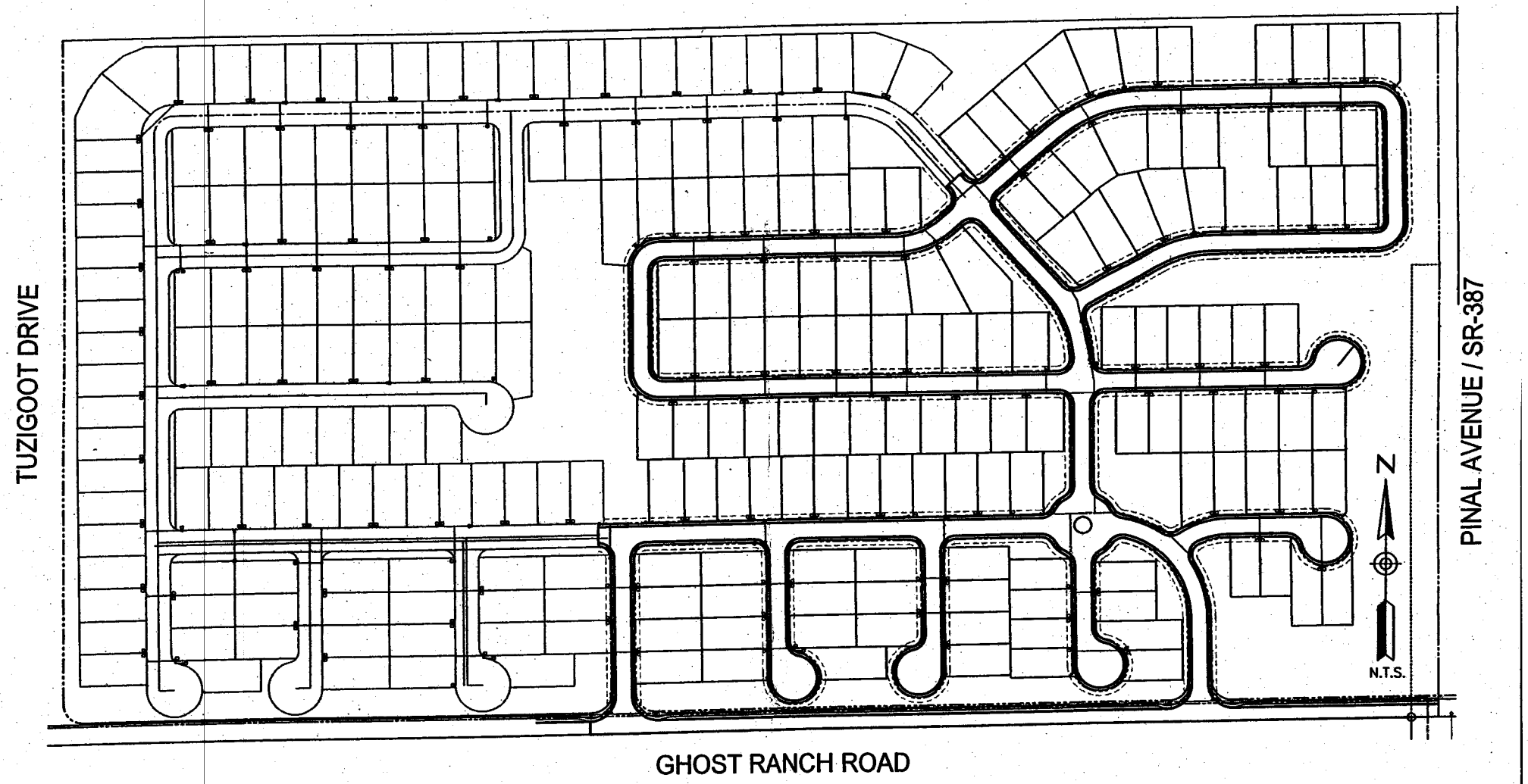

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P:\8662\001\ACADE\-8662Water\Figure3-Onsite Water.dwg Plotted by holde on 9/19/2005

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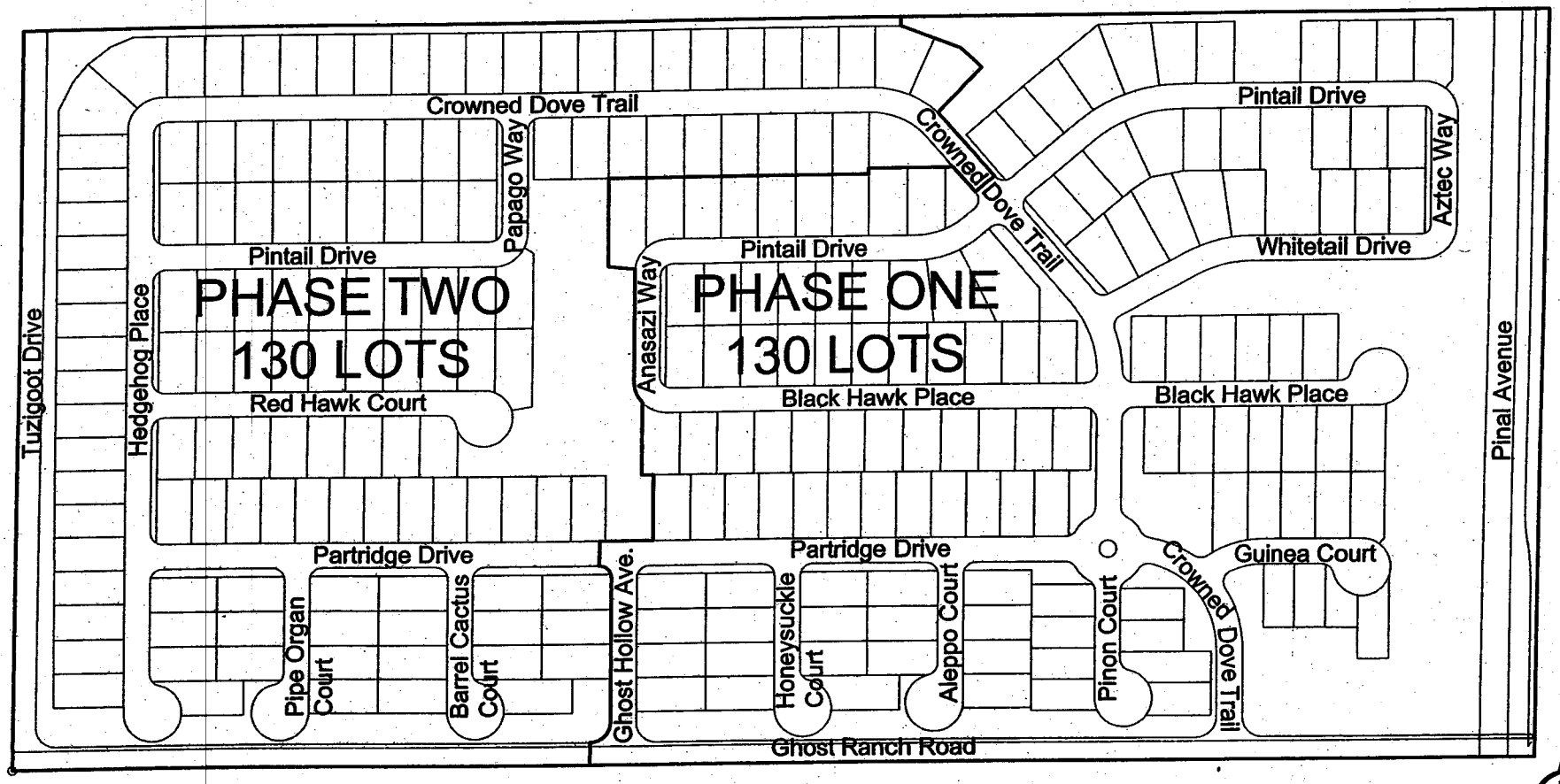
APPR. BY: DFP
DATE: 08/2005

Casa Grande — GHOST HOLLOW ESTATES — Arizona

ONSITE WATER IMPROVEMENTS

PROJECT NO. 8662.001.01

FIGURE NUMBER FIG. 3



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DATE:

GHOST HOLLOW ESTATES

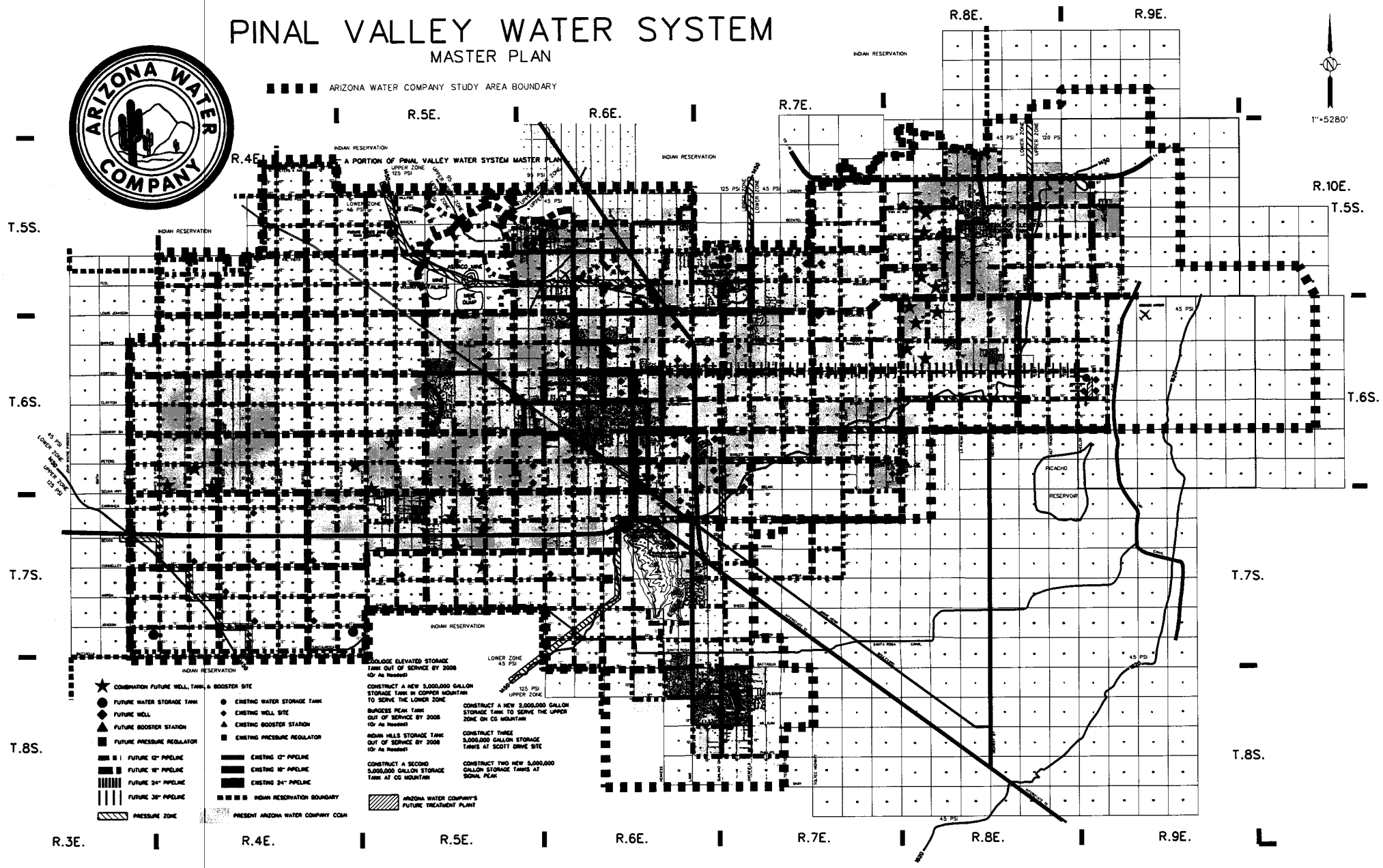
CASA GRANDE ARIZONA

SITE PHASING PLAN

PROJECT NUMBER
SHEET NUMBER
DRAWING NUMBER
FIG. 4

ATTACHMENT 2

PINAL VALLEY WATER SYSTEM
MASTER PLAN



ATTACHMENT 3

WATER USE DATA SHEET

NAME OF COMPANY →	ARIZONA WATER COMPANY - Casa Grande
ADEQ Public Water System No. →	11-009

MONTH/YEAR (LAST 13 MONTHS)	NUMBER OF CUSTOMERS	GALLONS SOLD (Thousands)	GALLONS PUMPED	GALLONS PURCHASED
August-06	20,844	386,558	419,403	0
July-06	20,728	462,815	485,525	0
June-06	20,396	433,590	487,459	0
May-06	20,294	315,496	455,678	0
April-06	20,066	282,544	320,179	0
March-06	19,773	267,679	306,065	0
February-06	19,421	261,330	283,961	0
January-06	19,213	269,149	305,254	0
December-05	19,089	285,407	280,927	0
November-05	18,895	327,561	330,540	0
October-05	18,670	375,638	383,468	0
September-05	18,314	398,883	412,325	0
August-05	18,181	366,708	384,751	0

STORAGE TANK CAPACITY (Gallons)	NUMBER OF EACH	ARIZONA DEPT. OF WATER RESOURCES WELL I.D. NUMBER	WELL PRODUCTION (Gallons per Minute)
Burgess Peak 2,000,000	1	D(6-6)9bbd - Casa Grande #9	1,000
Casa Grande Mtn 5,000,000	1	D(6-6)21bbc - Casa Grande #10	1,040
Cottonwood 1,000,000	1	D(6-6)23cbb – Casa Grande #19	1,560
Golf Course 115,000	1	D(6-6)22ddd – Singh/Quaid #22	1,000
Indian Hills 100,000	1	D(6-6)22bda – Casa Grande #25	1,320
North Park 650,000	1	D(6-6)21bbb – Cottonwood Lane #14	250
North Park 35,000	1	D(6-6)22bad – Casa Grande #20	1,110
Scott Drive 110,000	1	D(6-6)22baa – Casa Grande #23	1,550
Scott Drive 5,000,000	1	D(6-6)15cdd – Casa Grande #26	1,400
Tierra Grande #1 10,000	1	D(7-6)35ddd – AZ City/Battaglia #28	1,620
Tierra Grande #1 250,000	1	D(6-6)15ccb – Casa Grande #17	850
		D(6-6)22cdc – Casa Grande #21	740
		D(6-6)22cdd – Casa Grande #24	950
		D(6-7)5baa – Lake-in-the-Desert #27	550
		D(6-6)25dcd - Casa Grande #29	1,380
		D(6-6)22ddd Casa Grande #30	1,000
		D(6-6)15cad - Casa Grande #31	1,500
		D(8-6)1ddb - Del Rio #34	1,500

Other Water Sources in Acre Feet (Non-Potable CAP Water) →	Acre/Ft 2554.
Fire Hydrants on System →	YES NO
Total Water Pumped Last 13 Months (Gallons in Thousands) →	4,855,535

The Department's determination is an appealable agency action. In order to appeal this decision, you must request an appeal within thirty (30) days from receipt of this letter. I have enclosed a summary of the appeals process and an appeal form should you wish to pursue this option.

If you have any questions regarding the physical availability review, please contact me at (602) 417-2448.

Sincerely,

Greg Wallace
Chief Hydrologist

GW/KM/rd
202245

cc: Steve Corell, Clear Creek Associates
Doug Dunham, ADWR
Dennis Kimberlin, ADWR, Pinal AMA

image4257 (14400x9672x2 tiff)

ATTACHMENT 5

CITY OF CASA GRANDE GENERAL NOTES: CONSTRUCTION INSPECTION AND TESTING

1. ALL PUBLIC IMPROVEMENT CONSTRUCTION WITHIN THE PUBLIC RIGHT-OF-WAY AND ONSITE SHALL BE CONDUCTED IN ACCORDANCE WITH, AND CONFORM TO, THE LATEST EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION AND UNIFORM STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION, BOTH AS PUBLISHED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS (M.A.G.).

2. INSPECTION OF WORK PER M.A.G. 105.10: THE ENGINEER SHALL BE PERMITTED TO INSPECT ALL MATERIALS, AND EACH PART OR DETAIL OF THE WORK AT ANY TIME FOR THE PURPOSE OF EXPEDITING AND FACILITATING THE PROGRESS OF WORK. HE SHALL BE FURNISHED WITH SUCH INFORMATION AND ASSISTANCE BY THE CONTRACTOR, AS IS REQUIRED TO MAKE A COMPLETE AND DETAILED INSPECTION. THE CITY ENGINEER REQUIRES THAT THE ACTUAL TEST RESULT DATA SHEET ACCOMPANY ALL COMPACTION TEST RESULTS SUBMITTED TO THE CITY'S INSPECTOR. PROVIDING STATEMENTS ARE NOT ACCEPTABLE WITHOUT THE ATTACHED DATA SHEET. FAILURE TO SUBMIT THE TEST RESULT DATA SHEETS WILL RESULT IN AN INCOMPLETE SUBMITTAL AND THE TEST WILL BE REJECTED.

3. IN THE EVENT OF CONFLICT BETWEEN M.A.G. STANDARD SPECIFICATIONS AND STANDARD DETAILS AND THESE PLANS, THESE PLANS SHALL PREVAIL.

4. THE OFFICE OF THE CITY ENGINEER SHALL BE NOTIFIED AT LEAST FORTY-EIGHT (48) HOURS PRIOR TO THE COMMENCEMENT OF ANY WORK WITHIN THE CITY RIGHT-OF-WAY. TELEPHONE: 520-421-8625.

5. CONTRACTOR IS TO NOTIFY ALL PUBLIC UTILITIES AT LEAST TWO (2) WORKING DAYS PRIOR TO CONSTRUCTION, FOR FIELD LOCATIONS OF THEIR RESPECTIVE FACILITIES, BY CONTACTING THE FOLLOWING: BLUE STAKE NUMBER: 1-602-702-5148.

6. CONTRACTOR SHALL COORDINATE AND MAKE ARRANGEMENTS FOR RELOCATION OF ANY UTILITIES CONFLICTING WITH THE PROPOSED CONSTRUCTION OF THESE PLANS, WITH THE APPROPRIATE UTILITY.

7. REMOVAL AND REPLACEMENT OF ALL TREES, SHRUBS, VEGETATION, MISCELLANEOUS STRUCTURES, DEBRIS, RUBBLE AND OTHER DELETERIOUS MATERIALS WITHIN THE LIMITS OF CONSTRUCTION SHALL BE AT THE CONTRACTOR'S EXPENSE.

8. ALL CONCRETE SIDEWALKS, DRIVEWAYS, APRONS, CROSS-PANS, VALLEY GUTTER, CURBS AND GUTTERS, LANDSCAPING AND IRRIGATION THAT MAY BE DAMAGED DURING THE COURSE OF CONSTRUCTIONS SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.

9. SHORING IS TO BE INSTALLED OR A TRENCH BOX IS TO BE USED, IN ALL TRENCHES IN EXCESS OF FIVE (5') FEET IN DEPTH. A REGISTERED CIVIL ENGINEER OR SOILS ENGINEER SHALL CERTIFY SHORING INSTALLATION PLANS, DETAILS AND SPECIFICATIONS. SHORING MUST CONFORM TO OSHA 29 CFR, PART 1926, AND SUBPART D.

10. COMPACTION TESTING IS REQUIRED AND MUST BE PERFORMED IN THE PRESENCE OF A REPRESENTATIVE OF THE CITY ENGINEER.

BACKFILL: BACKFILL WITHIN THE PUBLIC UTILITY EASEMENTS AND WITHIN PUBLIC STREET RIGHT-OF-WAY COMPACT TO 95% OF MAXIMUM THEORETICAL DENSITY PER ASTM D698. ALL MATERIALS OUTSIDE THE MOISTURE LIMIT SHALL BE CONSIDERED UNSUITABLE, AND SUBJECT TO REMOVAL. NO HYDRAULIC COMPACTION OR WATER JET COMPACTION WILL BE ALLOWED. ALL COMPACTION MUST BE DONE BY MECHANICAL MEANS. MOISTURE LIMIT SPEC: 2.0 PERCENT BELOW OPTIMUM MOISTURE, MATERIAL SHALL BE UNIFORM.

SUB-GRADE: SUB-GRADE PREPARATION FOR ALL NEW STREETS AND ROADWAYS SHALL CONSIST OF SCARIFYING AND LOOSENING SUB-GRADE TO A DEPTH OF SIX (6") INCHES. SUB-GRADE SHALL BE CONSTRUCTED TO ACHIEVE UNIFORM MOISTURE CONTENT BY THE ADDITION OF WATER AND COMPACTED TO 95% OF MAXIMUM DENSITY. MOISTURE SHALL BE MAINTAINED BETWEEN OPTIMUM AND JUST BELOW OPTIMUM MOISTURE AND SHALL BE COMPACTED TO 95% OF MAXIMUM THEORETICAL DENSITY, AS DETERMINED BY ASTM D698. ALL MATERIALS OUTSIDE THE MOISTURE LIMIT AT THE TIME OF PLACEMENT AND COMPACTION SHALL BE CONSIDERED UNSUITABLE AND SUBJECT TO REMOVAL. THE FINISHED SURFACE OF THE SUB-GRADE SHALL NOT VARY FROM THE GRADES ESTABLISHED BY THE CITY ENGINEER BY MORE THAN 0.04 OF A FOOT ABOVE OR BELOW SPECIFIED GRADE

11. INSTALL FOUR (4") INCHES OF AGGREGATE BASE COURSE MATERIAL COMPACTED TO 100% UNDER ALL SIDEWALKS, ALLEYWAY AND DRIVEWAY ENTRANCES.

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14. ONE (1) SAND CONE TEST SHALL BE REQUIRED FOR EVERY TEN (10) NUCLEAR DENSITY TESTS PERFORMED, OR WHEN REQUESTED BY THE CITY ENGINEER OR HIS REPRESENTATIVE. THE CITY ENGINEER OR ENGINEER'S REPRESENTATIVE SHALL DETERMINE THE LOCATIONS OF THESE SAND CONE TESTS.

15. ALL MATERIALS, INCLUDING BUT NOT LIMITED TO AGGREGATE BASE COURSE, BORROW MATERIAL AND WATER MATERIAL, WILL BE ACCEPTED IN PLACE ONLY. TESTING REQUIRED FOR ACCEPTANCE WILL INCLUDE A SIEVE ANALYSIS AND PLASTICITY INDEX (P.I.). DETERMINATION OF MAXIMUM THEORETICAL DENSITY WILL BE IN ACCORDANCE WITH ASTM D698. ONLY A FOUR-POINT PROCTOR TEST WILL BE ACCEPTED.

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18. THE LOCATION OF ALL SEWER STUB-OUTS SHALL BE STAMPED ON THE TOP OF VERTICAL CURB, AND FACE OF ROLLED CURBS, WITH A FOUR (4") INCH HIGH LETTERS (S: "4").

19. ALL CURB, GUTTER AND SIDEWALK EXPANSION JOINT FILLER WILL BE ½" BITUMINOUS PRE-MOLDED STRIPS. ALL EXPANSION JOINT SPACING SHALL NOT EXCEED A MAXIMUM OF (60') FEET OR AS DIRECTED BY THE CITY ENGINEER. CONCRETE CURING COMPOUND MATERIAL SHALL BE A WHITE PIGMENT MEMBRANE USED ON ALL CONCRETE STRUCTURES INCLUDING CURB & GUTTER, SIDEWALK, MEDIANS, CATCH BASINS AND SIDEWALK RAMPS.

20. PARKING WILL NOT COMMENCE UNTIL AGGREGATE BASE COURSE COMPACTION AND GRADATION TESTS ARE COMPLETED AND THE CITY ENGINEER ACCEPTS THE RESULTS.

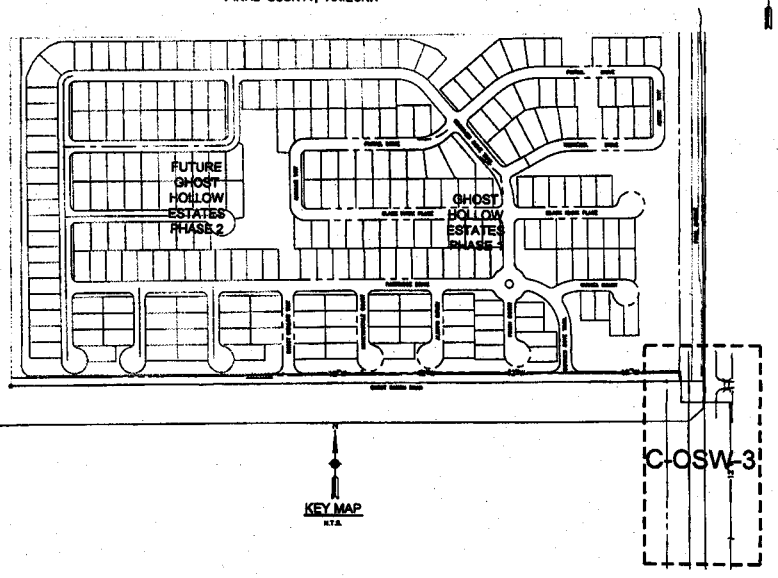
21. NO TRENCH IN PUBLIC RIGHT OF WAY SHALL BE LESS THAN TWELVE (12") INCHES IN WIDTH TO INSURE PROPER COMPACTION AND TESTING.

22. USPS CLUSTER MAIL BOX LOCATIONS MUST BE PRE-DETERMINED AND NOTED ON THE CIVIL PLANS FOR DRAINAGE AND PARKING. ADD CLUSTER BOXES TO LEGEND AND IN CONSTRUCTION NOTES. CLUSTER BOX LOCATIONS SHOULD BE SHOWN ON THE "OVERALL SEWER/WATER/HYDRANT/STREETLIGHT PLAN."

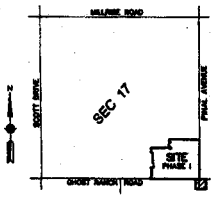
23. MEDIAN CURB & GUTTER BULL NOSE SHALL BE PAINTED YELLOW, WITH REFLECTIVE GLASS BEADS, PER M. A. G. STD.-533, AND HAVE YELLOW RAISED PAVEMENT REFLECTORS INSTALLED BEFORE THE PAINTING IS COMPLETE.

GHOST HOLLOW ESTATES PHASE 1
OFFSITE WATER IMPROVEMENTS

A PLANNED AREA DEVELOPEMENT LOCATED WITHIN A PORTION OF THE SE 1/4 OF SECTION 17, T.5S., R.6E. OF THE GILA AND SALT RIVER BASE & MERIDIAN, PINAL COUNTY, ARIZONA



KEY MAP
N.T.S.



VICINITY MAP
N.T.S.

FIRST
SEP 19 2006
REVIEW
FILE COPY

BENCHMARK
ADOT BC 36 CONCRETE HEADWALL SW CORNER VAL VISTA & PINAL AVE (DB367)
ELEVATION = 1479.46 (COOG DATUM)

BASIS OF BEARING:
BEARING FROM THE EAST 1/4 CORNER OF SECTION 17 TO THE NORTHEAST CORNER OF SECTION 17
= NORTH 00°06'48" WEST (LOCAL DATUM).

OWNER
MC HOMES
P.O. BOX 20939
MESA, AZ 85277-0939
TEL:(480)768-1104
FAX:(480)768-1105

ENGINEER
MORRISON MAIERLE, INC.
80 E. RIO SALADO PARKWAY
SUITE 301
TEMPE, AZ 85281
TEL: (480) 517-8800
FAX: (480) 517-8801
CONTACT: DOUGLAS PIKE
JOSHUA SIMONS

LEGEND
- CENTERLINE
- WATER LINE
- EXISTING ROW
- SEWER LINE
- EX. 40.48 — EXISTING SPOT ELEVATION
- B/C — BACK OF CURB
- R/W — RIGHT OF WAY
- PUE — PUBLIC UTILITY
- E/P — EDGE OF PAVEMENT
- FIRE HYDRANT
- VALVE

SHEET INDEX
C-OSW-1 COVER SHEET
C-OSW-2 NOTES
C-OSW-3 WATER PLANS

WATER DISTRIBUTION SYSTEM APPROVAL:
ALL WATER MAINS AND APPURTENANCES ARE TO BE INSTALLED AS PER ARIZONA WATER COMPANY'S STANDARD SPECIFICATIONS FOR THE INSTALLATION OF DUCTILE IRON WATER MAINS ON FILE WITH THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY. THIS APPROVAL DOES NOT APPLY TO PRIVATE DISTRIBUTION SYSTEMS ON THE CUSTOMERS PREMISES. THIS APPROVAL IS VALID FOR A PERIOD OF EIGHTEEN MONTHS FROM THE DATE OF THIS APPROVAL AFTER WHICH TIME THE WATER DISTRIBUTION SYSTEM PLAN(S) ARE SUBJECT TO RE-REVIEW AND APPROVAL.

DATE OF APPROVAL: _____ APPROVED BY: _____

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-782-5348

REVISIONS			
NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.
An Employee-Owned Company

DRAWN BY: LMA
CHK'D BY: JBL
APPR. BY: DPP
DATE: 8/2006
G.A. REVIEW
BY:
DATE:

CASA GRANDE — GHOST HOLLOW ESTATES PHASE 1 OFFSITE WATER PLANS — ARIZONA

COVER SHEET

PROJECT NUMBER: 5K0L.001
SHEET NUMBER: 1 OF 3
DRAWING NUMBER: C-OSW-1

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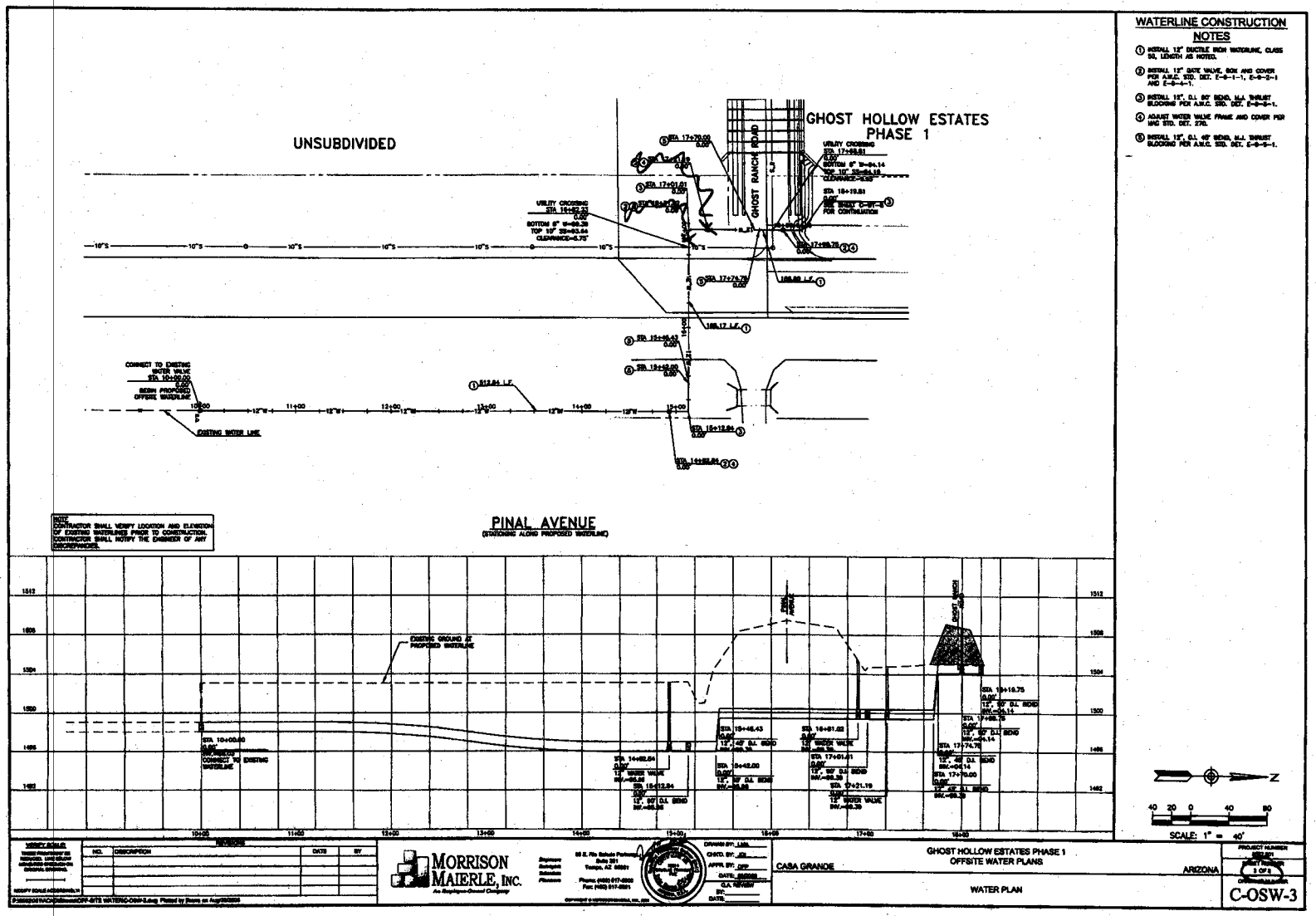

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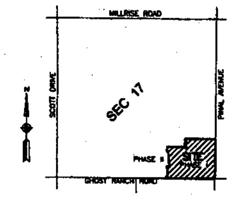
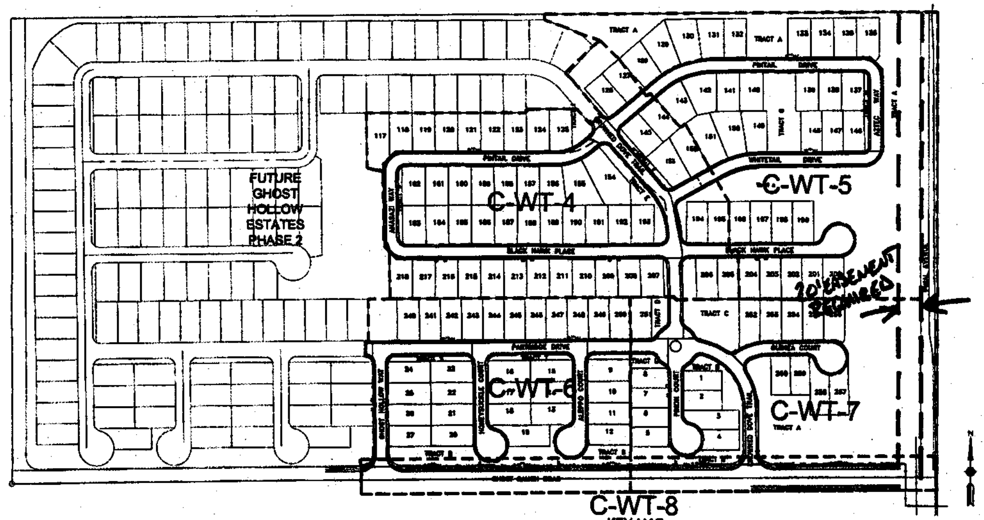


VICINITY MAP
N.T.S.



C-WT-8
KEY MAP
N.T.S.

FILE COPY

FIRST REVIEW

WATER DISTRIBUTION SYSTEM APPROVAL:

ALL WATER MAINS AND APPURTENANCES ARE TO BE INSTALLED AS PER ARIZONA WATER COMPANY'S STANDARD SPECIFICATIONS FOR THE INSTALLATION OF DUCTILE IRON WATER MAINS ON FILE WITH THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY. THE APPROVAL DOES NOT APPLY TO PRIVATE DISTRIBUTION SYSTEMS ON THE CUSTOMER'S PREMISE. THIS APPROVAL IS VALID FOR A PERIOD OF EIGHTEEN MONTHS FROM THE DATE OF THIS APPROVAL, AFTER WHICH TIME THE WATER DISTRIBUTION SYSTEM PLAN(S) ARE SUBJECT TO RE-REVIEW AND APPROVAL.

DATE OF APPROVAL: ____________ APPROVED BY: ____________

BENCHMARK

ADOT BC IN CONCRETE HEADWALL SW CORNER VAL VISTA & PINAL AVE (SR387)
ELEVATION = 1479.48 (COCS DATUM)

BASIS OF BEARING:

BEARING FROM THE EAST 1/4 CORNER OF SECTION 17 TO THE NORTHEAST CORNER OF SECTION 17
= NORTH 00°08'48" WEST (LOCAL DATUM).

OWNER

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ENGINEER

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LEGEND

Symbol	Meaning
℄	CENTERLINE
— W —	WATER LINE
— —	EXISTING ROW
— S —	SEWER LINE
EX. 40.02	EXISTING SPOT ELEVATION
B/C	BACK OF CURB
R/W	RIGHT OF WAY
PUE	PUBLIC UTILITY
E/P	EDGE OF PAVEMENT
⊕	FIRE HYDRANT
●	VALVE

SHEET INDEX

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C-WT-8	WATER PLANS

MORRISON MAIERLE, INC.
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DRAWN BY: LMA
CHKD. BY: JOI
APPR. BY: DPP

CASA GRANDE — ARIZONA

GHOST HOLLOW ESTATES PHASE 1
WATER PLANS

COVER SHEET

SHEET NUMBER 1 OF 8

DRAWING NUMBER C-WT-1

image4260 (14400x9688x2 tiff)

CONSTRUCTION SPECIFICATIONS FOR THE INSTALLATION OF WATER DISTRIBUTION SYSTEMS-DUCTILE IRON

1. GENERALLY, ALL WORK IS TO BE COMPLETED IN A SAFE, WORKMANLIKE MANNER AND IN ACCORDANCE WITH THESE CONSTRUCTION SPECIFICATIONS; ANY DEVIATION THEREFROM MUST BE APPROVED IN WRITING BY THE COMPANY. INSTALLATIONS MUST CONFORM WITH THE REQUIREMENTS OF ALL GOVERNMENTAL REGULATING AGENCIES AND THE COST OF CONFORMING TO SUCH REGULATIONS MUST BE INCLUDED IN THE UNIT BID PRICES. EXAMPLES OF SUCH REGULATIONS, WITHOUT ATTEMPTING TO BE INCLUSIVE, ARE: A. SPECIAL COMPACTION AND PAVING FOR STREET CROSSING. B. SHORING WHEN REQUIRED BECAUSE OF THE TRENCH DEPTH. C. CLOSING A TRENCH IN THOSE AREAS WHERE NO OPEN TRENCH IS ALLOWED OVERNIGHT. D. BARRICADING AND TRAFFIC CONTROL AS REQUIRED.

2. LOCATION MARKING ALIGNMENT STAKES AS REQUIRED IN THE OPINION OF THE COMPANY SHALL BE FURNISHED BY THE COMPANY TO THE CONTRACTOR AND SHALL BE SET BY THE COMPANY AT AGREED UPON INTERVALS AND OFFSETS. UNDER NORMAL CIRCUMSTANCES THESE WILL REFERENCE THE PIPELINE LOCATION FIVE FEET (5') INTO THE RIGHT-OF-WAY OR MEASURED FROM PROPERTY PINS. GRADE STAKES WILL BE PROVIDED ONLY WHEN THE CONSTRUCTION DRAWINGS SHOW A PIPELINE DEPTH OTHER THAN COVERED IN THESE SPECIFICATIONS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PRESERVE ALL SURVEY WORK.

3. TRENCH EXCAVATION THE TRENCH LOCATION IS TO BE DETERMINED BY THE CONSTRUCTION DRAWINGS. FOR 8-INCH OR SMALLER PIPE: THE DEPTH OF THE TRENCH PRIOR TO PIPE LAYING SHALL BE SUCH THAT THE FINISHED PIPELINE SHALL HAVE BETWEEN THIRTY-SIX INCHES (36") AND FORTY-TWO INCHES (42") OF COVER OVER THE TOP OF PIPE UNLESS OTHERWISE SPECIFIED ON THE CONSTRUCTION DRAWINGS. FOR 12-INCH AND LARGER PIPE: THE DEPTH OF THE TRENCH PRIOR TO PIPE LAYING SHALL BE SUCH THAT THE FINISHED PIPELINE SHALL HAVE BETWEEN FORTY-EIGHT INCHES (48") AND SIXTY INCHES (60") OF COVER OVER THE TOP OF PIPE UNLESS OTHERWISE SPECIFIED ON THE CONSTRUCTION DRAWINGS. THE WIDTH OF THE TRENCH AT AND BELOW THE LEVEL AT THE TOP OF THE PIPE SHALL BE A MINIMUM OF TWELVE (12") PLUS THE OUTSIDE DIAMETER OF THE PIPE BARREL AND A MAXIMUM OF TWENTY-FOUR INCHES (24") PLUS THE OUTSIDE DIAMETER OF THE PIPE BARREL. THE BOTTOM OF THE TRENCH SHALL BE ACCURATELY GRADED TO PROVIDE A UNIFORM BEARING FOR EACH LENGTH OF PIPE FOR THE FULL LENGTH OF THE PIPE. IF THE NATIVE MATERIAL ON THE TRENCH BOTTOM CAN BE REASONABLY DUG BY HAND, BELL HOLES SHALL BE DUG FOR THE JOINTS SO THAT THE JOINTS IN NO WAY SUPPORT THE PIPE. WHEN NATIVE MATERIALS SUCH AS ROCK ARE ENCOUNTERED DURING TRENCHING THAT WILL NOT PROVIDE A UNIFORM SUPPORT FOR THE PIPE, THE TRENCH WILL BE OVER-EXCAVATED AN ADDITIONAL SIX INCHES (6") AND SUITABLE BEDDING MATERIAL WILL BE PLACED IN THE TRENCH. BEDDING MATERIAL WILL BE PLACED BY HAND IN FOUR INCH (4") LIFTS AND COMPACTED TO ENSURE UNIFORM COMPACTION AND TO ELIMINATE ANY VOIDS UNDER THE PIPE WHEN THE SPACE BETWEEN THE PIPE AND TRENCH BOTTOM VARIES. THIS MUST BE BACKFILLED AND COMPACTED IN FOUR INCH (4") LIFTS TO THE MID-SECTION OF THE PIPE. WHENEVER THE TRENCH IS OVER-EXCAVATED FOR WHATEVER REASON, THE TRENCH BOTTOM WILL BE BROUGHT UP TO THE CORRECT DEPTH AT THE CONTRACTOR'S EXPENSE USING EITHER METHOD (A) OR (B) AS FOLLOWS: A. A.B.C. MATERIAL SHALL BE USED AND COMPACTED TO A UNIFORM DENSITY OF NOT LESS THAN 90% OF THE MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99 METHOD A AND T-191. B. NATIVE MATERIAL 100% OF WHICH WILL PASS THROUGH A ONE AND ONE HALF INCH (1 1/2") SCREEN AND AT LEAST 20% OF WHICH WILL PASS THROUGH NUMBER-8 SCREEN SHALL BE USED AND COMPACTED TO A UNIFORM DENSITY OF NOT LESS THAN 95% OF THE MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99 METHOD A AND T-191.

4. MATERIALS TO BE PROVIDED BY CONTRACTOR UNLESS OTHERWISE SPECIFIED ON THE CONSTRUCTION DRAWING OR IN THE CONTRACT. THE CONTRACTOR WILL SUPPLY ALL OF THE NECESSARY MATERIAL WHICH WILL BECOME A PERMANENT AND INTEGRAL PART OF THE WATER DISTRIBUTION SYSTEM, INCLUDING CONCRETE BLOCKING, ANCHORS, BACKFILL MATERIAL, PAVING MATERIAL AND SUPPLIES USED DURING THE PROSECUTION OF THE WORK. ALL MATERIALS PROVIDED BY THE CONTRACTOR TO CONSTRUCT THE WATER DISTRIBUTION SYSTEM MUST BE NSF STANDARD 61 APPROVED. ALL POTABLE WATER PIPES AND FITTINGS SHALL HAVE NSF-PW SEAL. CONSTRUCTION MATERIALS USED IN THE WATER SYSTEM SHALL BE LEAD FREE AS DEFINED AT AAC R18-4-604 AND R18-1-101. THE CONTRACTOR WILL PROVIDE THE FOLLOWING MATERIAL:

   A. FIRE HYDRANTS: MUELLER SUPER CENTURION 250 FIRE HYDRANT, MEETS ANSI/AWWA C502 STANDARD, MODEL NO. A-421, 4 1/2" MAIN VALVE OPENING, THREE WAY, 6" MECHANICAL JOINT SHOE, 1 1/2" PENTAGON OPERATING NUT, COLOR-YELLOW, DRAIN OPEN, OPEN DIRECTION-LEFT, 4' OR 4'6" BURY DEPENDING ON APPLICATION FOR PUMPER AND HOSE NOZZLE INFORMATION SEE BELOW. (1) 1-4" PUMPER NOZZLE, NST AND 2-2 1/2" HOSE NOZZLES, NST. (THESE LOCATIONS ONLY: AJO, CASA GRADE, COOLIDGE AND SAN MANUEL.) (2) 1-4 1/2" PUMPER NOZZLE, NST AND 2-2 1/2" HOSE NOZZLES, NST. (THESE LOCATIONS ONLY: APACHE JUNCTION, ARIZONA CITY, LAKESIDE, ORACLE, OVERGAARD, PINEWOOD, RIMROCK, SEDONA, SIERRA VISTA, WHITE TANK AND WINKELMAN.) (3) 1-4 1/2" PUMPER NOZZLE, NST AND 2-2 1/2" HOSE NOZZLES, NPT (BISBEE ONLY.) (4) 1-3" PUMPER NOZZLE GA 6-350 (6 THREADS PER INCH, 3.50 PITCH DIAMETER) AND 2-2 1/2" HOSE NOZZLES, NPT (MIAMI ONLY.) (5) 1-3 1/2" PUMPER NOZZLE GA 6-411 (6 THREADS PER INCH, 4.11 PITCH DIAMETER) AND 2-2 1/2" HOSE NOZZLE, NST (SUPERIOR ONLY.)

   B. FITTINGS: MANUFACTURED BY TYLER OR UNION. CROSSES, ELBOWS, TEES, CAP, REDUCER, ADAPTER, PLUG, BLIND FLANGE AND TAPPED FLANGE: DUCTILE IRON, CLASS 350, SSB, CAST IRON CEMENT LINED. (1) FOSTER ADAPTORS FOR MJ, MADE BY IMPACT CORPORATION: AVAILABLE IN SIZES 4" TO 16". PART NO. 4"=4FA-BC, 6"=6FA-BC, 8"=8FA-BC, 10"=10FA-BC, 12"=12FA-BC, 16"=16FA-BC.

   C. DETECTOR CHECK VALVE: MUELLER/HERSEY EDC III, IRON BODY, INCLUDING 5/8" X 3/4" TRIM KIT. TRIM KIT PART NO: 4"=282084, 6"=282082, 8"=282085, 10"=283406.

   D. GATE VALVES: MUELLER RESILIENT WEDGE GATE VALVES, MEETS AWWA C509 SPECIFICATION, 200 PSIG, NON RISING STEM, PART NO. A-2360, LOW ZINC STEMS, EPOXY COATED INSIDE AND OUTSIDE TO MEET THE NSF 61 RATING. THE BONNET AND STUFFING BOX SHALL HAVE 304 STAINLESS STEEL NUTS/BOLTS.

   E. MEGALUG: MECHANICAL JOINT RESTRAINT MADE OF DUCTILE IRON CONFORMING TO ASTM 536-80, 250 PSI MADE BY EBAA IRON, INC., SERIES 1100 OR EQUAL.

   F. METER BOXES: AVAILABLE FROM U.S. FILTER: (1) CONCRETE BOX WITH A STEEL REGULAR LID, NUMBER 1: TUCSON SPECIFICATION. (2) CONCRETE BOX WITH A STEEL REGULAR LID, NUMBER 2, 3 AND 4: PHOENIX SPECIFICATION.

   G. PIPE, COPPER: TYPE K SOFT COPPER IN 60 OR 100 FOOT COILS.

   H. PIPE, DUCTILE IRON: DUCTILE IRON PIPE, CEMENT LINED, PUSH-ON, CONFORM TO CURRENT ANSI/AWWA SPECIFICATION A21.51/C151, PRESSURE CLASS 350 (SIZES 4" THROUGH 12"), PRESSURE CLASS 250 (SIZES 14" THROUGH 20"), OR PRESSURE CLASS 200 FOR 24" PIPE. VENDORS: (1) PACIFIC STATES CAST IRON PIPE COMPANY (2) GRIFFIN PIPE (3) UNITED STATES PIPE AND FOUNDRY COMPANY (4) AMERICAN DUCTILE IRON PIPE.

   I. PIPE, PLASTIC: PLASTIC PIPE, C-900 PVC PER ANSI/AWWA C900, DR18, CLASS 150, SIZES 6" THROUGH 12". NSF 61 APPROVED. FURNISHED IN LAYING LENGTHS OF 20'.

   J. COUPLING: MEULLER, STRAIGHT THREE PART UNION, TESTED TO MEET ANSI/AWWA C800, H15403, 110 CONDUCTIVE COMPRESSION. VIKING JOHNSON BRAND, SOLD BY MUELLER: MAXFIT STRAIGHT (2"-24"). MAXIFITXORA STRAIGHT (4"-6") OR MAXISTEP TRANSITION. TESTED TO MEET AWWA/ANSI C.219-91 SPECIFICATION CERTIFIED TO ISO 9001:1994.

   K. STOP, ANGLE METER, BALL: MUELLER, VALVE, B24258, 110 CONDUCTIVE COMPRESSION BY METER SWIVEL NUT, TESTED TO MEET ANSI/AWWA C800, SIZE 5/8" X 3/4" X 3/4" FOR A 3/4" SERVICE OR SIZE 1" FOR A 1" SERVICE. MUELLER, VALVE, B24286, FEMALE PIPE THREAD BY METER SWIVEL NUT, TESTED TO MEET ANSI/AWWA C800, SIZE 3/4" X 5/8" X 3/4" FOR A 3/4" SERVICE OR SIZE 1" FOR A 1" SERVICE. MUELLER, VALVE, H14351, STRAIGHT METER VALVE, FEMALE PIPE THREAD BY METER SWIVEL NUT, TEST TO MEET ANSI/AWWA C800, SIZE 3/4" X 3/4" X 3/4" FOR DOUBLE SERVICES.

   L. STOP, CORP: MUELLER, BALL VALVE, B25008, CC THREAD BY 110 CONDUCTIVE COMPRESSION, TESTED TO MEET ANSI/AWWA C800 SPECIFICATION, SIZES: 3/4", 1" AND 2". MUELLER, ORI-CORP VALVE, H15013, CC THREAD BY 110 CONDUCTIVE COMPRESSION, TESTED TO MEET ANSI/AWWA C800 SPECIFICATION, SIZE: 2".

   M. STOP, CURB: MUELLER ORISEAL VALVE, H10291, IRON PIPE THREAD BY IRON PIPE THREAD, QUARTER TURN CHECK, BRASS, TESTED TO 300 PSI WORKING PRESSURE, TESTED TO MEET ANSI/AWWA C800 SPECIFICATION, SIZE: 2".

   N. TAPPING SLEEVE: SMITH BLAIR, CAST BRONZE ASTM-B584 85-5-5-5, DOUBLE STRAP, IRON PIPE THREADS. MODELS 321 AND 323. WASHERS ARE SILICON BRONZE, ASTM-B98. GASKETS ARE GRADE 60 BUNA N. OR MUELLER BRONZE DOUBLE STRAP SERVICE SADDLE, BR 2 B SERIES, CAST BRONZE, ASTM-B585, 85-5-5-5, OR H16064, 200 PSIG, MEETS ANSI/AWWA C800.

   O. TAPPING SLEEVE: MUELLER H304 STAINLESS STEEL TAPPING SLEEVE, JCM 432 18-8 TYPE 304 STAINLESS STEEL TAPPING SLEEVE, ROMAC "SST" TYPE 304 STAINLESS STEEL TAPPING SLEEVE OR CASCADE-STYLE CST-EX STAINLESS STEEL PRESSURE-RATED TAPPING SLEEVE.

   P. U-BRANCH: MUELLER, H1363, 1" 110 CONDUCTIVE COMPRESSION BY 3/4" MALE, MEETS ANSI/AWWA C800 SPECIFICATION, SIZE: 1" X 3/4" X 13 1/2", STRAIGHT LINE.

   Q. VALVE BOXES: VALVE BOX WITH COVER, ADJUSTABLE, TYLER 562-A OR EQUAL, MADE OF CAST IRON.

   R. VAULTS: UTILITY VAULT COMPANY, CHANDLER, AZ. (1) 4484-WA CONCRETE VAULT WITH A 3660 ALUMINUM DOUBLE TORSION DOOR WITH A RECESSED PADLOCK HASP, TWO-16" X 24" CENTER KNOCKOUTS. (2) 576-WA CONCRETE VAULT WITH A 4674 ALUMINUM DOUBLE TORSION DOOR WITH A RECESSED PADLOCK HASP, TWO-16" X 24" CENTER KNOCKOUTS AND ADJUSTABLE FRAME. (3) 612-SX-WA CONCRETE VAULT WITH A 4874 ALUMINUM DOUBLE TORSION DOOR WITH A RECESSED PADLOCK HASP, TWO- 16" X 24" CENTER KNOCKOUTS.

   S. YOKES, METER: RELOCATOR TYPE COPPER METER YOKE WITH HORIZONTAL INLET AND OUTLET AND METER THREAD ENDS. H14115, WITH LOCK WING GROUND KEY ANGLE METER STOP, SIZES" 1" X 12", 5/8" X 3/4" X 7", 5/8" X 3/4" X 9.

   T. AIR RELEASE VALVE: CRISPIN MODEL AR10 WITH 1" NPT INLET AND 1/2" NPT OUTLET, CAST IRON BODY AND TOP FLANGE: WITH A 5/64" ORIFICE WITH STAINLESS STEEL VALVE SEALING FACES AND BUNA-N RUBBER.

   U. PRESSURE RELIEF VALVE: WATTS 174A, MODEL M, 2" INLET, 2" OUTLET, BRONZE BODY, 30LB. TO 150LB. PRESSURE RANGE.

   V. POLYETHYLENE ENCASEMENT: FOR ALL PIPELINE AND RELATED FITTINGS INSTALLED, EXCEPT FOR THE COOLIDGE DIVISION. MINIMUM 8 MIL. AND INSTALLED PER AWWA C105/A21.5-93 AND ASTM A-674-89. MANUFACTURED BY THE PACIFIC STATES CAST IRON PIPE COMPANY.

   W. BUTTERFLY VALVES: MUELLER CATALOG NUMBER 3211, 150 PSI MAXIMUM WORKING PRESSURE, ANSI/AWWA C504 AND NSF61 CERTIFIED. EPOXY INTERIOR/EXTERIOR. SIZES 16" THROUGH 36".

   X. TAPPING VALVE: MEULLER DOUBLE DISC TAPPING VALVE, CATALOG NUMBER H667, CLASS 125, SIZES 4" THROUGH 24". FLANGE BY MECHANICAL JOINT PER ANSI/AWWA C111. IRON BODY, DOUBLE DISC, NON-RISING STEM. EPOXY COATED INTERIOR/EXTERIOR PER ANSI/AWWA C550 FOR NSF 61 COMPLIANCE. 200 PSI RANGE FOR VALVES 4" TO 12", 150 PSI RANGE FOR VALVES 16" TO 24". THE CONTRACTOR ALSO WILL BE REQUIRED TO PROVIDE THE FOLLOWING MATERIALS, THE COST OF WHICH WILL BE INCLUDED IN ITS UNIT BID PRICE: ALL MATERIAL AND CONCRETE FOR THRUST BLOCKS, OTHER ANCHORS, REINFORCING STEEL; ALL GRAVEL, CRUSHED STONE, A.B.C. EARTH, SAND, OR SCREENED MATERIAL WHICH MAY BE REQUIRED: ALL MATERIAL FOR BRACING AND SHORING TRENCHES AND FOR CONSTRUCTION OF FORMS; ALL BARRICADES AND TRAFFIC CONTROL EQUIPMENT; ALL MATERIAL FOR PAVING REPLACEMENT AND ANY WATER USED FOR COMPACTION OF BACKFILL.

5. INSTALLATION OF MATERIALS
ALL MATERIALS ARE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS UNLESS OTHERWISE DIRECTED BY THESE SPECIFICATIONS. ALL PIPE, FITTINGS AND VALVES SHALL BE LAID TRUE TO THE LINES, GRADES AND LOCATIONS ESTABLISHED BY THE SPECIFICATIONS AND THE CONSTRUCTION DRAWINGS. THE ENDS AND INSIDE THE PIPE SHALL BE THOROUGHLY CLEANED AND INSPECTED FOR DAMAGE. NO DAMAGED MATERIALS SHALL BE INSTALLED IN THE WATER DISTRIBUTION SYSTEM. WHENEVER THE WORK CEASES FOR ANY REASON, ALL OPEN PIPELINE ENDS SHALL BE TIGHTLY PLUGGED BY THE CONTRACTOR. CONCRETE THRUST BLOCKS OF THE SIZES REQUIRED BY THE PLANS SPECIFICATIONS ARE TO BE PROVIDED AT ALL VALVES, CHANGES IN DIRECTION OR SIZE, OR AT ANY OTHER POINT WHERE AN UNBALANCED THRUST DUE TO WATER PRESSURE WOULD EXIST. THRUST BLOCKS ARE TO BE FORMED TO PREVENT ANY CONCRETE FROM SPILLING OVER OR INTO A JOINT. TRENCH CURVES AS SHOWN ON THE CONSTRUCTION DRAWINGS MAY BE MADE WITHOUT FITTINGS WHEN USING PIPE UP TO TWELVE INCHES (12") IN DIAMETER, IF THE DEFLECTION OF THE PIPE DOES NOT EXCEED FIVE DEGREES (5°) OR NINETEEN INCHES (19") PER EIGHTEEN FOOT (18') LENGTH OF PIPE. THE MINIMUM RADIUS OF SUCH CURVES WILL BE TWO HUNDRED FIVE FEET (205').

   A. PRIOR TO CONSTRUCTION, THE APPROPRIATE AGENCY(IES) WILL BE NOTIFIED AS REQUIRED BY THE PERMIT(S).

   B. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO UNCOVER ALL EXISTING WATER LINES BEING CONNECTED TO, AND TO VERIFY THE LOCATION, DEPTH AND SIZE OF PIPE BEFORE ANY CONSTRUCTION BEGINS.

   C. ANY CONSTRUCTION PERFORMED WITHOUT THE KNOWLEDGE OF THE DULY AUTHORIZED REPRESENTATIVE IS LIABLE FOR REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.

   D. ALL FIRE HYDRANTS, FRAMES, COVERS AND VALVE BOXES, ETC SHALL BE ADJUSTED TO FINISHED GRADE PRIOR TO THE PLACING OF ASPHALTIC CONCRETE SURFACE COURSE BY THE CONTRACTOR (WHERE APPLICABLE).

   E. AIR RELEASE VALVES SHALL BE INSTALLED AT WATER SYSTEM HIGH POINTS PER STANDARD DETAIL E-9-9-2.

   F. ALL WATER SERVICES SHALL BE SET A MINIMUM OF TWO FEET (2') ON THE CUSTOMER'S PROPERTY, PREFERABLY WITHIN THE P.U.E. AND NOT WITHIN RIGHT-OF-WAY.

   G. UNLESS OTHERWISE SPECIFIED ON THE CONSTRUCTION DRAWINGS, ALL WATER MAINS SHALL BE INSTALLED FIVE FEET (5') FROM THE PROPERTY LINE INSIDE THE RIGHT-OF-WAY OR EASEMENT.

   H. WATER VALVES SHALL BE SPACED NOT MORE THAN FIVE HUNDRED FEET (500') IN COMMERCIAL DISTRICTS AND NOT MORE THAN EIGHT HUNDRED FEET (800') IN OTHER DISTRICTS. VARIATIONS MAY BE REQUIRED FOR TRANSMISSION MAINS OR SPECIAL APPLICATIONS.

   I. INSTALLATION OF WATERLINE CASING SHALL BE PER STANDARD SPECIFICATION E-9-24-1.

6. BACKFILL OF WATER MAIN TRENCHES BACKFILL OF ANY EXCAVATION SHALL CONFORM TO THE REQUIREMENTS OF ANY OF THE GOVERNMENTAL AGENCIES HAVING JURISDICTION OVER THE LOCATION. IF NO GOVERNMENTAL AGENCY HAVING SUCH JURISDICTION SPECIFIES BACKFILL OR COMPACTION REQUIREMENTS, AND NO SPECIAL REQUIREMENTS ARE SHOWN ON THE CONSTRUCTION DRAWINGS, THE PROCEDURE SET FORTH IN THIS SECTION WILL APPLY FOR WATER LINE TRENCHES. THE BEDDING MATERIAL ABOVE THE PIPE AND BACKFILL MATERIAL SHALL BE COMPACTED TO A MINIMUM OF 70% COMPACTION WITHIN A UTILITY EASEMENT AND 90% COMPACTION WITHIN A RIGHT-OF-WAY AS DETERMINED BY AASHTO T-99 METHOD A AND T-191. IF WATER SETTLING IS USED FOR COMPACTION, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PREVENT THE PIPE FROM FLOATING. THE BEDDING MATERIAL SHALL BE EITHER NATIVE MATERIAL, 100% OF WHICH WILL PASS THROUGH A ONE AND ONE-HALF INCH (1 1/2") SCREEN AND AT LEAST 20% OF WHICH WILL PASS THROUGH A NUMBER-8 SCREEN, OR IMPORTED MATERIAL WHICH CONFORMS TO M.A.G. SPECIFICATIONS FOR A.B.C. OR TYPE-B SELECT MATERIALS. BEDDING MATERIAL SHALL BE USED BELOW AND AROUND THE PIPE AND A MINIMUM OF TWELVE INCHES (12") ABOVE THE PIPE. THE REMAINDER OF THE TRENCH SHALL BE BACKFILLED WITH NATIVE OR IMPORTED MATERIAL WHICH SHALL BE OF SOUND EARTHEN MATERIAL FREE FROM BROKEN CONCRETE, WOOD, BROKEN PAVEMENT, OR OTHER UNSUITABLE SUBSTANCES. EXCEPT AS OTHERWISE SPECIFIED, BACKFILL MAY BE MATERIAL CONTAINING NO PIECES LARGER THAN EIGHT INCHES (8") IN GREATEST DIMENSION. WHERE SETTLEMENT OCCURS, ADDITIONAL BACKFILL MATERIAL SHALL BE PLACED AND COMPACTED AND THE TRENCH SHALL BE BROUGHT TO FINAL GRADE.

7. HYDROSTATIC TESTING OF COMPLETED PIPELINES HYDROSTATIC TESTING OF WATER PIPELINES WILL BE COMPLETED BEFORE THE NEW SYSTEM IS CONNECTED INTO THE EXISTING WATER SYSTEM SO THAT ALL TESTING CAN BE DONE AGAINST ALL NEW MATERIALS. THE COMPLETED SECTION OF WATER PIPELINE TO BE TESTED SHALL BE SLOWLY FILLED WITH WATER WITH CARE BEING TAKEN TO EXPEL ALL AIR FROM THE PIPE. IF NECESSARY, THE PIPE WILL BE TAPPED AT HIGH POINTS TO VENT AIR. THE CONTRACTOR SHALL PROVIDE ALL EQUIPMENT AND LABOR NECESSARY TO ACCOMPLISH THIS TESTING AND THE PRICE SHALL BE INCLUDED IN THE UNIT PRICES. THE CONTRACTOR SHALL NOTIFY THE COMPANY IN ADVANCE OF THE TESTING SO THAT THE COMPANY CAN SCHEDULE A DULY AUTHORIZED REPRESENTATIVE TO BE AT THE SITE DURING TESTING. THE CONTRACTOR, AT ITS OWN EXPENSE, SHALL MAKE ANY NECESSARY REPAIRS TO THE SYSTEM BEING TESTED IN ORDER TO CAUSE THE SECTION BEING TESTED TO MEET THE TEST LIMITS SET BELOW. THE CONTRACTOR MAY REQUEST AUTHORIZATION OF THE COMPANY TO CONNECT THE NEW PIPELINES TO THE EXISTING SYSTEM PRIOR TO COMPLETION OF PRESSURE TESTING WHEN, IN THE COMPANY'S SOLE OPINION AND JUDGEMENT, CONDITIONS WARRANT SUCH CONNECTION. THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY TO COMPLETE PRESSURE TESTING TO COMPANY'S SPECIFICATIONS AFTER SUCH CONNECTION, INCLUDING, BUT NOT LIMITED TO, ISOLATION OF THE NEW PIPELINES FROM THE EXISTING SYSTEM, IF NECESSARY. CONNECTIONS PRIOR TO COMPLETION OF PRESSURE TESTING SHALL NOT BE MADE UNLESS PRIOR COMPANY AUTHORIZATION HAS BEEN OBTAINED, AND ANY EXTRA EXPENSES RESULTING FROM SUCH CONNECTIONS SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. LEAKAGE TESTS WILL BE FOR A PERIOD OF TWO HOURS AT 200 PLUS OR MINUS 5 PSI AT THE POINT OF LOWEST ELEVATION: LEAKAGE MAY NOT EXCEED 0.1 GALLONS PER HOUR PER ONE THOUSAND FEET (1,000') OF PIPE PER INCH OF DIAMETER.

8. STERILIZATION AND FLUSHING OF COMPLETED WATER PIPELINES STERILIZATION AND FLUSHING WILL CONFORM TO RECOMMENDATIONS OF ARIZONA STATE DEPARTMENT OF HEALTH SERVICES ENGINEERING BULLETIN NUMBER 8, LATEST EDITION, OR ANY FUTURE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY BULLETINS.

9. NO OTHER UTILITIES ALLOWED IN OR NEAR WATER PIPELINE TRENCHES NO OTHER UTILITY INSTALLATIONS WILL BE PERMITTED IN THE WATER PIPELINE TRENCH OR WITHIN FIVE FEET (5') OF THE COMPANY'S WATER PIPELINE WHEN RUNNING PARALLEL TO THE WATER PIPELINES.

10. PROTECTION OF WATER MAINS NEAR SEWERS WATER/SEWER LINE(S) SEPARATION SHALL BE IN ACCORDANCE WITH AAC R18-4-502C. WATER LINE(S) SEPTIC SYSTEMS SEPARATION SHALL BE IN ACCORDANCE WITH AAC R18-9-A312C.

11. COMPACTION WHEN CROSSING EXISTING WATER MAINS A MINIMUM OF 95% COMPACTION IS REQUIRED TO THE BOTTOM OF EXISTING MAINS. ARIZONA WATER COMPANY REQUIRES THAT NO SLURRY BE PERMITTED TO CONTACT EXISTING CEMENT/ASBESTOS OR DUCTILE IRON PIPES. SLURRY MAY BE POURED IN THE BOTTOM OF THE SEWER TRENCH STOPPING THREE INCHES(3") BELOW THE EXISTING WATER MAIN. THE BACKFILL USED AROUND THE MAIN SHOULD BE ABC IN SUFFICIENT DEPTH TO PREVENT SLURRY FROM CONTACTING EXISTING MAIN.

12. WATER MAIN MATERIAL SPECIFICATION DUCTILE IRON PIPE (PUSH-ON TYPE) MINIMUM CLASS 350, CEMENT LINED AND CONFORM TO AWWA C151. ALL MAIN LINE VALVES SHALL CONFORM TO AWWA C500 WITH A MINIMUM WORKING PRESSURE OF 200 PSI. ALL CAST IRON FITTINGS TO BE CEMENT LINED IN ACCORDANCE WITH AWWA C104 AND SHALL CONFORM TO AWWA C110 WITH A MINIMUM WORKING PRESSURE OF 200 PSI. EXCEPT FOR THE COOLIDGE SYSTEM - SEE NOT 4.1 A. MAXIMUM JOINT DEFLECTION FOR 6" MECHANICAL JOINT DUCTILE IRON PIPE IS SEVEN DEGREES, SEVEN MINUTES (7°7') OR TWENTY-SEVEN INCHES (27") PER EIGHTEEN FOOT (18') LENGTH PIPE, FOR A MAXIMUM CURVE OF ONE HUNDRED FORTY FIVE FEET (145'). B. MAXIMUM JOINT DEFLECTION FOR 8" & 12" MECHANICAL JOINT DUCTILE IRON PIPE IS FIVE DEGREES, TWENTY ONE MINUTES (5°21') OR TWENTY INCHES (20") PER EIGHTEEN FOOT (18') LENGTH PIPE, FOR A MAXIMUM CURVE OF ONE HUNDRED NINETY FIVE FEET (195'). C. MAXIMUM JOINT DEFLECTION FOR 6", 8" & 12" PUSH-ON JOINT DUCTILE IRON PIPE IS FIVE DEGREES (5°) OR NINETEEN INCHES (19") PER EIGHTEEN FOOT (18') LENGTH PIPE FOR A MAXIMUM CURVE OF TWO HUNDRED FIVE FEET (205').

WATER MAIN NOTES

1. ALL PROPOSED PUBLIC AND/OR PRIVATE UTILITIES SHALL BE INSTALLED ON THE OPPOSITE SIDE OF RIGHT-OF-WAY FROM THE PROPOSED WATER MAINS WHENEVER POSSIBLE.

2. WATER DISTRIBUTION DESIGN REPORT:
BY: MORRISON-MAIERLE, INC.
DATED: AUGUST 30, 2006. JOB NUMBER: #6082.001.

3. ALL MATERIALS THAT COME INTO CONTACT WITH DRINKING WATER SHALL MEET NSF STANDARD 60 AND 61.

4. ALL WATER MAINS LESS THAN TWELVE (12") INCHES IN DIAMETER ARE TO BE INSTALLED AT A MINIMUM TOP OF PIPE DEPTH OF THIRTY SIX (36") INCHES BELOW FINISHED GRADE. WATER MAINS TWELVE (12") INCHES IN DIAMETER, OR LARGER, SHALL BE INSTALLED AT A MINIMUM TOP OF PIPE DEPTH OF FORTY EIGHT (48") INCHES BELOW FINISHED GRADE.

5. ALL WATERLINES SHALL BE PRESSURE AND LEAKAGE TESTED IN ACCORDANCE WITH AWWA C-600 SECTION 4, OR M.A.G. SECTION 610.14.

6. ALL NEW FIRE HYDRANTS SHALL HAVE FOUR (4") INCH N.S.T. STEAMER CONNECTIONS.

7. NO OBSTRUCTIONS, (IE: TREES, SHRUBS, UTILITY PEDESTALS, STREETLIGHTS, TRANSFORMERS, J-BOXES, SWITCH CABINETS) SHALL BE PLACED WITH FIVE (5') FEET IN FRONT OF OR TO THE SIDE OF ANY FIRE HYDRANT.

8. ALL ONSITE WATER MAINS SHALL BE WITHIN THE PUBLIC RIGHT-OF-WAY UNLESS OTHERWISE NOTED ON PLANS. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE ARIZONA WATER COMPANY STANDARD DETAILS AND SPECIFICATIONS AND ADEQ/ADWR CURRENT STANDARDS. HOWEVER ALL TRENCH BACKFILL COMPACTION WITHIN THE PUBLIC RIGHT-OF-WAY AND IN ALL PUBLIC EASEMENTS SHALL BE PER CITY OF CASA GRANDE DETAIL AND COMPACTION SPECIFICATIONS.

9. ALL WATER MAINS MUST BE DISINFECTED PER AAC TITLE 18 AND ARIZONA WATER COMPANY STANDARDS.

10. THERE SHALL BE NO SEPTIC SYSTEMS WITHIN ONE HUNDRED (100') FEET OF THE PROPOSED WATER MAIN EXTENSION.

11. WATER PLAN AS-BUILTS: AS BUILT WATER PLANS SHALL BE PREPARED BY THE DESIGN ENGINEER AND SHALL INCLUDE BUT ARE NOT LIMITED TO; ALL HYDRANT BASE ELEVATIONS, HYDRANT LOCATIONS, VALVE BOX LOCATIONS, METER BOX LOCATIONS, AND LANDSCAPE METER LOCATIONS, ANDS ANY AND ALL DEVIATIONS FROM THE APPROVED PLANS.

VERIFY SCALE	REVISIONS			
	NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.

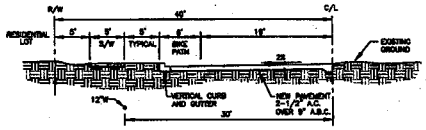
GHOST HOLLOW ESTATES PHASE 1
WATER PLANS

CASA GRANDE — ARIZONA

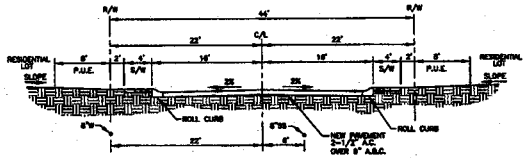
NOTES

C-WT-2

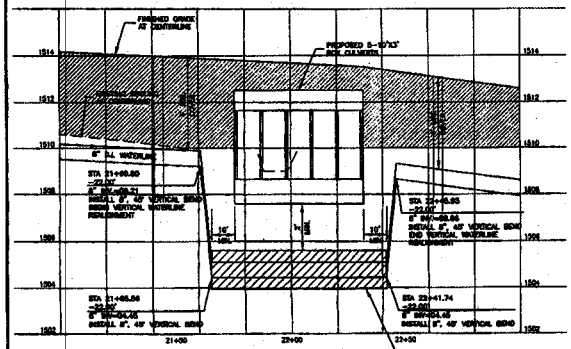
image4261 (14400x9723x2 tiff)



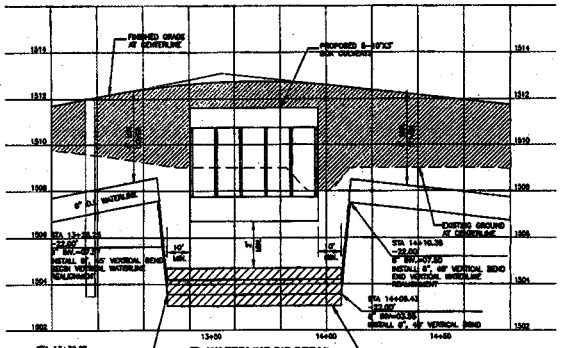
1 TYPICAL SECTION GHOST RANCH ROAD N.T.S.



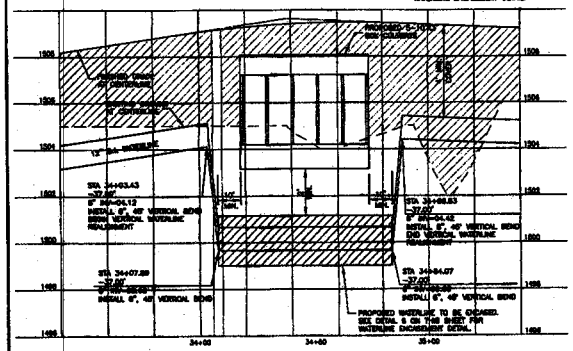
2 TYPICAL SECTION LOCAL STREET N.T.S.



3 WATERLINE DIP DETAIL 1"=20' PINTAL DRAIN



4 WATERLINE DIP DETAIL 1"=20' VERTICAL DRAIN



5 WATERLINE DIP DETAIL 1"=20' GHOST RANCH ROAD

GENERAL NOTES – JACKING & BORING:

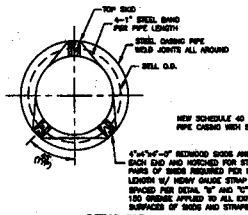
THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ALL PIPELINES, TRAFFIC CONTROL, SHORING AND BRACING OF JACKING AND RECEIVING PITS, BELOWING, BACKFILL, OVER EXCAVATION, COMPACTION OR ANY OTHER WORK NOT SPECIFICALLY MENTIONED HEREIN, CONFORMING BY THE AGENCY TO BE ASSOCIATED WITH THE INSTALLATION OF THE CARRIER PIPE WITHIN THE STEEL CASING. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS SPECIFIED HEREIN, ON THE APPROVED PLANS OR IN THE SPECIAL SPECIFICATIONS.

CASING –
CASING SIZE SHALL BE AS SPECIFIED IN THE TABLE OF THIS DETAIL. ALL CASING SHALL BE SCHEDULE 40 "STANDARD WALL" SMOOTH STEEL PIPE UNLESS OTHERWISE NOTED. CASING ALIGNMENT, BOTH HORIZONTAL AND VERTICAL, SHALL NOT DEVIATE LONG THAN 0.25 FEET FROM THE GRADE SPECIFIED ON THE APPROVED PLANS.

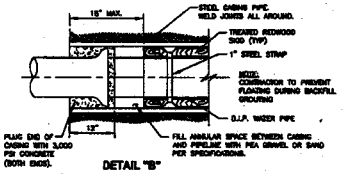
CASING SHALL BE BUTT WELDED AROUND THE ENTIRE CIRCUMFERENCE OF EACH JOINT TO PROVIDE A TRUE SEAL. WELDING SHALL BE ACCOMPLISHED BY CERTIFIED WELDERS IN ACCORDANCE WITH A.S.M.E. SECTION 9.

CARRIER PIPE –
CARRIER PIPE SIZE SHALL BE SPECIFIED ON THE APPROVED PLANS. PIPE MATERIAL SHALL BE WATERMAIN CLASS 52 RESTRAINED JOINT DUCTILE IRON PIPE. THE RESTRAINT FIXTURE SHALL BE MECHANICAL JOINTS WITH "MEGA-LUG" BRAND RESTRAINED FOLLOWING GLAND OR U.S. PIPE "RI FLEX" RESTRAINED JOINT PIPE. OTHER MANUFACTURERS MAY BE PERMITTED WITH PRIOR APPROVAL OF THE AGENCY.

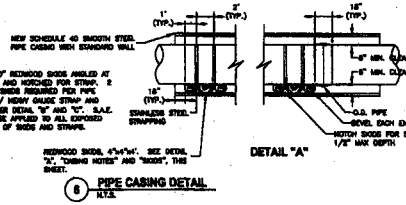
SKIDS –
SKIDS SHALL BE CONSTRUCTED OF REDWOOD AND SHALL BE TREATED TO PROLONG USABLE LIFE. 4 INCH BY 4 INCH REDWOOD SHALL BE USED FOR CARRIER PIPES 12 INCHES AND LARGER. THE LENGTH WILL BE (4 FEET). SKIDS ARE TO BE SPACED ON EACH END. IT IS RECOMMENDED THAT A.S.A.E. 150 GREASE BE APPLIED TO THE CARRIER PIPE WITH STAINLESS STEEL BANDS, CABLES, CLAMPS, OR OTHER HARDWARE MAY BE USED WITH PRIOR APPROVAL OF THE ENGINEER. CARRIER PIPE ON SKIDS THAT NEED TO CLEAR CASING WALLS AND DEVIATE FROM LINE AND GRADE WILL NOT BE ACCEPTED. END TO END SPACING BETWEEN SKIDS WILL BE A MAXIMUM OF 36 INCHES.



DETAIL "A"



DETAIL "B"



DETAIL "A"

6 PIPE CASING DETAIL N.T.S.

VERIFY SCALE
BARS PRINTED ONLY ON ORIGINAL DRAWING, UNDERLINE MEASURED ONE INCH ON ORIGINAL DRAWING.
VERIFY SCALE HORIZONTALLY

REVISIONS			
NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.
An Employee-Owned Company

Engineers
Surveyors
Scientists
Planners

50 E. Rio Salado Parkway, Suite 201
Tempe, AZ 85281
Phone: (480) 917-0000
Fax: (480) 917-0001

DRAWN BY: LMA
CHKD. BY: JG
APPD. BY: DRP
DATE: 8/2000
G.A. REVISION
BY:
DATE:

CASA GRANDE

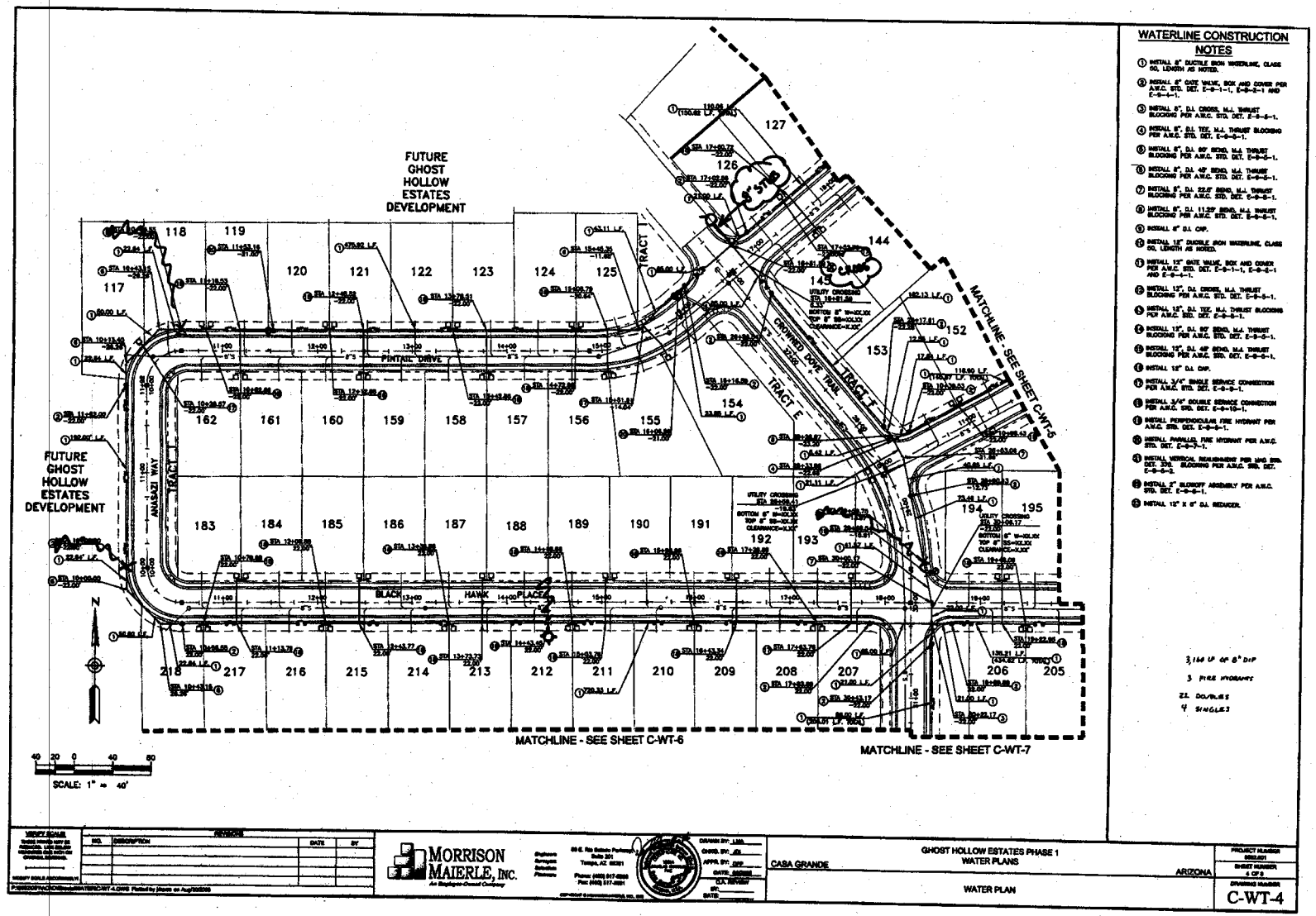
GHOST HOLLOW ESTATES PHASE 1
WATER PLANS

ARIZONA

DETAILS

PROJECT NUMBER 96SL001
SHEET NUMBER 5 OF 8
DRAWING NUMBER
C-WT-3

image4262 (14400x9671x2 tiff)



WATERLINE CONSTRUCTION NOTES

1. INSTALL 8" DUCTILE IRON WATERLINE, CLASS 50, LENGTH AS NOTED.
2. INSTALL 8" GATE VALVE, BOX AND COVER PER A.W.C. STD. DET. E-9-1-1, E-9-2-1 AND E-9-4-1.
3. INSTALL 8", D.I. CROSS, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
4. INSTALL 8", D.I. TEE, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
5. INSTALL 8", D.I. 90° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
6. INSTALL 8", D.I. 45° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
7. INSTALL 8", D.I. 22.5° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
8. INSTALL 8", D.I. 11.25° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
9. INSTALL 8" D.I. CAP.
10. INSTALL 12" DUCTILE IRON WATERLINE, CLASS 50, LENGTH AS NOTED.
11. INSTALL 12" GATE VALVE, BOX AND COVER PER A.W.C. STD. DET. E-9-1-1, E-9-2-1 AND E-9-4-1.
12. INSTALL 12", D.I. CROSS, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
13. INSTALL 12", D.I. TEE, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
14. INSTALL 12", D.I. 90° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
15. INSTALL 12", D.I. 45° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
16. INSTALL 12" D.I. CAP.
17. INSTALL 3/4" SINGLE SERVICE CONNECTION PER A.W.C. STD. DET. E-9-9-1.
18. INSTALL 3/4" DOUBLE SERVICE CONNECTION PER A.W.C. STD. DET. E-9-10-1.
19. INSTALL PERPENDICULAR FIRE HYDRANT PER A.W.C. STD. DET. E-9-8-1.
20. INSTALL PARALLEL FIRE HYDRANT PER A.W.C. STD. DET. E-9-7-1.
21. INSTALL VERTICAL REALIGNMENT PER UNI STD. DET. STD. BLOCKING PER A.W.C. STD. DET. E-9-5-2.
22. INSTALL 2" BLOWOFF ASSEMBLY PER A.W.C. STD. DET. E-9-6-1.
23. INSTALL 12" X 8" D.I. REDUCER.

3,164 LF OF 8" DIP
3 FIRE HYDRANTS
22 DOUBLES
4 SINGLES

VERIFY SCALE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.
An Engineer-Owned Company

Engineers
Surveyors
Scientists
Planners

CASA GRANDE

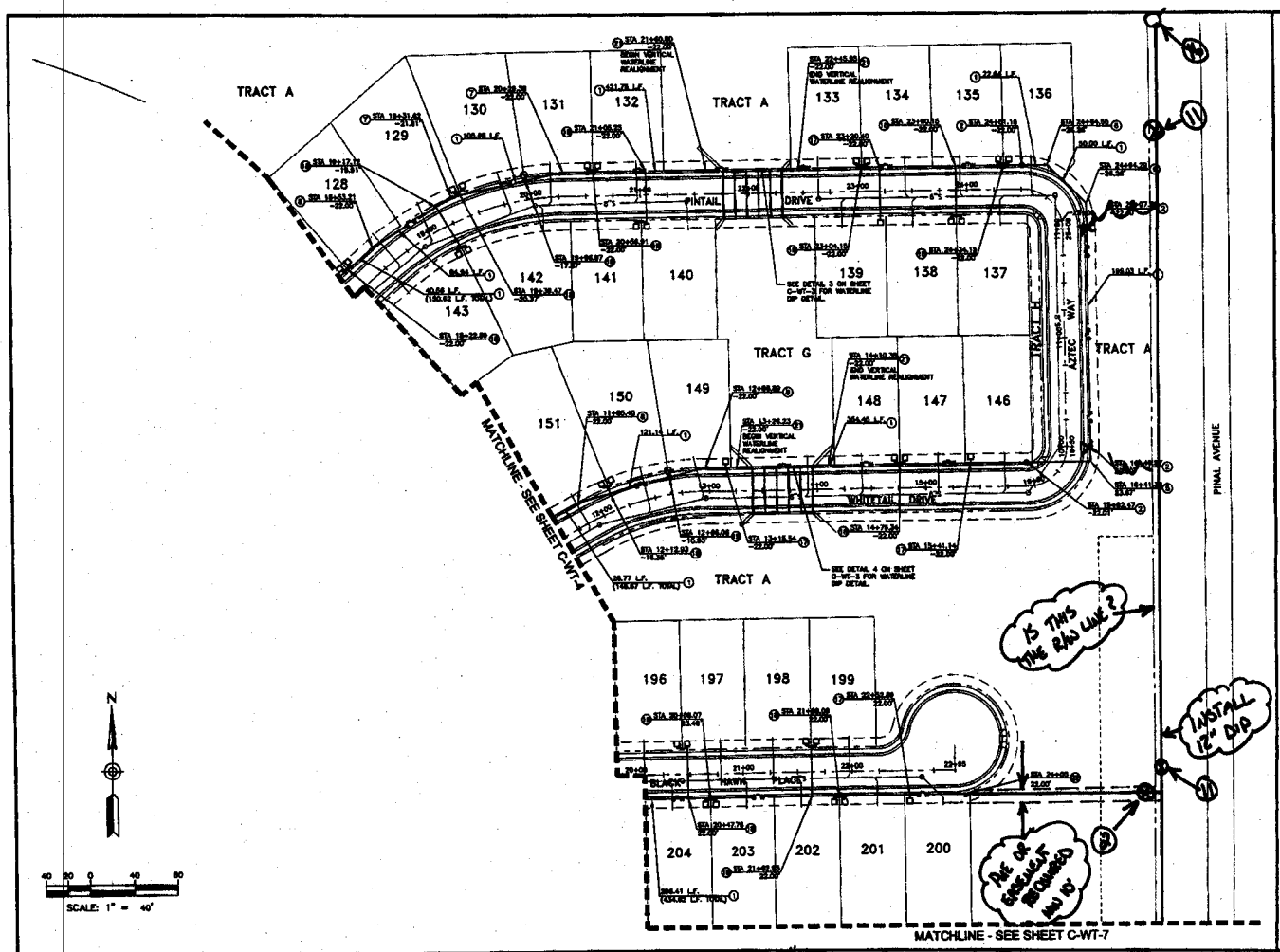
GHOST HOLLOW ESTATES PHASE 1
WATER PLANS

ARIZONA

WATER PLAN

PROJECT NUMBER
SHEET NUMBER
4 OF 8
DRAWING NUMBER
C-WT-4

image4263 (14400x9698x2 tiff)



WATERLINE CONSTRUCTION NOTES

1. INSTALL 8" DUCTILE IRON WATERLINE, CLASS 50, LENGTH AS NOTED.
2. INSTALL 8" GATE VALVE, BOX AND COVER PER A.W.C. STD. DET. E-9-1-1, E-9-2-1 AND E-9-4-1.
3. INSTALL 8", D.I. CROSS, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
4. INSTALL 8", D.I. TEE, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
5. INSTALL 8", D.I. 90° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
6. INSTALL 8", D.I. 45° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
7. INSTALL 8", D.I. 22.5° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
8. INSTALL 8", D.I. 11.25° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
9. INSTALL 8" D.I. CAP.
10. INSTALL 12" DUCTILE IRON WATERLINE, CLASS 50, LENGTH AS NOTED.
11. INSTALL 12" GATE VALVE, BOX AND COVER PER A.W.C. STD. DET. E-9-1-1, E-9-2-1 AND E-9-4-1.
12. INSTALL 12", D.I. CROSS, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
13. INSTALL 12", D.I. TEE, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
14. INSTALL 12", D.I. 90° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
15. INSTALL 12", D.I. 45° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-5-1.
16. INSTALL [illegible]
17. INSTALL 3/4" SINGLE SERVICE CONNECTION PER A.W.C. STD. DET. E-9-9-1.
18. INSTALL 3/4" DOUBLE SERVICE CONNECTION PER A.W.C. STD. DET. E-9-10-1.
19. INSTALL PERPENDICULAR FIRE HYDRANT PER A.W.C. STD. DET. E-9-6-1.
20. INSTALL PARALLEL FIRE HYDRANT PER A.W.C. STD. DET. E-9-7-1.
21. INSTALL VERTICAL REALIGNMENT PER MAG STD. DET. 370. BLOCKING PER A.W.C. STD. DET. E-9-5-3.
22. INSTALL 2" BLOWOFF ASSEMBLY PER A.W.C. STD. DET. E-9-8-1.
23. INSTALL 12" X 8" D.I. REDUCER.

1,960 LF OF 8"
360 LF OF 12"
2 FIRE HYDRANTS
14 DOUBLE SERVICES
4 SINGLE SERVICES

VERIFY SCALE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.
An Employee-Owned Company

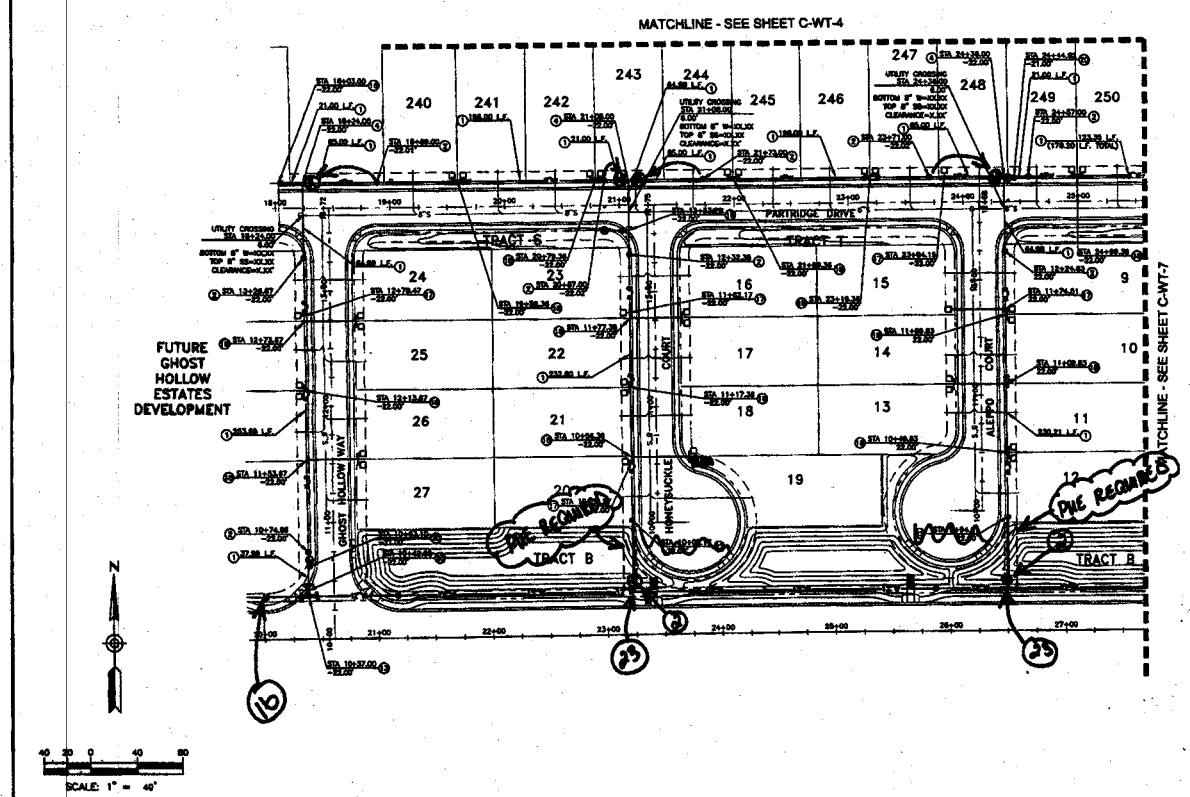
DRAWN BY: LMA
CHKD. BY: GI
APPR. BY: DFD
DATE: [illegible]
C.O. REVIEW
BY:
DATE:

CASA GRANDE — GHOST HOLLOW ESTATES PHASE 1 WATER PLANS — ARIZONA

WATER PLAN

PROJECT NUMBER: 6551.001
SHEET NUMBER: 5 OF 8
DRAWING NUMBER: C-WT-5

image4264 (14400x9669x2 tiff)



WATERLINE CONSTRUCTION NOTES

1. INSTALL 8" DUCTILE IRON WATERLINE, CLASS 50, LENGTH AS NOTED.
2. INSTALL 8" GATE VALVE, BOX AND COVER PER A.W.C. STD. DET. E-6-1-1, E-6-2-1 AND E-6-4-1.
3. INSTALL 8" D.I. CROSS, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
4. INSTALL 8" D.I. TEE, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
5. INSTALL 8" D.I. 90° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
6. INSTALL 8" D.I. 45° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
7. INSTALL 8" D.I. 22.5° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
8. INSTALL 8" D.I. 11.25° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
9. INSTALL 6" D.I. CAP.
10. INSTALL 12" DUCTILE IRON WATERLINE, CLASS 50, LENGTH AS NOTED.
11. INSTALL 12" GATE VALVE, BOX AND COVER PER A.W.C. STD. DET. E-6-1-1, E-6-2-1 AND E-6-4-1.
12. INSTALL 12" D.I. CROSS, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
13. INSTALL 12" D.I. TEE, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
14. INSTALL 12" D.I. 90° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
15. INSTALL 12" D.I. 45° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
16. INSTALL ~~12" D.I. GATE~~ 8" BLOWOFF
17. INSTALL 3/4" SINGLE SERVICE CONNECTION PER A.W.C. STD. DET. E-6-8-1.
18. INSTALL 3/4" DOUBLE SERVICE CONNECTION PER A.W.C. STD. DET. E-6-10-1.
19. INSTALL PERPENDICULAR FIRE HYDRANT PER A.W.C. STD. DET. E-6-5-1.
20. INSTALL PARALLEL FIRE HYDRANT PER A.W.C. STD. DET. E-6-7-1.
21. INSTALL VERTICAL REALIGNMENT PER MAG STD. DET. 375, BLOCKING PER A.W.C. STD. DET. E-6-6-2.
22. INSTALL 2" BLOWOFF ASSEMBLY PER A.W.C. STD. DET. E-6-8-1.
23. INSTALL 12" X 8" ~~[illegible]~~ TEE

320 LF OF 12" DIP
1840 LF OF 8" DIP
3 FIRE HYDRANTS
14 DOUBLE SERVICES
5 SINGLE SERVICES

VERIFY SCALE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

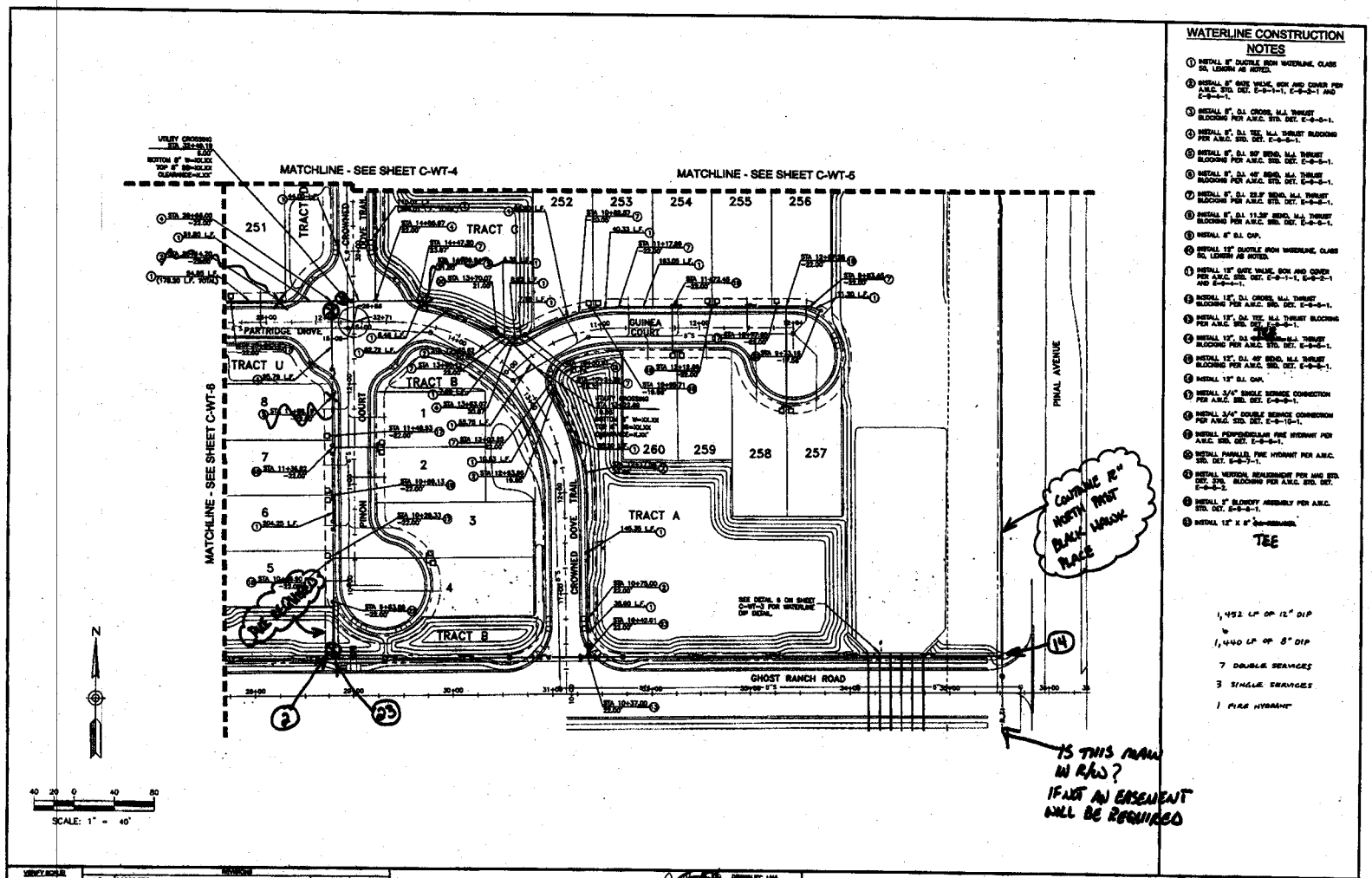
MORRISON MAIERLE, INC.
An Employee-Owned Company

CASA GRANDE — GHOST HOLLOW ESTATES PHASE 1 WATER PLANS — ARIZONA

WATER PLAN

PROJECT NUMBER
SHEET NUMBER 6 OF 8
DRAWING NUMBER C-WT-6

image4265 (14400x9703x2 tiff)



WATERLINE CONSTRUCTION NOTES

1. INSTALL 8" DUCTILE IRON WATERLINE, CLASS 50, LENGTH AS NOTED.
2. INSTALL 8" GATE VALVE, BOX AND COVER PER A.W.C. STD. DET. E-9-1-1, E-9-2-1 AND E-9-4-1.
3. INSTALL 8" D.I. CROSS, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-6-1.
4. INSTALL 8" D.I. TEE, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-6-1.
5. INSTALL 8" D.I. 90° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-6-1.
6. INSTALL 8" D.I. 45° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-6-1.
7. INSTALL 8" D.I. 22.5° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-6-1.
8. INSTALL 8" D.I. 11.25° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-6-1.
9. INSTALL 8" D.I. CAP.
10. INSTALL 12" DUCTILE IRON WATERLINE, CLASS 50, LENGTH AS NOTED.
11. INSTALL 12" GATE VALVE, BOX AND COVER PER A.W.C. STD. DET. E-9-1-1, E-9-2-1 AND E-9-4-1.
12. INSTALL 12" D.I. CROSS, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-6-1.
13. INSTALL 12" D.I. TEE, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-6-1.
14. INSTALL 12" D.I. 90° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-6-1.
15. INSTALL 12" D.I. 45° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-6-1.
16. INSTALL 12" D.I. CAP.
17. INSTALL 3/4" SINGLE SERVICE CONNECTION PER A.W.C. STD. DET. E-9-9-1.
18. INSTALL 3/4" DOUBLE SERVICE CONNECTION PER A.W.C. STD. DET. E-9-10-1.
19. INSTALL PERPENDICULAR FIRE HYDRANT PER A.W.C. STD. DET. E-9-8-1.
20. INSTALL PARALLEL FIRE HYDRANT PER A.W.C. STD. DET. E-9-7-1.
21. INSTALL VERTICAL REALIGNMENT PER AND STD. DET. STD. BLOCKING PER A.W.C. STD. DET. E-9-6-2.
22. INSTALL 2" BLOWOFF ASSEMBLY PER A.W.C. STD. DET. E-9-5-1.
23. INSTALL 12" X 8" [illegible] TEE

1,452 LF OF 12" DIP
&
1,440 LF OF 8" DIP

7 DOUBLE SERVICES

3 SINGLE SERVICES

1 FIRE HYDRANT

VERIFY SCALE
THESE PRINTS MAY BE REDUCED OR ENLARGED FROM THE ORIGINAL DRAWING.

NO.	DESCRIPTION	DATE	BY

REVISIONS

MORRISON MAIERLE, INC.
An Employee-Owned Company

Engineers
Schedulers
Planners

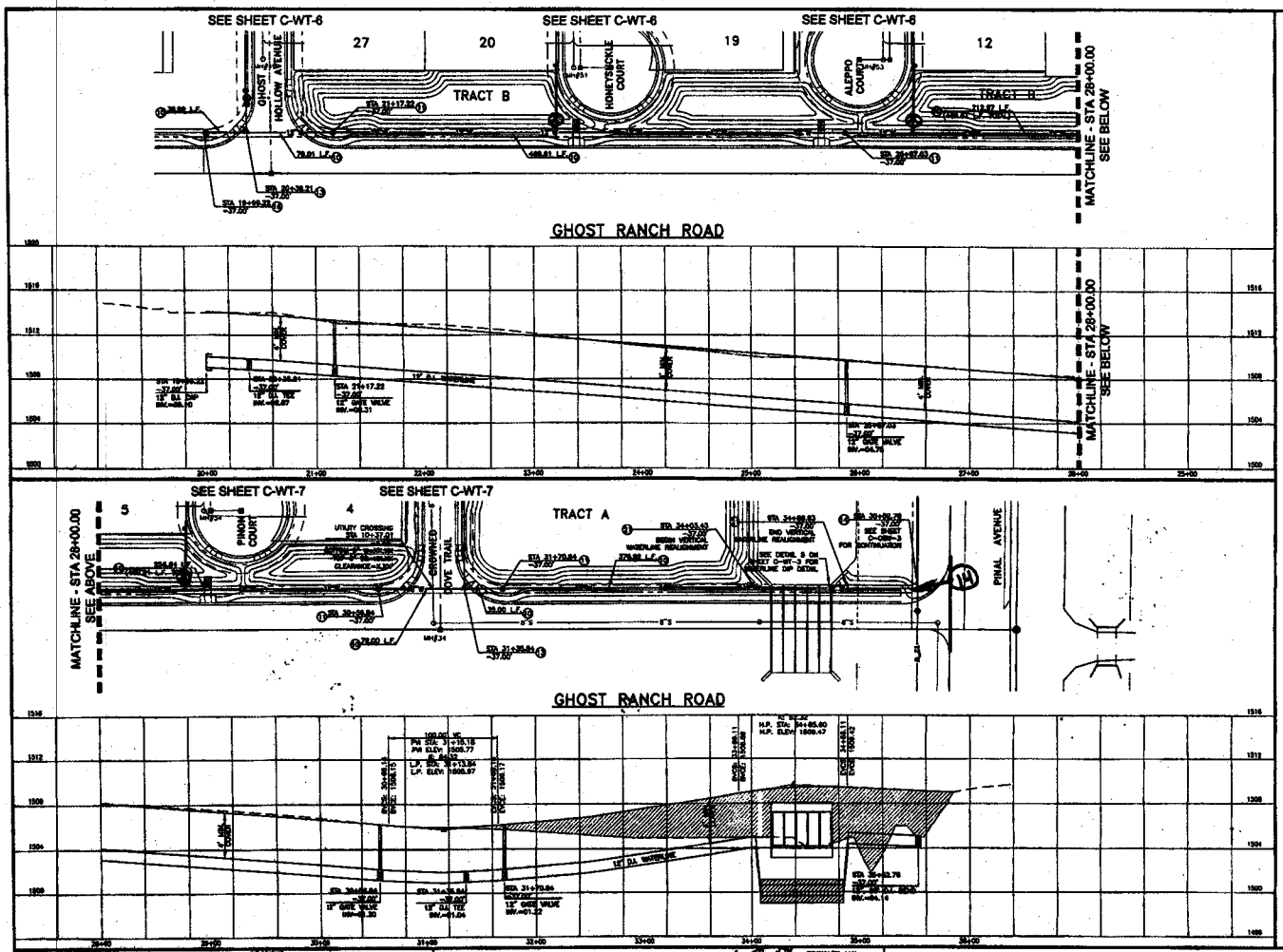
DRAWN BY: MM
CHKD. BY: JG
APPR. BY: DRP
DATE: 05/2004
C.A. REVIEW BY:
DATE:

CASA GRANDE — GHOST HOLLOW ESTATES PHASE 1 WATER PLANS — ARIZONA

WATER PLAN

PROJECT NUMBER
SHEET NUMBER 1 OF 1
C-WT-7

image4266 (14400x9700x2 tiff)



WATERLINE CONSTRUCTION NOTES

1. INSTALL 8" DUCTILE IRON WATERLINE, CLASS 50, LENGTH AS NOTED.
2. INSTALL 8" GATE VALVE, BOX AND COVER PER A.W.C. STD. DET. E-6-1-1, E-6-2-1 AND E-6-4-1.
3. INSTALL 8", D.I. CROSS, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
4. INSTALL 8", D.I. TEE, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
5. INSTALL 8" D.I. 90° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
6. INSTALL 8", D.I. 45° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
7. INSTALL 8", D.I. 22.5° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
8. INSTALL 8" D.I. 11.25° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
9. INSTALL 8" D.I. CAP.
10. INSTALL 12" DUCTILE IRON WATERLINE, CLASS 50, LENGTH AS NOTED.
11. INSTALL 12" GATE VALVE, BOX AND COVER PER A.W.C. STD. DET. E-6-1-1, E-6-2-1 AND E-6-4-1.
12. INSTALL 12", D.I. CROSS, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
13. INSTALL 12", D.I. TEE, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
14. INSTALL 12", D.I. 90° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
15. INSTALL 12", D.I. 45° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-6-6-1.
16. INSTALL 12" D.I. CAP.
17. INSTALL 3/4" SINGLE SERVICE CONNECTION PER A.W.C. STD. DET. E-6-8-1.
18. INSTALL 3/4" DOUBLE SERVICE CONNECTION PER A.W.C. STD. DET. E-6-10-1.
19. INSTALL PERPENDICULAR FIRE HYDRANT PER A.W.C. STD. DET. E-6-7-1.
20. INSTALL PARALLEL FIRE HYDRANT PER A.W.C. STD. DET. E-6-7-1.
21. INSTALL VERTICAL REALIGNMENT PER MAG STD. DET. 376. BLOCKING PER A.W.C. STD. DET. E-6-2-2.
22. INSTALL 2" BLOWOFF ASSEMBLY PER A.W.C. STD. DET. E-6-5-1.
23. INSTALL 12" X 8" [illegible]

TEE

N

40 20 0 40 80

SCALE: 1" = 40'

REVISIONS			
NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.
An Employee-Owned Company

DRAWN BY: LMS
CHKD. BY: JCL
APPR. BY: DRP
DATE: [illegible]
G.A. REVIEW BY:
DATE:

CASA GRANDE

GHOST HOLLOW ESTATES PHASE 1
WATER PLANS

ARIZONA

WATER PLAN

PROJECT NUMBER
SHEET NUMBER
DRAWING NUMBER

C-WT-8

image4267 (14400x9648x2 tiff)

GHOST HOLLOW ESTATES PHASE 2
WATER PLAN

A PLANNED AREA DEVELOPEMENT LOCATED WITHIN A PORTION OF THE SE 1/4 OF SECTION 17 T. 5S., R.6E. OF THE GILA AND SALT RIVER BASE MERIDIAN, PINAL COUNTY, ARIZONA

CITY OF CASA GRANDE GENERAL NOTES: CONSTRUCTION INSPECTION AND TESTING

1. ALL PUBLIC IMPROVEMENT CONSTRUCTION WITHIN THE PUBLIC RIGHT-OF-WAY AND ONSITE SHALL BE CONDUCTED IN ACCORDANCE WITH, AND CONFORM TO, THE LATEST EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION AND UNIFORM STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION BOTH AS PUBLISHED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS (M.A.G.).

2. INSPECTION OF WORK PER M.A.G. 105.10: THE ENGINEER SHALL BE PERMITTED TO INSPECT ALL MATERIALS, AND EACH PART OR DETAIL OF THE WORK, AT ANY TIME FOR THE PURPOSE OF EXPEDITING AND ENGINEERING THE PROGRESS OF WORK. HE SHALL BE FURNISHED WITH SUCH INFORMATION AND ASSISTANCE BY THE CONTRACTOR AS IS REQUIRED TO MAKE A COMPLETE AND DETAILED INSPECTION. THE CITY ENGINEER INFORMS THAT THE ORIGINAL TEST RESULT DATA SHEET (COMPANY ALL COMPACTION TEST RESULTS PERMITTED TO THE CITY'S INSPECTION. PASS/FAIL STANDARDS ARE NOT ACCEPTABLE WITHOUT THE ATTACHED DATA SHEET. FAILURE TO SUBMIT THE TEST RESULT DATA SHEETS WILL RESULT IN AN INCOMPLETE SUBMITTAL AND THE TEST WILL BE REJECTED.

3. IN THE EVENT OF CONFLICT BETWEEN M.A.G. STANDARD SPECIFICATIONS AND STANDARD DETAILS AND THESE PLANS, THOSE PLANS SHALL PREVAIL.

4. THE OFFICE OF THE CITY ENGINEER SHALL BE NOTIFIED AT LEAST FORTY-EIGHT (48) HOURS PRIOR TO THE COMMENCEMENT OF ANY WORK WITHIN THE CITY RIGHT-OF-WAY. TELEPHONE: 520-421-8625.

5. CONTRACTOR IS TO NOTIFY ALL PUBLIC UTILITIES AT LEAST TWO (2) WORKING DAYS PRIOR TO CONSTRUCTION, FOR FIELD LOCATIONS OF THEIR RESPECTIVE FACILITIES, BY CONTACTING THE FOLLOWING: BLUE STAKE NUMBER 1-800-782-5348.

6. CONTRACTOR SHALL COORDINATE AND MAKE ARRANGEMENTS FOR RELOCATION OF ANY UTILITIES CONFLICTING WITH THE PROPOSED CONSTRUCTION OF THESE PLANS, WITH THE APPROPRIATE UTILITY.

7. REMOVAL AND REPLACEMENT OF ALL TREES, SHRUBS, VEGETATION, MISCELLANEOUS STRUCTURES, DEBRIS, RUBBLE AND OTHER DELETERIOUS MATERIALS WITHIN THE LIMITS OF CONSTRUCTION SHALL BE AT THE CONTRACTOR'S EXPENSE.

8. ALL CONCRETE SIDEWALKS, DRIVEWAYS, APRONS, CROSS-PANS, VALLEY GUTTER, CURBS AND GUTTER LANDSCAPING AND IRRIGATION THAT MAY BE DAMAGED DURING THE COURSE OF CONSTRUCTION SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.

9. SHORING IS TO BE INSTALLED OR A TRENCH BOX IS TO BE USED, IN ALL TRENCHES IN EXCESS OF FIVE (5') FEET IN DEPTH. A REGISTERED CIVIL ENGINEER OR SOILS ENGINEER SHALL CERTIFY SHORING INSTALLATION PLANS. DETAILS AND INSTALLATION OF SHORING MUST CONFORM TO OSHA 29 CFR, PART 1926, AND SUBPART D.

10. COMPACTION TESTING IS REQUIRED AND MUST BE PERFORMED IN THE PRESENCE OF A REPRESENTATIVE OF THE CITY ENGINEER.

BACKFILL: BACKFILL WITHIN THE PUBLIC UTILITY EASEMENTS AND WITHIN PUBLIC STREET RIGHT-OF-WAY COMPACT TO 95% OF MAXIMUM THEORETICAL DENSITY PER ASTM D698. ALL MATERIALS OUTSIDE THE MOISTURE LIMIT SHALL BE CONSIDERED UNSUITABLE AND SUBJECT TO REMOVAL. NO HYDRAULIC COMPACTION OR WATER JET COMPACTION WILL BE ALLOWED. ALL COMPACTION MUST BE DONE BY MECHANICAL MEANS. MOISTURE LIMIT SPEC: 2.0 PERCENT BELOW OPTIMUM MOISTURE, MATERIAL SHALL BE UNIFORM.

SUB-GRADE: SUB-GRADE PREPARATION FOR ALL NEW STREETS AND ROADWAYS SHALL CONSIST OF SCARIFYING AND LOOSENING SUB-GRADE TO A DEPTH OF SIX (6") INCHES. SUB-GRADE SHALL BE CONTRACTED TO ACHIEVE UNIFORM MOISTURE CONTENT BY THE ADDITION OF WATER AND COMPACTED TO 95% OF MAXIMUM DENSITY. MOISTURE SHALL BE MAINTAINED BETWEEN OPTIMUM AND 4.0% BELOW OPTIMUM MOISTURE AND SHALL BE COMPACTED TO 95% OF MAXIMUM THEORETICAL DENSITY, AS DETERMINED BY ASTM D698. ALL MATERIALS OUTSIDE THE MOISTURE LIMIT AT THE TIME OF PLACEMENT AND COMPACTION SHALL BE CONSIDERED UNSUITABLE AND SUBJECT TO REMOVAL. THE FINISHED SURFACE OF THE SUB-GRADE SHALL NOT VARY FROM THE GRADES ESTABLISHED BY THE CITY ENGINEER BY MORE THAN 0.05 OF A FOOT ABOVE OR BELOW SPECIFIED GRADE.

11. INSTALL FOUR (4") INCHES OF AGGREGATE BASE COURSE MATERIAL COMPACTED TO 100% UNDER ALL SIDEWALKS, ALLEYWAY AND DRIVEWAY ENTRANCES.

12. GRADING OF AGGREGATE BASES AND AGGREGATE SUB-BASE SHALL BE AS FOLLOWS: AGGREGATE MATERIALS SHALL HAVE WATER ADDED TO THEM AND SHALL BE MIXED AND PROCESSED TO PRODUCE A UNIFORM BLEND OF MATERIAL BEFORE PLACEMENT. AFTER PROCESSING THE MATERIAL SHALL BE PLACED AND SPREAD ON THE PREPARED SUB-GRADE AND SHALL BE PLACED IN A UNIFORM LAYER OR LAYERS NOT EXCEEDING SIX (6") INCHES IN COMPACTED DEPTH, UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER. EACH LAYER OF AGGREGATE BASE SHALL BE COMPACTED TO A DENSITY OF NOT LESS THAN 100% OF THE MAXIMUM DENSITY. THE FINISHED SURFACE OF THE SUB-GRADE SHALL NOT VARY FROM THE GRADES ESTABLISHED BY THE CITY ENGINEER BY MORE THAN 0.05 OF A FOOT ABOVE OR BELOW SPECIFIED GRADE.

13. COMPACTION TESTING FOR SUB-GRADE WILL BE DONE AFTER THE SUB-GRADE HAS BEEN STRING LINED AND IS WITHIN TOLERANCE AND ACCEPTED BY THE CITY ENGINEER. THE CITY ENGINEER OR HIS REPRESENTATIVE WILL DIRECT THE NUMBER AND LOCATION OF COMPACT TESTS. ALL SUB-GRADES SHALL HAVE A SUBGRADE ELEVATION SET TO FINISHED GRADE AND LEFT AND RIGHT EDGES OF PAVEMENT, AND DEMARCATING OF WIDTHS.

14. ONE (1) SAND CONE TEST SHALL BE REQUIRED FOR EVERY TEN (10) NUCLEAR DENSITY TESTS PERFORMED, OR WHEN REQUESTED BY THE CITY ENGINEER OR HIS REPRESENTATIVE. THE CITY ENGINEER OR ENGINEER'S REPRESENTATIVE SHALL DETERMINE THE LOCATIONS OF THESE SAND CONE TESTS.

15. ALL MATERIALS, INCLUDING BUT NOT LIMITED TO AGGREGATE BASE COURSE, BORROW MATERIAL AND NATIVE MATERIAL WILL BE ACCEPTED IN PLACE ONLY. TESTING REQUIRED FOR ACCEPTANCE WILL INCLUDE A SIEVE ANALYSIS AND PLASTICITY INDEX (P.I.). DETERMINATION OF MAXIMUM THEORETICAL DENSITY WILL BE IN ACCORDANCE WITH ASTM D698. ONLY A FOUR-POINT PROCTOR TEST WILL BE ACCEPTED.

16. THE BASE COURSE SHALL NOT BE PLACED ON SUB-GRADE UNTIL THE CITY ENGINEER HAS ACCEPTED THE SUB-GRADE. ALL MATERIALS WILL BE ACCEPTED IN PLACE ONLY.

17. COMPACTION DENSITIES: M.A.G. TYPE I BACKFILL MATERIAL (SECTION 601.4.4) IS MODIFIED TO INCLUDE AREAS UNDER THE PAVEMENT, RIGHT-OF-WAY, AND EASEMENTS FOR ALL TRENCHES INCLUDING SEWER, WATER, ELECTRIC, GAS, TELEPHONE, AND STORM DRAINS. MOISTURE SPEC: 2.0 PERCENT BELOW OPTIMUM MOISTURE. COMPACT TO 95% OF MAXIMUM THEORETICAL DENSITY. ALL MATERIALS OUTSIDE THE MOISTURE SPEC-LIMIT SHALL BE CONSIDERED UNSUITABLE, SUBJECT TO REMOVAL AND MATERIAL SHALL BE UNIFORM.

18. THE LOCATION OF ALL SEWER STUB-OUTS SHALL BE STAMPED ON THE TOP OF VERTICAL CURB, AND FACE OF ROLLED CURBS, WITH A FOUR (4") INCH HIGH LETTERS DE "S".

19. ALL CURB, GUTTER AND SIDEWALK EXPANSION JOINT FILLER WILL BE ½" BITUMINOUS PRE-MOLDED STRIPS. ALL EXPANSION JOINT SPACING SHALL NOT EXCEED A MAXIMUM OF (50') FEET OR AS DIRECTED BY THE CITY ENGINEER. CONCRETE CURING COMPOUND MATERIAL SHALL BE A WHITE PIGMENT MEMBRANE USED ON ALL CONCRETE STRUCTURES INCLUDING CURB & GUTTER, SIDEWALK, HEADWALL, CATCH BASINS AND SIDEWALK RAMPS.

20. PAVING WILL NOT COMMENCE UNTIL AGGREGATE BASE COURSE COMPACTION AND GRADATION TESTS ARE COMPLETED AND THE CITY ENGINEER ACCEPTS THE RESULTS.

21. NO TRENCH IN PUBLIC RIGHT OF WAY SHALL BE LESS THAN TWELVE (12") INCHES IN WIDTH TO ENSURE PROPER COMPACTION AND TESTING.

22. USPS CLUSTER MAIL BOX LOCATIONS MUST BE PRE-DETERMINED AND NOTED ON THE CIVIL PLANS FOR GRADING AND PAVING. ADD CLUSTER BOXES TO LEGEND AND IN CONSTRUCTION NOTES. CLUSTER BOX LOCATIONS SHOULD BE SHOWN ON THE "OVERALL SEWER/WATER/HYDRANT/STREETLIGHT PLAN."

23. MEDIAN CURB & GUTTER BULL NOSE SHALL BE PAINTED YELLOW, WITH REFLECTIVE GLASS BEADS, PER M. A. G. STD.-233, AND HAVE YELLOW RAISED PAVEMENT REFLECTORS INSTALLED BEFORE THE PAINTING IS COMPLETE.

QUANTITIES - ONSITE-WATER

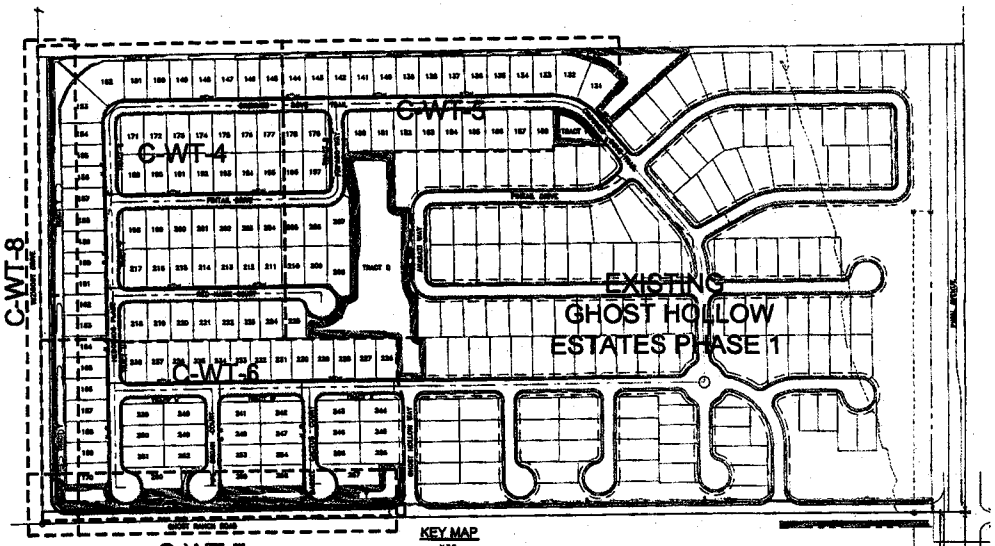
FOR ESTIMATING AND PERMITTING PURPOSES ONLY. ENGINEER MAKES NO GUARANTEE OF ACCURACY. IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE EXACT QUANTITIES BASED ON THE PLANS.

ITEM	DESCRIPTION	QUANTITY	UNIT
1	8" DUCTILE IRON WATERLINE	4,000	LF
2	8" 45° BEND	4	EA
3	8" 11.25° BEND	1	EA
4	8" 22.5° BEND	1	EA
5	8" 45° BEND	1	EA
6	8" 90° BEND	1	EA
7	8" 22.5° BEND	1	EA
8	8" 11.25° BEND	1	EA
9	12" DUCTILE IRON WATERLINE	2,000	LF
10	12" GATE VALVE	4	EA
11	12" 90° BEND	1	EA
12	12" CAP	1	EA
13	1" SINGLE SERVICE CONNECTION	20	EA
14	1" DOUBLE SERVICE CONNECTION	20	EA
15	2" SINGLE FIRE HYDRANT	20	EA
16	2" DOUBLE FIRE HYDRANT	10	EA
17	8" BLOWOFF ASSEMBLY	4	EA

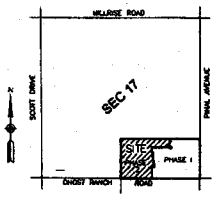
WATER DISTRIBUTION SYSTEM APPROVAL:

ALL WATER MAIN AND APPURTENANCES ARE TO BE INSTALLED AS PER ARIZONA WATER COMPANY'S STANDARD SPECIFICATIONS FOR THE INSTALLATION OF DUCTILE IRON WATER MAINS ON FILE WITH THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY. THIS APPROVAL DOES NOT APPLY TO PRIVATE DISTRIBUTION SYSTEMS ON THE CUSTOMER'S PREMISES. THIS APPROVAL IS VALID FOR A PERIOD OF EIGHTEEN MONTHS FROM THE DATE OF THIS APPROVAL AFTER WHICH TIME THE WATER DISTRIBUTION SYSTEM PLAN(S) ARE SUBJECT TO RE-REVIEW AND APPROVAL.

DATE OF APPROVAL: _____ APPROVED BY: _____



KEY MAP
N.T.S.



VICINITY MAP
N.T.S.

BENCHMARK

ADOT BC IN CONCRETE HEADWALL SW CORNER VAL VISTA & PINAL AVE (SR387) ELEVATION = 1478.48 (COCG datum)

BASIS OF BEARING:

BEARING FROM THE EAST 1/4 CORNER OF SECTION 17 TO THE NORTHEAST CORNER OF SECTION 17 = NORTH 00°00'46" WEST (LOCAL datum).

OWNER

MC HOMES
P.O. BOX 30826
MESA, AZ 85277-0826
TEL:(480)768-1104
FAX:(480)768-1105

ENGINEER

MORRISON MAIERLE, INC.
80 E. RIO SALADO PARKWAY
SUITE 301
TEMPE, AZ 85281
TEL: (480) 517-8800
FAX: (480) 517-8801
CONTACT: JOSUA PIKE
JOSHUA IBARRA

LEGEND

	CENTERLINE
	WATER LINE
	EXISTING ROW
	SEWER LINE
EX. 40.00	EXISTING SPOT ELEVATION
B/C	BACK OF CURB
R/W	RIGHT OF WAY
PUE	PUBLIC UTILITY
E/P	EDGE OF PAVEMENT
	FIRE HYDRANT
	VALVE

FILE COPY

SHEET INDEX

C-WT-1	COVER SHEET
C-WT-2	NOTES
C-WT-3	DETAILS
C-WT-4	WATER PLANS
C-WT-5	WATER PLANS
C-WT-6	WATER PLANS
C-WT-7	WATER PLANS
C-WT-8	WATER PLANS

FIRST REVIEW
OCT 6 4 2006

602-263-1100
1-800-STAKE-IT

VERIFY SCALE	REVISIONS			
	NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.
An Employee Owned Company

GHOST HOLLOW ESTATES PHASE 2
WATER PLANS

CASA GRANDE ARIZONA

COVER SHEET

PROJECT NUMBER
SHEET NUMBER
DRAWING NUMBER
C-WT-1

image4268 (14400x9570x2 tiff)

CONSTRUCTION SPECIFICATIONS FOR THE INSTALLATION OF WATER DISTRIBUTION SYSTEMS-DUCTILE IRON

1. GENERALLY, ALL WORK IS TO BE COMPLETED IN A SAFE, WORKMANLIKE MANNER AND IN ACCORDANCE WITH THESE CONSTRUCTION SPECIFICATIONS; ANY DEVIATION THEREFROM MUST BE APPROVED IN WRITING BY THE COMPANY. INSTALLATIONS MUST CONFORM WITH THE REQUIREMENTS OF ALL GOVERNMENTAL REGULATING AGENCIES AND THE COST OF CONFORMING TO SUCH REGULATIONS MUST BE INCLUDED IN THE UNIT BID PRICES. EXAMPLES OF SUCH REGULATIONS, WITHOUT ATTEMPTING TO BE INCLUSIVE, ARE: A. SPECIAL COMPACTION AND PAVING FOR STREET CROSSING. B. SHORING WHEN REQUIRED BECAUSE OF THE TRENCH DEPTH. C. CLOSING A TRENCH IN THOSE AREAS WHERE NO OPEN TRENCH IS ALLOWED OVERNIGHT. D. BARRICADING AND TRAFFIC CONTROL AS REQUIRED.

2. LOCATION MARKING ALIGNMENT STAKES AS REQUIRED IN THE OPINION OF THE COMPANY SHALL BE FURNISHED BY THE COMPANY TO THE CONTRACTOR AND SHALL BE SET BY THE COMPANY AT AGREED UPON INTERVALS AND OFFSETS. UNDER NORMAL CIRCUMSTANCES THESE WILL REFERENCE THE PIPELINE LOCATION FIVE FEET (5') INTO THE RIGHT-OF-WAY OR MEASURED FROM PROPERTY PINS. GRADE STAKES WILL BE PROVIDED ONLY WHEN THE CONSTRUCTION DRAWINGS SHOW A PIPELINE DEPTH OTHER THAN COVERED IN THESE SPECIFICATIONS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PRESERVE ALL SURVEY WORK.

3. TRENCH EXCAVATION THE TRENCH LOCATION IS TO BE DETERMINED BY THE CONSTRUCTION DRAWINGS. FOR 8-INCH OR SMALLER PIPE: THE DEPTH OF THE TRENCH PRIOR TO PIPE LAYING SHALL BE SUCH THAT THE FINISHED PIPELINE SHALL HAVE BETWEEN THIRTY-SIX INCHES (36") AND FORTY-TWO INCHES (42") OF COVER OVER THE TOP OF PIPE UNLESS OTHERWISE SPECIFIED ON THE CONSTRUCTION DRAWINGS. FOR 12-INCH AND LARGER PIPE: THE DEPTH OF THE TRENCH PRIOR TO PIPE LAYING SHALL BE SUCH THAT THE FINISHED PIPELINE SHALL HAVE BETWEEN FORTY-EIGHT INCHES (48") AND SIXTY INCHES (60") OF COVER OVER THE TOP OF PIPE UNLESS OTHERWISE SPECIFIED ON THE CONSTRUCTION DRAWINGS. THE WIDTH OF THE TRENCH AT AND BELOW THE LEVEL AT THE TOP OF THE PIPE SHALL BE A MINIMUM OF TWELVE (12") PLUS THE OUTSIDE DIAMETER OF THE PIPE BARREL AND A MAXIMUM OF TWENTY-FOUR INCHES (24") PLUS THE OUTSIDE DIAMETER OF THE PIPE BARREL. THE BOTTOM OF THE TRENCH SHALL BE ACCURATELY GRADED TO PROVIDE A UNIFORM BEARING FOR EACH LENGTH OF PIPE FOR THE FULL LENGTH OF THE PIPE. IF THE NATIVE MATERIAL ON THE TRENCH BOTTOM CAN BE REASONABLY DUG BY HAND, BELL HOLES SHALL BE DUG FOR THE JOINTS SO THAT THE JOINTS IN NO WAY SUPPORT THE PIPE. WHEN NATIVE MATERIALS SUCH AS ROCK ARE ENCOUNTERED DURING TRENCHING THAT WILL NOT PROVIDE A UNIFORM SUPPORT FOR THE PIPE, THE TRENCH WILL BE OVER-EXCAVATED AN ADDITIONAL SIX INCHES (6") AND SUITABLE BEDDING MATERIAL WILL BE PLACED IN THE TRENCH. BEDDING MATERIAL WILL BE PLACED BY HAND IN FOUR INCH (4") LIFTS AND COMPACTED TO ENSURE UNIFORM COMPACTION AND TO ELIMINATE ANY VOIDS UNDER THE PIPE WHEN THE SPACE BETWEEN THE PIPE AND TRENCH BOTTOM VARIES. THIS MUST BE BACKFILLED AND COMPACTED IN FOUR INCH (4") LIFTS TO THE MID-SECTION OF THE PIPE. WHENEVER THE TRENCH IS OVER-EXCAVATED FOR WHATEVER REASON, THE TRENCH BOTTOM WILL BE BROUGHT UP TO THE CORRECT DEPTH AT THE CONTRACTOR'S EXPENSE USING EITHER METHOD (A) OR (B) AS FOLLOWS: A. A.B.C. MATERIAL SHALL BE USED AND COMPACTED TO A UNIFORM DENSITY OF NOT LESS THAN 90% OF THE MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99 METHOD A AND T-191. B. NATIVE MATERIAL 100% OF WHICH WILL PASS THROUGH A ONE AND ONE HALF INCH (1 1/2") SCREEN AND AT LEAST 20% OF WHICH WILL PASS THROUGH NUMBER-8 SCREEN SHALL BE USED AND COMPACTED TO A UNIFORM DENSITY OF NOT LESS THAN 95% OF THE MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99 METHOD A AND T-191.

4. MATERIALS TO BE PROVIDED BY CONTRACTOR UNLESS OTHERWISE SPECIFIED ON THE CONSTRUCTION DRAWING OR IN THE CONTRACT. THE CONTRACTOR WILL SUPPLY ALL OF THE NECESSARY MATERIAL WHICH WILL BECOME A PERMANENT AND INTEGRAL PART OF THE WATER DISTRIBUTION SYSTEM, INCLUDING CONCRETE BLOCKING, ANCHORS, BACKFILL MATERIAL, PAVING MATERIAL AND SUPPLIES USED DURING THE PROSECUTION OF THE WORK. ALL MATERIALS PROVIDED BY THE CONTRACTOR TO CONSTRUCT THE WATER DISTRIBUTION SYSTEM MUST BE NSF STANDARD 61 APPROVED. ALL POTABLE WATER PIPES AND FITTINGS SHALL HAVE NSF-PW SEAL. CONSTRUCTION MATERIALS USED IN THE WATER SYSTEM SHALL BE LEAD FREE AS DEFINED AT AAC R36-4-504 AND R18-1-101. THE CONTRACTOR WILL PROVIDE THE FOLLOWING MATERIAL:

   A. FIRE HYDRANTS: MUELLER SUPER CENTURION 250 FIRE HYDRANT, MEETS ANSI/AWWA C502 STANDARD, MODEL NO. A-421, 4 1/2" MAIN VALVE OPENING, THREE WAY, 6" MECHANICAL JOINT SHOE, 1 1/2" PENTAGON OPERATING NUT, COLOR-YELLOW, DRAIN OPEN, OPEN DIRECTION-LEFT, 4' OR 4'6" BURY DEPENDING ON APPLICATION FOR PUMPER AND HOSE NOZZLE INFORMATION SEE BELOW. (1) 1-4" PUMPER NOZZLE, NST AND 2-2 1/2" HOSE NOZZLES, NST. (THESE LOCATIONS ONLY: AJO, CASA GRADE, COOLIDGE AND SAN MANUEL.) (2) 1-4 1/2" PUMPER NOZZLE, NST AND 2-2 1/2" HOSE NOZZLES, NST. (THESE LOCATIONS ONLY: APACHE JUNCTION, ARIZONA CITY, LAKESIDE, ORACLE, OVERGAARD, PINEWOOD, RIMROCK, SEDONA, SIERRA VISTA, WHITE TANK AND WINKELMAN.) (3) 1-4 1/2" PUMPER NOZZLE, NST AND 2-2 1/2" HOSE NOZZLES, NPT (BISBEE ONLY.) (4) 1-3" PUMPER NOZZLE GA 6-350 (6 THREADS PER INCH, 3.50 PITCH DIAMETER) AND 2-2 1/2" HOSE NOZZLES, NPT (MIAMI ONLY.) (5) 1-3 1/2" PUMPER NOZZLE GA 6-411 (6 THREADS PER INCH, 4.11 PITCH DIAMETER) AND 2-2 1/2" HOSE NOZZLE, NST (SUPERIOR ONLY.)

   B. FITTINGS: MANUFACTURED BY TYLER OR UNION. CROSSES, ELBOWS, TEES, CAP, REDUCER, ADAPTER, PLUG, BLIND FLANGE AND TAPPED FLANGE: DUCTILE IRON, CLASS 350, SSB, CAST IRON CEMENT LINED. (1) FOSTER ADAPTORS FOR MJ, MADE BY IMPACT CORPORATION: AVAILABLE IN SIZES 4" TO 16". PART NO. 4"=4FA-8C, 6"=6FA-8C, 8"=8FA-8C, 10"=10FA-8C, 12"=12FA-8C, 16"=16FA-8C.

   C. DETECTOR CHECK VALVE: MUELLER/HERSEY DDC III, IRON BODY, INCLUDING 5/8" X 3/4" TRIM KIT. TRIM KIT PART NO: 4"=262080, 6"=262082, 8"=262085, 10"=262405.

   D. GATE VALVES: MUELLER RESILIENT WEDGE GATE VALVES, MEETS AWWA C509 SPECIFICATION, 250 PSIG, NON RISING STEM, PART NO. A-2360, LOW ZINC STEMS, EPOXY COATED WEDGE AND CASING TO MEET THE NSF 61 RATING. THE BONNET AND STUFFING BOX SHALL HAVE 304 STAINLESS STEEL NUTS/BOLTS.

   E. MEGALUG: MECHANICAL JOINT RESTRAINT MADE OF DUCTILE IRON CONFORMING TO ASTM 536-80, 250 PSI MADE BY EBAA IRON, INC., SERIES 1100 OR EQUAL.

   F. METER BOXES: AVAILABLE FROM U.S. FILTER: (1) CONCRETE BOX WITH A STEEL REGULAR LID, NUMBER 1: TUCSON SPECIFICATION. (2) CONCRETE BOX WITH A STEEL REGULAR LID, NUMBER 2, 3 AND 4: PHOENIX SPECIFICATION.

   G. PIPE, COPPER: TYPE K SOFT COPPER IN 60 OR 100 FOOT COILS.

   H. PIPE, DUCTILE IRON: DUCTILE IRON PIPE, CEMENT LINED, PUSH-ON, CONFORM TO CURRENT ANSI/AWWA SPECIFICATION A21.51/C151. PRESSURE CLASS 350 (SIZES 4" THROUGH 12"), PRESSURE CLASS 250 (SIZES 14" THROUGH 20"), OR PRESSURE CLASS 200 FOR 24" PIPE. VENDORS: (1) PACIFIC STATES CAST IRON PIPE COMPANY (2) GRIFFIN PIPE (3) UNITED STATES PIPE AND FOUNDRY COMPANY (4) AMERICAN DUCTILE IRON PIPE.

   I. PIPE, PLASTIC: PLASTIC PIPE, C-900 PVC PER ANSI/AWWA C900, DR18, CLASS 150, SIZES 6" THROUGH 12". NSF 61 APPROVED. FURNISHED IN LAYING LENGTHS OF 20'.

   J. COUPLING: MEULLER, STRAIGHT THREE PART UNION, TESTED TO MEET ANSI/AWWA C800, H15403, 110 CONDUCTIVE COMPRESSION. VIKING JOHNSON BRAND, SOLD BY MUELLER: MAXIFIT STRAIGHT (2"-24"), MAXIFITXTRA STRAIGHT (4"-6") OR MAXISTEP TRANSITION. TESTED TO MEET AWWA/ANSI C.219-91 SPECIFICATION CERTIFIED TO ISO 9001:1994.

   K. STOP, ANGLE METER, BALL: MUELLER, VALVE, B24258, 110 CONDUCTIVE COMPRESSION BY METER SWIVEL NUT, TESTED TO MEET ANSI/AWWA C800, SIZE 5/8" X 3/4" X 3/4" FOR A 3/4" SERVICE OR SIZE 1" FOR A 1" SERVICE. MUELLER, VALVE, B24265, FEMALE PIPE THREAD BY METER SWIVEL NUT, TESTED TO MEET ANSI/AWWA C800, SIZE 3/4" X 5/8" X 3/4" FOR A 3/4" SERVICE OR SIZE 1" FOR A 1" SERVICE. MUELLER, VALVE, H14351, STRAIGHT METER VALVE, FEMALE PIPE THREAD BY METER SWIVEL NUT, TEST TO MEET ANSI/AWWA C800, SIZE 3/4" X 3/4" X 3/4" FOR DOUBLE SERVICES.

   L. STOP, CORP: MUELLER, BALL VALVE, B2500B, CC THREAD BY 110 CONDUCTIVE COMPRESSION, TESTED TO MEET ANSI/AWWA C800 SPECIFICATION, SIZES: 3/4", 1" AND 2". MUELLER, ORI-CORP VALVE, H15013, CC THREAD BY 110 CONDUCTIVE COMPRESSION, TESTED TO MEET ANSI/AWWA C800 SPECIFICATION, SIZE: 2".

   M. STOP, CURB: MUELLER ORISEAL VALVE, H10281, IRON PIPE THREAD BY IRON PIPE THREAD, QUARTER TURN CHECK, BRASS, TESTED TO 300 PSI WORKING PRESSURE, TESTED TO MEET ANSI/AWWA C800 SPECIFICATION, SIZE: 2".

   N. TAPPING SLEEVE: SMITH BLAIR, CAST BRONZE ASTM-B584 85-5-5-5, DOUBLE STRAP, IRON PIPE THREADS. MODELS 321 AND 323. WASHERS ARE SILICON BRONZE, ASTM-B36. GASKETS ARE GRADE 60 BUNA N. OR MUELLER BRONZE DOUBLE STRAP SERVICE SADDLE, BR 2 B SERIES, CAST BRONZE, ASTM-B585, 85-5-5-5, OR H16094, 200 PSIG, MEETS ANSI/AWWA C800.

   O. TAPPING SLEEVE: MUELLER H304 STAINLESS STEEL TAPPING SLEEVE, JCM 432 18-8 TYPE 304 STAINLESS STEEL TAPPING SLEEVE, ROMAC "SST" TYPE 304 STAINLESS STEEL TAPPING SLEEVE OR CASCADE-STYLE CST-EX STAINLESS STEEL PRESSURE-RATED TAPPING SLEEVE.

   P. U-BRANCH: MUELLER, H1363, 1" 110 CONDUCTIVE COMPRESSION BY 3/4" MALE, MEETS ANSI/AWWA C800 SPECIFICATION, SIZE: 1" X 3/4" X 13 1/2", STRAIGHT LINE.

   Q. VALVE BOXES: VALVE BOX WITH COVER, ADJUSTABLE, TYLER 562-A OR EQUAL, MADE OF CAST IRON.

   R. VAULTS: UTILITY VAULT COMPANY, CHANDLER, AZ. (1) 4484-WA CONCRETE VAULT WITH A 3660 ALUMINUM DOUBLE TORSION DOOR WITH A RECESSED PADLOCK HASP, TWO-16" X 24" CENTER KNOCKOUTS. (2) 576-WA CONCRETE VAULT WITH A 4874 ALUMINUM DOUBLE TORSION DOOR WITH A RECESSED PADLOCK HASP, TWO-16" X 24" CENTER KNOCKOUTS AND ADJUSTABLE FRAME. (3) 612-EX-WA CONCRETE VAULT WITH A 4874 ALUMINUM DOUBLE TORSION DOOR WITH A RECESSED PADLOCK HASP, TWO- 16" X 24" CENTER KNOCKOUTS.

   S. YOKES, METER: RELOCATOR TYPE COPPER METER YOKE WITH HORIZONTAL INLET AND OUTLET AND METER THREAD ENDS, H14118, WITH LOCK WING GROUND KEY ANGLE METER STOP, SIZES" 1" X 12", 5/8" X 3/4" X 7", 5/8" X 3/4" X 9.

   T. AIR RELEASE VALVE: CRISPIN MODEL AR10 WITH 1" NPT INLET AND 1/2" NPT OUTLET, CAST IRON BODY AND TOP FLANGE: WITH A 5/64" ORIFICE WITH STAINLESS STEEL VALVE SEALING FACES AND BUNA-N RUBBER.

   U. PRESSURE RELIEF VALVE: WATTS 174A, MODEL M, 2" INLET, 2" OUTLET, BRONZE BODY, 30LB. TO 100LB. PRESSURE RANGE.

   V. POLYETHYLENE ENCASEMENT: FOR ALL PIPELINE AND RELATED FITTINGS INSTALLED, EXCEPT FOR THE COOLIDGE DIVISION. MINIMUM 8 MIL. AND INSTALLED PER AWWA C105/A21.5-93 AND ASTM A-674-95. MANUFACTURED BY THE PACIFIC STATES CAST IRON PIPE COMPANY.

   W. BUTTERFLY VALVES: MUELLER CATALOG NUMBER 3211, 150 PSI MAXIMUM WORKING PRESSURE, ANSI/AWWA C504 AND NSF61 CERTIFIED. EPOXY INTERIOR/EXTERIOR. SIZES 16" THROUGH 36".

   X. TAPPING VALVE: MEULLER DOUBLE DISC TAPPING VALVE, CATALOG NUMBER H667, CLASS 125, SIZES 4" THROUGH 24", FLANGE BY MECHANICAL JOINT PER ANSI/AWWA C111. IRON BODY, DOUBLE DISC, NON-RISING STEM. EPOXY COATED INTERIOR/EXTERIOR PER ANSI/AWWA C550 FOR NSF 61 COMPLIANCE. 200 PSI RANGE FOR VALVES 4" TO 12", 150 PSI RANGE FOR VALVES 16" TO 24". THE CONTRACTOR ALSO WILL BE REQUIRED TO PROVIDE THE FOLLOWING MATERIALS, THE COST OF WHICH WILL BE INCLUDED IN ITS UNIT BID PRICE: ALL MATERIAL AND CONCRETE FOR THRUST BLOCKS, OWNER ANCHORS, REINFORCING STEEL; ALL GRAVEL, CRUSHED STONE, A.B.C. EARTH, SAND, OR SCREENED MATERIAL WHICH MAY BE REQUIRED: ALL MATERIAL FOR BRACING AND SHORING TRENCHES AND FOR CONSTRUCTION OF FORMS; ALL BARRICADES AND TRAFFIC CONTROL EQUIPMENT; ALL MATERIAL FOR PAVING REPLACEMENT AND ANY WATER USED FOR COMPACTION OF BACKFILL.

5. INSTALLATION OF MATERIALS
ALL MATERIALS ARE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS UNLESS OTHERWISE DIRECTED BY THESE SPECIFICATIONS. ALL PIPE, FITTINGS AND VALVES SHALL BE LAID TRUE TO THE LINES, GRADES AND LOCATIONS ESTABLISHED BY THE SPECIFICATIONS AND THE CONSTRUCTION DRAWINGS. THE ENDS AND INSIDE THE PIPE SHALL BE THOROUGHLY CLEANED AND INSPECTED FOR DAMAGE. NO DAMAGED MATERIALS SHALL BE INSTALLED IN THE WATER DISTRIBUTION SYSTEM. WHENEVER THE WORK CEASES FOR ANY REASON, ALL OPEN PIPELINE ENDS SHALL BE TIGHTLY PLUGGED BY THE CONTRACTOR. CONCRETE THRUST BLOCKS OF THE SIZES REQUIRED BY THE PLANS SPECIFICATIONS ARE TO BE PROVIDED AT ALL VALVES, CHANGES IN DIRECTION OR SIZE, OR AT ANY OTHER POINT WHERE AN UNBALANCED THRUST DUE TO WATER PRESSURE WOULD EXIST. THRUST BLOCKS ARE TO BE FORMED TO PREVENT ANY CONCRETE FROM SPILLING OVER OR INTO A JOINT. TRENCH CURVES AS SHOWN ON THE CONSTRUCTION DRAWINGS MAY BE MADE WITHOUT FITTINGS WHEN USING PIPE UP TO TWELVE INCHES (12") IN DIAMETER, IF THE DEFLECTION OF THE PIPE DOES NOT EXCEED FIVE DEGREES (5°) OR NINETEEN INCHES (19") PER EIGHTEEN FOOT (18') LENGTH OF PIPE. THE MINIMUM RADIUS OF SUCH CURVES WILL BE TWO HUNDRED FIVE FEET (205').

   A. PRIOR TO CONSTRUCTION. THE APPROPRIATE AGENCY(IES) WILL BE NOTIFIED AS REQUIRED BY THE PERMIT(S).

   B. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO UNCOVER ALL EXISTING WATER LINES BEING CONNECTED TO, AND TO VERIFY THE LOCATION, DEPTH AND SIZE OF PIPE BEFORE ANY CONSTRUCTION BEGINS.

   C. ANY CONSTRUCTION PERFORMED WITHOUT THE KNOWLEDGE OF THE DULY AUTHORIZED REPRESENTATIVE IS LIABLE FOR REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.

   D. ALL FIRE HYDRANTS, FRAMES, COVERS AND VALVE BOXES, ETC SHALL BE ADJUSTED TO FINISHED GRADE PRIOR TO THE PLACING OF ASPHALTIC CONCRETE SURFACE COURSE BY THE CONTRACTOR (WHERE APPLICABLE).

   E. AIR RELEASE VALVES SHALL BE INSTALLED AT WATER SYSTEM HIGH POINTS PER STANDARD DETAIL E-9-8-2.

   F. ALL WATER SERVICES SHALL BE SET A MINIMUM OF TWO FEET (2') ON THE CUSTOMER'S PROPERTY, PREFERABLY WITHIN THE P.U.E. AND NOT WITHIN RIGHT-OF-WAY.

   G. UNLESS OTHERWISE SPECIFIED ON THE CONSTRUCTION DRAWINGS, ALL WATER MAINS SHALL BE INSTALLED FIVE FEET (5') FROM THE PROPERTY LINE INSIDE THE RIGHT-OF-WAY OR EASEMENT.

   H. WATER VALVES SHALL BE SPACED NOT MORE THAN FIVE HUNDRED FEET (500') IN COMMERCIAL DISTRICTS AND NOT MORE THAN EIGHT HUNDRED FEET (800') IN OTHER DISTRICTS. VARIATIONS MAY BE REQUIRED FOR TRANSMISSION MAINS OR SPECIAL APPLICATIONS.

   I. INSTALLATION OF WATERLINE CASING SHALL BE PER STANDARD SPECIFICATION E-9-34-1.

6. BACKFILL OF WATER MAIN TRENCHES BACKFILL OF ANY EXCAVATION SHALL CONFORM TO THE REQUIREMENTS OF ANY OF THE GOVERNMENTAL AGENCIES HAVING JURISDICTION OVER THE LOCATION. IF NO GOVERNMENTAL AGENCY HAVING SUCH JURISDICTION SPECIFIES BACKFILL OR COMPACTION REQUIREMENTS, AND NO SPECIAL REQUIREMENTS ARE SHOWN ON THE CONSTRUCTION DRAWINGS, THE PROCEDURE SET FORTH IN THIS SECTION WILL APPLY FOR WATER LINE TRENCHES. THE BEDDING MATERIAL ABOVE THE PIPE AND BACKFILL MATERIAL SHALL BE COMPACTED TO A MINIMUM OF 70% COMPACTION WITHIN A UTILITY EASEMENT AND 90% COMPACTION WITHIN A RIGHT-OF-WAY AS DETERMINED BY AASHTO T-99 METHOD A AND T-191. IF WATER SETTLING IS USED FOR COMPACTION, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PREVENT THE PIPE FROM FLOATING. THE BEDDING MATERIAL SHALL BE EITHER NATIVE MATERIAL, 100% OF WHICH WILL PASS THROUGH A ONE AND ONE-HALF INCH (1 1/2") SCREEN AND AT LEAST 20% OF WHICH WILL PASS THROUGH A NUMBER-8 SCREEN, OR IMPORTED MATERIAL WHICH CONFORMS TO M.A.G. SPECIFICATIONS FOR A.B.C. OR TYPE-B SELECT MATERIALS. BEDDING MATERIAL SHALL BE USED BELOW AND AROUND THE PIPE, AND A MINIMUM OF TWELVE INCHES (12") ABOVE THE PIPE. THE REMAINDER OF THE TRENCH SHALL BE BACKFILLED WITH NATIVE OR IMPORTED MATERIAL WHICH SHALL BE OF SOUND EARTHEN MATERIAL FREE FROM BROKEN CONCRETE, WOOD, BROKEN PAVEMENT, OR OTHER UNSUITABLE SUBSTANCES. EXCEPT AS OTHERWISE SPECIFIED, BACKFILL MAY BE MATERIAL CONTAINING NO PIECES LARGER THAN EIGHT INCHES (8") IN GREATEST DIMENSION. WHERE SETTLEMENT OCCURS, ADDITIONAL BACKFILL MATERIAL SHALL BE PLACED AND COMPACTED AND THE TRENCH SHALL BE BROUGHT TO FINAL GRADE.

7. HYDROSTATIC TESTING OF COMPLETED PIPELINES HYDROSTATIC TESTING OF WATER PIPELINES WILL BE COMPLETED BEFORE THE NEW SYSTEM IS CONNECTED INTO THE EXISTING WATER SYSTEM SO THAT ALL TESTING CAN BE DONE AGAINST ALL NEW MATERIALS. THE COMPLETED SECTION OF WATER PIPELINE TO BE TESTED SHALL BE SLOWLY FILLED WITH WATER WITH CARE BEING TAKEN TO EXPEL ALL AIR FROM THE PIPE. IF NECESSARY, THE PIPE WILL BE TAPPED AT HIGH POINTS TO VENT AIR. THE CONTRACTOR SHALL PROVIDE ALL EQUIPMENT AND LABOR NECESSARY TO ACCOMPLISH THIS TESTING AND THE PRICE SHALL BE INCLUDED IN THE UNIT PRICES. THE CONTRACTOR SHALL NOTIFY THE COMPANY IN ADVANCE OF THE TESTING SO THAT THE COMPANY CAN SCHEDULE A DULY AUTHORIZED REPRESENTATIVE TO BE AT THE SITE DURING TESTING. THE CONTRACTOR, AT ITS OWN EXPENSE, SHALL MAKE ANY NECESSARY REPAIRS TO THE SYSTEM BEING TESTED IN ORDER TO CAUSE THE SECTION BEING TESTED TO MEET THE TEST LIMITS SET BELOW. THE CONTRACTOR MAY REQUEST AUTHORIZATION OF THE COMPANY TO CONNECT THE NEW PIPELINES TO THE EXISTING SYSTEM PRIOR TO COMPLETION OF PRESSURE TESTING WHEN, IN THE COMPANY'S SOLE OPINION AND JUDGMENT, CONDITIONS WARRANT SUCH CONNECTION, THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY TO COMPLETE PRESSURE TESTING TO COMPANY'S SPECIFICATIONS AFTER SUCH CONNECTION, INCLUDING, BUT NOT LIMITED TO, ISOLATION OF THE NEW PIPELINES FROM THE EXISTING SYSTEM, IF NECESSARY. CONNECTIONS PRIOR TO COMPLETION OF PRESSURE TESTING SHALL NOT BE MADE UNLESS PRIOR COMPANY AUTHORIZATION HAS BEEN OBTAINED, AND ANY EXTRA EXPENSES RESULTING FROM SUCH CONNECTIONS SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. LEAKAGE TESTS WILL BE FOR A PERIOD OF TWO HOURS AT 200 PLUS OR MINUS 5 PSI AT THE POINT OF LOWEST ELEVATION; LEAKAGE MAY NOT EXCEED 0.1 GALLONS PER HOUR PER ONE THOUSAND FEET (1,000') OF PIPE PER INCH OF DIAMETER.

8. STERILIZATION AND FLUSHING OF COMPLETED WATER PIPELINES STERILIZATION AND FLUSHING WILL CONFORM TO RECOMMENDATIONS OF ARIZONA STATE DEPARTMENT OF HEALTH SERVICES ENGINEERING BULLETIN NUMBER 8, LATEST EDITION, OR ANY FUTURE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY BULLETINS.

9. NO OTHER UTILITIES ALLOWED IN OR NEAR WATER PIPELINE TRENCHES NO OTHER UTILITY INSTALLATIONS WILL BE PERMITTED IN THE WATER PIPELINE TRENCH OR WITHIN FIVE FEET (5') OF THE COMPANY'S WATER PIPELINE WHEN RUNNING PARALLEL TO THE WATER PIPELINES.

10. PROTECTION OF WATER MAINS NEAR SEWERS WATER/SEWER LINE(S) SEPARATION SHALL BE IN ACCORDANCE WITH AAC R18-4-502C. WATER LINE(S) SEPTIC SYSTEMS SEPARATION SHALL BE IN ACCORDANCE WITH AAC R18-9-A312C.

11. COMPACTION WHEN CROSSING EXISTING WATER MAINS A MINIMUM OF 95% COMPACTION IS REQUIRED TO THE BOTTOM OF EXISTING MAINS. ARIZONA WATER COMPANY REQUIRES THAT NO SLURRY BE PERMITTED TO CONTACT EXISTING CEMENT/ASBESTOS OR DUCTILE IRON PIPES. SLURRY MAY BE POURED IN THE BOTTOM OF THE SEWER TRENCH STOPPING THREE INCHES(3") BELOW THE EXISTING WATER MAIN. THE BACKFILL USED AROUND THE MAIN SHOULD BE ABC IN SUFFICIENT DEPTH TO PREVENT SLURRY FROM CONTACTING EXISTING MAIN.

12. WATER MAIN MATERIAL SPECIFICATION DUCTILE IRON PIPE (PUSH-ON TYPE) MINIMUM CLASS 350, CEMENT LINED AND CONFORM TO AWWA C151. ALL MAIN LINE VALVES SHALL CONFORM TO AWWA C500 WITH A MINIMUM WORKING PRESSURE OF 200 PSI. ALL CAST IRON FITTINGS TO BE CEMENT LINED IN ACCORDANCE WITH AWWA C104 AND SHALL CONFORM TO AWWA C110 WITH A MINIMUM WORKING PRESSURE OF 250 PSI. EXCEPT FOR THE COOLIDGE SYSTEM - SEE NOT 4.I A. MAXIMUM JOINT DEFLECTION FOR 6" MECHANICAL JOINT DUCTILE IRON PIPE IS SEVEN DEGREES, SEVEN MINUTES (7°7') OR TWENTY-SEVEN INCHES (27") PER EIGHTEEN FOOT (18') LENGTH PIPE, FOR A MAXIMUM CURVE OF ONE HUNDRED FORTY FIVE FEET (145'). B. MAXIMUM JOINT DEFLECTION FOR 8" & 12" MECHANICAL JOINT DUCTILE IRON PIPE IS FIVE DEGREES, TWENTY ONE MINUTES (5°21') OR TWENTY INCHES (20") PER EIGHTEEN FOOT (18') LENGTH PIPE, FOR A MAXIMUM CURVE OF ONE HUNDRED NINETY FIVE FEET (195'). C. MAXIMUM JOINT DEFLECTION FOR 6", 8" & 12" PUSH-ON JOINT DUCTILE IRON PIPE IS FIVE DEGREES (5°) OR NINETEEN INCHES (19") PER EIGHTEEN FOOT (18') LENGTH PIPE FOR A MAXIMUM CURVE OF TWO HUNDRED FIVE FEET (205').

WATER MAIN NOTES

1. ALL PROPOSED PUBLIC AND/OR PRIVATE UTILITIES SHALL BE INSTALLED ON THE OPPOSITE SIDE OF RIGHT-OF-WAY FROM THE PROPOSED WATER MAINS WHENEVER POSSIBLE.

2. WATER DISTRIBUTION DESIGN REPORT:
BY: MORRISON MAIERLE, INC.,
DATED: AUGUST, 2006. JOB NUMBER: #6062001.

3. ALL MATERIALS THAT COME INTO CONTACT WITH DRINKING WATER SHALL MEET NSF STANDARD 60 AND 61.

4. ALL WATER MAINS LESS THAN TWELVE (12") INCHES IN DIAMETER ARE TO BE INSTALLED AT A MINIMUM TOP OF PIPE DEPTH OF THIRTY SIX (36") INCHES BELOW FINISHED GRADE. WATER MAINS TWELVE (12") INCHES IN DIAMETER, OR LARGER, SHALL BE INSTALLED AT A MINIMUM TOP OF PIPE DEPTH OF FORTY EIGHT (48") INCHES BELOW FINISHED GRADE.

5. ALL WATERLINES SHALL BE PRESSURE AND LEAKAGE TESTED IN ACCORDANCE WITH AWWA C-600 SECTION 4, OR M.A.G. SECTION 610.14.

6. ALL NEW FIRE HYDRANTS SHALL HAVE FOUR (4") INCH N.S.T. STEAMER CONNECTIONS.

7. NO OBSTRUCTIONS. (IE: TREES, SHRUBS, UTILITY PEDESTALS, STREETLIGHTS, TRANSFORMERS, J-BOXES, SWITCH CABINETS) SHALL BE PLACED WITH FIVE (5') FEET IN FRONT OF OR TO THE SIDE OF ANY FIRE HYDRANT.

8. ALL ONSITE WATER MAINS SHALL BE WITHIN THE PUBLIC RIGHT-OF-WAY UNLESS OTHERWISE NOTED ON PLANS. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE ARIZONA WATER COMPANY STANDARD DETAILS AND SPECIFICATIONS AND ADEQ/ADWR CURRENT STANDARDS. HOWEVER ALL TRENCH BACKFILL COMPACTION WITHIN THE PUBLIC RIGHT-OF-WAY AND IN ALL PUBLIC EASEMENTS SHALL BE PER CITY OF CASA GRANDE DETAIL AND COMPACTION SPECIFICATIONS.

9. ALL WATER MAINS MUST BE DISINFECTED PER AAC TITLE 18 AND ARIZONA WATER COMPANY STANDARDS.

10. THERE SHALL BE NO SEPTIC SYSTEMS WITHIN ONE HUNDRED (100') FEET OF THE PROPOSED WATER MAIN EXTENSION.

11. WATER PLAN AS-BUILTS: AS BUILT WATER PLANS SHALL BE PREPARED BY THE DESIGN ENGINEER AND SHALL INCLUDE BUT ARE NOT LIMITED TO: ALL HYDRANT BASE ELEVATIONS, HYDRANT LOCATIONS, VALVE BOX LOCATIONS, METER BOX LOCATIONS, AND LANDSCAPE METER LOCATIONS, AND ANY AND ALL DEVIATIONS FROM THE APPROVED PLANS.

REVISIONS			
NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.

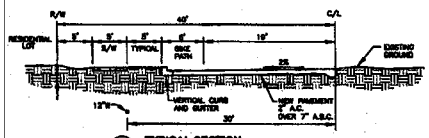
GHOST HOLLOW ESTATES PHASE 2
WATER PLANS

CASA GRANDE — ARIZONA

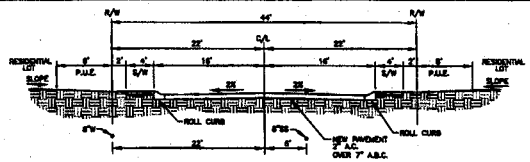
NOTES

C-WT-2

image4269 (14400x9563x2 tiff)



1 TYPICAL SECTION
(TUBBOOT DRIVE AND GHOST RANCH ROAD) N.T.S.



2 TYPICAL SECTION
LOCAL STREET N.T.S.

GENERAL NOTES – JACKING & BORING:

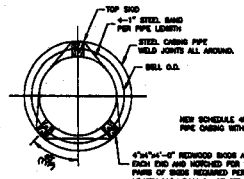
THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS, TRAFFIC CONTROL, SHORING AND BRACING OF JACKING AND RECEIVING PITS, BEDDING, BACKFILL, OVER EXCAVATION, COMPACTION OR ANY OTHER WORK NOT SPECIFICALLY MENTIONED HEREIN, CONSIDERED BY THE AGENCY TO BE ASSOCIATED WITH THE INSTALLATION OF THE CARRIER PIPE INSIDE THE STEEL CASING. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS SPECIFIED HEREIN, ON THE APPROVED PLANS OR IN THE SPECIAL SPECIFICATIONS.

CASING –
CASING SIZE SHALL BE AS SPECIFIED IN THE TABLE OF THIS DETAIL. ALL CASING SHALL BE SCHEDULE 40 "STANDARD WALL" SMOOTH STEEL PIPE UNLESS OTHERWISE NOTED. CASING ALIGNMENT, BOTH HORIZONTAL AND VERTICAL, SHALL NOT DEVIATE MORE THAN 0.25 FEET FROM THE GRADE SHOWN ON THE APPROVED PLANS.

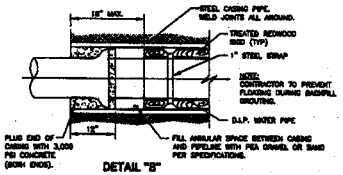
CASING SHALL BE BUTT WELDED AROUND THE ENTIRE CIRCUMFERENCE OF EACH JOINT TO PROVIDE A TIGHT SEAL. WELDING SHALL BE ACCOMPLISHED BY CERTIFIED WELDERS IN ACCORDANCE WITH A.S.U.E. SECTION 9.

CARRIER PIPE –
CARRIER PIPE SIZE SHALL BE SPECIFIED ON THE APPROVED PLANS. PIPE MATERIAL SHALL BE THICKNESS CLASS 50 RESTRAINED JOINT DUCTILE IRON PIPE. THE MISTRAINT FIGURE SHALL BE MECHANICAL JOINTS WITH "MEGA-LUG" BRAND RESTRAINED FOLLOWING BLAND OR U.S. PIPE "RI FLEX" RESTRAINED JOINT PIPE. OTHER MANUFACTURERS MAY BE PERMITTED WITH PRIOR APPROVAL OF THE AGENCY.

SKIDS –
SKIDS SHALL BE CONSTRUCTED OF REDWOOD AND SHALL BE TREATED TO PROLONG USABLE LIFE. 4 INCH BY 4 INCH REDWOOD SHALL BE USED FOR CARRIER PIPES 12 INCHES AND LARGER. THE LENGTH WILL BE (4 FEET). SKIDS ARE TO BE SPACED ON EACH END. IT IS RECOMMENDED THAT G.A.E. 100 GREASE BE APPLIED TO THE CARRIER PIPE WITH STAINLESS STEEL BANDS, CABLES , CLAMPS, OR OTHER METHODS MAY BE USED WITH PRIOR APPROVAL OF THE ENGINEER. CARRIER PIPE ON SKIDS MAY TEND TO CLIMB CASING WALLS AND DEVIATE FROM LINE AND GRADE WILL NOT BE ACCEPTED. END TO END SPACING BETWEEN SKIDS WILL BE A MINIMUM OF 36 INCHES.



DETAIL "A"



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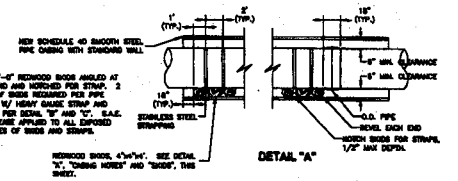

DETAIL "A"

6 PIPE CASING DETAIL
N.T.S.

REVISIONS			
NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.
An Employee Owned Company

DRAWN BY: LMA
CHKD. BY: JDI
APPR. BY: RFP
DATE: 2/22/06
CLK REVIEW
BY:
DATE:

GHOST HOLLOW ESTATES PHASE 2
WATER PLANS

CASA GRANDE ARIZONA

DETAILS

PROJECT NUMBER
SHEET NUMBER
3 OF 5
DRAWING NUMBER
C-WT-3

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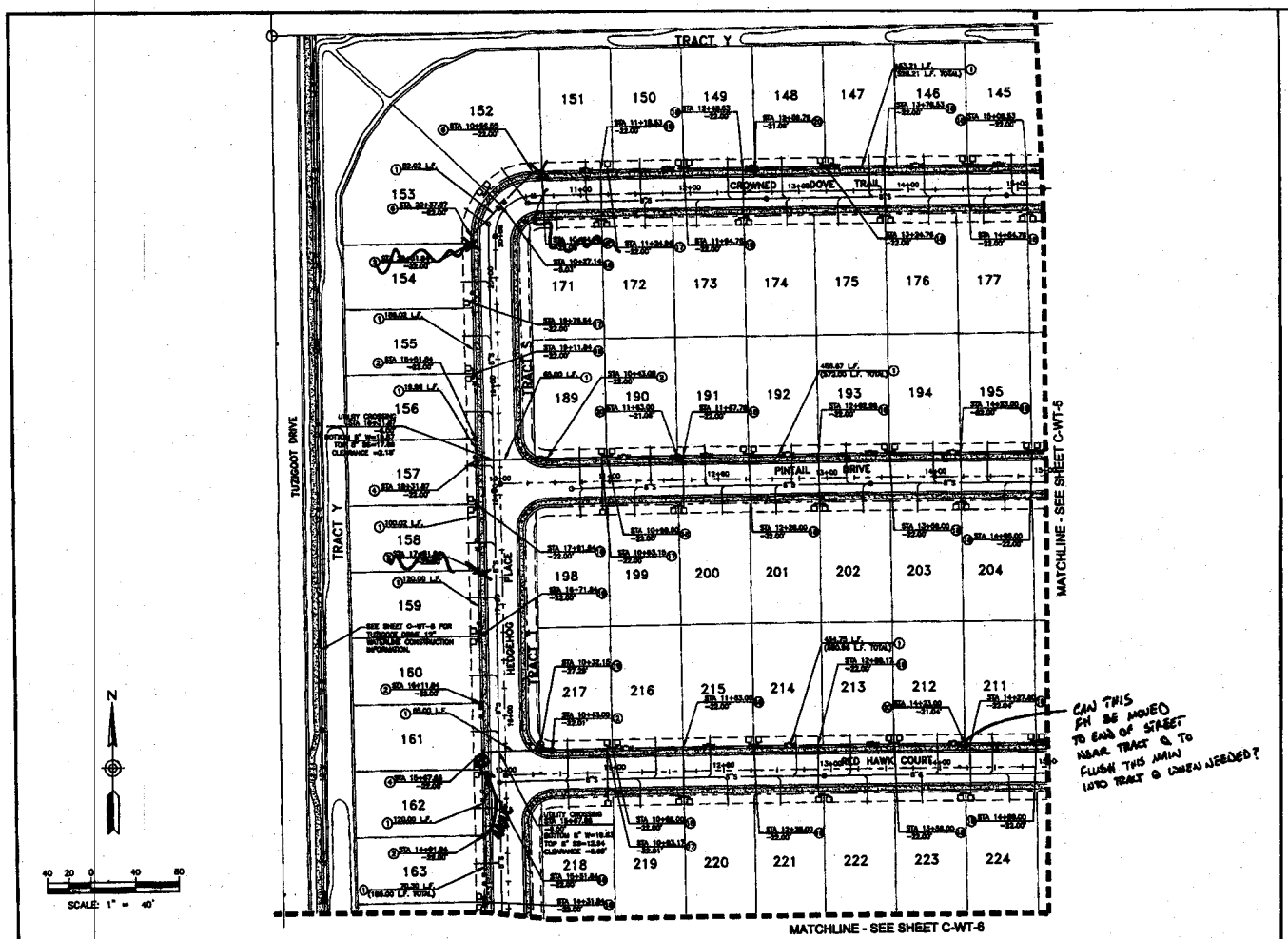

WATERLINE CONSTRUCTION NOTES

1. INSTALL 8" DUCTILE IRON WATERLINE, CLASS 50, LENGTH AS NOTED.
2. INSTALL 8" GATE VALVE, BOX AND COVER PER A.W.C. STD. DET. E-9-1-1, E-9-2-1 AND E-9-4-1.
3. INSTALL 8" D.I. TEE, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-8-1.
4. INSTALL 8" D.I. 90° BEND, M.J. THRUST BLOCKING PER A.W.C. STD. DET. E-9-8-1.
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16. INSTALL VERTICAL REALIGNMENT PER MAG STD. DET. 370. BLOCKING PER A.W.C. STD. DET. E-9-8-2.
17. INSTALL 2" BLOWOFF ASSEMBLY PER A.W.C. STD. DET. E-9-5-1.

REVISIONS			
NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.
An Employee Owned Company

Engineers
Surveyors
Schedulers
Planners

80 E. Rio Salado Parkway, Suite 201
Tempe, AZ 85281
Phone: (480) 967-5200
Fax: (480) 967-6001

DRAWN BY: LMA
CHKD. BY: JS
APPR. BY: DBP
DATE: 09/08/06
D.A. REVIEW BY:
DATE:

CASA GRANDE

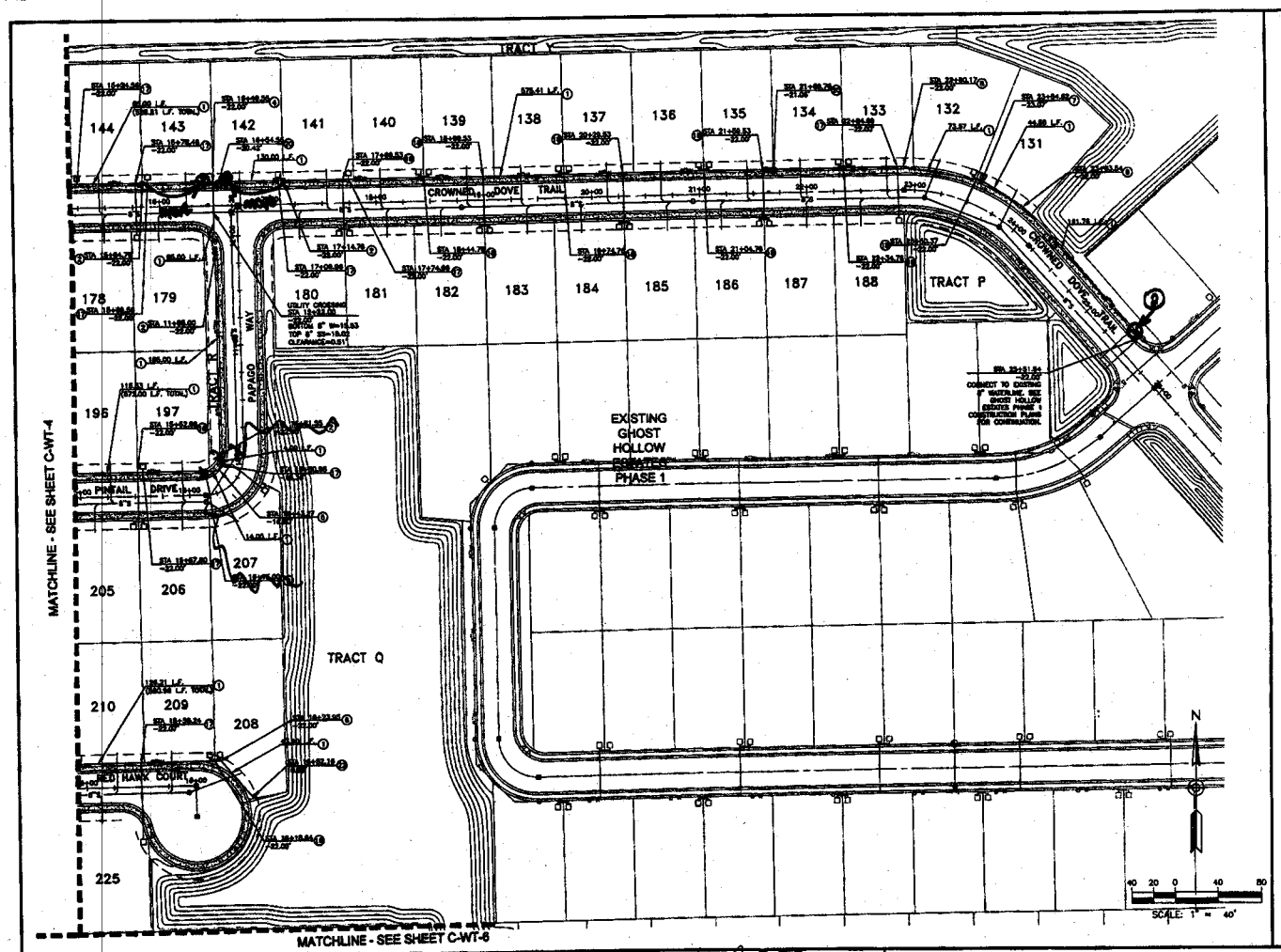
GHOST HOLLOW ESTATES PHASE 2
WATER PLANS

ARIZONA

WATER PLAN

PROJECT NUMBER
4 OF 5
DRAWING NUMBER
C-WT-4

image4271 (14400x9643x2 tiff)



WATERLINE CONSTRUCTION NOTES

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17. INSTALL 2" BLOWOFF ASSEMBLY PER A.W.C. STD. DET. E-9-8-1.

VERIFY SCALE

NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.

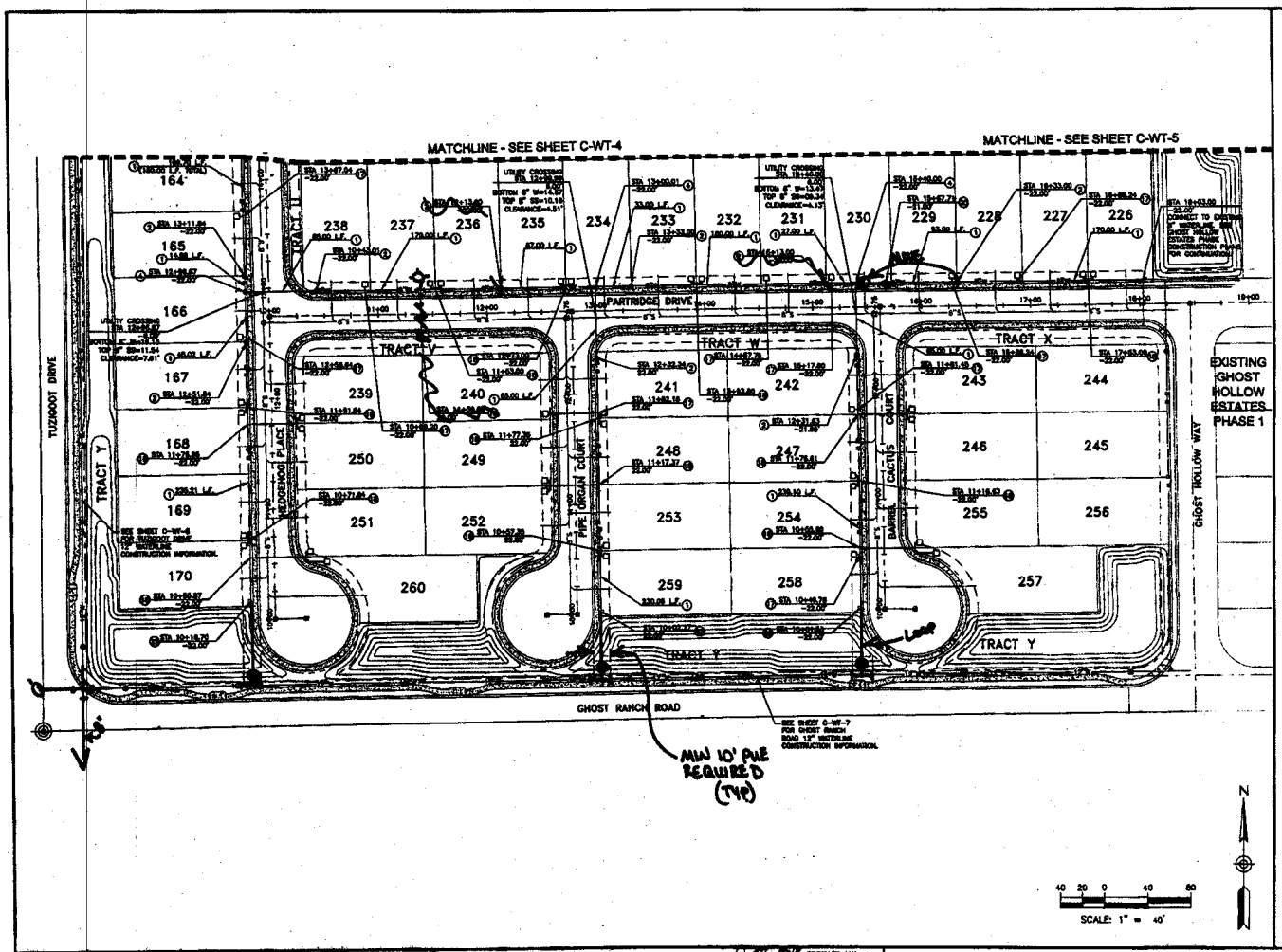
GHOST HOLLOW ESTATES PHASE 2
WATER PLANS

CASA GRANDE ARIZONA

WATER PLAN

C-WT-5

image4272 (14400x9574x2 tiff)



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22. INSTALL 2" BLOWOFF ASSEMBLY PER A.M.C. STD. DET. E-6-5-1.

VERIFY SCALES

NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.
An Anglemyer-Soward Company

DRAWN BY: LMA
CHK'D. BY: JCL
APPR. BY: GFF
DATE: 10/2003
R.V. REVIEW BY:
DATE:

CASA GRANDE

GHOST HOLLOW ESTATES PHASE 2
WATER PLANS

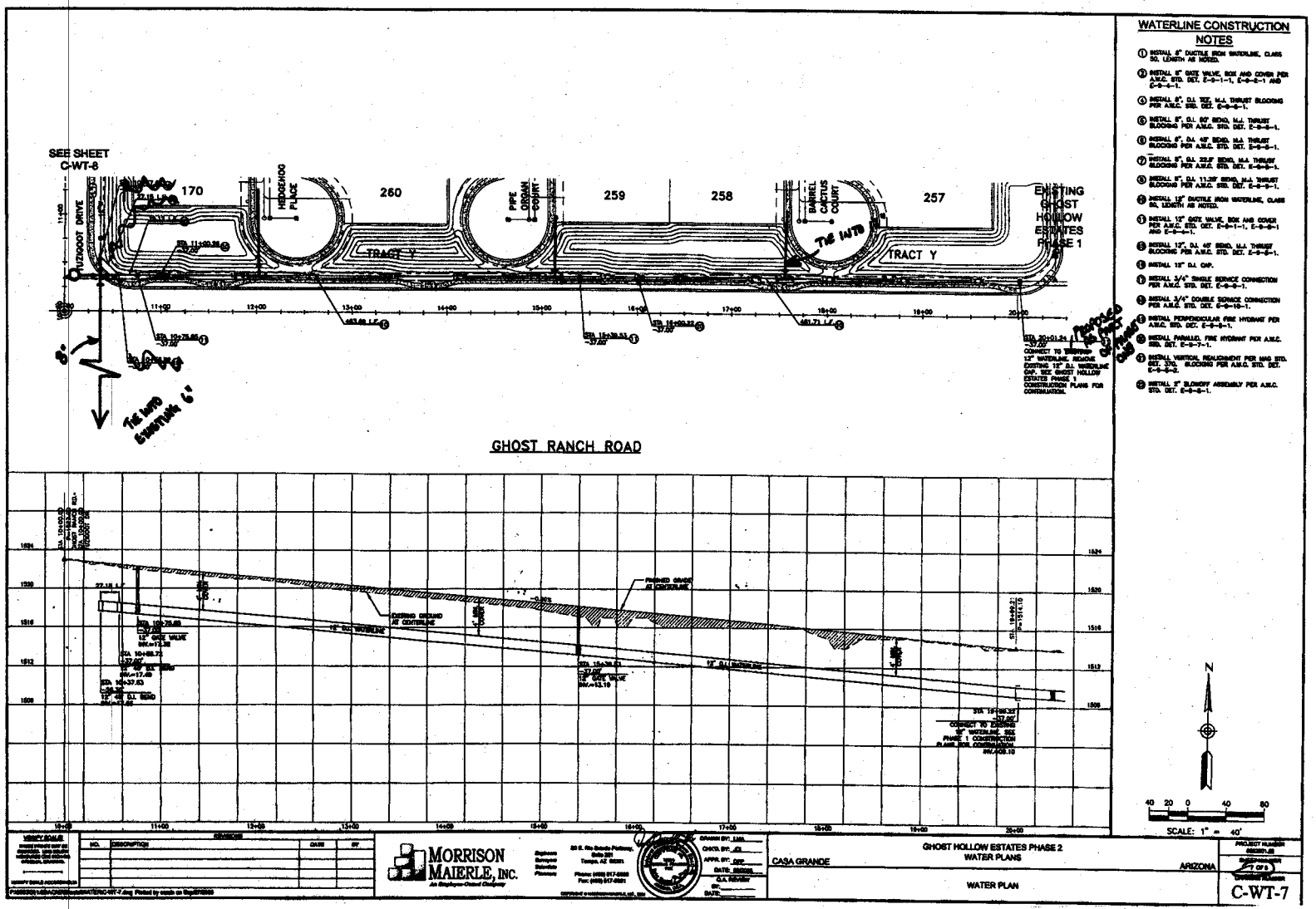
ARIZONA

WATER PLAN

PROJECT NUMBER
SHEET 22 OF 6

C-WT-6

image4273 (14400x9594x2 tiff)



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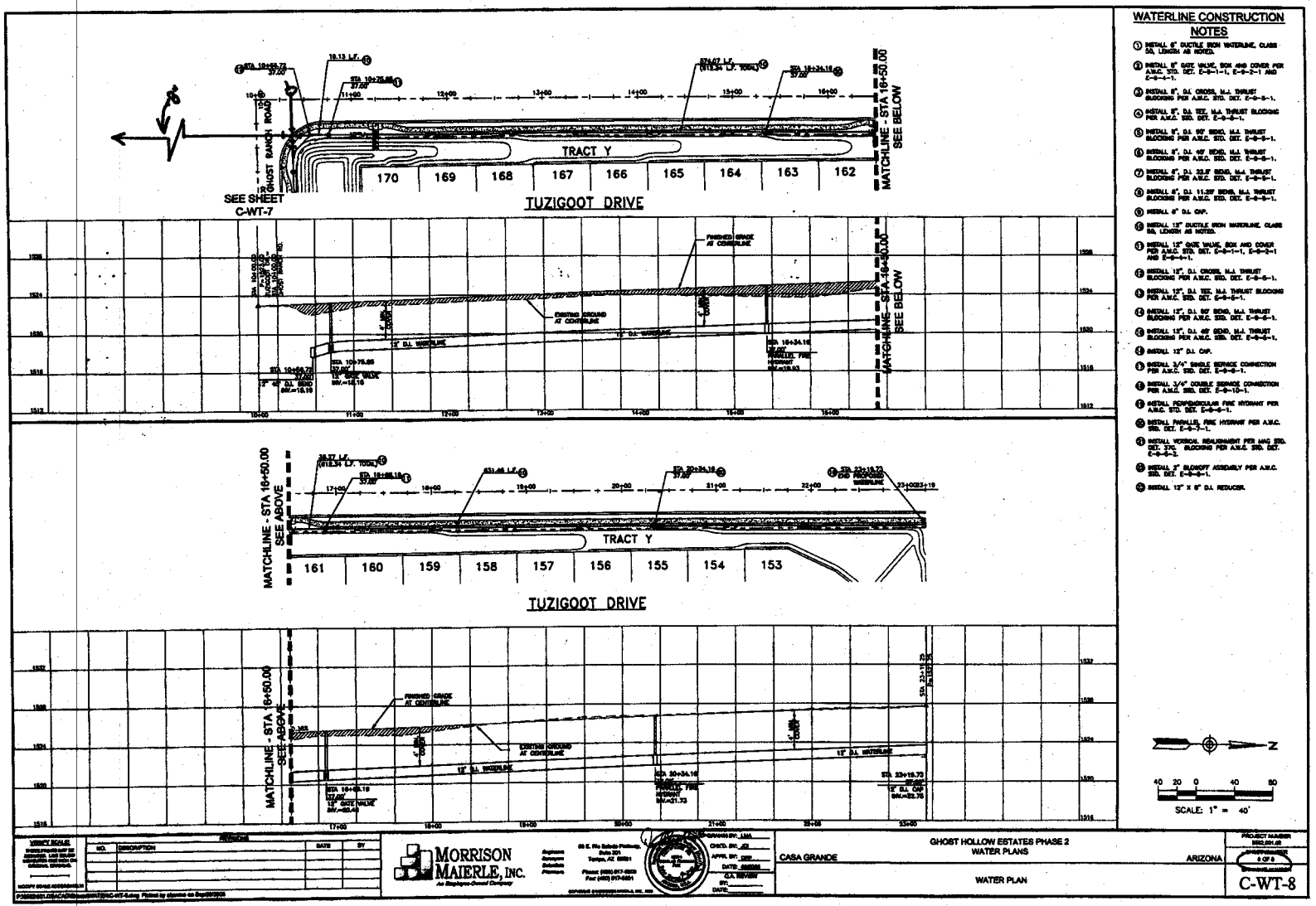

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21. INSTALL VERSICAL REALIGNMENT PER ANC STD. DET. 370. BLOCKING PER A.M.C. STD. DET. E-9-5-2.
22. INSTALL 2" BLOWOFF ASSEMBLY PER A.M.C. STD. DET. E-9-9-1.
23. INSTALL 12" X 8" D.I. REDUCER.

SCALE: 1" = 40'

VERIFY SCALE	REVISIONS		
	NO.	DESCRIPTION	DATE	BY

MORRISON MAIERLE, INC.
An Employee-Owned Company

GHOST HOLLOW ESTATES PHASE 2
WATER PLANS

CASA GRANDE ARIZONA

WATER PLAN

PROJECT MANAGER

C-WT-8

NOTE: THIS COST ESTIMATE IS GOOD UNTIL: AFTER WHICH TIME IT IS SUBJECT TO REVISION UNLESS THE ATTACHED AGREEMENT HAS BEEN EXECUTED.	**ARIZONA WATER COMPANY** COST ESTIMATE	DATE PREPARED: 10/4/2006
	PREPARED BY: Charles Briggs	SYSTEM: Casa Grande
	PROJECT LOCATION: Southeast quarter Section 17, T.5S.,R.6E.	DRAWING NO.

PROJECT DESCRIPTION:

Install Approximately 2,132 LF OF 12" DIP and 8,400 LF Of 8" DIP and Related Fittings, 9 Fire Hydrants, 57 Double Services and 16 Single Services to Serve Ghost Hollow Estates, Phase One - Onsite

MATERIALS & LABOR			ESTIMATED PROJECT COST	
ACCOUNT	QUANTITY	DESCRIPTION	REFUNDABLE ADVANCE	NON-REFUNDABLE CONTRIBUTION
343	2,132	12" Ductile Iron Pipe and Related Fittings	$ 155,402	
343	8,400	8" Ductile Iron Pipe and Related Fittings	452,340	
348	9	6" Fire Hydrants - Complete		8,854
345	28	Double Water Services - Long	12,600	
345	27	Double Water Services - Short	11,016	
345	8	Single Water Services - Long	2,752	
345	8	Single Water Services - Short	2,336	
SUBTOTAL - MATERIALS & LABOR			$ 636,446	$ 8,854
OVERHEAD			35,323	491
TOTAL REFUNDABLE AND NON-REFUNDABLE ESTIMATED PROJECT COST			$ 671,769	$ 9,345
TOTAL ESTIMATED PROJECT COST			$681,114	

ATTACHMENT 6

ATTACHMENT 7

505 13

C.G. Contract No. ___-___

FRANCHISE AGREEMENT
BETWEEN
ARIZONA WATER COMPANY
AND THE
CASA GRANDE, ARIZONA, CITY COUNCIL

Section 1. –Grant of Franchise. There is hereby granted to Arizona Water Company, a corporation organized and existing under and by virtue of the laws of the State of Arizona, its successors and assigns (hereinafter called "Grantee"), the right, privilege and franchise to construct, maintain and operate upon, over, along, across and under the present and future public streets, avenues, alleys, highways, bridges and other public places in the City of Casa Grande, Pinal County, Arizona, (hereinafter called "Municipality"), water lines, plant and system, including mains, laterals, pumps, manholes, meters, fire hydrants, regulator stations and related equipment, facilities and appurtenances, for the purpose of providing water service for all purposes in Municipality.

Section 2. Construction and Maintenance in Accordance with Municipality's Ordinances & Regulations. All facilities to be constructed and maintained pursuant to the Franchise shall be constructed and maintained in accordance with Municipality's standards with respect to repairs and maintenance of such public streets, avenues, alleys, highways, and bridges and other public places of Municipality. Prior to construction, Grantee shall apply for a right-of-way work permit in accordance with all existing ordinances and regulations of Municipality and a map showing the location of such facilities shall be submitted to Municipality's Director of Public Works, or his/her designee. If Grantee does not comply with any Municipal ordinance or regulation governing work in the public streets,

avenues, alleys, highways, and bridges and other public places of the Municipality, Grantee shall, within 30 days after written notice of non-compliance in accordance with Section 12, undertake action to achieve compliance.

Section 3. Removal or Movement of Facilities. In the event that facilities constructed pursuant to this Franchise shall at any time be found by Municipality to interfere unduly with Municipality's governmental functions over such public streets, avenues, alleys, highways or bridges or other public places, Grantee hereby agrees that it will, at its own expenses, and within a reasonable time after notice thereof by Municipality, remove or relocate said facilities so as to minimize said interference. In all other instances the costs incurred in relocating facilities shall be borne by and added to the costs of the public or private improvement causing or resulting in such relocation.

Section 4. Disposal of Unnecessary Rights-of-Way. In the event Municipality takes action to dispose of unnecessary public roadways in accordance with the provisions of the Arizona Revised Statutes, Municipality shall recognize and preserve each of Grantee's prior rights-of-way, easements, and rights under this Franchise which are affected thereby, as they existed prior to such disposition, by including specific and appropriate language for that purpose in any legal instrument utilized for the purpose of accomplishing such disposition.

Section 5. Franchise Fee.

(a) As a further consideration for the franchise hereby granted, Grantee will pay quarterly to Municipality a sum equal to 3% of the gross receipts of Grantee from the sale of all water for residential, commercial and industrial purposes, including connect or reconnect charges, service establishment or reestablishment charges, or other similar charges, within Municipality's corporate limits, as Grantee is notified from time to time by Municipality of the extent of such corporate limits. For the purpose of

verifying the amounts payable hereunder, Grantee's billing records shall be subject to inspection by duly authorized officials or representatives of Municipality, at reasonable times.

(b) Said payment shall be a franchise fee. Said payments shall only be in lieu of any and all permit fees or other fees, charges or exactions whatsoever otherwise assessed by Municipality for the construction and maintenance of Grantee's facilities within public streets, avenues, alleys, highways, and bridges and other public places of the Municipality hereunder or for inspections thereof up to the amount payable under the terms of this Section 5. Furthermore, the amount of such franchise fee may be lawfully and specifically added to customer bills.

(c) Payment as described in the preceding paragraphs shall be payable in quarterly amounts within 30 days after the end of each calendar quarter.

Section 6. Indemnity. Grantee shall save Municipality harmless from expenses, claims and liability arising by reason of the exercise of this Franchise by Grantee.

Section 7. Term. The right, privilege, and franchise hereby granted shall continue and exist for a period of twenty-five (25) years from the date that the last representative for the parties executes this Agreement(effective date), however, either party may terminate this Franchise on its tenth (10th) anniversary by giving written notice of its intention to do so not less than six (6) months before the tenth (10th) anniversary. While such notice may or may not result in a renegotiated Franchise, the party giving the notice of termination shall be responsible for the costs of any resulting franchise election to renew this franchise or adopt a new franchise.

Section 8. Assignability of Franchise by Grantee The right, privilege and franchise hereby granted may be assigned by Grantee in whole or in part.

Section 9. – Franchise; Non-Exclusive: This Franchise is not exclusive, and nothing herein contained shall be construed to prevent Municipality from granting other like or similar grants or privileges to any other person, firm or corporation.

Section 10. – Conflicting Ordinances: All ordinances and parts of ordinances in conflict with the provisions hereof are, to the extent applicable to a franchised water public service corporation, are hereby superseded by the terms of this Franchise.

Section 11. – Independent Provisions: If any section, paragraph, subdivision, clause, phrase or provision of this Franchise Agreement, other than Section 5, shall be adjudged invalid or unconstitutional, the same shall not affect the validity of this Franchise as a whole or any part of the provisions hereof other than the part so adjudged to be invalid or unconstitutional. If Section 5 shall be adjudged invalid or unconstitutional in whole or in part by a final judgment, this Franchise shall immediately terminate and shall be of no further force or effect.

Section 12. – Notices: Any notice required or permitted to be given hereunder shall be in writing, unless otherwise expressly permitted or required, and shall be deemed effective either (i) upon hand delivery to the person then holding the office shown below, or, if such office is vacant or no longer exists, to a person holding a comparable office, or (ii) on the third business day following its deposit with the United States Postal Service, first class and certified or registered mail, return receipt requested, postage prepaid, addressed as follows:

(a) To the City:

City Clerk
City of Casa Grande
510 East Florence Blvd
Casa Grande, Arizona 85222

With a copy to:

Casa Grande City Attorney
510 East Florence Blvd
Casa Grande, Arizona 85222

(b) To Arizona Water Company: P.O. Box 29006

Phoenix, AZ 85038-9006

Section 13. Avowal. We, the undersigned, have executed this document in accordance with the results of the City of Casa Grande Special Election held on September 13th, 2005, on the dates below written.

CITY OF CASA GRANDE, an Arizona Municipal Corporation

By _____
Charles T. Walton, Mayor

On behalf of the City of Casa Grande
Date: May 18, 2005

ARIZONA WATER COMPANY, an Arizona Corporation

By _____
WILLIAM M. GARFIELD
PRESIDENT

Date: 9-27-2005

ATTEST:

_____
Gloria Leija, Casa Grande City Clerk

CASA GRANDE, ARIZONA • CITY OF CASA GRANDE INCORPORATED 1915

APPROVED AS TO FORM:

_____
Casa Grande City Attorney

State of Arizona)
maricopa) ss **Arizona Water Company**
County of ~~Pinal~~) **Acknowledgment**

On this 27th day of September, 2005, William M. Garfield, who acknowledged himself/herself to be the President of Arizona Water Company personally appeared befor the undersigned and that he/she, as such officer, being authorized to do so, executed the document in the capacity therein stated and for the purposes therein contained by signing his/her name.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Jackie R. Craig
Notary Public

My commission expires: 1-19-2009

"OFFICIAL SEAL"
Jackie R. Craig
Notary Public-Arizona
Maricopa County
My Commission Expires 1/19/2009

ATTACHMENT 4

ARIZONA DEPARTMENT OF WATER RESOURCES
Hydrology Division
500 North Third Street, Phoenix, Arizona 85004
Telephone 602 417-2448
Fax 602 417-2425

JANE DEE HULL
Governor

JOSEPH C. SMITH
Director

April 24, 2002

RECEIVED
APR 26 2002
ARIZONA WATER COMPANY
PHOENIX - EXECUTIVE

Mr. William Garfield
Arizona Water Company
3805 North Black Canyon Highway
Phoenix, Arizona 85015

RE: Arizona Water Company
Application for Physical Availability Demonstration #20-400600

Dear Mr. Garfield:

The Department has completed review of the report entitled ***Hydrology Study Report, Pinal AMA, Casa Grande Groundwater Flow Model,*** prepared by Clear Creek Associates, August 31, 2001. The area of review has been limited to the Casa Grande (including Arizona City), Coolidge, and Tierra Grande service areas of Arizona Water Company's Pinal County CC&Ns. The model study area is located primarily in the Maricopa-Stanfield and Eloy sub-basins of the Pinal Active Management Area.

In accordance with A.A.C. R-12-15-702(C), it was determined that approximately 57,507 acre-feet per year of groundwater is available for the Casa Grande service area; 13,510 acre-feet per year is available for the Coolidge service area; and 4,786 acre-feet per year is available for the Tierra Grande service area. These quantities represent the amount of groundwater available for new demands within the service area of each system. The groundwater is projected to be physically available for 100 years under A.A.C. R-12-15-703(B) for assured water supply purposes in the respective areas. Currently, the water supply systems are in compliance with water quality standards for the purposes of A.A.C. R-12-15-704. It is the Department's conclusion that, pumping the projected demands for 100 years, will take the depth-to-static water level to approximately the maximum depth allowed by A.A.C. R-12-15-703(B).

The results of the Department's hydrologic review fulfill the requirements of A.A.C. R12-15-702 (C) and can be cited in applications for a Certificates of Assured Water Supply or for Designation of Assured Water Supply. These applications have certain additional requirements based on the assured water supply criteria referenced in A.R.S. §45-576 and A.A.C. R-12-15-701 *et. seq.* For further information on these requirements, please contact the Office of Assured and Adequate Water Supply Certification at (602)417-2465. **If the Department finds that the groundwater supply is not available because the assumptions and information used in determining the physical availability under the current criteria prove incorrect, the Department will modify the availability of groundwater accordingly.**