Exterior Building Color & Material Samples

Color Drawdowns

Archaeological Resources

Airport Vicinity Development Checklist

Parking Study

Trip Generation Comparison

Parking Master Plan

CERTIFICATE OF NO EFFECT
ARCHAEOLOGICAL RESOURCES

14-ZN-2017

Braun 20

APPLICATION INFORMATION			
LOCATION:	E PINNACLE VISTA DR / N 132ND ST (NW Corner)	APPLICANT:	David Gulino
PARCEL:	216-77-024C	COMPANY:	Land Development Services LLC
Q.S.:	50-59	ADDRESS:	7525 E Camelback Rd Ste 104 Scottsdale, AZ 85251
		PHONE:	602-330-5252

Request: Request by the owner for the approval of a Density Incentive for increases in NAOS, on a Single-family Residential, Environmentally Sensitive Lands (R1-70 ESL) zoned parcel, to increase the allowed number of lots, from eleven to thirteen, at a property located at the northwest corner of N. 132nd Street and E. Pinnacle Vista Drive (parcel number 216-77-024C).

Certificate of No Effect Criteria:
In accordance with Chapter 46, Article VI, of the Scottsdale Revised City Code, the City Archaeologist finds that:

- No archaeological resources are located on the property according to the archaeological survey and report and based upon the city's review of the report.

STIPULATIONS

1. Any development on the property is subject to the requirements of Scottsdale Revised Code, Chapter 46, Article VI, Protection of Archaeological Resources, Section 46-134 - Discoveries of archaeological resources during construction.

SIGNATURE: Steve Venker DATE: January 8, 2018

Steve Venker, City Archaeologist 480-312-2831

STATE HISTORIC PRESERVATION OFFICE
SURVEY REPORT SUMMARY FORM

1. REPORT TITLE

1a. Report Title: A Cultural Resources Survey of 20 Acres of Private Land Located Near the Intersection of Rio Verde Drive and 132nd Street, Scottsdale, Maricopa County, Arizona

1b. Report Author(s): Pamela Rainey

1c. Date: October 27, 2017 **1d. Report No.:** 17-49

2. PROJECT REGISTRATION/PERMITS

2a. ASM Accession Number: NA

2b. AAA Permit Number: NA

2c. ASLD Lease Application Number(s): NA

2d. Other Permit Number(s).: NA

3. ORGANIZATION/CONSULTING FIRM

3a. Name: Northland Research, Inc.

3b. Internal Project Number: 17-48

3c. Internal Project Name: Braun 20

3d. Contact Name: Johna Hutira

3e. Contact Address: 1865 E. Third Street, Tempe, AZ 85281

3f. Contact Phone: 480-894-0020

3g. Contact Email: johna@northlandresearch.com

4. SPONSOR/LEAD AGENCY

4a. Sponsor: Land Development Services

4b. Lead Agency: City of Scottsdale

4c. Agency Project Number(s):

4d. Agency Project Name:

4e. Funding Source(s): Private

4f. Other Involved Agencies:

4g. Applicable Regulations: Scottsdale Revised Code, Chapter 46, Article VI

5. DESCRIPTION OF PROJECT OR UNDERTAKING: Survey conducted prior to residential development of parcel.

6. PROJECT AREA/AREA OF POTENTIAL EFFECTS: A 20 acre parcel measuring approximately 0.125 mile (east-west) by 0.25 mile (north-south).

7. PROJECT LOCATION

7a. Address: northwest of the intersection of 132nd Street and Pinnacle Vista Road

7b. Route: **7c. Mileposts Limits:**

7d. Nearest City/Town: Scottsdale **7e. County:** Maricopa

7f. Project Locator UTM: 426206 Easting 3733182 Northing **7g. NAD** 83 **7h. Zone:** 11

7i. Baseline & Meridian: Gila and Salt River **7j. USGS Quadrangle(s):** McDowell Peak

7k. Legal Description(s): E ½ SE ¼ NW ¼ sec 36, T5N, R5E

8. SURVEY AREA

8a. Total Acres: 20

8b. Survey Area.

1. Land Jurisdiction	2. Total Acres Surveyed	3. Total Acres Not Surveyed	4. Justification for Areas Not Surveyed
Private	20	0	NA

9. ENVIRONMENTAL CONTEXTS

9a. Landform: alluvial fan

9b. Elevation: 2500ft amsl

9c. Surrounding Topographic Features: Fraesfield Mountain to the north, McDowell Mountains to the south

9d. Nearest Drainage: unnamed wash in southern portion of project area

9e. Local Geology: Basin and Range Physiographic province

9f. Vegetation: This region falls within the Paloverde-Cacti-Mixed Scrub series of the Arizona Upland Subdivision of the Sonoran Desert Scrub Biotic Community (Turner and Brown 1994:200–202). Observed vegetation includes creosote, palo verde, mesquite, cholla, desert scrub and grasses.

9g. Soils/Deposition: alluvial terrace mixed with gravels

9h. Buried Deposits: possible

9i. Justification: alluvium and possible flooding events from wash

I0. BUILT ENVIRONMENT: NA

11. INVENTORY CLASS COMPLETED

11a. Class I Inventory: ☐

11b. Researcher(s):

11c. Class II Survey: ☐

11d Sampling Strategy:

11e. Class III Inventory: ☒

12. BACKGROUND RESEARCH SOURCES

12a. AZSITE: ☒

12b. ASM Archaeological Records Office: ☐

12c. SHPO Inventories and/or SHPO Library: ☐

12d. NRHP Database: ☐

12e. ADOT Portal: ☐

12f. GLO Maps:

12g. Land- Managing Agency Files:

12h. Tribal Cultural Resources Files:

12i. Local Government Websites:

12j. Other:

13. BACKGROUND RESEARCH RESULTS

13a. Previous Projects Within Study Area.

1. Project Reference Number	2. Project Name	3. Author(s)	4. Year
1987-243.ASM	North Scottsdale Reconnaissance	RECON	1987
1990-124.ASM	120th St and Jomax	Stone	1990
1991-020.ASM	Community Builders/120th St and Jomax.II	Irwin	1991
1998-360.ASM	The Golf Club of Scottsdale	Schroeder	1998
2000-548.ASM	Scottsdale National Survey	Stübing	2000

2001-439.ASM	132nd Street and Dynamite Survey	Lundin	2001
2004-255.ASM	118th Street and East Rio Drive Survey	Hart and Freeman	2003
2012-317.ASM	10 Acres – Rio Verde and 128th Street Survey	Breternitz	2004
unknown	Unknown	Bustoz	2011

13b. Previously Recorded Cultural Resources Within Study Area.

1. Site Number/Name	2. Affiliation	3. Site Type	4. Eligibility Status	5. Associated Reference(s)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

13c. Historic Buildings/Districts/Neighborhoods.

1. Property Name or Address	2. Year	3. Eligibility Status

14. CULTURAL CONTEXTS

14a. Prehistoric Culture: Hohokam

14b. Protohistoric Culture: Yavapai

14c. Indigenous Historic Culture: Yavapai

14d. Euro-American Culture: 1800s to present

15. FIELD SURVEY PERSONNEL

15a. Principal Investigator: Douglas Craig

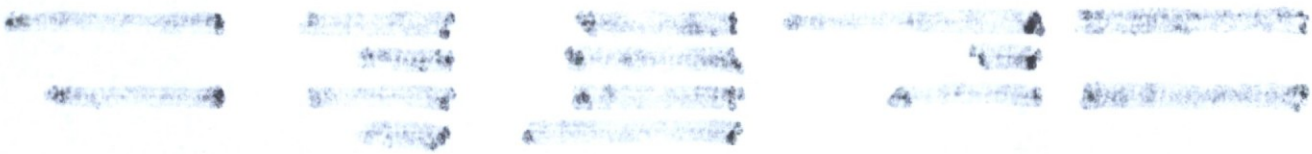
15b. Field Supervisor: Pamela Rainey

15c. Crew: Pamela Rainey

15d. Fieldwork Date(s): August 25, 2017

16. SURVEY METHODS

16a. Transect Intervals: 15 m apart



16b. Coverage (%): 100

16c. Site Recording Criteria: ASM

16d. Ground Surface Visibility: poor due to dense vegetation, visibility ranged from 0–50%

16e. Observed Disturbances: Vegetation was dense within the survey area due mostly to desert grasses; some modern construction debris (cinder block fragments, bricks, one piece of sheet metal) was noted near the wash in the southern portion of the project area.

17. FIELD SURVEY RESULTS

17a. No Cultural Resources Identified: ☒

17b. Isolated Occurrences (IOs) Only: ☐

17c. Number of IOs Recorded:

17d. Table of IOs.

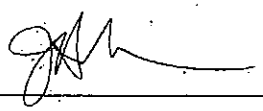
1. IO Number	2. Description	3. Date Range	4. UTMs

18. COMMENTS:

SECTION 19. ATTACHMENTS
19a. Project Location Map: ☒
19b. Land Jurisdiction Map: ☒
19c. Background Research Map(s): ☒
19d. GLO Map(s): ☐
19e. References: ☒

SECTION 20. CONSULTANT CERTIFICATION

I certify the information provided herein has been reviewed for content and accuracy and all work meets applicable agency standards.



Signature

Vice President

Title

SECTION 21. DISCOVERY CLAUSE

In the event that previously unreported cultural resources are encountered during ground disturbing activities, all work must immediately cease within 30 meters (100 feet) until a qualified archaeologist has documented the discovery and evaluated its eligibility for the Arizona or National Register of Historic Places in consultation with the lead agency, the SHPO, and Tribes, as appropriate. Work must not resume in this area without approval of the lead agency.

If human remains are encountered during ground-disturbing activities, all work must immediately cease within 30 meters (100 feet) of the discovery and the area must be secured. The Arizona State Museum, lead agency, SHPO, and appropriate Tribes must be notified of the discovery. All discoveries will be treated in accordance with NAGPRA (Public Law 101-601; 25 U.S.C. 3001-3013) or Arizona Revised Statutes (A.R.S. § 41-844 and A.R.S. § 41-865), as appropriate, and work must not resume in this area without authorization from ASM and the lead agency.

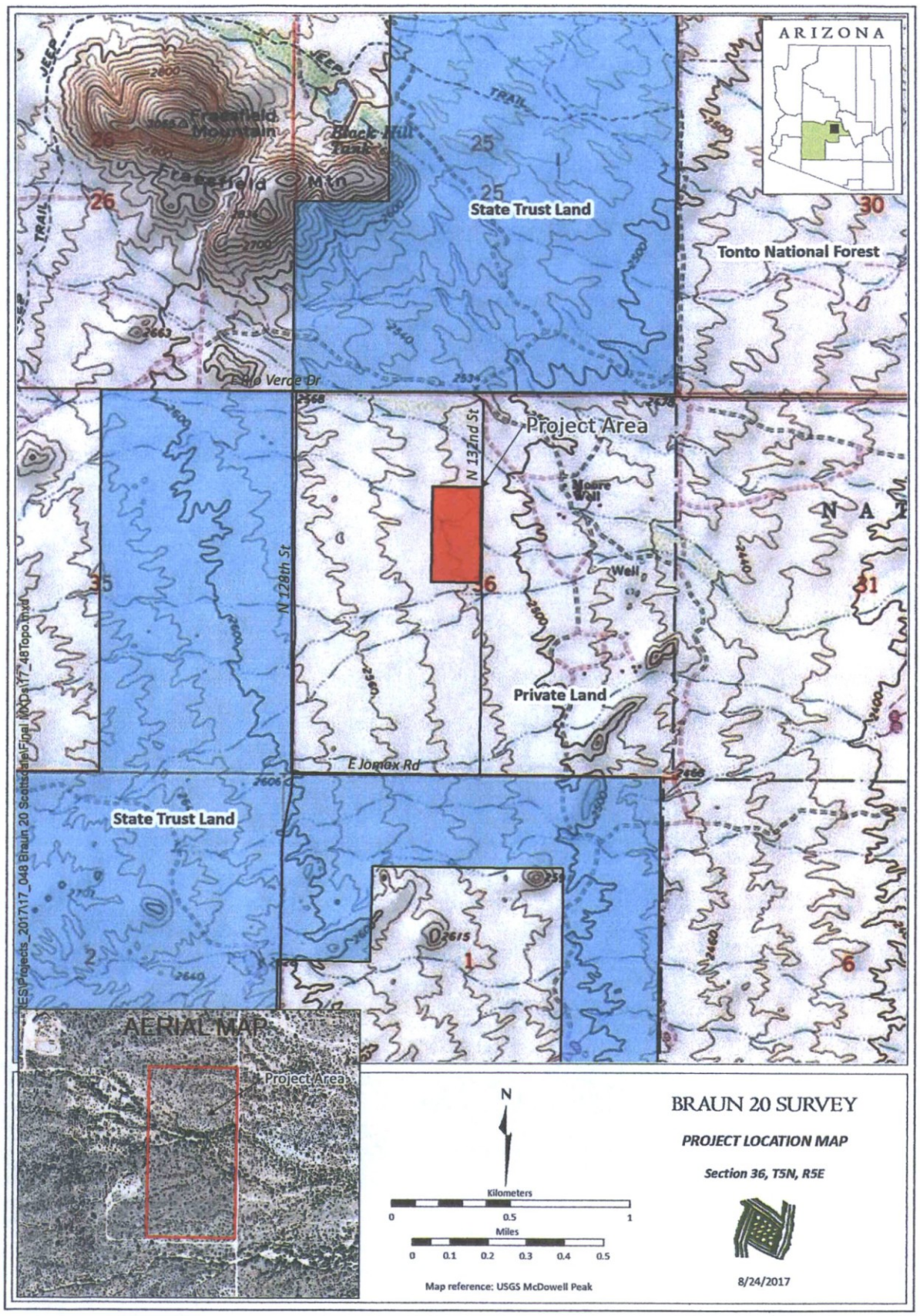


Figure 1. Location of project area.

Confidential Information has been removed.

REFERENCES CITED

Breternitz, Cory Dale
2004 *A Cultural Resources Survey of Approximately 10 Acres of Private Land at the Southeast Corner of Rio Verde Drive and 128th Street in North Scottsdale, Maricopa County, Arizona.* Technical Report No. 04-27. Soil Systems, Inc., Phoenix.

Bustoz, David
2011 *A Cultural Resources Survey of 1,954.6 Acres of State Trust Land Near the McDowell Mountain Regional Park, Scottsdale, Maricopa County, Arizona.* Technical Report No. 115004. Logan Simpson Design, Inc., Tempe.

Hart, David R. and Kirk A. Freeman
2003 *Cultural Resources Survey of Approximately 210 Acres Northeast of the Intersection of 118th Street and East Rio Verde Drive, North Scottsdale, Maricopa County, Arizona.* NRI Technical Report No. 03-44. Northland Research, Inc., Tempe.

Irwin, Donald C.
1991 The Archaic Prehistory of the North American Southwest. *Journal of World Prehistory* 10(3):305–373.

Lundin, Deil
2001 *An Archaeological Survey of 160 Acres at 132nd Street and Dynamite Boulevard in Scottsdale, Maricopa County, Arizona.* Report No. 01-375. SWCA Inc., Phoenix.

RECON
1987 *North Scottsdale Reconnaissance Survey*, Scottsdale, Arizona. Report No. R-1698. RECON, Scottsdale.

Schroeder, K. J.
1998 *The Golf Club of Scottsdale Archaeological Survey, Scottsdale, Maricopa County, Arizona.* Road Runner Archaeology and Consulting, Tempe.

Stone, Connie L.
1990 *An Archaeological Survey of State Trust Land Along Jomax Road, East of Pinnacle Peak, Maricopa County, Arizona.* Archaeological Consulting Services, Ltd., Tempe.

Stubing, Michael
2000 *An Archaeological Survey of Approximately 275 Acres for the Proposed Scottsdale National Development in North Scottsdale, Maricopa County, Arizona.* Report No. 00-78. SWCA Inc., Phoenix.

Turner, Raymond M., and David E. Brown
1994 Tropical-Subtropical Desertlands: Sonoran Desertscrub. In *Biotic Communities: Southwestern United States and Northwestern Mexico*, edited by David E. Brown, pp. 180–221. University of Utah Press, Salt Lake City.

City of Scottsdale
Current Planning Services

DEVELOPMENT STANDARDS
Zoning R1-70

☐ PCD ☐ PRD ☑ ESL

Subdivision Name: Braun 20 Acres Date: August 18, 2017

Case Number: 955-PA-2016 **Quarter Section:** 50/59

	ORDINANCE REQUIREMENTS	AMENDED STANDARDS	MAXIMUM ESLO REDUCTION %
MIN. LOT AREA	70,000 sf	52,500 sf	25%
MIN. LOT WIDTH			
Standard Lot:	250'	187.5'	25%
Flag Lot:			
MAX. BUILDING HEIGHT	30'		
MIN.YARD SETBACKS			
Front Yard -			
Front (to face of building):	60'	45'	25%
Front (to face of garage):	60'	45'	25%
Front (corner lot, side street):	60'	45'	25%
Front (corner lot, adjacent to key lot, side street):	60'	45'	25%
Front (double frontage):	60'	45'	25%
Side Yard -			
Minimum:	30'	22.5'	25%
Maximum:	60'	45'	25%
Rear Yard -			
Standard Depth:	60'	45'	25%
Min. Depth (% of difference which can be occupied):			
DISTANCE BETWEEN BUILDINGS (MIN)			
Accessory & Main:	10'		
Main buildings/adjacent lots:	60'		
MAX. WALL HEIGHT			
Front:	3'		
Side:	8'		
Rear:	8'		
Corner side not next to key lot:	8' on PL		
Corral fence height (on prop line):	6' on PL		
DEVELOPMENT PERIMETER SETBACKS			
APPLICABLE ZONING CASES			

NOTES AND EXCEPTIONS

Planning and Development Services Department
7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone: 480-312-7000 • Fax: 480-312-7088

14-ZN-2017
9/1/2017

Sensitive Design Concept Plan and Proposed Design Guidelines

Scottsdale has established a set of guidelines for the design of public and private projects within the city. These guidelines are contained within the Design Standards and Policies Manual, commonly known as the DS&PM. The DS&PM is made up of 12 chapters all dealing with various areas of public and private development issues and intended to provide direction during the design of and construction document preparation for development activities within the City.

The Braun Properties is in its preliminary development stages. As a result, specific detailed design has not begun at this time. However, the following standards and guidelines have been established to ensure that the standards and policies conveyed by the DS&PM will be followed.

Site Features

- Site features such as washes and native vegetation will be kept in a natural state to the maximum extent as practical. Improvements that are required to natural washes will complement their natural function and appearance.
- Existing trees shall be preserved whenever practical or feasible.
- Significant rock outcrops, should there be any, shall be preserved.
- Views of near and distant mountains shall be considered during the design process.

Site Planning

- Roadway and driveway alignments will be located to minimize disruption to the natural drainage patterns of the site. Where crossings are necessary, consideration will be given to flow over the roadway, erosion, sediment transport and clogging.
- Emergency access will meet or exceed Scottsdale Fire Department requirements.
- Gated entrances will comply with the standards of figure 2.1-3 of the DS&PM.

Infrastructure

- Roadway cross-sections will comply with ESL standards as illustrated in the DS&PM.
- To minimize impact, utility lines will be located in road and driveway corridors as much as possible. In cases where utility lines cannot follow a road or driveway corridor, they will be located in easements or separate tracts and where desert materials are damaged due to the installation, revegetation will be provided.
- Pavers and natural stone may be used as an alternative to asphalt or concrete streets.

Grading

- Grading and disturbance to the site will be minimized. Fill and cut slopes will be graded to blend back into the natural terrain. Where retaining walls are required, heights will be kept to a minimum and terracing will be incorporated to avoid tall walls.
- Grading for individual residences will be limited to the building envelope area only.

Drainage

- Only local native rock will be used for erosion protection.

- Storm water storage basins and drainage channels will comply with DS&PM standards. In additions, they will be shaped to be "free-form" so as to blend into the natural desert surroundings. Landscape material will generally ne native plants capable of surviving periodic inundation such as the species identified in section 2-1.903 of the DS&PM.

Architecture

- All residential structures shall compliment the natural desert in form and color.
- All accessory structures shall match the character of the main building.
- All residences shall utilize four-sided architecture.
- Residences should provide shading and shaded areas to provide protection from the intense sun.
- Buildings should be designed to maximize the beauty of the outdoors and the warm winter climate.
- Building design should draw inspiration from the rich southwest architectural heritage.
- Native materials and colors should be emphasized.
- Garage placement should vary from lot to lot.
- Massing and articulation should be varied.
- Roof tile materials will be concrete or clay, flat or S-tiles, depending on the architectural style.
- Standing seam metal roofs in non-reflective neutral colors shall be permitted in appropriate architectural styles.
- Roof tile colors, shapes and textures shall be consistent with architectural themes.

Landscape

- All landscape plantings shall conform to the standards as identified in DS&PM and ESLO.
- All landscape materials shall compliment the natural vegetation found on-site.
- All areas of disturbance shall be revegetated with plants and densities consistent with the existing natural condition.
- Landscape selection should be consistent in size and scale of the adjacent residence.
- The colors of the landscape material should complement the character of the adjacent building.
- Landscape should enhance the architectural features of the building, not detract or hide them.
- Landscape design should provide for shade and use of outdoor spaces that complement the building.
- Landscape material should be of the desert whenever possible.
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- Whenever feasible or desirable, existing healthy trees shall be preserved or relocated.
- Existing trees that are salvaged must be placed in a temporary onsite nursery to be maintained until planted in the community.
- Turf shall only be permitted in areas within a residential lot, inside the building envelope, enclosed by a wall or fence, and not in view from the public street.

Hardscape

- All hardscape materials shall be complimentary and compatible with the natural desert environment.

- Concrete used for exposed drainage structures, sidewalks, curbs, gutters and driveways shall be integrally colored.
- Yard walls and fences shall be permitted within the building envelope only. Perimeter lot walls shall not be allowed.
- All utility boxes and other such structures must be screened with landscape and/or walls.
- Mechanical equipment, such as A/C units, pool equipment, etc. must be screened on all residential lots. These units must be screened by a solid masonry wall, at a minimum of four (4) feet in height.

Exterior Lighting

- All exterior lighting shall comply with the provisions as set forth in DS&PM, ESLO, and City Code.
- All exterior lighting shall be consistent with "Dark Skies" and be designed to minimize light pollution.
- All street lights shall be full cut-off and directed downward.

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- All community features, should there be any, shall comply with the provisions as set forth in DS&PM, ELSO, and City Code.
- Any planned community features will be designed to enhance the community, and compliment the character if the development.

Common Structures

- Although no common structures are planned at this time, all potential common structures shall conform to the standards as set forth in DS&PM, ESLO, and City Code.
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File Copy

PRELIMINARY WATER CAPACITY REPORT

Braun Property – 20 acres

Scottsdale, AZ

Prepared For:

LAND DEVELOPMENT SERVICES

7525 E. Camelback Rd., Suite #104
Scottsdale, AZ 85251
P: 480.946.5020

ACCEPTED AS PRELIMINARY REPORT W/COMMENTS

City of Scottsdale
Water Resources Administration
9379 E. San Salvador
Scottsdale, AZ 85258

Prepared by:

09/20/2017

Registered Professional Engineer (Civil)
CERTIFICATE NO.
52743
MARK A. MALONEY
Date Signed 8/1/17
ARIZONA U.S.A.

EXPIRES 9/30/2017

Sustainability Engineering Group
8280 E. Gelding Drive, Suite 101
Scottsdale, AZ 85260
480.588.7226 www.azSEG.com

Project Number: 170601

Original Submittal Date: August 3, 2017

Case No.: TBD **Plan Check No.: TBD**

14-ZN-2017
9/1/2017

EXPIRES 9/30/2017

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1. EXECUTIVE SUMMARY

The subject property is a proposed residential development of +/- 20 acres of undeveloped land located within the City of Scottsdale. The site is located on the NWC 132nd Street and East Pinnacle Vista Rd. The parcels are currently zoned R1-70 ESL and will be developed as thirteen residential lots with associated open space and public roads. The purpose of this report is to support an application for a ESL Density Incentive in accordance with the City of Scottsdale zoning ordinance and the environmentally sensitive land ordinance.

City of Scottsdale Quarter Section water maps show there is currently no water infrastructure near the project. The site falls within Quarter Section 50-59. According to the Addendum to Water BOD Report for Reata Ranch, dated September 2014, and Quarter Section Map 50-57, the closest existing water main is located at approximately Rio Verde Drive (Dynamite Blvd.) and 122nd Street. An existing 20" transmission main and an existing 12" golf course irrigation line are located in the Rio Verde R/W at this location. The Reata Ranch BOD report discusses the proposed water infrastructure from the connection to these existing water mains. A proposed 16-inch water main is planned along Rio-Verde Drive from 120th Street (connecting into the existing main) to 128th Street feeding and existing PRV, and a 12-inch water main from 128th Street to 136th Street. A 12-inch water main is also proposed south from Rio Verde Drive, down 132nd street to E. Pinnacle Vista.

Future ?

2. INTRODUCTION

2.1 PLAN OBJECTIVE:

The purpose of this report is to provide discussions defining the water system concepts necessary to comply with the requirements outlined in the City of Scottsdale Design Standards & Policy Manual. It is intended to describe the requirements of providing water service to the site. A detailed study (with flow testing and calculations) of the existing and proposed water system will be completed prior to submission of the improvement plans to the City of Scottsdale.

2.2 SITE LOCATION

The project property consists of one (1) parcel of land located on the NWC 132nd Street and East Pinnacle Vista Rd. It is further defined as being in the E ½ of the SE ¼ of the NW ¼ of Section 36, Township 5 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Scottsdale, Arizona; Parcel ID number is APN: 216-77-024C. Refer to **FIGURE 1 - Vicinity Map** for the project's location with respect to major cross streets.

The site is bounded by E. Pinnacle Vista to the south, N 132 Street to the east, and the Desert Estates at Pinnacle Peak subdivision to the north and the east. The site is located approximately ¼ of a mile south of Rio Verde Drive.

Desert Estates at Pinnacle Peak is a recorded residential subdivision adjacent to the property, that is currently in the process of re-platting, and re-approval for onsite and offsite infrastructure. We have used the Addendum to Water BOD Report for Reata Ranch, dated September 2014, is the basis of this study.

2.3 PROPOSED DEVELOPMENT

2.3.1 Existing Site Description:

Land ownership includes 20.05 +/- net acres (19.26+/- gross acres) of undeveloped land designated as R1-70 (Single Family Residential-Low Density) per City of Scottsdale Zoning Map 39.

The site slopes from west to east and contains average cross-slopes generally ranging from 2% to 15%. Predominantly, the buildable areas of the site contain slopes ranging from 2% to 10%. The Rio Verde Wash 10 Tributary 3 splits the center of the property. FIRM Map Number 04013C1331M dated November 4, 2015 indicates this site is designated as Zone "X" with a portion of the property zone AE where the Rio Verde Wash 10 Tributary 3 crosses the site. A CLOMR has been approved by FEMA for improvements along this tributary, but the improvements have yet to be completed. A recorded drainage easement along this tributary exists for installing these drainage improvements. Two thirds of the AE zone have base flood elevations determined while the western one third was not part of the detailed study. The layout of the residential lots is such that the developable envelopes are outside of the determined flood plain and the dedicated drainage easement. Finished floor elevations for the home sites will be set a minimum one (1) foot above the high-water elevations of this tributary. Refer to **FIGURE 2** for an aerial of the overall project existing conditions.

The City of Scottsdale Water Quarter Section Map (**QS 50-59**) shows the project site with no water infrastructure in the area. Also included is Quarter Section Map (**QS 50-57**) showing the nearest point of connection at this time. Refer to **Figures 3 and 4** for the COS Water Quarter Section Maps (QS 50-59 and 50-57).

Due to the lack of current water infrastructure in the area, the parcel will be developed subsequent to or concurrently with the Reata Ranch development which proposes a 12-inch water main fronting the property. This water main is proposed as part of the Reata Ranch – Offsite Improvement plans currently being process through the City of Scottsdale under Case #2-PP-2014 and Plan #5483-14.

2.3.2 Proposed Site Development:

The property is proposed to be developed with a lot configuration for thirteen residential units. The development will include two 24' wide cul-de-sac roadways entering from 132nd Street. Refer to **Appendix II** for the preliminary utility plan showing the proposed site layout.

An 8" main is proposed at each roadway tying into the proposed 12" DIP water main per the Reata Ranch – Offsite Improvements (Plan #5483-14). Domestic and irrigation services to the units will be tapped off these new 8" mains. ?

3. DESIGN CRITERIA

3.1 UTILITY DEVELOPER GUIDE CRITERIA

This project is designed using 13 du / 19.26 gross acres = 0.67 du/ac. Refer to **Table 1** below for applicable "Design Criteria for Water Systems" based on Figure 6.1-2 (<2 du/ac) in accordance with the City of Scottsdale DS&PM. ✓

Table 1 - COS Design Criteria by demand type

Land Use	Average Day Demand (gal/day/unit)	Max Day Peaking Factor	Peak Hour Peaking Factor
Residential (<2 DU/ac)	485.6	2.0	3.5

The system pressures, velocities, head losses and fire flow are in accordance with the COS DS&PM as follows:

Minimum Pressures:

50 psi residual pressure at the highest delivery point and 30 psi @ max day +fire flow ✓

Maximum Pressures:

Maximum Pressure =120 psi ✓

The City of Scottsdale operates its system such that pressures may exceed 80 psi. Therefore, the city requires all metered services to have a pressure-regulating valve installed on the private service line per DS&PM 6-1.~~402~~. 407. ✓

Velocity & Head loss:

- *10 ft. head loss maximum per 1,000 linear feet of pipe for pipes less than 16 inches in diameter.*

Hazen-Williams Coefficient *130*

Fire Flows:

This site is under the jurisdiction of the City of Scottsdale Fire Department. Fire flows must be in accordance with the 2015 International Fire Code which, for one- and two-family dwellings, is determined as follows:

- Dwellings having a fire-flow calculation area that does not exceed 3,600 s.f. that have automatic sprinklers shall be 500 gpm for 1/2 hour. ✓

Higher Fire flow demand for >3,600 s.f. Homes. Confirm Home sizes, as this will govern the F.F. demand.

4. DEMANDS

4.1 PROJECT USE DESCRIPTION

Proposed demands for this project are based on a Residential Demand per Dwelling Unit for a density <2 DU/ac. Refer to **Table 2** below for the proposed water demand calculations based on the design criteria established in *Section 3.1* above

Table 2: Water Demand Calculations

	Units	Avg. Day Flow (gpd/unit)	Max Day Peaking Factor	Peak Hour Peaking Factor	Avg. Day Demand (GPD)	Max. Day Demand (GPD)	Peak Hour (GPD)
Res. (<2 DU/ac)	13	485.6	2	3.5	6,312.8	12,625.6	22,094.8
TOTAL PROPOSED BLDG UNITS	9						
		TOTAL DEMANDS (GPD):			6,312.8	12,625.6	22,094.8
		TOTAL DEMANDS (gpm):			4.38	8.77	15.34

what is this unit nos.?

4.2 **ZONING**

This site is in Zone 11 according to Figure 6.1-3 Pressure Zone Map in DS&PM. ✓

4.3 **PHASING OF DEMANDS**

This residential project may be phased as dictated by unit demand. The infrastructure will be built in a single phase.

Include Max. Day + Fire Flow demand Scenario.

4.4 **SUMMARY NARRATIVE OF DEMANDS**

The demand scenario that governs the design was the peak hour demand.

5. EXISTING FACILITIES / CONDITIONS

5.1 **PREVIOUS MASTER PLANS**

No existing master plan or water report is available from COS for this site. However, a copy of the Addendum to Water BOD Report for Reata Ranch, dated September 2014 has been included in Appendix I of this report.

6. PROPOSED FACILITIES

6.1 **DISTRIBUTION SYSTEM PIPING**

6.1.1 Onsite:

The proposed water supply will consist of two new 8" public water lines and two new fire hydrants. The proposed 8" pipe will be DIP in accordance with COS requirements. ✓

Domestic service will be provided by 1" copper service connections to each lot. Irrigation will be tapped from the domestic service and require backflow prevention.

Irrigation for common areas will be provided by a separate system tapped from the 8" line and maintained by the Home Owners Association.

6.1.2 Offsite Infrastructure:

Assuming this development proceeds the development of Reata Ranch no offsite infrastructure is required to service this site.

7. WATER MODEL

7.1 DESCRIPTION OF MODEL

The final model of the proposed water system will be designed to meet the criteria of COS Water, the Arizona Department of Environmental Quality ("ADEQ"), and Maricopa County Environmental Services Department ("MCESD").

Bentley WaterCAD® Version 8i will be used to model the water system.

Network analysis input parameters included the following:

1. Pipe diameters (inches)
2. Pipe lengths (feet)
3. Pipes invert elevations (feet)
4. General Purpose Valve to model Water Meter and Double Check Valve Assembly
5. A reservoir and a pump to model the fire flow test performed
6. System demands (gpm)
7. Fire flows (gpm)
8. Model piping is ductile iron pipe using Hazen-Williams frictional losses (C = 130)

Output parameters will include but not necessarily limited too:

1. Pressure (psig)
2. Flow rates (gpm)
3. Velocities (fps)
4. Head loss (feet)

Include the worst case scenario which is Max Day + Fire Flow Demand

However, referencing the modeling results from the *Water BOD Report for Reata Ranch* during maximum day and peak hour conditions provides a pressure of roughly 77 psi within the waterline within 132nd street. (Refer to Appendix I at nodes 7 and 23). During Max Day and Peak hour the pressure in this line is constant (77 psi) at both of the proposed taps for this subdivision. The Hazen Williams headloss equation provides a negligible friction loss for the approximately 400 foot of 8-inch pipe providing service to the proposed subdivision.

$$S_{\text{psi per foot}} = \frac{P_d}{L} = \frac{4.52\,Q^{1.852}}{C^{1.852}\,d^{4.8704}}$$

Where;

- $S_{\text{psi per foot}}$ = frictional resistance (pressure drop per foot of pipe) in psi/ft
- P_d = pressure drop over the length of pipe in
- L = length of pipe in feet
- Q = flow, gpm

- C = pipe roughness coefficient (130)
- d = inside pipe diameter, (inches)
- H_f = friction headloss

$S\ (psi/ft) = [4.52 \times (15\ gpm)^{\wedge 1.852}] / [(130)^{\wedge 1.852} \times (8.38)^{\wedge 4.8704} = 2.640 \times 10^{-6}\ psi/ft$

Show Headloss @ Max Day + F.F. Cond^n
For, ~500 gpm FF, ~ Headloss ≈ 2.4'
For, 1000 gpm FF, ~ Headloss ≈ 8.3'

At 400 lf of onsite pipe length;
H_f = 0.0011 psi

Approximately 10 ft -15 ft (4.3 psi – 6.5 psi) of elevation head loss will occur at the highest proposed PAD elevation on site. Consequently, the minimum Max Day and Peak Hour pressure should be around;

Elv. for Node 7 (App-I) is 2506.47. From GIS Map, Approx. Highest Elv. @ Site is 2535. Resulting Approx. of 12.4 psi of Elv. headloss.

Minimum site pressure = 77 psi – 0.0011 psi – 6.5 psi = 70.5 psi

7.2 ASSUMPTIONS

Please refer to *Section 3.1* for the design criteria.

The general methodology that will be used to provide the final design of this water infrastructure will consist of modeling a network of water distribution mains to meet COS pressure, head loss, and water demand requirements during daily demands and fire events. The connection to the water system will be modeled as a reservoir and pump. The pump will simulate the pressure drop and the available flow from the existing water system as depicted by the fire flow test. ✓

7.3 SUMMARY OF RESULTS

Modeling of the water system will be completed in the final BOD water report for the subdivision.

8. SUMMARY / CONCLUSIONS

8.1 CONFORMANCE TO DESIGN GOALS

- The proposed water main will be designed in accordance with COS design standards and policies[1]. The following summary is based on the above analysis summary.
- Minimum 50 psi residual @ highest delivery point required, 70.5 psi minimum provided (per standard headloss calculations). — Show min available pressure for Max Day + F.F. Cond^n.
- Minimum 30 psi @ max+ fire flow required.
- 10 ft of headloss per 1000 feet of pipe will not be exceeded during fire flow conditions.
- The system will be designed to support the minimum 500 gpm fire flow requirements.
- If homes exceed 3,600 sf a fireflow rate of 1500 gpm will be required. This can be reduced to 750 gpm with the installation of a fire sprinkler system. ✓

8.2 REQUIRED FACILITIES AND PHASING

- Proposed facility improvements for this project are limited to a two 8" mains (approximately 400 lf each), two new fire hydrants, and 1" domestic service connections. ✓

- This project will be constructed in a single phase.

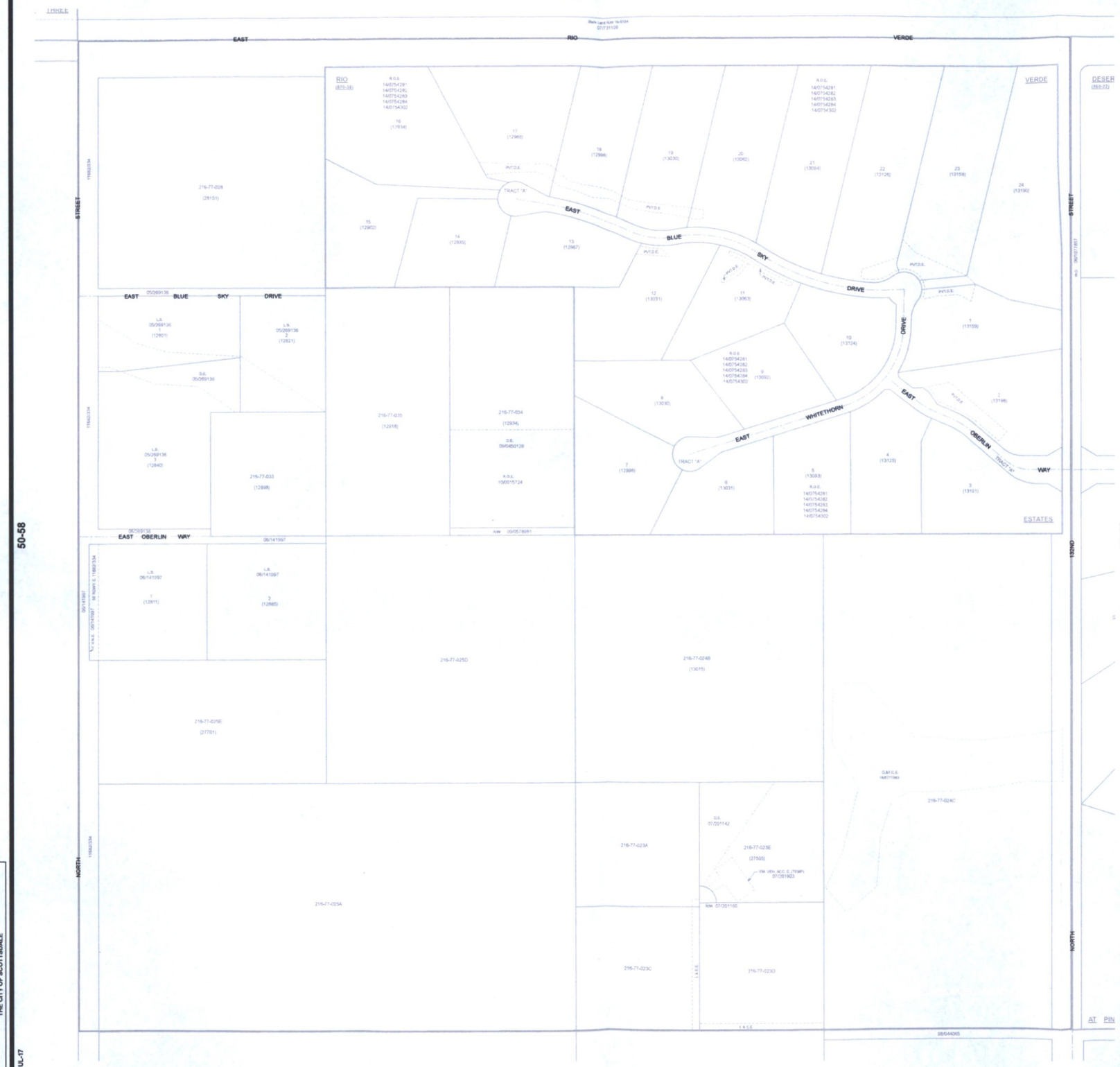
REFERENCES

1. *City of Scottsdale Design Standards & Policies Manual-Chapter 6, Water*
2. *Water BOD Report for Reata Ranch, dated September 2014*

FIGURE 1
VICINITY MAP

FIGURE 2
AERIAL

51-59



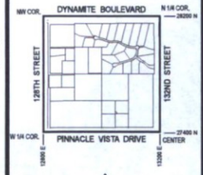
GENERAL NOTES:

- THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7792.
- THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER, 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS 'CALCULATED ON THE MAP.'

LEGEND:

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

VICINITY MAP



NORTH

SCALE: 1" = 100'

0 50 100 200

The map scale of 1" = 100' is based on a full size print of 30" x 36"

WATER

QUARTER SECTION MAP

50-59

NW 1/4 SEC. 36 T5N R5E

FIGURE 3

SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS
3629 North Drinkwater Boulevard
Scottsdale, Arizona 85251

N O T I C E

THIS DOCUMENT IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY. THE CITY OF SCOTTSDALE DOES NOT WARRANT ITS ACCURACY OR SUITABILITY FOR ANY SPECIFIC PURPOSE. IT SHALL NOT BE RELIED UPON AS SUCH BY ANY PERSON OR ENTITY. THE CITY OF SCOTTSDALE

30-JUL-17

51-57

50-56

50-58

EAST RIO VERDE DRIVE

20" DIP

12" DIP

GOLDIE BROWN (194-28)

PINNACLE PEAK

STREET

215-78-007

215-78-034A

EAST HEDGEHOG PLACE

NORTH 12IST STREET

EAST PINNACLE VISTA DRIVE

TWO RANCH PEAK

UNIT TWO

OBERLIN WAY

215-78-005A

215-78-005B

215-78-005C

215-78-006B

215-78-006E

215-78-006F

215-78-006C

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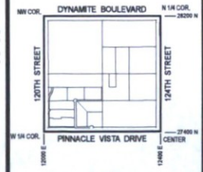
VICINITY MAP



NORTH

SCALE: 1" = 100'

0 50 100 200

The map scale of 1" = 100' is based on a full size print of 30" x 36"

WATER

QUARTER SECTION MAP

50-57

NW 1/4 SEC. 35 T5N R5E

FIGURE 4

SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS
3829 North Drinkwater Boulevard
Scottsdale, Arizona 85251

30-JUL-17

APPENDIX I

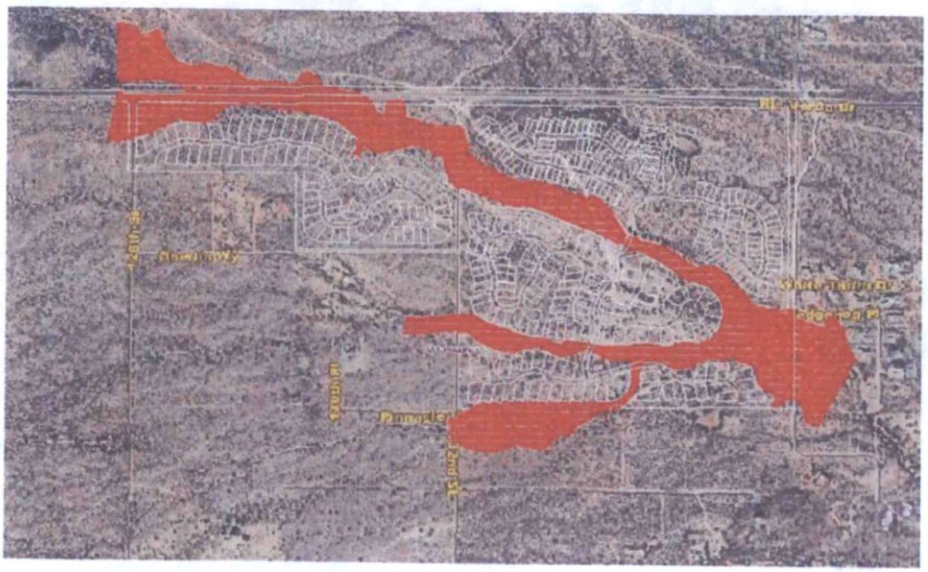
Addendum to Water BOD Report for Reata Ranch
September 2014

ADDENDUM TO WATER BOD REPORT

For

REATA RANCH

City of Scottsdale project Number: 3902-12



Prepared for:
Land Development Services, L.L.C.
7525 E. Camelback Road, Suite 104
Scottsdale, AZ 85251
Phone (480) 946-5020
Fax (480) 946-5041

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

By: Doug Warman
Date: 10.14.14

Registered Professional Engineer (Civil)
CERTIFICATE NO
25970
SHAKIR
GUSHGARI
DATE SIGNED 9.24.14
ARIZONA U.S.A.
Expires 3.31.16

Prepared by:
SKG Enterprises, Inc.
9260 East Raintree Drive, Suite 140
Scottsdale, Arizona 85260
Phone (480) 998-5600
Fax (480) 998-5603

September 2014
SKG Project #30-11

2-PP-2014

4508-14

4508-14 Water 9/25/14

ADDENDUM TO WATER BOD REPORT

For

REATA RANCH

City of Scottsdale project Number: 3902-12

Prepared for:
Land Development Services, L.L.C.
7525 E. Camelback Road, Suite 104
Scottsdale, AZ 85251
Phone (480) 946-5020
Fax (480) 946-5041

Prepared by:
SKG Enterprises, Inc.
9260 East Raintree Drive, Suite 140
Scottsdale, Arizona 85260
Phone (480) 998-5600
Fax (480) 998-5603

September 2014
SKG Project #30-11

2-PP-2014 **4508-14**

TABLE OF CONTENTS

EXHIBITS

TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

- **Purpose of Study and Relative History**

The master water distribution system basis of design report (BOD) for Reata Ranch was originally developed by SKG Enterprises, Inc. on August 24th, 2012 (Reference 1 and Appendix B). This Water BOD report was approved by the City of Scottsdale under case number 3902-12 on September of 2012. Further, the proposed offsite waterline, along Rio Verde Drive, was designed as a part of Water Master Plan (Hunn & Associates, Inc.) by GTA Engineering Inc. on April 25th, 2001 (Reference 2), which was also City approved. Since the approval of the Rio Verde waterline design and the SKG water BOD report, the proposed development of Reata Ranch has undergone slight lot layout configuration changes, while the intent of the original design is still maintained.

The purpose of this addendum is to present the most recent proposed onsite water system's layout within the Reata Ranch development as has recently been approved by the City of Scottsdale Development Review Board under case number 2-PP-2014 and to demonstrate that the development of Reach Ranch (with its new and revise lot configuration) still meets the water design standards in accordance with the City of Scottsdale's Design Standards and Policy Manual.

- **Location of Study**

Reata Ranch is a proposed master planned development bounded by 136th to 128th Streets (east-west-direction) and Rio Verde Drive to Pinnacle Vista Drive (north-south-direction) and is situated in a portion of the north half of Section 36, Township 5 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Scottsdale, Arizona (Exhibit 1).

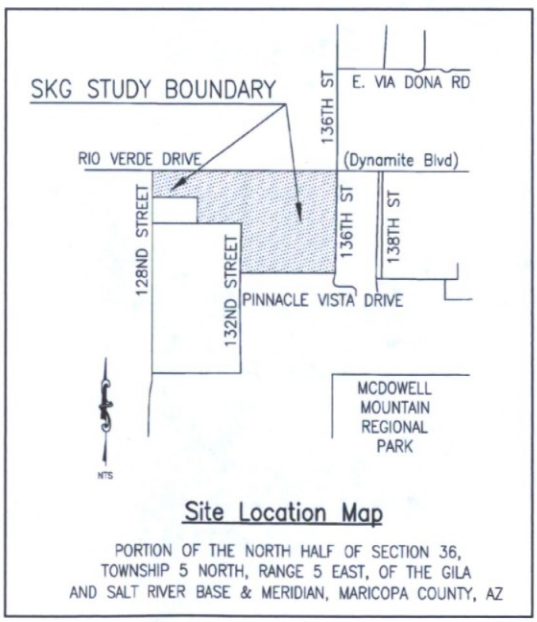


Exhibit 1 – Location Map

2.0 EXISTING INFRASTRUCTURE

Currently, there is no existing water main along the perimeter of the site. The closest existing water line to Reata Ranch is located within the vicinity of Rio Verde Drive and 120th Street. A proposed 16-inch water main is planned along Rio-Verde Drive from 120th Street (connecting into the existing main) to 128th Street (Reference 2) and a 12-inch water main from 128th Street to 136th Street. In addition to the proposed Rio Verde water main, additional water lines are also proposed as follow:

- 12-inch water main along 128th Street,
- 12-inch water main along 132nd Street,
- 12-inch water main along 136th Street, and
- Pressure Reducing Valve (PRV) at 128th Street

3.0 ONSITE WATER DISTRIBUTION SYSTEM

The proposed water distribution infrastructure for the Reata Ranch development will consist of two components:

1. Offsite water main along Rio Verde Drive, 128th Street, 132nd Street and 136th Street, and
2. Onsite water distribution system

It is currently anticipated that entire Reata Ranch site grading and infrastructure activities be constructed at one time. This construction plan was a result of balancing earthwork grading activity to mitigate potential earthwork import or export. In order to maintain flexibility to close-out of some parcels while the rest of the parcels are still under construction, the design team has elected to submit improvement plans via seven separate cover sheets labeled as Parcels "A" through "G". The final plat for the development is; however, planned to be submitted as one complete final plat document (as opposed to seven separate plats). It should be noted; however, that all seven parcels are planned to be submitted to the City of Scottsdale for review at the same time. Associated with seven separate plans submittals, this water BOD report was prepared as a one document (not seven separate documents) with the understanding that the entire water system will be constructed at one time. The water hydraulic model has been prepared as one complete system to be constructed at one time. However, in case where one parcel should be closed-out while the rest of the infrastructure is still being constructed, the following table has been prepared to demonstrate which parcel can be closed-out "as a standalone parcel" and which parcel is dependent on others relative to water, sewer, and access. It is implied that the offsite water distribution system will be constructed prior to any onsite line installation (See Exhibit 2). It should be noted herein that the intent of the table below is not to suggest the project will be phased, relative to infrastructure construction, but rather which parcel can be closed-out while others are still being under construction.

Table 1 – Parcel Infrastructure Dependency

Sequence Number	Activity	Description of Construction Work
1	CLOMR channel grading	Channelization grading of wash and area directly adjacent to wash. Installation of drainage structures within the wash to comply with the FEMA-CLOMR application. The only utility to be installed with this construction activity is water line and potentially dry-utility sleeves under the drainage structures. These plans will also include channel erosion protection and channel re-vegetation plans.

2	Offsite Improvements	Construction of offsite improvements will consist of: 1. 136th Street: roadway, 12" water, and 4" sewer force main 2. 132nd Street: roadway and 12" water 3. 128th Street: roadway and 12" water 4. Rio Verde Drive: right & left turn lanes 5. Rio Verde Drive: 12" & 16" water line 6. Rio Verde Drive: 4" sewer force main These plans will also include storm-drain related construction, re-vegetation plans, landscape & irrigation, and dry utilities.
3	Parcel "E"	Residential subdivision with access drive off Rio Verde Drive. Secondary access will be toward 132nd Street (north of Parcel "C") since the channel grading will be 100% completed prior to completion of Parcel "E"; therefore, a graded access will be available from Parcel; "E" to 132nd Street. Water will have 2 sources, the 1st is via Rio Verde Drive and the 2nd is via 6" water line parallel to the force main connecting into 136th Street. Sewer is available all the way to the lift station. Parcel "E" is a "standalone parcel" that can be closed-out independent of any other parcel.
4	Parcel "C"	Access is through Rio Verde and 132nd Street (2 access points). Water will have 3 sources (Rio Verde, 136th Street, and 132nd Street). Sewer is gravity through Parcel "E". Parcel "C" depends on Parcel "E" for sewer outfall and therefore, cannot complete its "certificate of occupancy" status prior to Parcel "E" sewer line construction completion.
5	Parcel "G"	Access is through Rio Verde and 136th Street (2 access points). Water will have 2 sources (Rio Verde and 136th Street). Sewer is gravity all the way to the lift station. Parcel "G" is a "standalone" parcel that can be closed-out independent of any other parcel.
6	Parcel "F"	Access is through Rio Verde and 136th Street (2 access points). Water will have 3 sources (Rio Verde, 136th Street, and 132nd Street). Sewer is gravity through Parcel "G". Parcel "F" depends on Parcel "G" for sewer outfall and therefore, cannot complete its "certificate of occupancy: status prior to Parcel "G" sewer line construction completion.
7	Parcel "B"	Access will be through 132nd Street and 128th Street (2 access points). Access to 128th Street will be through the graded portion of the CLOMR wash grading activity in sequence number 1 above. The channel grading will be 100% completed prior to completion of Parcel "B"; therefore a graded access will be available to 128th Street. Water will be via 2 sources (132nd Street and 128th Street) which means that Parcel "A" water line must be installed with Parcel "B" to create the 2nd water source for Parcel "B". Also Parcel "B" sewer outfall depends on Parcels "E" and "C". Therefore Parcel "B" cannot be completed without Parcels "E", "C", and "A". **Parcel "B" & "A" will be submitted and constructed together.**
8	Parcel "A"	Access will be through 132nd Street and 128th Street (2 access points). Water will have 2 sources (128th Street and 132nd Street). Sewer outfall will be through Parcels "B", "C", and "E". Therefore, Parcel "A" is depends on parcels "B", "C", and "E" to function. Parcel "A" cannot be completed without Parcels "B", "C", and "E". **Parcel "B" & "A" will be submitted and constructed together.**

9	Parcel "D"	Access is through Rio Verde, 136th, and 132nd Street (3 access points). Water will have 3 sources (Rio Verde, 136th Street, and 132nd Street). Sewer is gravity through Parcel "E". Parcel "D" depends on Parcel "E" for sewer outfall and 2nd source water connection. Therefore, cannot complete its "certificate of occupancy" status prior to Parcel "E" construction completion.
10	Final Plat	Final plat will be prepared is one complete documents and be submitted "as reference" with each parcel submittal.

See Exhibit 2 for parcel configuration layout

The onsite water distribution system facility will entail the installation of the following:

- Onsite water distribution system consisting of 8-inch and 12-inch, water lines.
- 6-inch water line to create looping system at two locations.
- All water line shall be of ductile iron pipe material.

The proposed onsite distribution system design intent is to maintain pressure to range from an upper limit of approximately 120 pounds-per-square-inch (psi) to a lower limit of 50 psi limit at the highest end of the development's pressure zone. The lower limit could drop to as low as 30 psi during fire flow demand.

The water distribution system described in this report consists of ultimate buildout scenario where the water system model considered the entire developments of the Reata Ranch. The water infrastructure sizes for Reata Ranch development were based on this "ultimate buildout" scenario.

3.1 ULTIMATE BUILDOUT

Ultimate build-out is a final build-out scenario and includes the entire development areas of all 7 parcels and all offsite infrastructure improvements. As such, the ultimate build-out water model was prepared to include the entire Reata Ranch developments.

The proposed 12" D.I.P. along East Running Deer Trail connecting 128th, 132nd, and 136th streets and 8" D.I.P. for the remaining streets within the master planned development of Reata Ranch project is to deliver potable water and fire protection to the farthest of the development. Exhibit 3 illustrates the general layout of the water system infrastructure for each of the parcel development.

The table below outlines the projected water demand for the proposed Reata Ranch Ultimate build-out scenario. It describes the water demand in terms of average daily demand, maximum day demand and peak hourly demand.

Table 2 – Water demand calculation for Ultimate Build-out Scenario

Type 1	Acres 2	DU/Ac 3	Units 4	Demand Per Unit 5	Ave. Daily Demand (gpd) 6	Max Daily Demand (gpd) 7	Peak Hourly Demand (gpd) 8
Parcel A	17.9	3.5	36	485.6	17,482	34,963	61,186
Parcel B	20.5	3.5	40	485.6	19,424	38,848	67,984
Parcel C	26.3	3.5	63	485.6	30,593	61,186	107,075
Parcel D	24.7	3.5	37	485.6	17,967	35,934	62,885
Parcel E	16.6	3.5	24	485.6	11,654	23,309	40,790
Parcel F	22.3	3.5	78	485.6	37,877	75,754	132,569
Parcel G	20.6	3.5	50	485.6	24,280	48,560	84,980
Equestrian Center & Club House	15.3	-	-	1,786	27,322	54,644	95,627
Offsite - South of Property	420	3	140	485.6	67,984	135,968	237,944
Offsite - East of 136th Street	420	3	142	485.6	68,955	137,910	241,343

Design Criteria:

1. Average Daily Demand for Residential = 485.6 gpd per unit
2. Average Daily Demand for Resort town homes = 485.6 gpd per unit
2. Average Daily Demand for Developed Open Space - Parks = 1786 gpd per acre
2. Max Day Demand = 2 X Avg Daily Flow
3. Peak Hour Demand = 3.5 X Avg Daily Flow
4. Fire Flow = 1000 gpm for single family residential
5. Fire Flow = 2500 gpm for Resort
6. Offsite Water Demand was computed assuming that the surrounding Parcels are zoned as R1-130. Since Reata Ranch is 220acres, the adjoining Parcels of 420 acres is expected to develop 140 potential residential lots. Parcel to the east (Wildcat Ridge/Scottsdale National/ Scottsdale Appendage) is expected to develop 142 lots.

The City of Scottsdale has approved the proposed water distribution system along Rio Verde Drive consisting of 16" and 12" mains (Ref. 1 and 2). This approved water system will be the main domestic and fire flow water sources for the proposed development of Reata Ranch. A hydraulic water model for this water system was also previously prepared and City approved on May 7, 2001 (Ref. 5). Excerpt from this water model report is included in Ref. 3 of this report. The available water flow and pressure are summarized in Table-3.

Table 3 – Pressure at tie in locations

Node # 1	Near 2	Flow (GPM) 3	Pressure (psi) 4
210	128th Street	299.56	55.00
212	East of 128th Street	299.56	63.46
220	West of 132nd Street	299.56	80.45
224	136th Street	299.56	91.11

In the Ultimate build-out scenario, all the parcels (Parcels "A" through "G") are considered for Hydraulic Analysis, the results of which are included in Section 5.

Demand assigned at each of the junctions is summarized in Appendix A for Ultimate Build-out Scenario.

4.0 WATER SYSTEM DESIGN PARAMETERS

The design parameters used to calculate the water demand for this development are presented in the table below.

Table 4 - Summary of Water System Design Parameters

Criteria	Parameters
Average Single-family Residential Demand	485.6 GPD per dwelling unit
Resort Development Demand	485.6 GPD per unit
Residential Fire Flow	1,000 GPM, 4 hour Duration
Commercial Fire Flow (Resort)	2,500 GPM, 4 hour Duration
Velocity Range	0 to 5 foot-per-second
Water pipe material	Ductile Iron Pipe
Allowable pipe sizes (inches)	8" and 12"
Peak Day Peaking Factor	2.0 times average day demand
Maximum Hour Peaking Factor	3.5 times average day demand

GPM = gallon per minute

GPD = gallon per day

Water Design parameters obtained from City of Scottsdale, "Chapter 6 Potable Water System Design, Design Standards and Policies Manual", Dated August 2008.

5.0 HYDRAULIC ANALYSIS

This report provided the water hydraulic analysis for ultimate build-out development scenario. The model is analyzed for 4 independent demand scenarios:

1 Average Day Demand;
2 Maximum Day Demand;
3 Peak Hour Demand; and
4 Maximum Day + Fire Flow Demands

The hydraulic system is modeled for "steady state analysis" using Bentley WaterCAD V8i software. Fire flow analysis is performed for all the nodes to meet the fire demand. Based on the model results, the proposed water infrastructure is found to be adequate to meet ultimate buildout domestic and fire demands, and serve as a reliable source of water supply for the entire development. The hydraulic model analysis results and corresponding demand patterns, with the proposed water system diagram of the ultimate buildout scenario for steady state analysis is presented in Exhibit 4 of this report. The following summarizes the water distribution system design criteria under these four scenarios.

- The Hazen-Williams "C" for ductile iron pipe is 120.
- Minor losses are ignored.
- The overall head-loss through the piping networks is low at peak hour demand and at the maximum day+fire demand. The maximum and minimum pressures at each junction nodes are within the pressure zone range.
- The upper limit of water pressure shall be on the order of 120 psi.
- The lower limit of water pressure shall be on the order of 50 psi.
- The lower limit of water pressure shall be on the order of 30 psi with fire flow.
- On-site water system distribution will consist of adequate size to deliver the needed flows and pressures.
- Fire Flow analysis for all nodes were conducted based on 1,000-GPM for residential units, and 2,500-GPM flow for resort parcels, with pressure equal to or greater than 30 psi at all nodes.
- All pipe material shall be of ductile iron pipe.
- Hydraulic model output print out is presented in Exhibit 3 of this report.
- Digital copy of the hydraulic model is attached in a "CD" at the back of this report

Table 5 presents a summary of the water demand calculation for each parcel and that of the total site. Table 6 presents the calculated scour-depth for the proposed 6" water line segment that will be installed under the wash (see Exhibit 3 for water line segment to be installed within a wash).

Table 5 - Summary of Water Demand Calculation for Each Parcel and the Total Site

Parcel No.	Junction No.	No. of Units	Average Daily Flow (gpm)	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)	Maximum Day + Fireflow (gpm)
A	2	18	6.07	12.14	21.25	1000
B	3	18	6.07	12.14	21.25	1000
	4	22	7.42	14.84	25.97	1000
	5	7	2.36	4.72	8.26	1000
	6	11	3.71	7.42	12.98	1000
C	7	-	-	-	-	1000
	8	5	1.69	3.37	5.90	1000
	9	8	2.70	5.40	9.44	1000
	10	17	5.73	11.47	20.06	1000
	11	9	3.04	6.07	10.62	1000
	12	11	3.71	7.42	12.98	1000
	13	5	1.69	3.37	5.90	1000
	14	5	1.69	3.37	5.90	1000
E	15	3	1.01	2.02	3.54	1000
	16	-	-	-	-	1000
	17	4	1.35	2.70	4.72	1000
	18	8	2.70	5.40	9.44	1000
	19	12	4.05	8.09	14.16	1000
	35	-	-	-	-	1000
	36	-	-	-	-	1000
	27	-	-	-	-	2500
	31		18.97	37.95	66.41	2500
	41	-	-	-	-	1000
D	20	7	2.36	4.72	8.26	1000
	21	5	1.69	3.37	5.90	1000
	22	3	1.01	2.02	3.54	1000
	23	5	1.69	3.37	5.90	1000
	24	-	-	-	-	1000
	25	3	1.01	2.02	3.54	1000
	26	14	4.72	9.44	16.52	1000
F	28	30	10.12	20.23	35.41	2500
	29	32	10.79	21.58	37.77	2500
	30	16	5.40	10.79	18.88	2500
	40	-	-	-	-	1000
	44	-	-	-	-	2500
	45	-	-	-	-	2500
G	32	25	8.43	16.86	29.51	2500
	33	25	8.43	16.86	29.51	2500
	34	-	-	-	-	2500
	42	-	-	-	-	1000

Continued....

Parcel No.	Junction No.	No. of Units	Average Daily Flow (gpm)	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)	Maximum Day + Fireflow (gpm)
Offsite Demand	37	47	15.74	31.47	55.08	1000
	38	47	15.74	31.47	55.08	1000
	39	47	15.74	31.47	55.08	1000
	43	142	47.89	95.77	167.60	1000

Table 6 – Scour depth for the 6" Water Line Segment under Wash

Pipe ID	Pipe Size	Start Node	End Node	Scour Depth	Depth of Pipe below Proposed Channel Bottom
P-46	6"	J-35	J-36	5'	7'

6.0 REFERENCE

1. **Water Distribution System – Basis of Design Report for Reata Ranch, Case # 3902-12 by SKG Enterprises, Inc., City of Scottsdale,** *AZ, August 24th, 2012.*
City of Scottsdale approved on 09-19-2012.

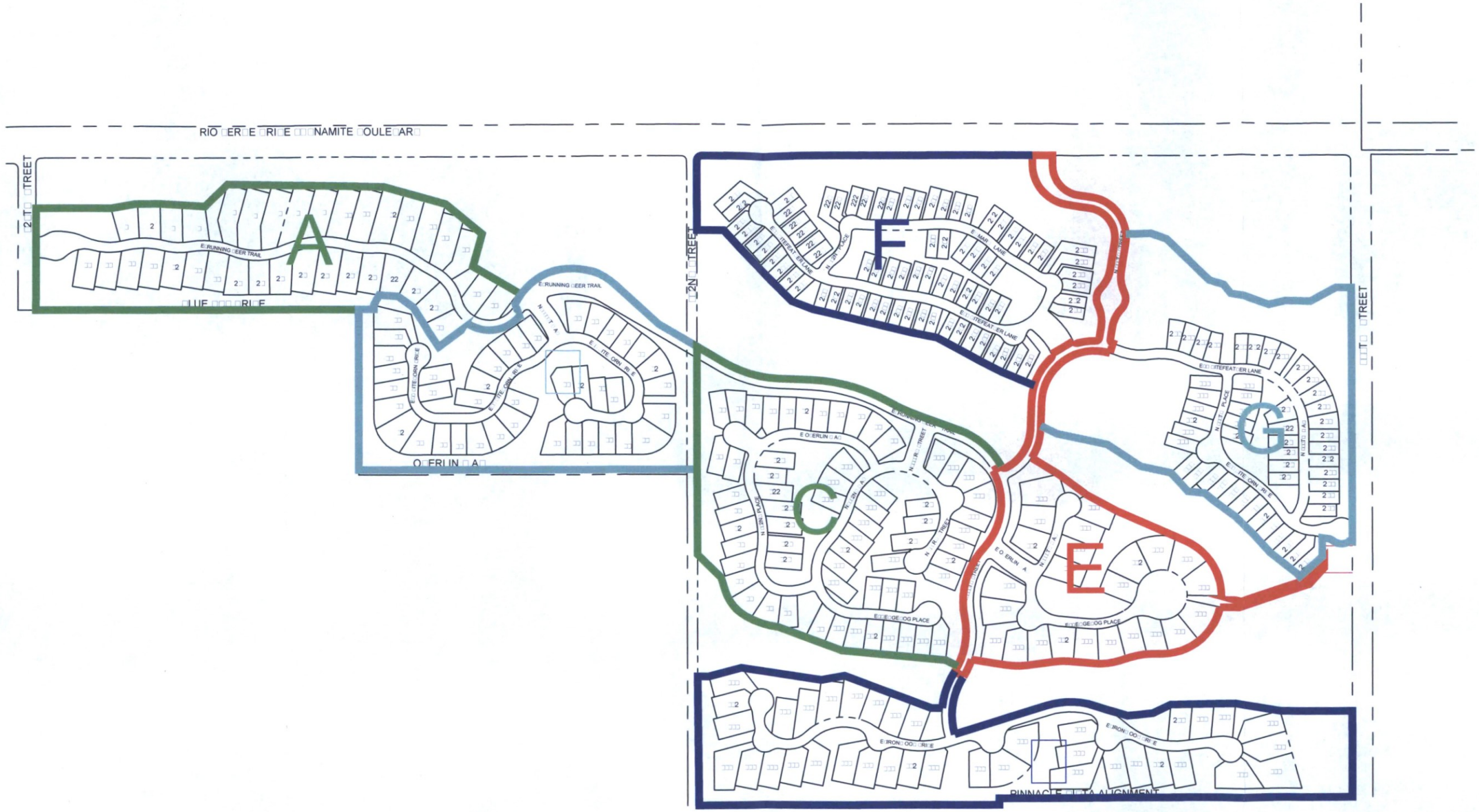
2. **GTA Engineering, Inc.,** *Scottsdale National Water Supply System, Scottsdale. Arizona.*
April 25, 2001. Project number GTA00145 (Approved by the City of Scottsdale on May 07, 2001).

3. **City of Scottsdale,** *"Chapter 6 Potable Water System Design, Design Standards and Policies Manual", Dated August 2008.*

4. **Arizona Department of Environmental Quality,** *"engineering bulletin 110.10 Guidelines for the Construction of Water, Minimum Requirements (or Design, Submission of Pimts a nd Specifications of Sewage Works".* **May, 1978.**

5. **2006 International Fire Code, International Code Council, dated 2006**

EXHIBIT 2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E MAIL LANE
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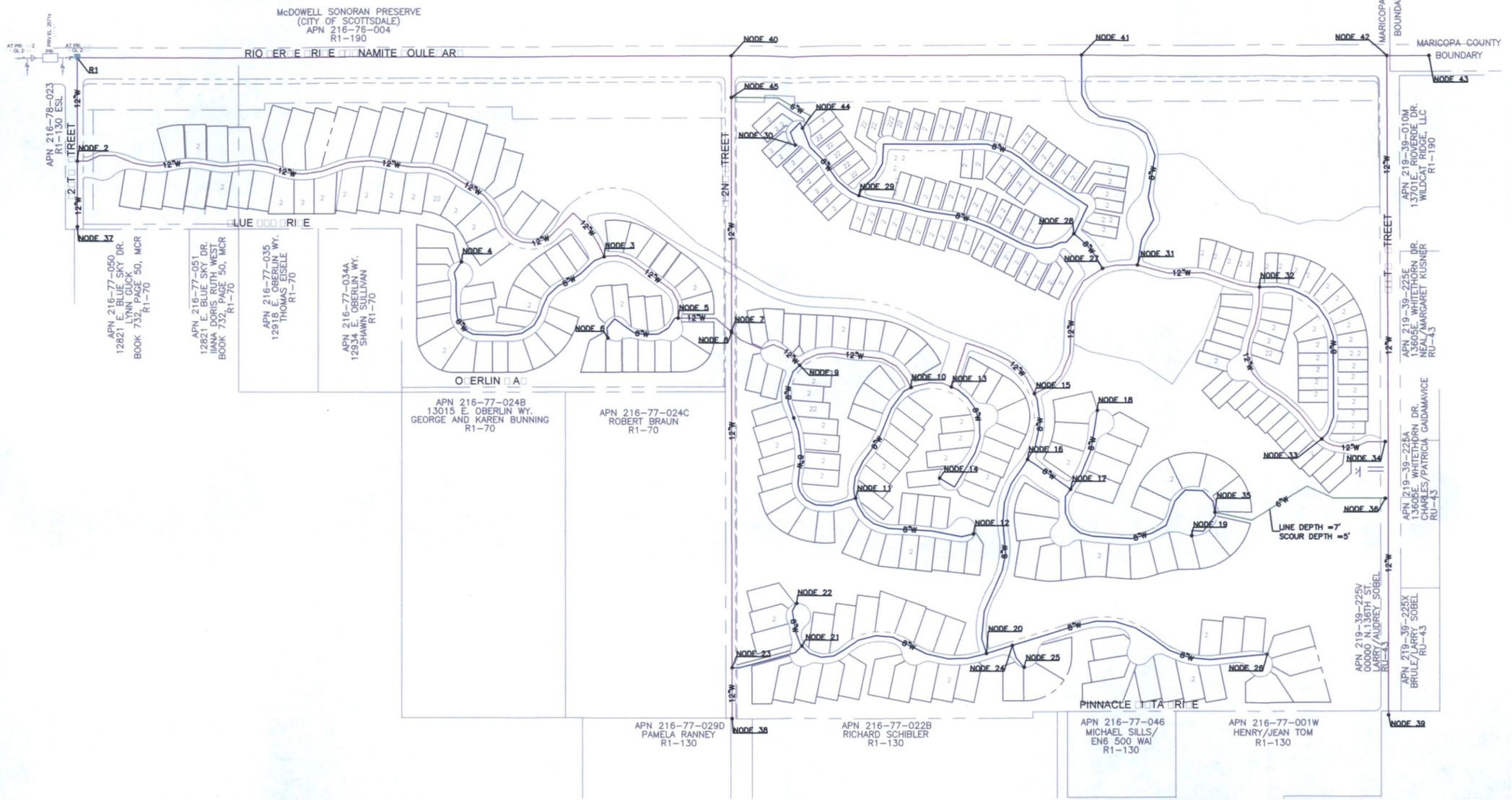
E□□I□IT 2

EXHIBIT 3



LEGEND

12" WATER LINE	12"W
8" WATER LINE	8"W
6" WATER LINE	6"W
NODE	
RESERVOIR	

Blue Stake, Inc.
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1-800-STAKE-IT
OUTSIDE MARICOPA COUNTY

Arizona Professional Engineering Society
CERTIFICATE NO.
25970
SHAKIR K GUSHGARI
Civil
ARIZONA, U.S.A.
Expires 03-31-18

DATE	REVISION	BY

SKG ENTERPRISES, INC.
CONSULTING CIVIL ENGINEERS
9280 E. Raintree Drive · Suite 140 · Scottsdale, Az. · 85260 · (480) 998-5600

DSN: JAR
CKD: SKG

SCALE
HORIZ: 1:200
VERT:

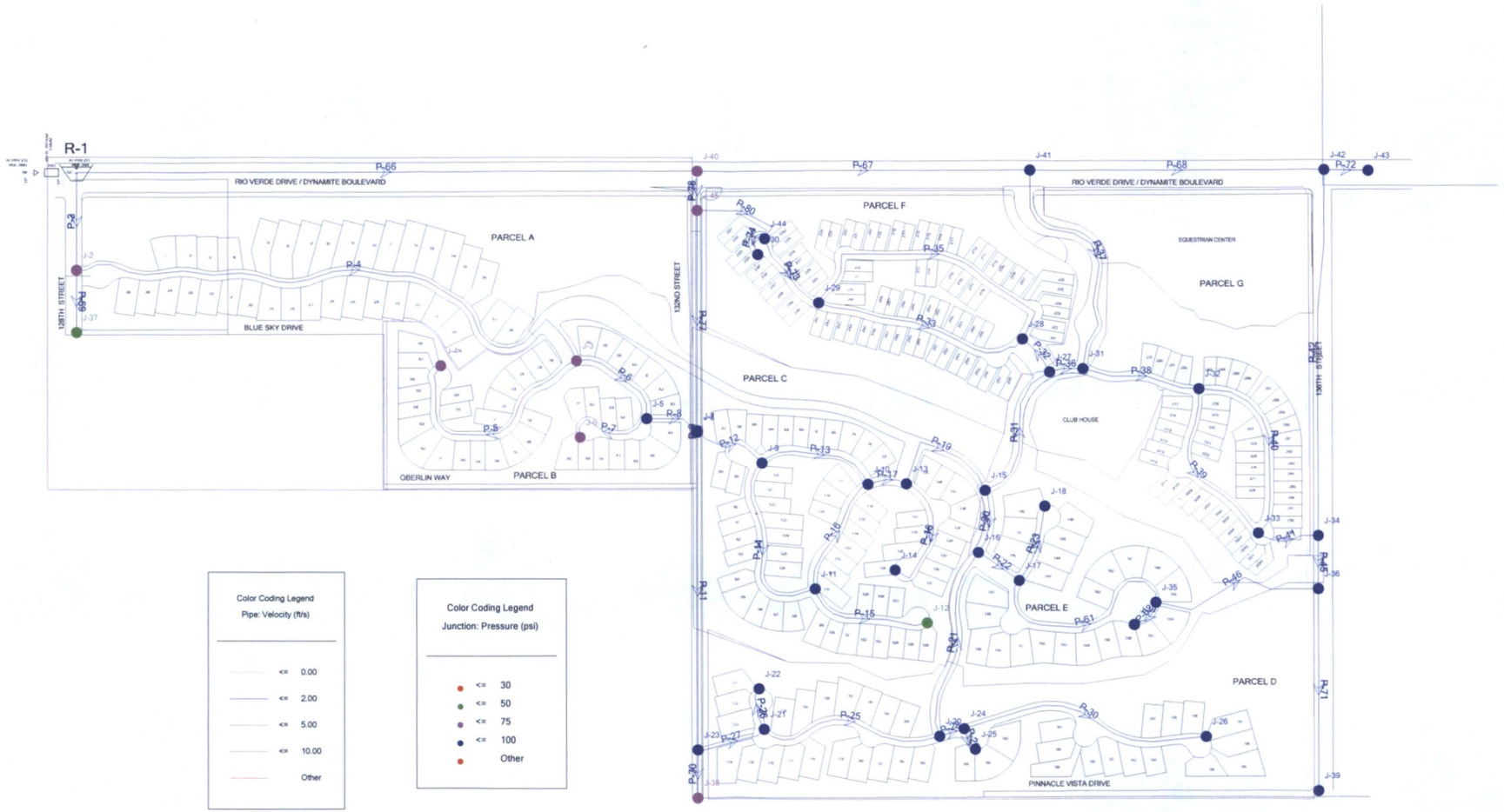
REATA RANCH
WATER KEYMAP

JOB# 30-11

EXHIBIT 3

EXHIBIT 4

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: AVG DAY



Color Coding Legend
Pipe: Velocity (ft/s)

	<=	0.00
	<=	2.00
	<=	5.00
	<=	10.00
		Other

Color Coding Legend
Junction: Pressure (psi)

	<=	30
	<=	50
	<=	75
	<=	100
		Other

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: AVG DAY

Scenario Summary

ID	115
Label	AVG DAY
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Average Day Demand
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Base Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Hydraulic SSA Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Hydraulic Summary

Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	00:00:00
Trials	40	Calculation Type	Hydraulics Only

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: AVG DAY

Title	REATA RANCH - WATER MODEL
Engineer	
Company	
Date	04-06-2014
Notes	

Scenario Summary

ID	115
Label	AVG DAY
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Average Day Demand
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Base Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Hydraulic SSA Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Network Inventory

Pipes	53	PRV's	0
Junctions	44	PSV's	0
Hydrants	0	PBV's	0
Tanks	0	FCV's	0

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: AVG DAY

Network Inventory			
Reservoirs	1	TCV's	0
Pumps	0	GPV's	0
Pump Stations	0	Isolation Valves	0
Variable Speed Pump Batteries	0	Spot Elevations	0

Transient Network Inventory			
Turbines	0	Rupture Disks	0
Periodic Head-Flows	0	Discharges to Atmosphere	0
Air Valves	0	Orifices Between Pipes	0
Hydropneumatic Tanks	0	Valves With Linear Area Change	0
Surge Valves	0	Surge Tanks	0
Check Valves	0		

Pressure Pipes Inventory			
6.0 (in)	1,140 ft	12.0 (in)	18,405 ft
8.0 (in)	13,796 ft	All Diameters	33,340 ft

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: AVG DAY

Current Time: 0.000 hours

Label	Elevation (ft)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Demand (gpm)
J-2	2,568.27	2,686.91	51	118.64	6
J-3	2,524.09	2,686.83	70	162.74	6
J-4	2,537.19	2,686.83	65	149.64	7
J-5	2,512.73	2,686.82	75	174.09	2
J-6	2,520.42	2,686.82	72	166.40	4
J-7	2,506.47	2,686.82	78	180.35	0
J-8	2,506.36	2,686.82	78	180.46	2
J-9	2,503.28	2,686.81	79	183.53	3
J-10	2,497.23	2,686.81	82	189.58	6
J-11	2,501.59	2,686.81	80	185.22	3
J-12	2,590.86	2,686.81	42	95.95	4
J-13	2,491.74	2,686.80	84	195.06	2
J-14	2,487.20	2,686.80	86	199.60	2
J-15	2,486.56	2,686.80	87	200.24	1
J-16	2,482.41	2,686.80	88	204.39	0
J-17	2,480.84	2,686.80	89	205.96	1
J-18	2,482.82	2,686.80	88	203.98	3
J-19	2,472.71	2,686.79	93	214.08	4
J-20	2,493.38	2,686.80	84	193.42	2
J-21	2,506.54	2,686.81	78	180.27	2
J-22	2,507.93	2,686.81	77	178.88	1
J-23	2,510.78	2,686.81	76	176.03	2
J-24	2,492.32	2,686.80	84	194.48	0
J-25	2,489.07	2,686.80	86	197.73	1
J-26	2,467.25	2,686.80	95	219.55	5
J-27	2,480.42	2,686.80	89	206.38	0
J-28	2,485.63	2,686.79	87	201.16	10
J-29	2,504.36	2,686.80	79	182.44	11
J-30	2,513.02	2,686.80	75	173.78	5

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: AVG DAY

Current Time: 0.000 hours

Label	Elevation (ft)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Demand (gpm)
J-31	2,477.85	2,686.79	90	208.94	19
J-32	2,474.60	2,686.79	92	212.19	8
J-33	2,469.66	2,686.79	94	217.13	8
J-34	2,464.99	2,686.79	96	221.80	0
J-35	2,473.14	2,686.79	92	213.65	0
J-36	2,458.52	2,686.79	99	228.27	0
J-37	2,572.61	2,686.91	49	114.30	16
J-38	2,514.21	2,686.81	75	172.60	16
J-39	2,455.97	2,686.79	100	230.82	16
J-40	2,520.01	2,686.82	72	166.81	0
J-41	2,490.35	2,686.80	85	196.45	0
J-42	2,476.80	2,686.79	91	209.99	0
J-43	2,476.20	2,686.79	91	210.59	48
J-44	2,513.05	2,686.80	75	173.75	0
J-45	2,516.89	2,686.82	74	169.93	0

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: AVG DAY

Current Time: 0.000 hours

Label	Diameter (in)	Status (Initial)	Start Node	Stop Node	Length (Scaled) (ft)	Flow (Absolute) (gpm)	Velocity (ft/s)	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Headloss Gradient (ft/ft)
P-3	12.0	Open	R-1	J-2	415	117	0.33	2,686.93	2,686.91	0.000
P-4	12.0	Open	J-2	J-3	2,417	95	0.27	2,686.91	2,686.83	0.000
P-5	8.0	Open	J-3	J-4	999	7	0.05	2,686.83	2,686.83	0.000
P-6	12.0	Open	J-3	J-5	434	81	0.23	2,686.83	2,686.82	0.000
P-7	8.0	Open	J-5	J-6	392	4	0.02	2,686.82	2,686.82	0.000
P-8	12.0	Open	J-5	J-7	233	75	0.21	2,686.82	2,686.82	0.000
P-9	12.0	Open	J-7	J-8	6	103	0.29	2,686.82	2,686.82	0.000
P-12	12.0	Open	J-8	J-9	328	66	0.19	2,686.82	2,686.81	0.000
P-14	8.0	Open	J-9	J-11	786	13	0.08	2,686.81	2,686.81	0.000
P-16	8.0	Open	J-11	J-10	521	6	0.04	2,686.81	2,686.81	0.000
P-13	12.0	Open	J-10	J-9	517	51	0.14	2,686.81	2,686.81	0.000
P-17	12.0	Open	J-10	J-13	168	51	0.14	2,686.81	2,686.80	0.000
P-18	8.0	Open	J-13	J-14	547	2	0.01	2,686.80	2,686.80	0.000
P-15	8.0	Open	J-12	J-11	538	4	0.02	2,686.81	2,686.81	0.000
P-19	12.0	Open	J-13	J-15	545	48	0.13	2,686.80	2,686.80	0.000
P-20	8.0	Open	J-15	J-16	279	6	0.04	2,686.80	2,686.80	0.000
P-21	8.0	Open	J-16	J-20	829	7	0.04	2,686.80	2,686.80	0.000
P-28	8.0	Open	J-20	J-24	109	6	0.04	2,686.80	2,686.80	0.000
P-29	8.0	Open	J-24	J-25	102	1	0.01	2,686.80	2,686.80	0.000
P-25	8.0	Open	J-20	J-21	799	15	0.10	2,686.80	2,686.81	0.000
P-27	8.0	Open	J-21	J-23	301	18	0.11	2,686.81	2,686.81	0.000
P-30	8.0	Open	J-24	J-26	1,076	5	0.03	2,686.80	2,686.80	0.000
P-22	8.0	Open	J-16	J-17	211	13	0.09	2,686.80	2,686.80	0.000
P-23	8.0	Open	J-17	J-18	341	3	0.02	2,686.80	2,686.80	0.000
P-31	12.0	Open	J-15	J-27	624	40	0.11	2,686.80	2,686.80	0.000
P-32	8.0	Open	J-27	J-28	183	6	0.04	2,686.80	2,686.79	0.000
P-33	8.0	Open	J-28	J-29	919	2	0.01	2,686.79	2,686.80	0.000
P-35	8.0	Open	J-29	J-28	1,259	2	0.01	2,686.80	2,686.79	0.000

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: AVG DAY

Current Time: 0.000 hours

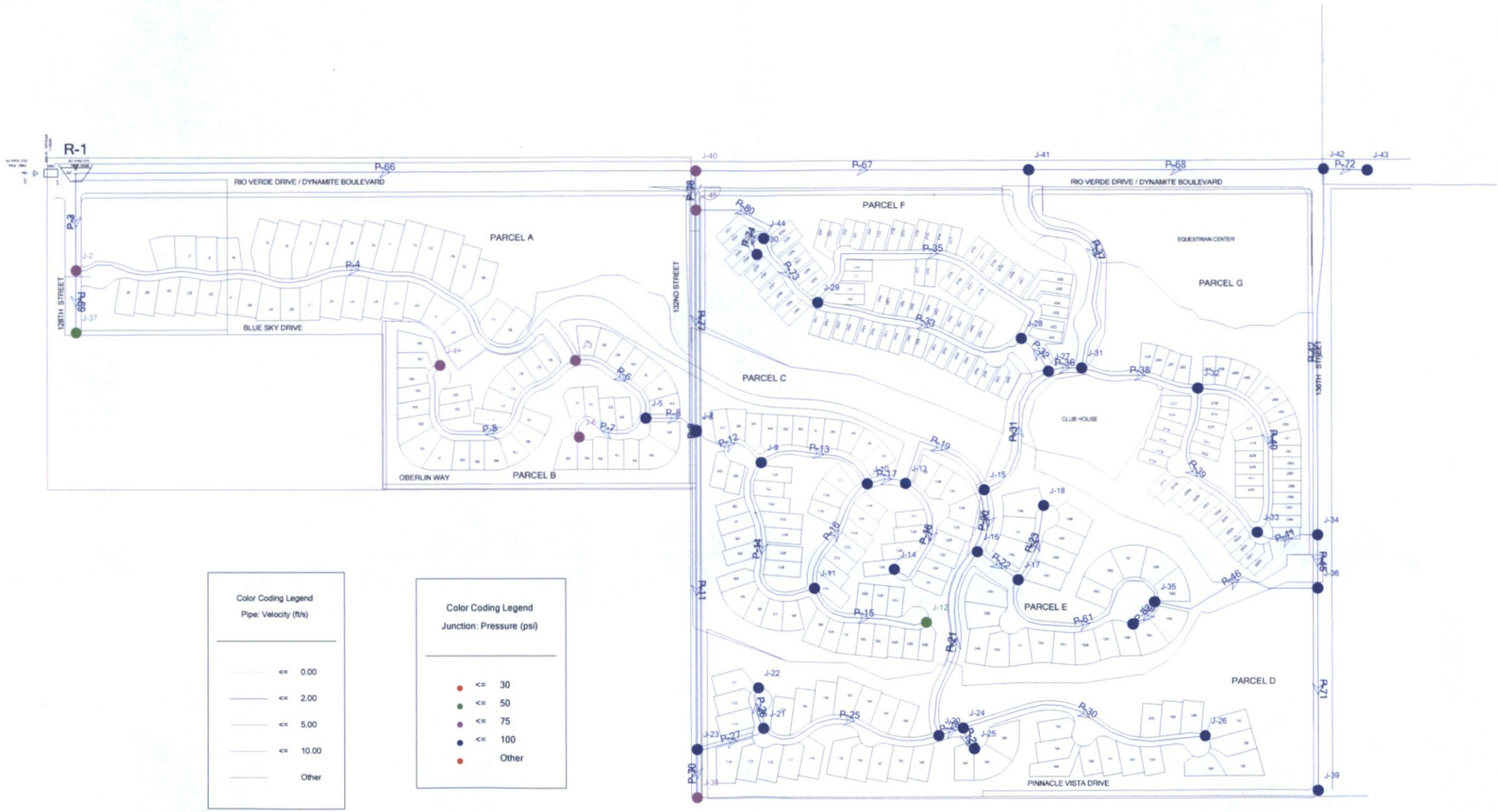
Label	Diameter (in)	Status (Initial)	Start Node	Stop Node	Length (Scaled) (ft)	Flow (Absolute) (gpm)	Velocity (ft/s)	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Headloss Gradient (ft/ft)
P-36	12.0	Open	J-27	J-31	143	34	0.10	2,686.80	2,686.79	0.000
P-37	8.0	Open	J-31	J-41	1,034	14	0.09	2,686.79	2,686.80	0.000
P-42	12.0	Open	J-42	J-34	1,560	2	0.01	2,686.79	2,686.79	0.000
P-41	12.0	Open	J-34	J-33	269	13	0.04	2,686.79	2,686.79	0.000
P-40	8.0	Open	J-33	J-32	823	5	0.03	2,686.79	2,686.79	0.000
P-39	12.0	Open	J-32	J-33	748	16	0.05	2,686.79	2,686.79	0.000
P-38	12.0	Open	J-32	J-31	503	30	0.08	2,686.79	2,686.79	0.000
P-11	12.0	Open	J-8	J-23	1,355	35	0.10	2,686.82	2,686.81	0.000
P-26	8.0	Open	J-21	J-22	184	1	0.01	2,686.81	2,686.81	0.000
P-61	8.0	Open	J-17	J-35	904	9	0.06	2,686.80	2,686.79	0.000
P-62	8.0	Open	J-35	J-19	153	4	0.03	2,686.79	2,686.79	0.000
P-45	12.0	Open	J-34	J-36	228	10	0.03	2,686.79	2,686.79	0.000
P-46	6.0	Open	J-36	J-35	742	5	0.06	2,686.79	2,686.79	0.000
P-66	12.0	Open	R-1	J-40	2,633	108	0.31	2,686.93	2,686.82	0.000
P-67	12.0	Open	J-40	J-41	1,411	60	0.17	2,686.82	2,686.80	0.000
P-68	12.0	Open	J-41	J-42	1,245	46	0.13	2,686.80	2,686.79	0.000
P-69	12.0	Open	J-2	J-37	265	16	0.04	2,686.91	2,686.91	0.000
P-70	12.0	Open	J-23	J-38	205	16	0.04	2,686.81	2,686.81	0.000
P-71	12.0	Open	J-36	J-39	861	16	0.04	2,686.79	2,686.79	0.000
P-72	12.0	Open	J-42	J-43	187	48	0.14	2,686.79	2,686.79	0.000
P-73	8.0	Open	J-29	J-44	365	15	0.10	2,686.80	2,686.80	0.000
P-74	8.0	Open	J-44	J-30	141	5	0.03	2,686.80	2,686.80	0.000
P-77	12.0	Open	J-7	J-45	939	28	0.08	2,686.82	2,686.82	0.000
P-78	12.0	Open	J-45	J-40	166	48	0.14	2,686.82	2,686.82	0.000
P-80	6.0	Open	J-45	J-44	398	20	0.23	2,686.82	2,686.80	0.000

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: AVG DAY

Current Time: 0.000 hours

ID	Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
135	R-1	2,686.93	225	2,686.93

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY



Color Coding Legend
Pipe: Velocity (ft/s)

<=	0.00
<=	2.00
<=	5.00
<=	10.00
	Other

Color Coding Legend
Junction: Pressure (psi)

<=	30
<=	50
<=	75
<=	100
	Other

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY

Scenario Summary	
ID	116
Label	MAX DAY
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Max Day Demand
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Base Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Hydraulic SSA Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	00:00:00
Trials	40	Calculation Type	Hydraulics Only

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY

Title	REATA RANCH - WATER MODEL
Engineer	
Company	
Date	04-06-2014
Notes	

Scenario Summary

ID	116
Label	MAX DAY
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Max Day Demand
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Base Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Hydraulic SSA Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Network Inventory

Pipes	53	PRV's	0
Junctions	44	PSV's	0
Hydrants	0	PBV's	0
Tanks	0	FCV's	0

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY

Network Inventory			
Reservoirs	1	TCV's	0
Pumps	0	GPV's	0
Pump Stations	0	Isolation Valves	0
Variable Speed Pump Batteries	0	Spot Elevations	0

Transient Network Inventory			
Turbines	0	Rupture Disks	0
Periodic Head-Flows	0	Discharges to Atmosphere	0
Air Valves	0	Orifices Between Pipes	0
Hydropneumatic Tanks	0	Valves With Linear Area Change	0
Surge Valves	0	Surge Tanks	0
Check Valves	0		

Pressure Pipes Inventory			
6.0 (in)	1,140 ft	12.0 (in)	18,405 ft
8.0 (in)	13,796 ft	All Diameters	33,340 ft

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY

Current Time: 0.000 hours

Label	Elevation (ft)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Demand (gpm)
J-2	2,568.27	2,686.86	51	118.59	12
J-3	2,524.09	2,686.58	70	162.49	12
J-4	2,537.19	2,686.57	65	149.38	15
J-5	2,512.73	2,686.54	75	173.81	5
J-6	2,520.42	2,686.54	72	166.12	7
J-7	2,506.47	2,686.52	78	180.05	0
J-8	2,506.36	2,686.52	78	180.16	3
J-9	2,503.28	2,686.50	79	183.22	5
J-10	2,497.23	2,686.48	82	189.25	11
J-11	2,501.59	2,686.49	80	184.90	6
J-12	2,590.86	2,686.48	41	95.62	7
J-13	2,491.74	2,686.48	84	194.74	3
J-14	2,487.20	2,686.48	86	199.28	3
J-15	2,486.56	2,686.46	86	199.90	2
J-16	2,482.41	2,686.46	88	204.05	0
J-17	2,480.84	2,686.45	89	205.61	3
J-18	2,482.82	2,686.45	88	203.63	5
J-19	2,472.71	2,686.44	92	213.73	8
J-20	2,493.38	2,686.46	84	193.08	5
J-21	2,506.54	2,686.48	78	179.94	3
J-22	2,507.93	2,686.48	77	178.55	2
J-23	2,510.78	2,686.50	76	175.72	3
J-24	2,492.32	2,686.46	84	194.14	0
J-25	2,489.07	2,686.46	85	197.39	2
J-26	2,467.25	2,686.46	95	219.21	9
J-27	2,480.42	2,686.44	89	206.02	0
J-28	2,485.63	2,686.44	87	200.81	20
J-29	2,504.36	2,686.44	79	182.08	22
J-30	2,513.02	2,686.45	75	173.43	11

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY

Current Time: 0.000 hours

Label	Elevation (ft)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Demand (gpm)
J-31	2,477.85	2,686.44	90	208.59	38
J-32	2,474.60	2,686.43	92	211.83	17
J-33	2,469.66	2,686.43	94	216.77	17
J-34	2,464.99	2,686.43	96	221.44	0
J-35	2,473.14	2,686.44	92	213.30	0
J-36	2,458.52	2,686.43	99	227.91	0
J-37	2,572.61	2,686.86	49	114.25	31
J-38	2,514.21	2,686.49	75	172.28	31
J-39	2,455.97	2,686.43	100	230.46	31
J-40	2,520.01	2,686.54	72	166.53	0
J-41	2,490.35	2,686.47	85	196.12	0
J-42	2,476.80	2,686.43	91	209.63	0
J-43	2,476.20	2,686.42	91	210.22	96
J-44	2,513.05	2,686.45	75	173.40	0
J-45	2,516.89	2,686.53	73	169.64	0

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY

Current Time: 0.000 hours

Label	Diameter (in)	Status (Initial)	Start Node	Stop Node	Length (Scaled) (ft)	Flow (Absolute) (gpm)	Velocity (ft/s)	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Headloss Gradient (ft/ft)
P-3	12.0	Open	R-1	J-2	415	233	0.66	2,686.93	2,686.86	0.000
P-4	12.0	Open	J-2	J-3	2,417	190	0.54	2,686.86	2,686.58	0.000
P-5	8.0	Open	J-3	J-4	999	15	0.09	2,686.58	2,686.57	0.000
P-6	12.0	Open	J-3	J-5	434	163	0.46	2,686.58	2,686.54	0.000
P-7	8.0	Open	J-5	J-6	392	7	0.05	2,686.54	2,686.54	0.000
P-8	12.0	Open	J-5	J-7	233	150	0.43	2,686.54	2,686.52	0.000
P-9	12.0	Open	J-7	J-8	6	206	0.58	2,686.52	2,686.52	0.000
P-12	12.0	Open	J-8	J-9	328	132	0.37	2,686.52	2,686.50	0.000
P-14	8.0	Open	J-9	J-11	786	26	0.16	2,686.50	2,686.49	0.000
P-16	8.0	Open	J-11	J-10	521	12	0.08	2,686.49	2,686.48	0.000
P-13	12.0	Open	J-10	J-9	517	101	0.29	2,686.48	2,686.50	0.000
P-17	12.0	Open	J-10	J-13	168	102	0.29	2,686.48	2,686.48	0.000
P-18	8.0	Open	J-13	J-14	547	3	0.02	2,686.48	2,686.48	0.000
P-15	8.0	Open	J-12	J-11	538	7	0.05	2,686.48	2,686.49	0.000
P-19	12.0	Open	J-13	J-15	545	95	0.27	2,686.48	2,686.46	0.000
P-20	8.0	Open	J-15	J-16	279	13	0.08	2,686.46	2,686.46	0.000
P-21	8.0	Open	J-16	J-20	829	14	0.09	2,686.46	2,686.46	0.000
P-28	8.0	Open	J-20	J-24	109	11	0.07	2,686.46	2,686.46	0.000
P-29	8.0	Open	J-24	J-25	102	2	0.01	2,686.46	2,686.46	0.000
P-25	8.0	Open	J-20	J-21	799	30	0.19	2,686.46	2,686.48	0.000
P-27	8.0	Open	J-21	J-23	301	35	0.23	2,686.48	2,686.50	0.000
P-30	8.0	Open	J-24	J-26	1,076	9	0.06	2,686.46	2,686.46	0.000
P-22	8.0	Open	J-16	J-17	211	27	0.17	2,686.46	2,686.45	0.000
P-23	8.0	Open	J-17	J-18	341	5	0.03	2,686.45	2,686.45	0.000
P-31	12.0	Open	J-15	J-27	624	80	0.23	2,686.46	2,686.44	0.000
P-32	8.0	Open	J-27	J-28	183	12	0.08	2,686.44	2,686.44	0.000
P-33	8.0	Open	J-28	J-29	919	5	0.03	2,686.44	2,686.44	0.000
P-35	8.0	Open	J-29	J-28	1,259	4	0.02	2,686.44	2,686.44	0.000

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY

Current Time: 0.000 hours

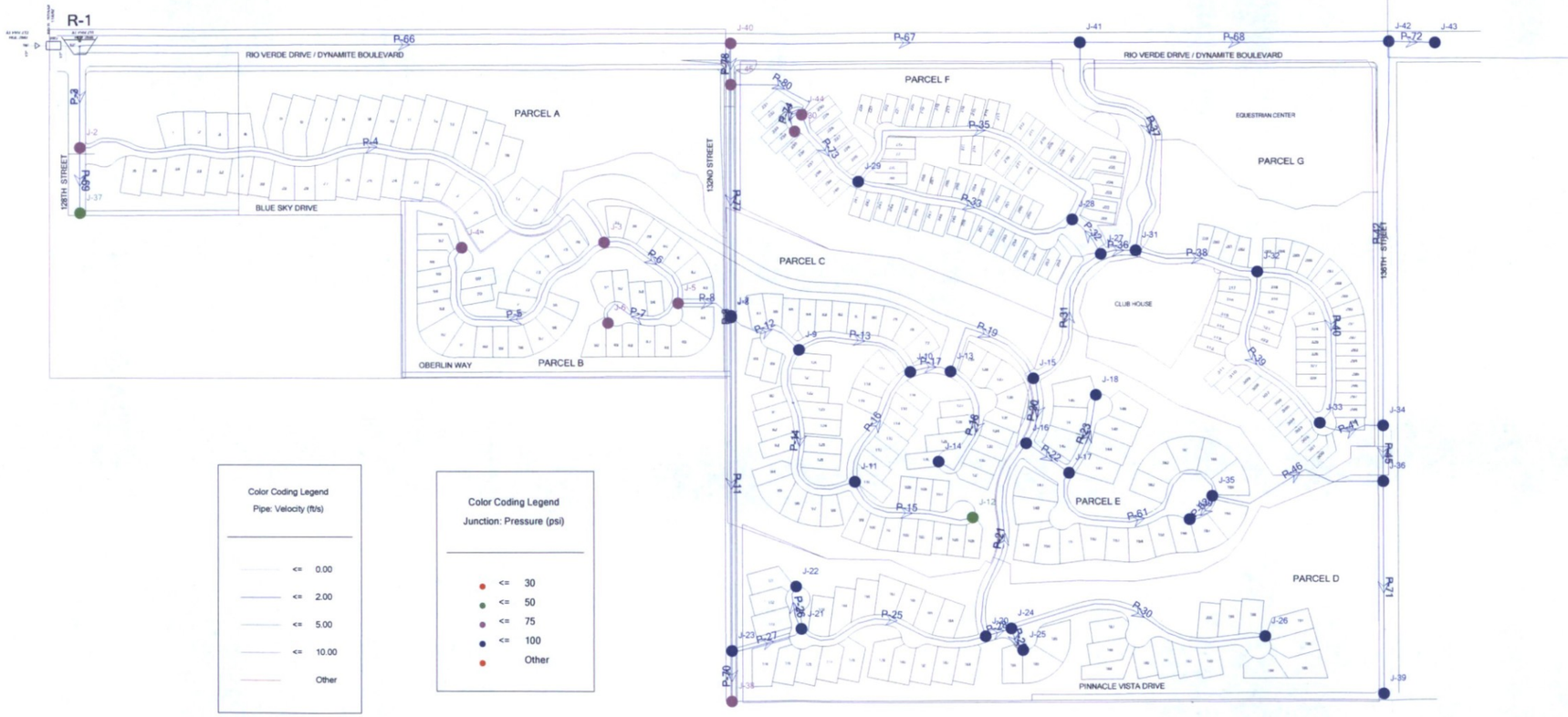
Label	Diameter (in)	Status (Initial)	Start Node	Stop Node	Length (Scaled) (ft)	Flow (Absolute) (gpm)	Velocity (ft/s)	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Headloss Gradient (ft/ft)
P-36	12.0	Open	J-27	J-31	143	68	0.19	2,686.44	2,686.44	0.000
P-37	8.0	Open	J-31	J-41	1,034	29	0.18	2,686.44	2,686.47	0.000
P-42	12.0	Open	J-42	J-34	1,560	5	0.01	2,686.43	2,686.43	0.000
P-41	12.0	Open	J-34	J-33	269	25	0.07	2,686.43	2,686.43	0.000
P-40	8.0	Open	J-33	J-32	823	10	0.07	2,686.43	2,686.43	0.000
P-39	12.0	Open	J-32	J-33	748	32	0.09	2,686.43	2,686.43	0.000
P-38	12.0	Open	J-32	J-31	503	59	0.17	2,686.43	2,686.44	0.000
P-11	12.0	Open	J-8	J-23	1,355	70	0.20	2,686.52	2,686.50	0.000
P-26	8.0	Open	J-21	J-22	184	2	0.01	2,686.48	2,686.48	0.000
P-61	8.0	Open	J-17	J-35	904	19	0.12	2,686.45	2,686.44	0.000
P-62	8.0	Open	J-35	J-19	153	8	0.05	2,686.44	2,686.44	0.000
P-45	12.0	Open	J-34	J-36	228	21	0.06	2,686.43	2,686.43	0.000
P-46	6.0	Open	J-36	J-35	742	10	0.12	2,686.43	2,686.44	0.000
P-66	12.0	Open	R-1	J-40	2,633	216	0.61	2,686.93	2,686.54	0.000
P-67	12.0	Open	J-40	J-41	1,411	120	0.34	2,686.54	2,686.47	0.000
P-68	12.0	Open	J-41	J-42	1,245	91	0.26	2,686.47	2,686.43	0.000
P-69	12.0	Open	J-2	J-37	265	31	0.09	2,686.86	2,686.86	0.000
P-70	12.0	Open	J-23	J-38	205	31	0.09	2,686.50	2,686.49	0.000
P-71	12.0	Open	J-36	J-39	861	31	0.09	2,686.43	2,686.43	0.000
P-72	12.0	Open	J-42	J-43	187	96	0.27	2,686.43	2,686.42	0.000
P-73	8.0	Open	J-29	J-44	365	30	0.19	2,686.44	2,686.45	0.000
P-74	8.0	Open	J-44	J-30	141	11	0.07	2,686.45	2,686.45	0.000
P-77	12.0	Open	J-7	J-45	939	55	0.16	2,686.52	2,686.53	0.000
P-78	12.0	Open	J-45	J-40	166	96	0.27	2,686.53	2,686.54	0.000
P-80	6.0	Open	J-45	J-44	398	41	0.46	2,686.53	2,686.45	0.000

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY

Current Time: 0.000 hours

ID	Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
135	R-1	2,686.93	449	2,686.93

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: PEAK HOUR



Color Coding Legend
Pipe: Velocity (ft/s)

<=	0.00
<=	2.00
<=	5.00
<=	10.00
	Other

Color Coding Legend
Junction: Pressure (psi)

<=	30
<=	50
<=	75
<=	100
	Other

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: PEAK HOUR

Scenario Summary	
ID	117
Label	PEAK HOUR
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Peak Hour Demand
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Base Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Hydraulic SSA Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	00:00:00
Trials	40	Calculation Type	Hydraulics Only

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: PEAK HOUR

Title	REATA RANCH - WATER MODEL
Engineer	
Company	
Date	04-06-2014
Notes	

Scenario Summary

ID	117
Label	PEAK HOUR
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Peak Hour Demand
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Base Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Hydraulic SSA Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Network Inventory

Pipes	53	PRV's	0
Junctions	44	PSV's	0
Hydrants	0	PBV's	0
Tanks	0	FCV's	0
Reservoirs	1	TCV's	0
Pumps	0	GPV's	0
Pump Stations	0	Isolation Valves	0
Variable Speed Pump Batteries	0	Spot Elevations	0

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: PEAK HOUR

Network Inventory

Transient Network Inventory

Turbines	0	Rupture Disks	0
Periodic Head-Flows	0	Discharges to Atmosphere	0
Air Valves	0	Orifices Between Pipes	0
Hydropneumatic Tanks	0	Valves With Linear Area Change	0
Surge Valves	0	Surge Tanks	0
Check Valves	0		

Pressure Pipes Inventory

6.0 (in)	1,140 ft	12.0 (in)	18,405 ft
8.0 (in)	13,796 ft	All Diameters	33,340 ft

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: PEAK HOUR

Current Time: 0.000 hours

Label	Elevation (ft)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Demand (gpm)
J-2	2,568.27	2,686.73	51	118.46	21
J-3	2,524.09	2,685.94	70	161.85	21
J-4	2,537.19	2,685.92	64	148.73	26
J-5	2,512.73	2,685.83	75	173.10	8
J-6	2,520.42	2,685.83	72	165.41	13
J-7	2,506.47	2,685.78	78	179.31	0
J-8	2,506.36	2,685.78	78	179.42	6
J-9	2,503.28	2,685.72	79	182.44	9
J-10	2,497.23	2,685.67	82	188.44	20
J-11	2,501.59	2,685.68	80	184.09	11
J-12	2,590.86	2,685.67	41	94.81	13
J-13	2,491.74	2,685.65	84	193.91	6
J-14	2,487.20	2,685.65	86	198.45	6
J-15	2,486.56	2,685.60	86	199.04	4
J-16	2,482.41	2,685.60	88	203.19	0
J-17	2,480.84	2,685.58	89	204.74	5
J-18	2,482.82	2,685.58	88	202.76	9
J-19	2,472.71	2,685.55	92	212.84	14
J-20	2,493.38	2,685.61	83	192.23	8
J-21	2,506.54	2,685.67	78	179.13	6
J-22	2,507.93	2,685.67	77	177.74	4
J-23	2,510.78	2,685.71	76	174.93	6
J-24	2,492.32	2,685.61	84	193.29	0
J-25	2,489.07	2,685.61	85	196.54	4
J-26	2,467.25	2,685.60	94	218.35	17
J-27	2,480.42	2,685.56	89	205.14	0
J-28	2,485.63	2,685.56	86	199.93	35
J-29	2,504.36	2,685.56	78	181.20	38
J-30	2,513.02	2,685.59	75	172.57	19

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: PEAK HOUR

Current Time: 0.000 hours

Label	Elevation (ft)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Demand (gpm)
J-31	2,477.85	2,685.55	90	207.70	66
J-32	2,474.60	2,685.53	91	210.93	30
J-33	2,469.66	2,685.52	93	215.86	30
J-34	2,464.99	2,685.52	95	220.53	0
J-35	2,473.14	2,685.55	92	212.41	0
J-36	2,458.52	2,685.52	98	227.00	0
J-37	2,572.61	2,686.73	49	114.12	55
J-38	2,514.21	2,685.70	74	171.49	55
J-39	2,455.97	2,685.51	99	229.54	55
J-40	2,520.01	2,685.83	72	165.82	0
J-41	2,490.35	2,685.63	84	195.28	0
J-42	2,476.80	2,685.52	90	208.72	0
J-43	2,476.20	2,685.50	91	209.30	168
J-44	2,513.05	2,685.59	75	172.54	0
J-45	2,516.89	2,685.81	73	168.92	0

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: PEAK HOUR

Current Time: 0.000 hours

Label	Diameter (in)	Status (Initial)	Start Node	Stop Node	Length (Scaled) (ft)	Flow (Absolute) (gpm)	Velocity (ft/s)	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Headloss Gradient (ft/ft)
P-3	12.0	Open	R-1	J-2	415	408	1.16	2,686.93	2,686.73	0.000
P-4	12.0	Open	J-2	J-3	2,417	332	0.94	2,686.73	2,685.94	0.000
P-5	8.0	Open	J-3	J-4	999	26	0.17	2,685.94	2,685.92	0.000
P-6	12.0	Open	J-3	J-5	434	284	0.81	2,685.94	2,685.83	0.000
P-7	8.0	Open	J-5	J-6	392	13	0.08	2,685.83	2,685.83	0.000
P-8	12.0	Open	J-5	J-7	233	263	0.75	2,685.83	2,685.78	0.000
P-9	12.0	Open	J-7	J-8	6	360	1.02	2,685.78	2,685.78	0.000
P-12	12.0	Open	J-8	J-9	328	231	0.66	2,685.78	2,685.72	0.000
P-14	8.0	Open	J-9	J-11	786	45	0.29	2,685.72	2,685.68	0.000
P-16	8.0	Open	J-11	J-10	521	21	0.13	2,685.68	2,685.67	0.000
P-13	12.0	Open	J-10	J-9	517	177	0.50	2,685.67	2,685.72	0.000
P-17	12.0	Open	J-10	J-13	168	178	0.51	2,685.67	2,685.65	0.000
P-18	8.0	Open	J-13	J-14	547	6	0.04	2,685.65	2,685.65	0.000
P-15	8.0	Open	J-12	J-11	538	13	0.08	2,685.67	2,685.68	0.000
P-19	12.0	Open	J-13	J-15	545	166	0.47	2,685.65	2,685.60	0.000
P-20	8.0	Open	J-15	J-16	279	23	0.14	2,685.60	2,685.60	0.000
P-21	8.0	Open	J-16	J-20	829	24	0.15	2,685.60	2,685.61	0.000
P-28	8.0	Open	J-20	J-24	109	20	0.13	2,685.61	2,685.61	0.000
P-29	8.0	Open	J-24	J-25	102	4	0.02	2,685.61	2,685.61	0.000
P-25	8.0	Open	J-20	J-21	799	52	0.33	2,685.61	2,685.67	0.000
P-27	8.0	Open	J-21	J-23	301	62	0.40	2,685.67	2,685.71	0.000
P-30	8.0	Open	J-24	J-26	1,076	17	0.11	2,685.61	2,685.60	0.000
P-22	8.0	Open	J-16	J-17	211	47	0.30	2,685.60	2,685.58	0.000
P-23	8.0	Open	J-17	J-18	341	9	0.06	2,685.58	2,685.58	0.000
P-31	12.0	Open	J-15	J-27	624	140	0.40	2,685.60	2,685.56	0.000
P-32	8.0	Open	J-27	J-28	183	21	0.13	2,685.56	2,685.56	0.000
P-33	8.0	Open	J-28	J-29	919	8	0.05	2,685.56	2,685.56	0.000
P-35	8.0	Open	J-29	J-28	1,259	7	0.04	2,685.56	2,685.56	0.000

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: PEAK HOUR

Current Time: 0.000 hours

Label	Diameter (in)	Status (Initial)	Start Node	Stop Node	Length (Scaled) (ft)	Flow (Absolute) (gpm)	Velocity (ft/s)	Hydraulic Grade (Start) (ft)	Hydraulic Grade (Stop) (ft)	Headloss Gradient (ft/ft)
P-36	12.0	Open	J-27	J-31	143	120	0.34	2,685.56	2,685.55	0.000
P-37	8.0	Open	J-31	J-41	1,034	50	0.32	2,685.55	2,685.63	0.000
P-42	12.0	Open	J-42	J-34	1,560	8	0.02	2,685.52	2,685.52	0.000
P-41	12.0	Open	J-34	J-33	269	45	0.13	2,685.52	2,685.52	0.000
P-40	8.0	Open	J-33	J-32	823	18	0.12	2,685.52	2,685.53	0.000
P-39	12.0	Open	J-32	J-33	748	56	0.16	2,685.53	2,685.52	0.000
P-38	12.0	Open	J-32	J-31	503	104	0.29	2,685.53	2,685.55	0.000
P-11	12.0	Open	J-8	J-23	1,355	123	0.35	2,685.78	2,685.71	0.000
P-26	8.0	Open	J-21	J-22	184	4	0.02	2,685.67	2,685.67	0.000
P-61	8.0	Open	J-17	J-35	904	33	0.21	2,685.58	2,685.55	0.000
P-62	8.0	Open	J-35	J-19	153	14	0.09	2,685.55	2,685.55	0.000
P-45	12.0	Open	J-34	J-36	228	37	0.10	2,685.52	2,685.52	0.000
P-46	6.0	Open	J-36	J-35	742	18	0.21	2,685.52	2,685.55	0.000
P-66	12.0	Open	R-1	J-40	2,633	378	1.07	2,686.93	2,685.83	0.000
P-67	12.0	Open	J-40	J-41	1,411	210	0.60	2,685.83	2,685.63	0.000
P-68	12.0	Open	J-41	J-42	1,245	160	0.45	2,685.63	2,685.52	0.000
P-69	12.0	Open	J-2	J-37	265	55	0.16	2,686.73	2,686.73	0.000
P-70	12.0	Open	J-23	J-38	205	55	0.16	2,685.71	2,685.70	0.000
P-71	12.0	Open	J-36	J-39	861	55	0.16	2,685.52	2,685.51	0.000
P-72	12.0	Open	J-42	J-43	187	168	0.48	2,685.52	2,685.50	0.000
P-73	8.0	Open	J-29	J-44	365	53	0.34	2,685.56	2,685.59	0.000
P-74	8.0	Open	J-44	J-30	141	19	0.12	2,685.59	2,685.59	0.000
P-77	12.0	Open	J-7	J-45	939	97	0.27	2,685.78	2,685.81	0.000
P-78	12.0	Open	J-45	J-40	166	168	0.48	2,685.81	2,685.83	0.000
P-80	6.0	Open	J-45	J-44	398	72	0.81	2,685.81	2,685.59	0.001

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: PEAK HOUR

Current Time: 0.000 hours

ID	Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
135	R-1	2,686.93	786	2,686.93

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY + FIRE

Color Coding Legend
Pipe: Velocity (ft/s)

<=	0.00
<=	2.00
<=	5.00
<=	10.00
	Other

Color Coding Legend
Junction: Pressure (psi)

<=	30
<=	50
<=	75
<=	100
	Other

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY + FIRE

Scenario Summary	
ID	118
Label	MAX DAY + FIRE
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Max Day + Fire
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Automated Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Automated Fire Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	00:00:00
Trials	40	Calculation Type	Fire Flow

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY + FIRE

Title	REATA RANCH - WATER MODEL
Engineer	
Company	
Date	04-06-2014
Notes	

Scenario Summary

ID	118
Label	MAX DAY + FIRE
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Max Day + Fire
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Automated Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Automated Fire Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Network Inventory

Pipes	53	PRV's	0
Junctions	44	PSV's	0
Hydrants	0	PBV's	0
Tanks	0	FCV's	0

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY + FIRE

Network Inventory			
Reservoirs	1	TCV's	0
Pumps	0	GPV's	0
Pump Stations	0	Isolation Valves	0
Variable Speed Pump Batteries	0	Spot Elevations	0

Transient Network Inventory			
Turbines	0	Rupture Disks	0
Periodic Head-Flows	0	Discharges to Atmosphere	0
Air Valves	0	Orifices Between Pipes	0
Hydropneumatic Tanks	0	Valves With Linear Area Change	0
Surge Valves	0	Surge Tanks	0
Check Valves	0		

Pressure Pipes Inventory			
6.0 (in)	1,140 ft	12.0 (in)	18,405 ft
8.0 (in)	13,796 ft	All Diameters	33,340 ft

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY + FIRE

Current Time: 0.000 hours

Label	Elevation (ft)	Pressure (Calculated Residual @ Total Flow Needed) (psi)	Flow (Total Needed) (gpm)
J-2	2,568.27	51	1,012
J-3	2,524.09	69	1,012
J-4	2,537.19	55	1,015
J-5	2,512.73	74	1,005
J-6	2,520.42	67	1,007
J-7	2,506.47	76	1,000
J-8	2,506.36	76	1,003
J-9	2,503.28	77	1,005
J-10	2,497.23	80	1,011
J-11	2,501.59	77	1,006
J-12	2,590.86	34	1,007
J-13	2,491.74	82	1,003
J-14	2,487.20	80	1,003
J-15	2,486.56	84	1,002
J-16	2,482.41	85	1,000
J-17	2,480.84	85	1,003
J-18	2,482.82	82	1,005
J-19	2,472.71	85	1,008
J-20	2,493.38	79	1,005
J-21	2,506.54	74	1,003
J-22	2,507.93	72	1,002
J-23	2,510.78	73	1,003
J-24	2,492.32	79	1,000
J-25	2,489.07	79	1,002
J-26	2,467.25	81	1,009
J-27	2,480.42	80	2,500
J-28	2,485.63	73	2,520

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY + FIRE

Current Time: 0.000 hours

Label	Elevation (ft)	Pressure (Calculated Residual @ Total Flow Needed) (psi)	Flow (Total Needed) (gpm)
J-29	2,504.36	60	2,522
J-30	2,513.02	48	2,511
J-31	2,477.85	81	2,538
J-32	2,474.60	81	2,517
J-33	2,469.66	83	2,517
J-34	2,464.99	85	2,500
J-35	2,473.14	86	1,000
J-36	2,458.52	96	1,000
J-37	2,572.61	49	1,031
J-38	2,514.21	72	1,031
J-39	2,455.97	96	1,031
J-40	2,520.01	70	1,000
J-41	2,490.35	83	1,000
J-42	2,476.80	88	1,000
J-43	2,476.20	88	1,096
J-44	2,513.05	71	1,000
J-45	2,516.89	72	1,000

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY + FIRE

Current Time: 0.000 hours

Label	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Junction w/ Minimum Pressure (Zone)	Is Fire Flow Run Balanced?
J-2	True	1,000	1,005	1,012	1,017	30	51	J-12	True
J-3	True	1,000	1,005	1,012	1,017	30	69	J-12	True
J-4	True	1,000	1,005	1,015	1,020	30	55	J-12	True
J-5	True	1,000	1,005	1,005	1,010	30	74	J-12	True
J-6	True	1,000	1,005	1,007	1,012	30	67	J-12	True
J-7	True	1,000	1,005	1,000	1,005	30	76	J-12	True
J-8	True	1,000	1,005	1,003	1,008	30	76	J-12	True
J-9	True	1,000	1,005	1,005	1,010	30	77	J-12	True
J-10	True	1,000	1,005	1,011	1,016	30	80	J-12	True
J-11	True	1,000	1,005	1,006	1,011	30	77	J-12	True
J-12	True	1,000	1,005	1,007	1,012	30	34	J-37	True
J-13	True	1,000	1,005	1,003	1,008	30	82	J-12	True
J-14	True	1,000	1,005	1,003	1,008	30	80	J-12	True
J-15	True	1,000	1,005	1,002	1,007	30	84	J-12	True
J-16	True	1,000	1,005	1,000	1,005	30	85	J-12	True
J-17	True	1,000	1,005	1,003	1,008	30	85	J-12	True
J-18	True	1,000	1,005	1,005	1,010	30	81	J-12	True
J-19	True	1,000	1,005	1,008	1,013	30	85	J-12	True
J-20	True	1,000	1,005	1,005	1,010	30	79	J-12	True
J-21	True	1,000	1,005	1,003	1,008	30	74	J-12	True
J-22	True	1,000	1,005	1,002	1,007	30	72	J-12	True
J-23	True	1,000	1,005	1,003	1,008	30	73	J-12	True
J-24	True	1,000	1,005	1,000	1,005	30	79	J-12	True
J-25	True	1,000	1,005	1,002	1,007	30	79	J-12	True
J-26	True	1,000	1,005	1,009	1,014	30	81	J-12	True
J-27	True	2,500	2,505	2,500	2,505	30	80	J-12	True
J-28	True	2,500	2,505	2,520	2,525	30	73	J-12	True

REATA RANCH - ULTIMATE BUILDOUT
Active Scenario: MAX DAY + FIRE

Current Time: 0.000 hours

Label	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Junction w/ Minimum Pressure (Zone)	Is Fire Flow Run Balanced?
J-29	True	2,500	2,505	2,522	2,527	30	60	J-12	True
J-30	True	2,500	2,505	2,511	2,516	30	48	J-12	True
J-31	True	2,500	2,505	2,538	2,543	30	81	J-12	True
J-32	True	2,500	2,505	2,517	2,522	30	81	J-12	True
J-33	True	2,500	2,505	2,517	2,522	30	83	J-12	True
J-34	True	2,500	2,505	2,500	2,505	30	85	J-12	True
J-35	True	1,000	1,005	1,000	1,005	30	86	J-12	True
J-36	True	1,000	1,005	1,000	1,005	30	96	J-12	True
J-40	True	1,000	1,005	1,000	1,005	30	70	J-12	True
J-41	True	1,000	1,005	1,000	1,005	30	83	J-12	True
J-42	True	1,000	1,005	1,000	1,005	30	88	J-12	True
J-37	True	1,000	1,005	1,031	1,036	30	49	J-12	True
J-38	True	1,000	1,005	1,031	1,036	30	72	J-12	True
J-39	True	1,000	1,005	1,031	1,036	30	96	J-12	True
J-43	True	1,000	1,005	1,096	1,101	30	88	J-12	True
J-44	True	1,000	1,005	1,000	1,005	30	71	J-12	True
J-45	True	1,000	1,005	1,000	1,005	30	72	J-12	True

APPENDIX A

Reata Ranch - Water Demand Computation

Usage	No. of Units	Area (Sq. ft)	Demand (gallons/day/ unit)	Average Daily Demand (gpd)	Average Daily Flow (gpm)	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)
1	2	3	4	5 = 2 x 4 or 5 = 3 x 4	6 = 5 / 1440	7 = 6 X 2.0	8 = 6 X 3.5
Residential	200		485.6	97,120	67.44	134.89	236.06
Resort Town Homes	128		485.6	62,157	43.16	86.33	151.08
Equestrian & Club House		666,387	1786	27,322	18.97	37.95	66.41
Offsite - South of Property (3Nodes)	140		485.6	67,984	47.21	94.42	165.24
Offsite - East of 136th Street (1Node)	142		485.6	68,955	47.89	95.77	167.60
Total	**328**	**666,387**		**186,599**	**130**	**259**	**454**

Design Criteria:

1. Average Daily Demand for Residential = 248.2 gpd per unit
2. Average Daily Demand for Resort town homes = 446.3 gpd per unit
2. Average Daily Demand for Developed Open Space - Parks = 1786 gpd per acre
2. Max Day Demand = 2 X Avg Daily Flow
3. Peak Hour Demand = 3.5 X Avg Daily Flow
4. Fire Flow = 1000 gpm for single family residential
5. Fire Flow = 2500 gpm for Resort
6. Offsite Water Demand was computed assuming that the surrounding Parcels are zoned as R1-130. Since Reata is 220acres, the adjoining Parcels of 420 acres is expected to develop 140 potential residential lots. Parcel to the east (Wildcat Ridge/Scottsdale National/ Scottsdale Appendage) is expected to develop 142 lots.

APPENDIX B

Eng Copy

WATER DISTRIBUTION SYSTEM
BASIS OF DESIGN REPORT
FOR
REATA RANCH

Case # 3902-12

Prepared For:

Land Development Services
7525 East Camelback Road
Suite 104
Scottsdale, AZ 85251

Accepted for

City of Scottsdale
Water Resources Administration
9379 E. San Salvador
Scottsdale, AZ 85258

Prepared By:

DMcMann
9.19.2012

SKG ENTERPRISES, INC.
9260 E. Raintree Drive
Suite 140
Scottsdale, AZ 85260
Ph: (480) 998-5600
Fax: (480) 998-5603
www.skgaz.com
info@skgaz.com

Registered Professional Engineer (Civil)
CERTIFICATE NO.
25970
SHAKIR K.
GUSHGARI
Date Signed 8-24-12
ARIZONA, U.S.A.

Expires 3-31-13

Job # 30-11.2
Prepared: July 2012
Revised: August 2012

8/31 PS

Water Resource

3902-12

WATER DISTRIBUTION SYSTEM
BASIS OF DESIGN REPORT
FOR
REATA RANCH

Prepared For:

Land Development Services
7525 East Camelback Road
Suite 104
Scottsdale, AZ 85251

Prepared By:

SKG ENTERPRISES, INC.
9260 E. Raintree Drive, Suite 140
Scottsdale, AZ 85260
Ph: (480) 998-5600
Fax: (480) 998-5603
www.skgaz.com

Registered Professional Engineer (Civil)
CERTIFICATE NO. 25970
SHAKIR K. GUSHGARI
Date Signed 7-12-12
ARIZONA, U.S.A.
Expires 3-31-13

Job # 30-11.2
Prepared: July 2012

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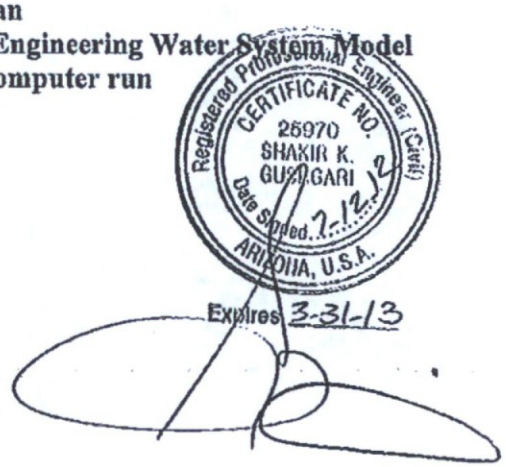
EXHIBITS



1.0 INTRODUCTION

Reata Ranch is a proposed master planned community located in Section 36 of Township 5 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. This site is located within the City of Scottsdale's Upper Desert Landform of the Environmentally Sensitive Lands Ordinance (E.S.L.O.) area. Reata Ranch consists of three separate parcels that are combined into one development totaling 220-acres in size. A site location map is included as Exhibit 1 in this report.

The land generally slopes from northwest to southeast at an average rate of 5 percent and is traversed by several well-defined washes. The site is currently platted as single family residential development with various lot sizes and will undergo a re-platting process as a planned community consisting of various residential parcels, ranch resort, and open space. The name and address of the developer's agent is:

Land Development Services, L.L.C.
7525 East Camelback Road, Suite 104
Scottsdale, AZ 85251
480-946-5020

2.0 EXISTING WATER DISTRIBUTION SYSTEM

At present, no domestic water system exists within the immediate project area. According to the City of Scottsdale water quarter section maps 50-57 through 50-60, an existing 20" Ductile Iron Pipe (DIP) City water line terminates at 122nd Street along Rio Verde Drive (Dynamite Boulevard), as shown on quarter section map number 50-57. However, there had been several previous projects that provided water line extension designs connecting into the existing 20"-line and extending it to 136th Street. These plans have previously been City approved but never constructed and have now expired.

One of the referenced expired water extension design plans were prepared by SKV Engineering, which proposed to construct a 16" water line from 122nd Street to 128th Street and continues with a 12" water line from 128th Street to 132nd Street along the Rio Verde Drive (Ref. 1). The other project was prepared by Evolution Engineering, which proposed to construct a 12" water line from 132nd to 136th Street along the Rio Verde Drive (Ref. 2).

This project will need to utilize the aforementioned City approved water extension design plans (Ref. 1 and 2) as its main water source. As the referenced water extension design plans have expired, this project should consider resurrecting the expired plans for re-approval and constructing the proposed water line from 122nd Street to 136th Street, as specified on the referenced expired design plans. Per the City of Scottsdale Design Standards and Procedures Manual (DS&PM), Section 6-1.103 the Developer intends to file for "Payback Agreements" for the proposed extension. As payback agreements are based upon construction cost, a completed package containing all required materials will be submitted with the final improvement plans with supplemental documentation provided by contractors bid documents and receipts.

3.0 PRESSURE ZONES

The ground elevation range of Reata Ranch is 2,455 to 2,565 in elevation, which is classified as pressure zone 11E (City of Scottsdale). City of Scottsdale Design Standard and Policies Manual for Potable Water System Design (Ref. 2) requires the maximum allowable pressure not exceed 120 pounds per square inch (psi) and the minimum residual pressure of 50 psi be maintained under all non-fire flow conditions at the highest finished floor elevation.

Table 1 Pressure Zone Service Elevations

Pressure Zone	Minimum Elevation	Maximum Elevation
11E	2,440	2,570

4.0 PROPOSED WATER DISTRIBUTION SYSTEM

The proposed water infrastructure for Reata Ranch shall be composed of eight (8) and twelve (12) inch diameter Ductile Iron (poly-wrapped) pipes. The 8-inch diameter pipes will be along the interior roadways within the development and the 12-inch diameter pipes will be along 128th, 132nd, and 136th Streets. A conceptual site plan depicting major infrastructure layout is presented on Exhibit 2 of this report. The on-site water distribution system will follow the roadway system shown in Exhibit 2.

There will be four points of connections into the 12" water main along Rio Verde Drive to serve the Reata Ranch development and they are:

1. At 128th Street
2. At Rio Verde Drive at the main development entrance, midway between 128th and 132nd Streets
3. At 132nd Street
4. At 136th Street

According to the offsite water line plans along Rio Verde (Ref. 1), there will be a Pressure Reducing Valve (PRV) directly to the west of 128th Street. This PRV is located at the water pressure zone 12E / 11E line. The offsite water distribution system, along Rio Verde Drive, shall follow the City approved plans prepared by SVK Engineering (Ref. 1) and Evolution Engineering (Ref. 2). The proposed 12" water line along 128th, 132nd, and 136th Street together with the interior onsite water distribution system shall be designed in accordance with Chapter 4 of the City of Scottsdale Water Distribution System design guidelines (Ref. 3), the Arizona Administrative Code R18-4-502, and Engineering Bulletin no. 10 (Ref. 4).

- **Demand**

The design parameters for the proposed water distribution system for Reata Ranch is presented in the table below

Table 3 Design Criteria

Criteria	Parameter
Average Daily Water Demand (gallon/day/unit)	485.6
Maximum Unit Count	330
Peaking Factor / Maximum day peaking factor	3.5 times average day demand
Peaking Factor / Maximum hour peaking factor	1.7 times peak day
[1]Fire Demand (gallon per minute)	1,000 gpm Residential, 2,500 gpm Commercial
Minimum pressure in the system during fire flow	40 psi
Water velocity range (foot per second) during fire flow	0 to 8

[1]Commercial Fire Flow values assumed from 2006 International Fire Code, Appendix B "Fire-Flow Requirements for Buildings", Section B105 and Table B105.1 (Ref. 6).

The table below outlines the projected water demand for the proposed Reata Ranch development. It describes the water demand in terms of average daily demand, Peak demand, and peak demand with fire flow.

Table 3 Water demand calculation by development category

Type	Acres	DU/Ac	Units	Demand per unit	Ave. daily demand (GPD)	Peak daily demand (GPD)	Max Hourly demand (GPM)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Resort			75	485.6	36,420	127,470	150
Parcel A	5.7	3.5	20	485.6	9,712	33,992	40
Parcel B	5.9	3.5	21	485.6	10,198	35,692	42
Parcel C	8.3	3.5	29	485.6	14,082	49,288	58
Parcel D	9.6	3.5	34	485.6	16,510	57,786	68
Parcel E	5.9	3.5	21	485.6	10,198	35,692	42
Parcel F	8.4	3.5	30	485.6	14,568	50,988	60
Parcel G	10.1	3.5	35	485.6	16,996	59,486	70
Parcel H	8.1	3.5	26	485.6	12,626	44,190	52
Parcel I	10.4	3.5	36	485.6	17,482	61,186	72
TOTAL	-	-	330	-	158,791	555,769	656

Notes:
(6) = (4) x (5)
(7) = (6) x 3.5
(8) = {(7) x 1.7}/1,440 minutes/day

5.0 HYDRAULIC ANALYSIS

The City of Scottsdale has approved the proposed water distribution system along Rio Verde Drive consisting of 16" and 12" mains (Ref. 1 and 2). This approved water system will be the main domestic and fire flow water sources for the proposed development of Reata Ranch. A hydraulic water model for this water system was also previously prepared and City approved on May 7, 2001 (Ref. 5). Exerts from this water model report is included in Exhibit 3 of this report. According to the enclosed exert, the available water flow and pressure are as described in the table below.

Node	Near	Flow (GPM)	(1)Pressure (psi)
210	128th Street	299.56	55.00
212	East of 128nd Street	299.56	63.46
220	West of 132nd Street	299.56	80.45
224	136th Street	299.56	91.11

(1) Based upon Average Day Demand

A hydraulic model has been developed connecting into the water system along Rio Verde Drive with the flows and pressures provided in the table above. The purpose of this hydraulic model is to present the water demand for Reata Ranch development and for the single family residential parcels to the south of Reata Ranch relative to flow and pressure. The model is presented in Exhibit 4 of this report. The hydraulic model employed the following parameters:

- ✓ The water source (PRV at Rio Verde Road, east of 128th Street) is modeled at fixed grade node with a constant pressure head of 55 psig;
- ✓ The Hazen-Williams "C" for ductile iron pipe is 120;
- ✓ Ignore minor losses

The results of the computer runs are included in Exhibit 4 and are summarized below.

- ✓ The overall head-loss through the piping networks is low at peak day demand and also at maximum day + fire demands. The maximum and minimum pressures at each junction nodes are within the pressure zone range.
- ✓ The proposed piping network for this subdivision is adequate for peak and maximum day + fire flow demands.
- ✓ Fire flow is modeled at Node J14 to coincide with the Resort parcel and a fire flow demand of 2,500 gpm. Results, as shown prove the sustainability of the proposed system under modeled conditions.

6.0 RECOMMENDATIONS

- ✓ Construct the offsite water line from 122nd Street to 136th Street per City approved plans, project number 3357-04-4 and project number 3357-04-1 upon plans re-approval.
- ✓ Construct the onsite piping network consisting of 8-inch diameter pipe following the backbone roadway alignment s as shown in Exhibit 2 for the Reata Ranch development.

7.0 CONCLUSIONS

- ✓ The project is located in City of Scottsdale pressure zones 11E (El. 2,440-2,570).
- ✓ Fire hydrants shall be placed per requirements of City of Scottsdale Fire Department.
- ✓ A "Water Quality Sampling Station" shall be placed in Reata Ranch development. The water quality sampling station shall be constructed according the City of Scottsdale Standard Detail 2349.
- ✓ The proposed offsite piping improvement shall comply with the approved Water Distributions System Master Plan. (Ref. 1, 2, and 5).
- ✓ When the water line alignments cross natural washes they shall be protected from scouring by the use of a downstream cutoff wall in the flow area.

8.0 REFERENCES

1. SVK Engineering, Inc., ***"Rio Verde Estates offsite Water, Rio Verde / Dynamite Boulevard – Water Main Plans Phase 2".*** April 10, 2008, Plan number 23-PP-2004, 3357-04-4 (Approved by the City of Scottsdale on May 20, 2008).

2. Evolution Engineering, LLC, ***"Desert Estates Offsite, Rio Verde Drive Water Main Plans".*** September 26, 2007, Plan number 5-PP-03, 73-NP-2001, 1346-03-4 (Approved by the City of Scottsdale on May 20, 2008).

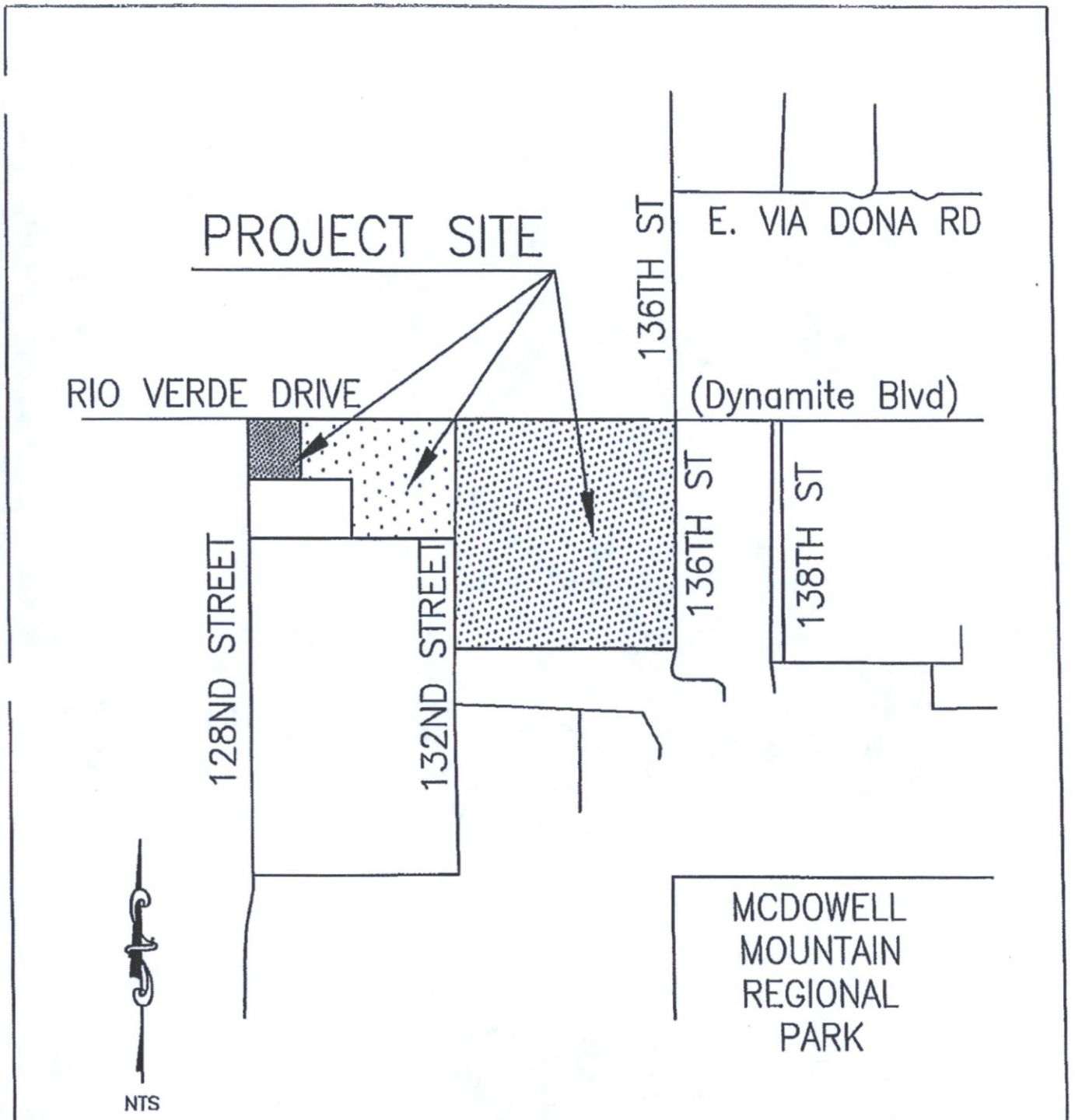
3. City of Scottsdale, ***"Chapter 6 Potable Water System Design, Design Standards and Policies Manual", Dated August 2008***.

4. Arizona Department of Environmental Quality, ***"engineering bulletin no. 10 Guidelines for the Construction of Water, Minimum Requirements for Design, Submission of Plans and Specifications of Sewage Works"***. May, 1978.

5. GTA Engineering, Inc., ***Scottsdale National Water Supply System, Scottsdale, Arizona***. April 25, 2001. Project number GTA00145 ((Approved by the City of Scottsdale on May 07, 2001).

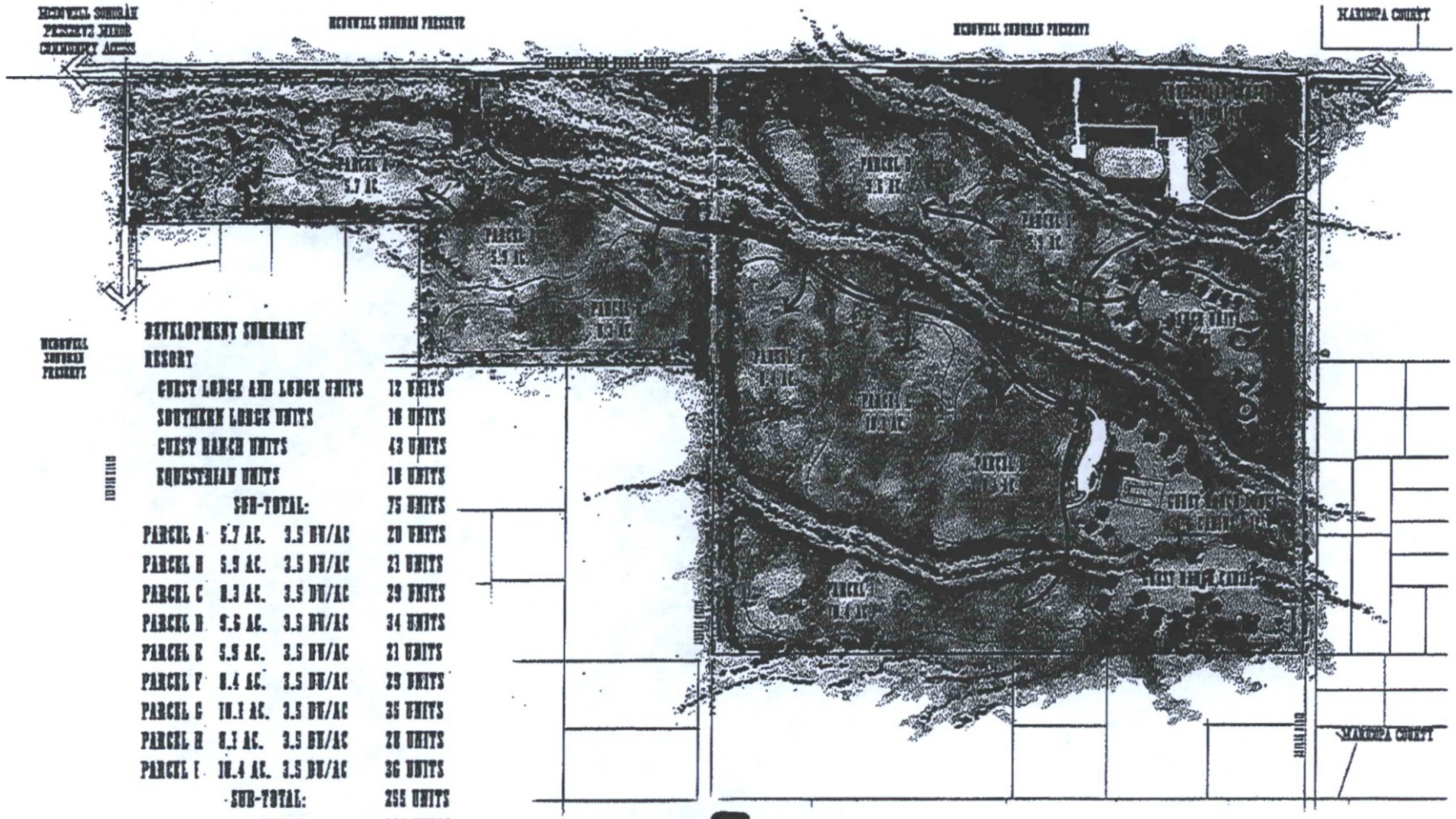
6. **2006 International Fire Code**, International Code Council, dated 2006

EXHIBIT 1



Site Location Map

EXHIBIT 2



DEVELOPMENT SUMMARY			
RESORT			
GUEST LODGE AND LODGE UNITS			12 UNITS
SOUTHERN LODGE UNITS			10 UNITS
GUEST RANCH UNITS			43 UNITS
EQUESTRIAN UNITS			10 UNITS
SUB-TOTAL:			75 UNITS
PARCEL A	5.7 AC.	3.5 DU/AC	20 UNITS
PARCEL B	6.5 AC.	3.5 DU/AC	23 UNITS
PARCEL C	8.3 AC.	3.5 DU/AC	29 UNITS
PARCEL D	9.6 AC.	3.5 DU/AC	34 UNITS
PARCEL E	5.9 AC.	3.5 DU/AC	21 UNITS
PARCEL F	8.4 AC.	3.5 DU/AC	29 UNITS
PARCEL G	10.1 AC.	3.5 DU/AC	35 UNITS
PARCEL H	8.3 AC.	3.5 DU/AC	28 UNITS
PARCEL I	10.4 AC.	3.5 DU/AC	36 UNITS
SUB-TOTAL:			255 UNITS
TOTAL:			330 UNITS

REATA RANCH

SCOTTSDALE, ARIZONA

APRIL 21, 2011
GREEY|PICKETT

EXHIBIT 3

Scottsdale National
Water Supply System
Scottsdale, Arizona

Water Master Plan

prepared for:
Hunn & Associates, Inc.

Accepted w/ Comments:

CITY OF SCOTTSDALE
WATER RESOURCES DEPT
9388 E SAN SALVADOR DR.
SCOTTSDALE, AZ 85258

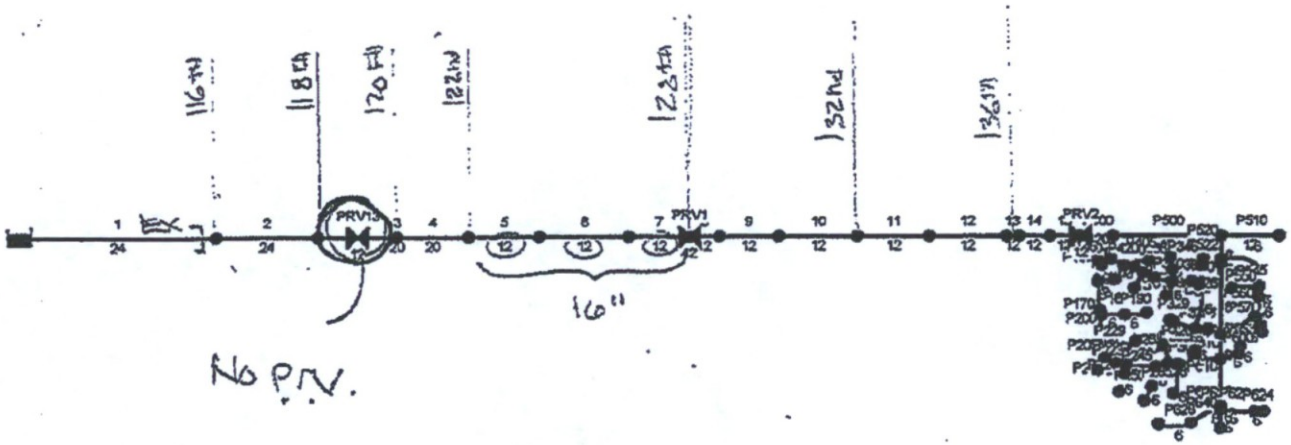
by Doug Mann
5-7-2001

prepared by

GTA ENGINEERING, INC.
Consulting Engineers
1990 W. Camelback Rd., Suite 401
Phoenix, Arizona 85015
TEL (602) 246-7759 FAX (602) 246-7645
e-mail: gta@goldmantoy.com

Revised April, 2001

Scottsdale National Links Map



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*************************************************************
*                                                           *
*                        EPANET                             *
*                Hydraulic and Water Quality                *
*                Analysis for Pipe Networks                 *
*                     Version 2.0                           *
*                                                           *
*************************************************************
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Input File: SN3ADF.inp

Scottsdale National (w/o Map)
AVERAGE DAILY FLOW RUN
Map displays entire network w/o backdrop. To see partial network w/ bacdrop, open: SNmap.net

Link - Node Table:

Link ID	Start Node	End Node	Length ft	Diameter in
1	R100	105	3300	24
2	105	110	1700	24
3	111	112	1300	20
4	112	114	1200	20
5	114	116	1200	12
6	116	118	1500	12
7	118	120	1000	12
8	121	210	500	12
9	210	212	1000	12
10	212	214	1300	12
11	214	220	1200	12
12	220	224	1300	12
13	224	228	200	12
14	228	230	500	12
15	230	232	500	12
P100	233	J100	551.79	12
P500	J100	J500	1789.21	12
P510	J500	J510	950.00	12
P120	J100	J120	420.01	8
P140	J120	J140	187.09	8
P160	J140	J160	272.99	8
P170	J160	FH170	489.42	8
P180	FH170	J180	83.32	8
P200	J180	J200	745.39	8
P210	J200	FH210	192.30	8
P220	FH210	J220	192.43	8
P240	J220	J240	474.89	8
P260	J240	J260	217.32	8
P280	J260	J280	161.15	8
P290	J280	FH290	32.26	8
P300	FH290	J300	307.32	8
P310	J300	J600	465.63	8
P520	J500	J520	411.75	8
P522	J520	FH522	66.51	8

16" Revised to 16" on 9.19.01 okw/ gary Lane After discussion.

Link - Node Table: (continued)

Link ID	Start Node	End Node	Length ft	Diameter in
P524	FH522	FH524	705.52	8
P526	FH524	FH526	849.87	8
P528	FH526	J600	60.79	8
P610	J600	FH610	772.03	8
P620	FH610	J620	69.46	8
P626	J620	FH626	535.35	8
P640	J620	J640	109.40	8
P145	J140	J145	121.59	6
P165	J160	J165	262.24	6
P185	J180	FH185	396.87	6
P190	FH185	J190	369.92	6
P205	J200	J205	254.73	6
P223	J220	FH223	130.50	6
P226	FH223	J226	313.79	6
P229	J220	J229	472.71	6
P245	J240	FH245	331.57	6
P250	FH245	J250	263.17	6
P265	J260	J265	324.30	6
P285	J280	J285	476.27	6
P305	J300	FH305	82.83	6
P320	FH305	J320	352.12	6
P323	J320	J323	203.66	6
P326	J320	FH326	379.38	6
P329	FH326	J329	70.13	6
P340	J320	J340	769.79	6
P343	J340	FH343	339.53	6
P346	FH343	J346	131.87	6
P350	J340	FH350	111.93	6
P360	FH350	J360	348.78	6
P363	J360	FH363	211.31	6
P366	FH363	J366	190.78	6
P369	J360	J369	255.68	6
P370	J360	FH370	299.99	6
P380	FH370	J380	205.82	6
P385	J380	J385	297.69	6
P400	J380	J400	157.31	6
P405	J400	J405	315.39	6
P410	J400	FH410	203.58	6
P420	FH410	J120	222.19	6
P540	J520	J540	963.88	6
P545	J540	J545	434.39	6
P550	J540	FH550	174.49	6
P560	FH550	J560	355.24	6
P563	J660	FH563	189.48	6
P566	FH563	J566	125.01	6
P570	J560	FH570	612.60	6
P580	FH570	J580	139.43	6

Link - Node Table: (continued)

Link ID	Start Node	End Node	Length ft	Diameter in	
P600	J580	J600	309.74	6	
P622	J620	FH622	575.20	6	
P624	FH622	J624	135.33	6	
P628	FH626	J628	544.80	6	
PRV1	120	121	#N/A	12	Valve
PRV2	232	233	#N/A	12	Valve
PRV13	110	111	#N/A	12	Valve

Node Results:

Node ID	Demand GPM	Head ft	Pressure psi	Quality	
105	0.00	2814.60	53.99	0.00	
110	572.00	2814.39	49.57	0.00	
111	0.00	2814.39	49.57	0.00	
112	0.00	2814.29	60.36	0.00	
114	0.00	2814.20	71.15	0.00	
116	0.00	2813.06	81.49	0.00	
118	0.00	2811.69	98.22	0.00	
120	235.00	2810.75	108.65	0.00	
121	0.00	2686.93	55.00	0.00	
210	0.00	2686.78	59.26	0.00	* 128th St./Rio Verde
212	0.00	2686.46	63.46	0.00	
214	0.00	2686.05	69.78	0.00	
220	0.00	2685.67	80.45	0.00	
224	0.00	2685.26	91.11	0.00	
228	0.00	2685.20	91.08	0.00	
230	251.00	2685.04	101.84	0.00	
232	0.00	2685.04	101.84	0.00	
233	0.00	2576.93	55.00	0.00	
J100	0.00	2576.93	57.47	0.00	
J120	0.00	2576.92	55.86	0.00	
J140	0.00	2576.91	54.99	0.00	
J145	1.01	2576.91	52.96	0.00	
J160	0.67	2576.91	57.37	0.00	
J165	1.01	2576.91	59.84	0.00	
FH170	0.00	2576.91	59.32	0.00	
J180	2.02	2576.91	57.50	0.00	
FH185	0.00	2576.91	76.65	0.00	
J190	2.36	2576.91	66.25	0.00	
J200	1.35	2576.90	60.62	0.00	
J205	1.35	2576.90	63.65	0.00	
FH210	0.00	2576.90	62.35	0.00	
J220	2.02	2576.90	64.52	0.00	
FH223	0.00	2576.90	63.65	0.00	
J226	1.35	2576.90	67.55	0.00	

Node Results: (continued)

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J229	1.35	2576.90	64.74	0.00
J240	0.34	2576.90	71.76	0.00
FH245	0.00	2576.90	72.32	0.00
J250	1.69	2576.90	71.45	0.00
J260	0.34	2576.90	74.49	0.00
J265	1.01	2576.90	67.55	0.00
J280	0.67	2576.90	76.44	0.00
J285	1.35	2576.90	75.57	0.00
FH290	0.00	2576.90	76.65	0.00
J300	1.01	2576.90	72.75	0.00
FH305	0.00	2576.90	74.49	0.00
J320	1.01	2576.90	73.62	0.00
J323	1.69	2576.90	75.78	0.00
FH326	0.00	2576.90	70.15	0.00
J329	1.69	2576.90	67.99	0.00
J340	1.69	2576.90	71.45	0.00
FH343	0.00	2576.90	72.32	0.00
J346	1.69	2576.90	70.58	0.00
FH350	0.00	2576.90	68.72	0.00
J360	1.35	2576.90	66.69	0.00
FH363	0.00	2576.90	65.82	0.00
J366	1.35	2576.90	65.60	0.00
J369	0.67	2576.90	69.07	0.00
FH370	0.00	2576.91	63.65	0.00
J380	0.00	2576.91	61.92	0.00
J385	1.35	2576.91	62.79	0.00
J400	0.34	2576.91	60.19	0.00
J405	1.01	2576.91	62.36	0.00
FH410	0.00	2576.91	57.37	0.00
J500	0.00	2576.92	74.58	0.00
J510	0.00	2576.92	84.03	0.00
J520	1.35	2576.92	74.27	0.00
FH522	0.00	2576.91	73.62	0.00
FH524	0.00	2576.91	78.39	0.00
FH526	0.00	2576.90	78.39	0.00
J540	1.69	2576.91	81.85	0.00
J545	1.35	2576.91	77.52	0.00
FH550	0.00	2576.91	83.15	0.00
J560	1.01	2576.90	82.07	0.00
FH563	0.00	2576.90	83.15	0.00
J566	1.01	2576.90	85.75	0.00
FH570	0.00	2576.90	83.15	0.00
J580	2.02	2576.90	84.45	0.00
J600	0.67	2576.90	78.39	0.00
FH610	0.00	2576.90	78.73	0.00
J620	1.69	2576.90	77.52	0.00
FH622	0.00	2576.90	83.15	0.00

Node Results: (continued)

Node ID	Demand GPM	Head ft	Pressure psi	Quality	
J624	2.02	2576.90	83.80	0.00	
FH626	0.00	2576.90	72.32	0.00	
J628	1.01	2576.90	71.45	0.00	
J640	0.00	2576.90	78.08	0.00	
R100	-1106.57	2815.00	0.00	0.00	Reservoir
VolCurve	0.00	2400.00	0.00	0.00	Reservoir

Will Establish Now @ 2830 w/ 8 12 Reservoir

Link Results:

Link ID	Flow GPM	Velocity fps	Headloss ft/Kft	Status
1	1106.57	0.78	0.12	Open
2	1106.57	0.78	0.12	Open
3	534.57	0.85	0.08	Open
4	534.57	0.55	0.08	Open
5	534.57	1.52	0.95	Open
6	534.57	1.52	0.92	Open
7	534.57	1.52	0.92	Open
8	299.56	0.85	0.32	Open
9	299.56	0.85	0.32	Open
10	299.56	0.85	0.32	Open
11	299.56	0.85	0.32	Open
12	299.56	0.85	0.32	Open
13	299.56	0.85	0.31	Open
14	299.56	0.85	0.32	Open
15	48.56	0.14	0.01	Open
P100	48.57	0.14	0.01	Open
P500	21.70	0.06	0.00	Open
P510	0.00	0.00	0.00	Open
P120	26.86	0.17	0.03	Open
P140	17.04	0.11	0.01	Open
P160	16.03	0.10	0.01	Open
P170	14.34	0.09	0.01	Open
P180	14.34	0.09	0.01	Open
P200	9.96	0.06	0.00	Open
P210	7.26	0.05	0.00	Open
P220	7.26	0.05	0.00	Open
P240	2.54	0.02	0.00	Open
P260	0.51	0.00	0.00	Open
P280	-0.83	0.01	0.00	Open
P290	-2.86	0.02	0.00	Open
P300	-2.86	0.02	0.00	Open
P310	-7.87	0.05	0.00	Open
P520	21.70	0.14	0.02	Open
P522	13.10	0.08	0.01	Open
P524	13.10	0.08	0.01	Open

Link Results: (continued)

Link ID	Flow GPM	Velocity fps	Headloss ft/Kft	Status
P526	13.10	0.08	0.01	Open
P528	13.10	0.08	0.01	Open
P610	4.72	0.03	0.00	Open
P620	4.72	0.03	0.00	Open
P625	1.01	0.01	0.00	Open
P640	0.00	0.00	0.00	Open
P145	1.01	0.01	0.00	Open
P165	1.01	0.01	0.00	Open
P185	2.36	0.03	0.00	Open
P190	2.36	0.03	0.00	Open
P205	1.35	0.02	0.00	Open
P223	1.35	0.02	0.00	Open
P226	1.35	0.02	0.00	Open
P229	1.35	0.02	0.00	Open
P245	1.69	0.02	0.00	Open
P250	1.69	0.02	0.00	Open
P265	1.01	0.01	0.00	Open
P285	1.35	0.02	0.00	Open
P305	4.00	0.05	0.00	Open
P320	4.00	0.05	0.00	Open
P323	1.69	0.02	0.00	Open
P326	1.69	0.02	0.00	Open
P329	1.69	0.02	0.00	Open
P340	-0.38	0.00	0.00	Open
P343	1.69	0.02	0.00	Open
P346	1.69	0.02	0.00	Open
P350	-3.75	0.04	0.00	Open
P360	-3.75	0.04	0.00	Open
P363	1.35	0.02	0.00	Open
P366	1.35	0.02	0.00	Open
P369	0.67	0.01	0.00	Open
P370	-7.13	0.08	0.01	Open
P380	-7.13	0.08	0.01	Open
P385	1.35	0.02	0.00	Open
P400	-8.47	0.10	0.01	Open
P405	1.01	0.01	0.00	Open
P410	-9.82	0.11	0.02	Open
P420	-9.82	0.11	0.02	Open
P540	7.25	0.08	0.01	Open
P545	1.35	0.02	0.00	Open
P550	4.21	0.05	0.00	Open
P560	4.21	0.05	0.00	Open
P563	1.01	0.01	0.00	Open
P566	1.01	0.01	0.00	Open
P570	2.19	0.02	0.00	Open
P580	2.19	0.02	0.00	Open
P600	0.17	0.00	0.00	Open

Link Results: (continued)

Link ID	Flow GPM	Velocity fps	Headloss ft/Kft	Status
P622	2.02	0.02	0.00	Open
P624	2.02	0.02	0.00	Open
P628	1.01	0.01	0.00	Open
PRV1	299.57	0.85	123.82	Active Valve
PRV2	48.56	0.14	108.10	Active Valve
PRV13	534.57	1.52	0.00	Open Valve

EXHIBIT 4

APPENDIX B

FIRE-FLOW REQUIREMENTS FOR BUILDINGS

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION B101 GENERAL

B101.1 Scope. The procedure for determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with this appendix. This appendix does not apply to structures other than buildings.

SECTION B102 DEFINITIONS

B102.1 Definitions. For the purpose of this appendix, certain terms are defined as follows:

FIRE-FLOW. The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138 kPa) residual pressure, that is available for fire fighting.

FIRE-FLOW CALCULATION AREA. The floor area, in square feet (m^2), used to determine the required fire flow.

SECTION B103 MODIFICATIONS

B103.1 Decreases. The fire chief is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

B103.2 Increases. The fire chief is authorized to increase the fire-flow requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall not be more than twice that required for the building under consideration.

B103.3 Areas without water supply systems. For information regarding water supplies for fire-fighting purposes in rural and suburban areas in which adequate and reliable water supply systems do not exist, the fire code official is authorized to utilize NFPA 1142 or the *International Wildland-Urban Interface Code*.

SECTION B104 FIRE-FLOW CALCULATION AREA

B104.1 General. The fire-flow calculation area shall be the total floor area of all floor levels within the exterior walls, and under the horizontal projections of the roof of a building, except as modified in Section B104.3.

B104.2 Area separation. Portions of buildings which are separated by fire walls without openings, constructed in accordance with the *International Building Code*, are allowed to be considered as separate fire-flow calculation areas.

B104.3 Type IA and Type IB construction. The fire-flow calculation area of buildings constructed of Type IA and Type IB construction shall be the area of the three largest successive floors.

Exception: Fire-flow calculation area for open parking garages shall be determined by the area of the largest floor.

SECTION B105 FIRE-FLOW REQUIREMENTS FOR BUILDINGS

B105.1 One- and two-family dwellings. The minimum fire-flow requirements for one- and two-family dwellings having a fire-flow calculation area which does not exceed 3,600 square feet (344.5 m^2) shall be 1,000 gallons per minute (3785.4 L/min). Fire-flow and flow duration for dwellings having a fire-flow calculation area in excess of 3,600 square feet (344.5 m^2) shall not be less than that specified in Table B105.1.

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

B105.2 Buildings other than one- and two-family dwellings. The minimum fire-flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in Table B105.1.

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

SECTION B106 REFERENCED STANDARDS

ICC	IBC	International Building Code	B104.2, Table B105.1
ICC	IWUIC	International Wildland-Urban Interface Code	B103.3
NFPA	1142	Standard on Water Supplies for Suburban and Rural Fire Fighting	B103.3

Typical WOOD FRAME

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

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[c]	FLOW DURATION (hours)
Type IA and IB[b]	Type IIA and IIIA[b]	Type IV and V-A[b]	Type IIB and IIIB[b]	Type V-B[b]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

3600 max is BASIS OF 500 gpm

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

a. The minimum required fire flow shall be allowed to be reduced by 25 percent for Group R.

b. Types of construction are based on the *International Building Code*.

c. Measured at 20 psi.

Disregard per FD. – Armstrong

THE CODE CONNECTION

Hosted by Terry Welker AIA

Construction Types

All buildings are classified according to their construction type. Type I is least combustible and Type V is most combustible. The more combustible a building is and the more hazardous the use is, the more the maximum allowable area is limited (in table 503). All construction types and use groups are allowed to have increased areas by using sprinklers.

Type I

I-A or I-B

Typically these are concrete frame buildings made of noncombustible materials. All of the building elements (structural frame, bearing walls, floors and roofs) are fire resistance rated according to Tables 601 and 602.

Type II

II-A or II-B

These buildings are constructed of noncombustible materials. Typically these are masonry bearing walls structures with steel studs for walls and steel bar joists for floor and roof structures. IIA has fire rated building elements (structural frame, bearing walls, floors and roofs). IIB is the most common construction type for commercial buildings because the building elements are not required to be fire resistance rated but still must be non-combustible.

Types I and II. (602.2)
Types I and II construction are those types of construction in which the building elements listed in Table 601 are of noncombustible materials.

Type III

III-A or III-B

Type III construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of any material permitted by the code (combustible or non-combustible). This is typical of buildings with masonry bearing walls and wood roofs or floors.

Type III. (602.3)
Type III construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of any material permitted by this code. Fire-retardant-treated wood framing complying with Section 2303.2 shall be permitted within exterior wall assemblies of a 2-hour rating or less.

Type IV

IV-A or IV-B

This is Heavy Timber construction which is not common in Ohio except perhaps in some worship facilities.

Type IV. (602.4)
Type IV construction (Heavy Timber, HT) is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of solid or laminated wood without concealed spaces. The details of Type IV construction shall comply with the provisions of this section. Fire-retardant-treated wood framing complying with Section 2303.2 shall be permitted within exterior wall assemblies with a 2-hour rating or less.

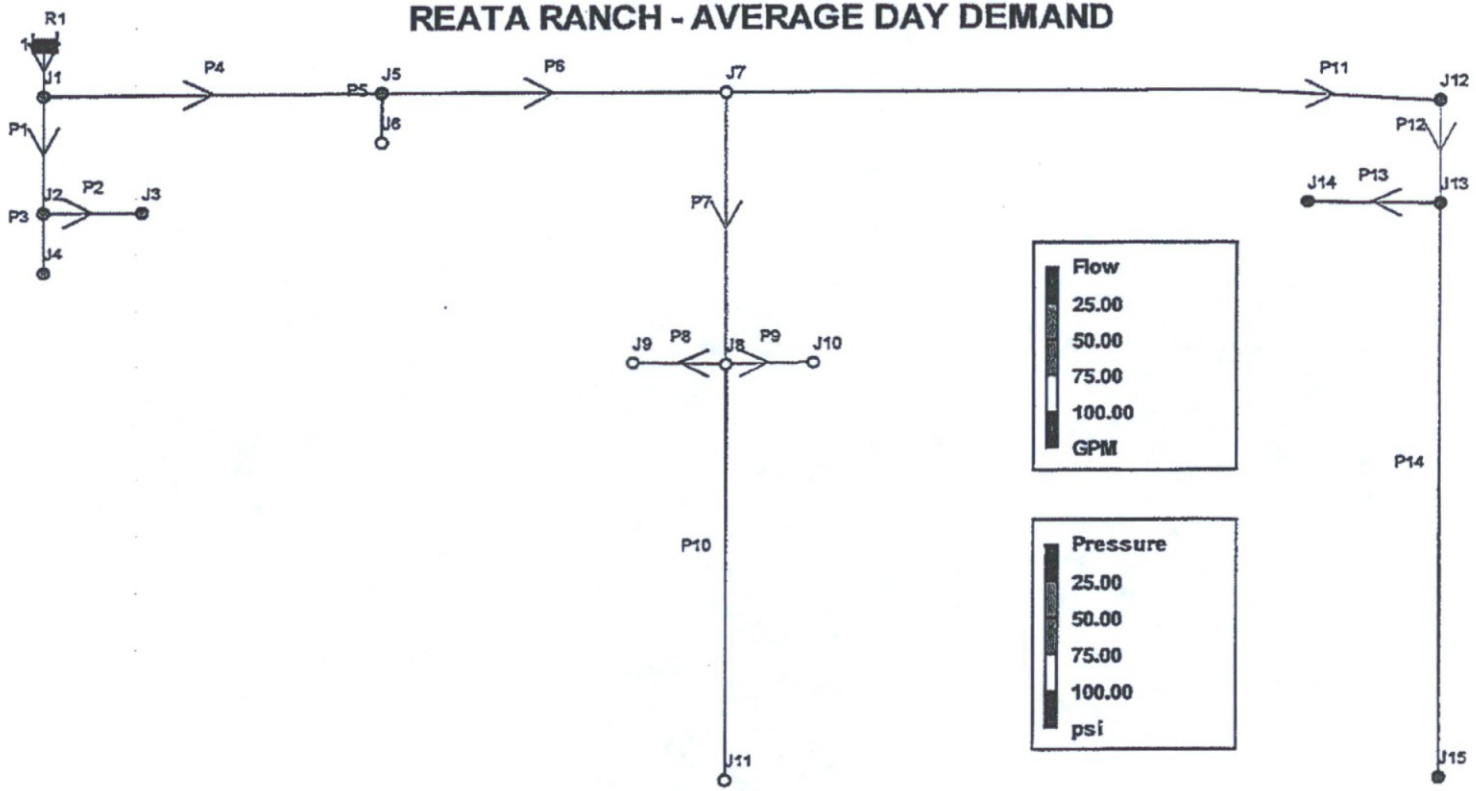
Type V

V-A or V-B

Type V construction is typically wood frame construction. V-A requires fire rated assemblies for all building elements (structural frame, bearing walls, floors and roofs); this is often seen in older construction that predates sprinklers but still not commonly used. V-B is very common because it does not require any fire rating.

Type V. (602.5)
Type V construction is that type of construction in which the structural elements, exterior walls and interior walls are of

REATA RANCH - AVERAGE DAY DEMAND



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*                            E P A N E T                                 *
*                     Hydraulic and Water Quality                        *
*                     Analysis for Pipe Networks                         *
*                          Version 2.0                                   *
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Input File: Reata Ranch Water System (AVG DAY)_7-11-2012.net

Link - Node Table:

Link ID	Start Node	End Node	Length ft	Diameter in
P1	J1	J2	455.3	12
P12	J12	J13	404	12
P11	J7	J12	2693	12
P10	J11	J8	1610	12
P2	J2	J3	19	8
P3	J2	J4	232.9	12
P6	J5	J7	1299	12
P5	J5	J6	50	8
P7	J8	J7	1053	12
P8	J9	J8	100	8
P9	J8	J10	100	12
P14	J13	J15	2220	12
P13	J13	J14	35	12
1	R1	J1	75	36
P4	J1	J5	1280	12

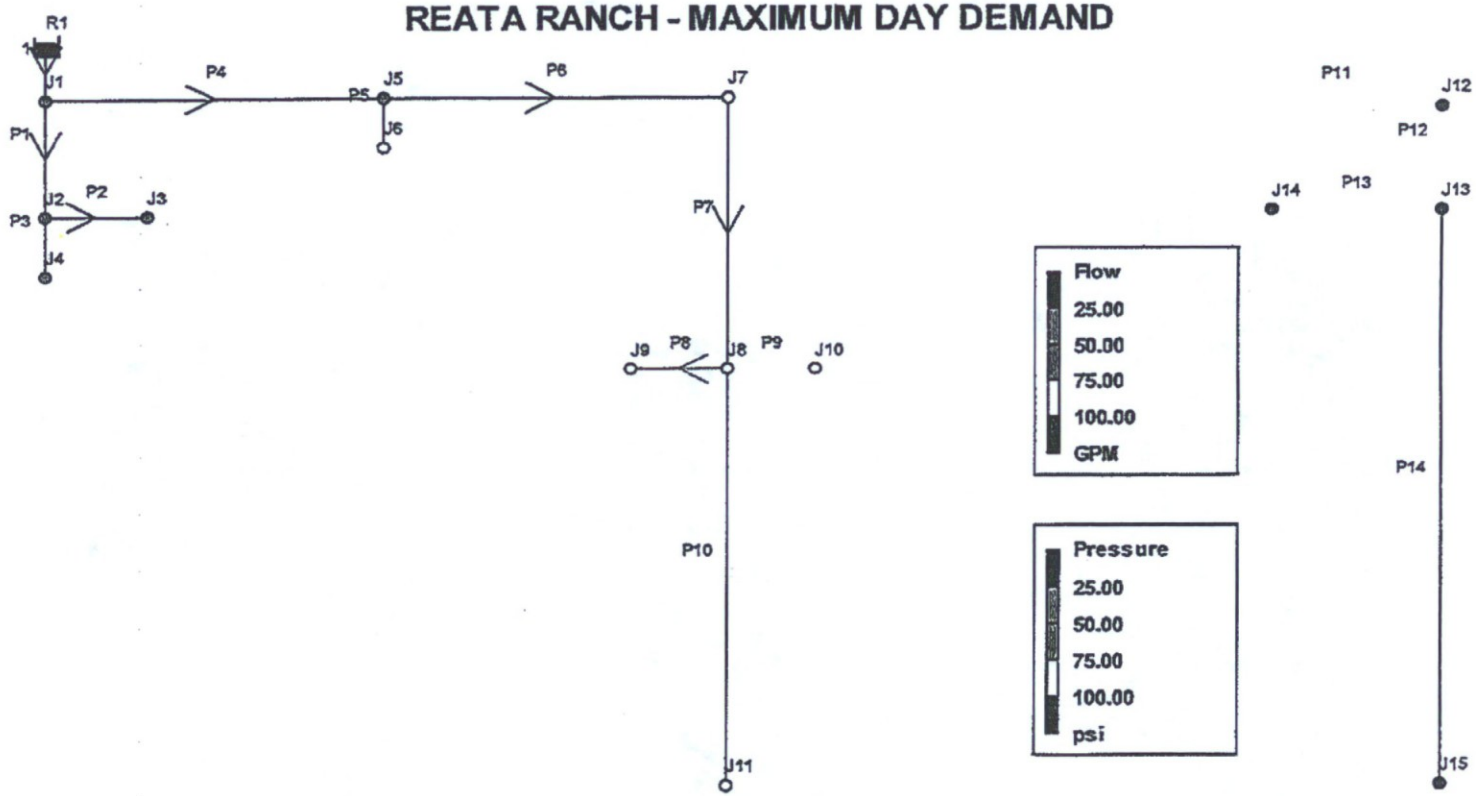
Node Results:

Node ID	Demand GPM	Head ft	Pressure psi	Quality	
J1	0.00	2706.77	59.26	0.00	128th / Rio Verde
J2	0.00	2706.77	58.83	0.00	
J12	0.00	2706.58	97.74	0.00	
J13	0.00	2706.57	104.67	0.00	
J7	0.00	2706.61	78.69	0.00	
J11	0.00	2706.59	81.71	0.00	
J8	0.00	2706.59	84.75	0.00	
J3	6.74	2706.77	59.70	0.00	
J4	0.00	2706.77	57.10	0.00	
J5	0.00	2706.69	70.06	0.00	
J6	0.00	2706.69	71.36	0.00	
J9	16.86	2706.58	83.88	0.00	
J10	43.16	2706.58	85.18	0.00	
J15	0.00	2706.57	106.84	0.00	
J14	43.84	2706.57	104.67	0.00	
R1	-110.61	2706.77	0.00	0.00	Reservoir

Link Results:

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
P1	6.74	0.02	0.00	Open
P12	43.84	0.12	0.01	Open
P11	43.84	0.12	0.01	Open
P10	0.00	0.00	0.00	Open
P2	6.74	0.04	0.00	Open
P3	0.00	0.00	0.00	Open
P6	103.86	0.29	0.06	Open
P5	0.00	0.00	0.00	Open
P7	-60.02	0.17	0.02	Open
P8	-16.86	0.11	0.01	Open
P9	43.16	0.12	0.01	Open
P14	0.00	0.00	0.00	Open
P13	43.84	0.12	0.01	Open
1	110.61	0.03	0.00	Open
P4	103.87	0.29	0.06	Open

REATA RANCH - MAXIMUM DAY DEMAND



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*                          E P A N E T                                   *
*                  Hydraulic and Water Quality                           *
*                  Analysis for Pipe Networks                            *
*                        Version 2.0                                     *
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Input File: Reata Ranch Water System (MAX DAY)_7-11-2012.NET

Link - Node Table:

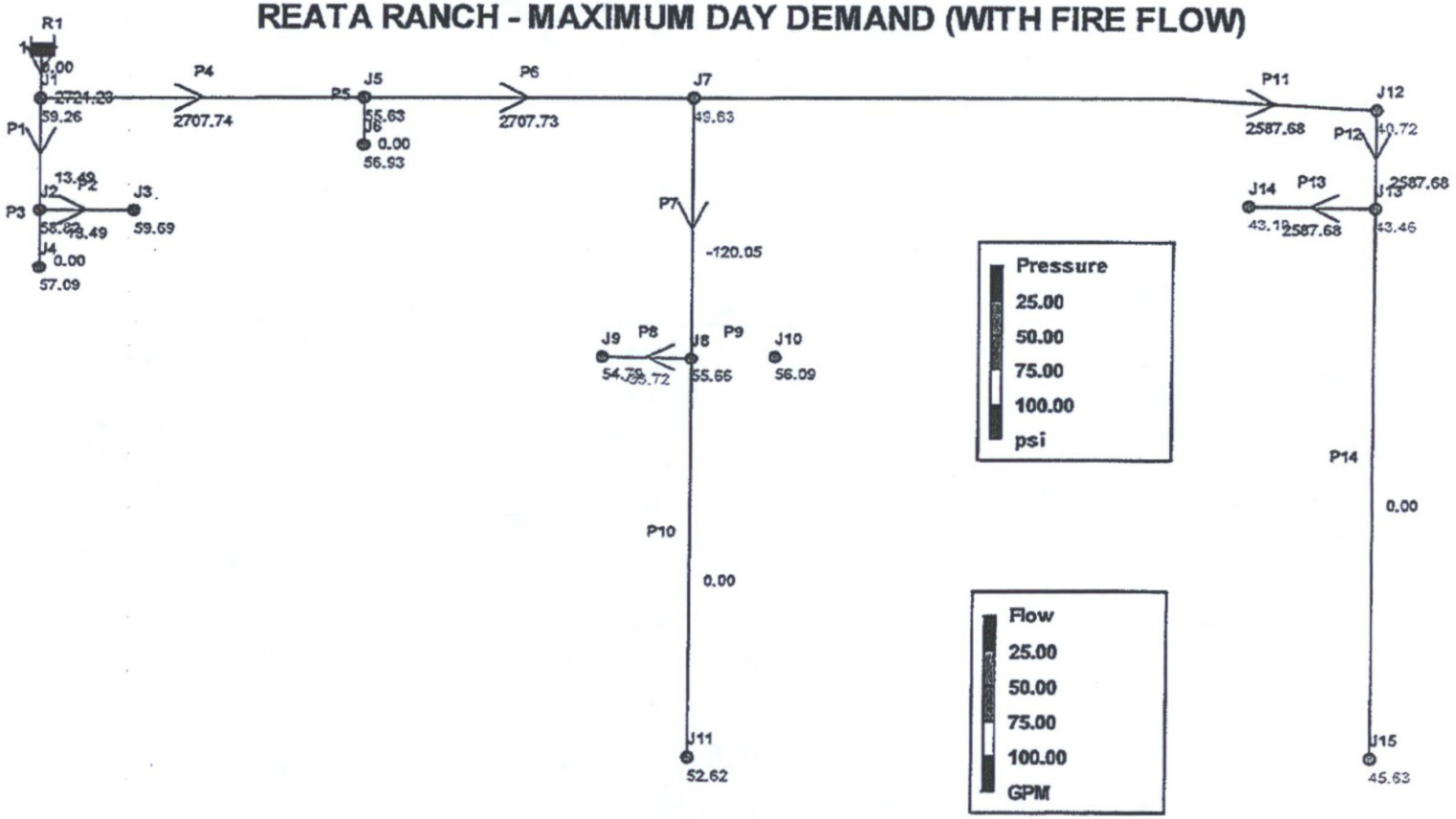
Link ID	Start Node	End Node	Length ft	Diameter in
P1	J1	J2	455.3	12
P12	J12	J13	404	12
P11	J7	J12	2693	12
P10	J11	J8	1610	12
P2	J2	J3	19	8
P3	J2	J4	232.9	12
P6	J5	J7	1299	12
P5	J5	J6	50	8
P7	J8	J7	1053	12
P8	J9	J8	100	8
P9	J8	J10	100	12
P14	J13	J15	2220	12
P13	J13	J14	35	12
1	R1	J1	75	36
P4	J1	J5	1280	12

Node Results:

Node ID	Demand GPM	Head ft	Pressure psi	Quality	
J1	0.00	2706.77	59.26	0.00	128th / Rio Verde
J2	0.00	2706.77	58.83	0.00	
J12	0.00	2706.07	97.52	0.00	
J13	0.00	2706.05	104.45	0.00	
J7	0.00	2706.19	78.51	0.00	
J11	0.00	2706.11	81.51	0.00	
J8	0.00	2706.11	84.54	0.00	
J3	13.49	2706.77	59.70	0.00	
J4	0.00	2706.77	57.10	0.00	
J5	0.00	2706.48	69.97	0.00	
J6	0.00	2706.48	71.27	0.00	
J9	33.72	2706.10	83.67	0.00	
J10	86.33	2706.10	84.97	0.00	
J15	0.00	2706.05	106.61	0.00	
J14	87.68	2706.05	104.45	0.00	
R1	-221.23	2706.77	0.00	0.00	Reservoir

Link Results:

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
P1	13.49	0.04	0.00	Open
P12	87.68	0.25	0.05	Open
P11	87.68	0.25	0.05	Open
P10	0.00	0.00	0.00	Open
P2	13.49	0.09	0.01	Open
P3	0.00	0.00	0.00	Open
P6	207.73	0.59	0.22	Open
P5	0.00	0.00	0.00	Open
P7	-120.05	0.34	0.08	Open
P8	-33.72	0.22	0.06	Open
P9	86.33	0.24	0.04	Open
P14	0.00	0.00	0.00	Open
P13	87.68	0.25	0.04	Open
1	221.23	0.07	0.00	Open
P4	207.74	0.59	0.22	Open


REATA RANCH - MAXIMUM DAY DEMAND (WITH FIRE FLOW)
R1
J1
2721.23
59.26
P1
P4
2707.74
J5
55.63
J6
0.00
56.93
P5
P6
2707.73
J7
43.63
P7
-120.05
P10
0.00
J11
52.62
P11
2587.68
J12
40.72
P12
2587.68
J13
43.46
P13
2587.68
J14
43.19
P14
0.00
J15
45.63
P2
13.49
J2
J3
59.69
P3
13.49
J4
0.00
57.09
J9
P8
J8
P9
J10
55.66
56.09
Pressure
25.00
50.00
75.00
100.00
psi
Flow
25.00
50.00
75.00
100.00
GPM

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*                            E P A N E T                                *
*                     Hydraulic and Water Quality                       *
*                     Analysis for Pipe Networks                        *
*                           Version 2.0                                 *
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Input File: Reata Ranch Water System (MAX DAY-W_FIRE)_7-11-2012.NET

Link - Node Table:

Link ID	Start Node	End Node	Length ft	Diameter in
P1	J1	J2	455.3	12
P12	J12	J13	404	12
P11	J7	J12	2693	12
P10	J11	J8	1610	12
P2	J2	J3	19	8
P3	J2	J4	232.9	12
P6	J5	J7	1299	12
P5	J5	J6	50	8
P7	J8	J7	1053	12
P8	J9	J8	100	8
P9	J8	J10	100	12
P14	J13	J15	2220	12
P13	J13	J14	35	12
1	R1	J1	75	36
P4	J1	J5	1280	12

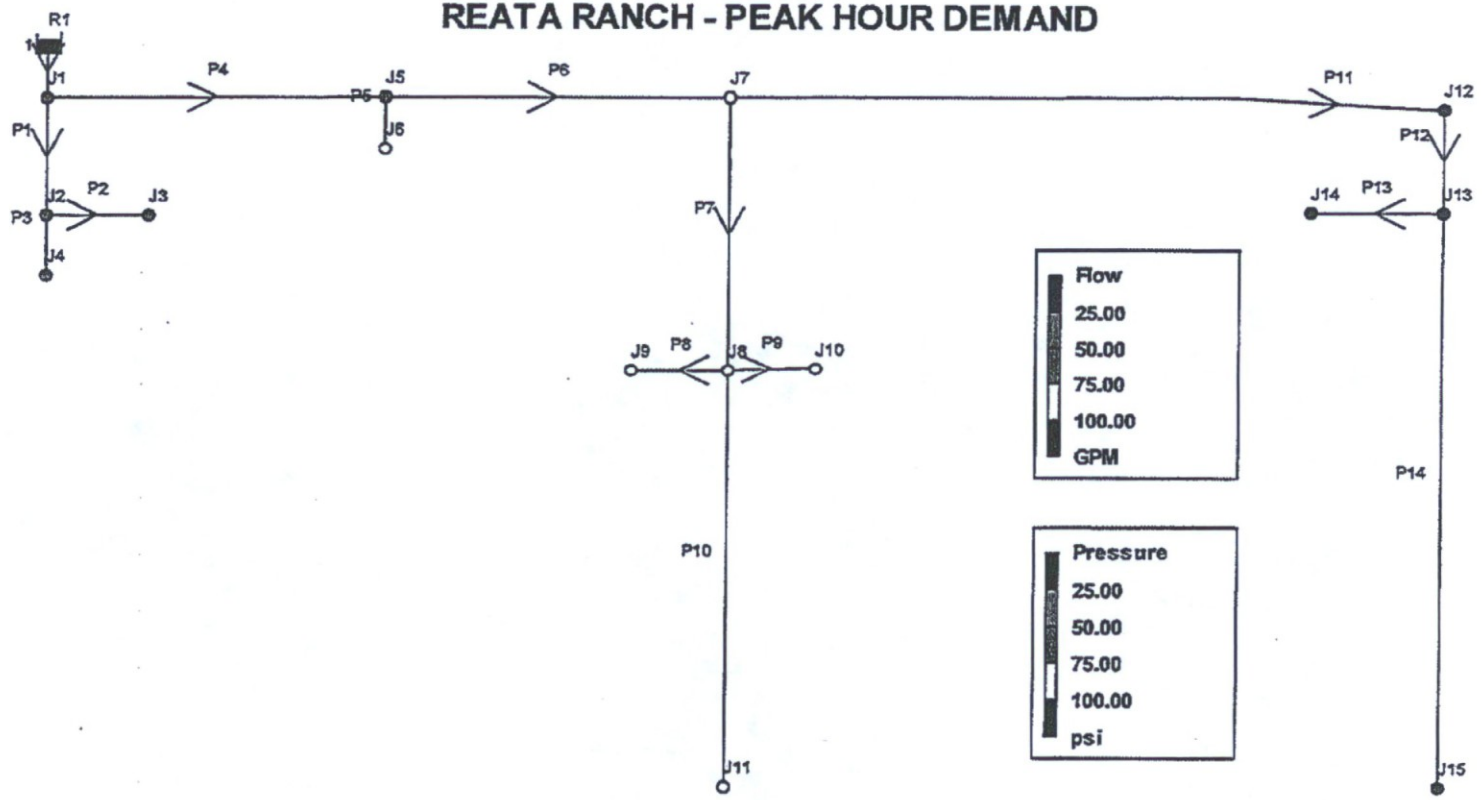
Node Results:

Node ID	Demand GPM	Head ft	Pressure psi	Quality	
J1	0.00	2706.76	59.26	0.00	128th / Rio Verde
J2	0.00	2706.76	58.82	0.00	
J12	0.00	2574.98	40.72	0.00	
J13	0.00	2565.30	43.46	0.00	
J7	0.00	2639.53	49.63	0.00	
J11	0.00	2639.44	52.62	0.00	
J8	0.00	2639.44	55.66	0.00	
J3	13.49	2706.76	59.69	0.00	
J4	0.00	2706.76	57.09	0.00	
J5	0.00	2673.39	55.63	0.00	
J6	0.00	2673.39	56.93	0.00	
J9	33.72	2639.44	54.79	0.00	
J10	86.33	2639.44	56.09	0.00	
J15	0.00	2565.30	45.63	0.00	
J14	2587.68	2564.46	43.10	0.00	
R1	-2721.23	2706.77	0.00	0.00	Reservoir

Link Results:

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
P1	13.49	0.04	0.00	Open
P12	2587.68	7.34	23.97	Open
P11	2587.68	7.34	23.97	Open
P10	0.00	0.00	0.00	Open
P2	13.49	0.09	0.01	Open
P3	0.00	0.00	0.00	Open
P6	2707.73	7.68	26.07	Open
P5	0.00	0.00	0.00	Open
P7	-120.05	0.34	0.08	Open
P8	-33.72	0.22	0.06	Open
P9	86.33	0.24	0.04	Open
P14	0.00	0.00	0.00	Open
P13	2587.68	7.34	23.97	Open
1	2721.23	0.86	0.12	Open
P4	2707.74	7.68	26.07	Open

REATA RANCH - PEAK HOUR DEMAND



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*                            E P A N E T                                 *
*                     Hydraulic and Water Quality                        *
*                     Analysis for Pipe Networks                         *
*                           Version 2.0                                  *
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Input File: Reata Ranch Water System (PEAK HOUR)_7-11-2012.NET

Link - Node Table:

Link ID	Start Node	End Node	Length ft	Diameter in
P1	J1	J2	455.3	12
P12	J12	J13	404	12
P11	J7	J12	2693	12
P10	J11	J8	1610	12
P2	J2	J3	19	8
P3	J2	J4	232.9	12
P6	J5	J7	1299	12
P5	J5	J6	50	8
P7	J8	J7	1053	12
P8	J9	J8	100	8
P9	J8	J10	100	12
P14	J13	J15	2220	12
P13	J13	J14	35	12
1	R1	J1	75	36
P4	J1	J5	1280	12

Node Results:

Node ID	Demand GPM	Head ft	Pressure psi	Quality	
J1	0.00	2706.77	59.26	0.00	128th/Rio Verde
J2	0.00	2706.77	58.83	0.00	
J12	0.00	2704.79	96.97	0.00	
J13	0.00	2704.74	103.88	0.00	
J7	0.00	2705.14	78.05	0.00	
J11	0.00	2704.90	80.98	0.00	
J8	0.00	2704.90	84.02	0.00	
J3	23.61	2706.77	59.69	0.00	
J4	0.00	2706.77	57.09	0.00	
J5	0.00	2705.96	69.74	0.00	
J6	0.00	2705.96	71.04	0.00	
J9	59.01	2704.88	83.14	0.00	
J10	151.08	2704.88	84.44	0.00	
J15	0.00	2704.74	106.05	0.00	
J14	153.44	2704.74	103.88	0.00	
R1	-387.15	2706.77	0.00	0.00	Reservoir

Link Results:

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
P1	23.61	0.07	0.00	Open
P12	153.44	0.44	0.13	Open
P11	153.44	0.44	0.13	Open
P10	0.00	0.00	0.00	Open
P2	23.61	0.15	0.03	Open
P3	0.00	0.00	0.00	Open
P6	363.54	1.03	0.63	Open
P5	0.00	0.00	0.00	Open
P7	-210.09	0.60	0.23	Open
P8	-59.01	0.38	0.16	Open
P9	151.08	0.43	0.12	Open
P14	0.00	0.00	0.00	Open
P13	153.44	0.44	0.13	Open
1	387.15	0.12	0.00	Open
P4	363.54	1.03	0.63	Open

SKG Enterprises, Inc.

Junction Node Elevation and Demand | Date: 7/11/2012

Project: Reata Ranch (Scottsdale, Arizona) | SKG Project No. 30-9

Junction Number (node)	Elevation (feet)	Number of Units	Average Day Water Demand (gpm)	Maximum Day Water Demand (gpm)	Peak Hour Water Demand (gpm)	Notes
Res1	2706.77[4]	0	Units*485.6/1440	2*Avg. Day	3.5*Average Day	Base Parameters
J1[5]	2570.0 ft	0	0.00	0.00	0.00	
J2	2571.0 ft	0	0.00	0.00	0.00	
J3	2569.0 ft	20	6.74	13.49	23.61	Parcel A
4[1]	2575.0 ft	0	0.00	0.00	0.00	
J5	2545.0 ft	0	0.00	0.00	0.00	
J6	2542.0 ft	0	0.00	0.00	0.00	
J7	2525.0 ft	0	0.00	0.00	0.00	
J8	2511.0 ft	0	0.00	0.00	0.00	
J9	2513.0 ft	50	16.86	33.72	59.01	Parcel B and Parcel C
J10	2510.0 ft	128	43.16	86.33	151.08	Parcels F, G, H and I
11[1]	2518.0 ft	0	0.00	0.00	0.00	
J12	2481.0 ft	0	0.00	0.00	0.00	
J13	2465.0 ft	0	0.00	0.00	0.00	
J14[2][3]	2465.0 ft	130	43.84	87.68	153.44	Parcels D, E and Resort (Fire Flow)
J15[1]	2460.0 ft	0	0.00	0.00	0.00	
Total		328	110.61	221.22	387.13	Total

1 = Boundary node -- Future system expansion estimated based on adjacent zoning opportunity

2 = Fire Flow Analysis (Use 2,500 gpm for Resort as Site Fire Flow control)

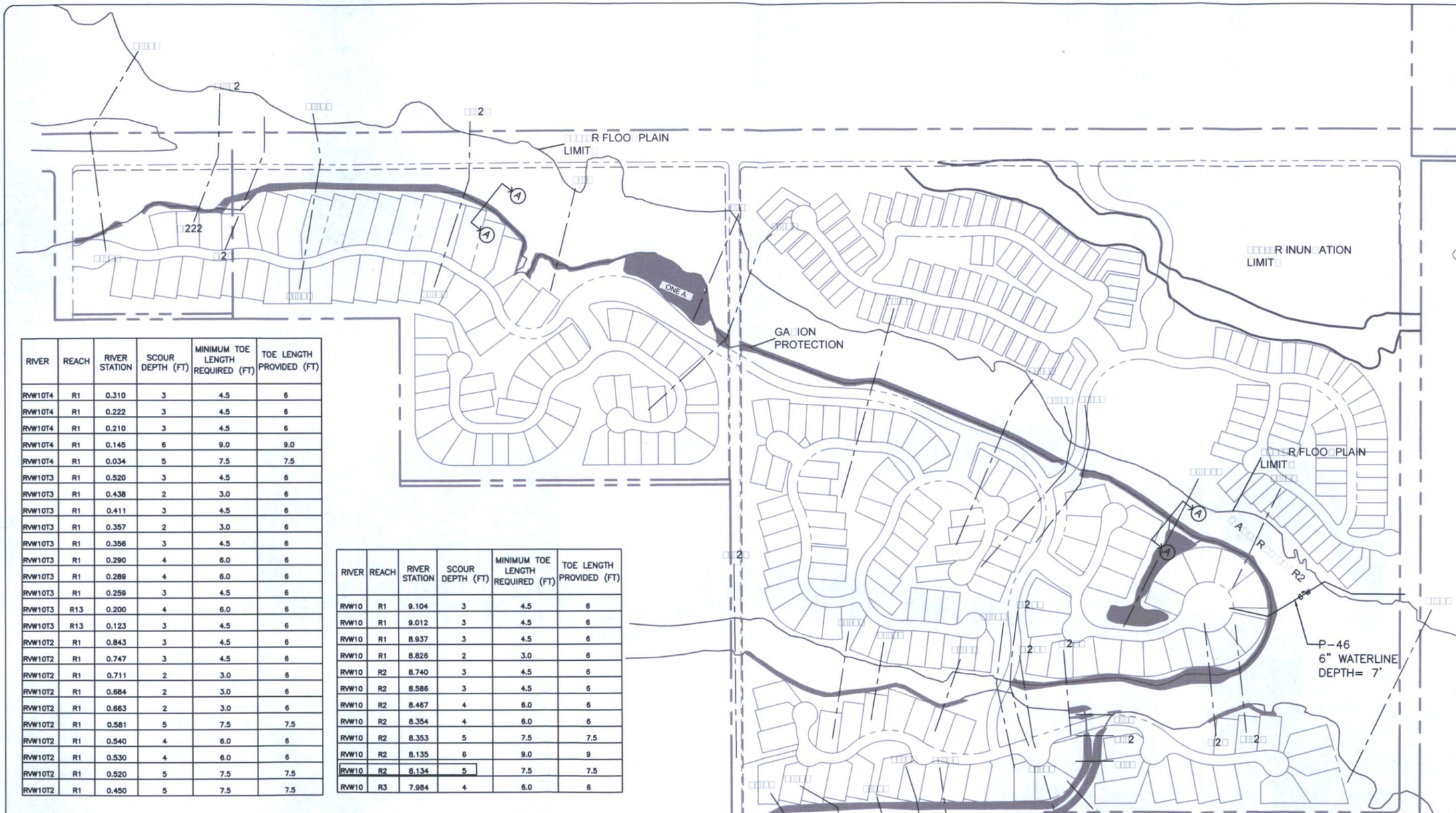
3 = A daily demand of 485.6/unit was applied to the Resort and Guest Ranch facilities as units more closely resemble Single Family housing.

4 = Elevation reflects required head + ground elevation.

5 = Node J1 (this report) = Node 210 (approved GTA Engineering, Inc. report for the Scottsdale national Water Supply System (dated 4/25/01).

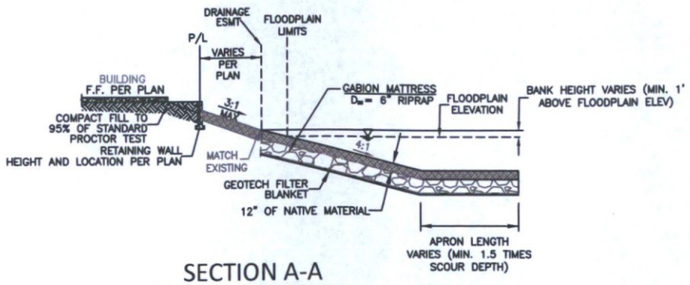
SKG Enterprises, Inc.
9260 East Raintree Drive #140
Scottsdale, Arizona 85260
ph) 480.998.5600

APPENDIX C



RIVER	REACH	RIVER STATION	SCOUR DEPTH (FT)	MINIMUM TOE LENGTH REQUIRED (FT)	TOE LENGTH PROVIDED (FT)
RVW10T4	R1	0.310	3	4.5	6
RVW10T4	R1	0.222	3	4.5	6
RVW10T4	R1	0.210	3	4.5	6
RVW10T4	R1	0.145	6	9.0	9.0
RVW10T4	R1	0.034	5	7.5	7.5
RVW10T3	R1	0.520	3	4.5	6
RVW10T3	R1	0.438	2	3.0	6
RVW10T3	R1	0.411	3	4.5	6
RVW10T3	R1	0.357	2	3.0	6
RVW10T3	R1	0.356	3	4.5	6
RVW10T3	R1	0.290	4	6.0	6
RVW10T3	R1	0.289	4	6.0	6
RVW10T3	R1	0.259	3	4.5	6
RVW10T3	R13	0.200	4	6.0	6
RVW10T3	R13	0.123	3	4.5	6
RVW10T2	R1	0.843	3	4.5	6
RVW10T2	R1	0.747	3	4.5	6
RVW10T2	R1	0.711	2	3.0	6
RVW10T2	R1	0.684	2	3.0	6
RVW10T2	R1	0.663	2	3.0	6
RVW10T2	R1	0.581	5	7.5	7.5
RVW10T2	R1	0.540	4	6.0	6
RVW10T2	R1	0.530	4	6.0	6
RVW10T2	R1	0.520	5	7.5	7.5
RVW10T2	R1	0.450	5	7.5	7.5

RIVER	REACH	RIVER STATION	SCOUR DEPTH (FT)	MINIMUM TOE LENGTH REQUIRED (FT)	TOE LENGTH PROVIDED (FT)
RVW10	R1	9.104	3	4.5	6
RVW10	R1	9.012	3	4.5	6
RVW10	R1	8.937	3	4.5	6
RVW10	R1	8.826	2	3.0	6
RVW10	R2	8.740	3	4.5	6
RVW10	R2	8.586	3	4.5	6
RVW10	R2	8.467	4	6.0	6
RVW10	R2	8.354	4	6.0	6
RVW10	R2	8.353	5	7.5	7.5
RVW10	R2	8.135	6	9.0	9
RVW10	R2	8.134	5	7.5	7.5
RVW10	R3	7.984	4	6.0	6



SECTION A-A
NTS

E□TIMATE□ RIPRAP □UANTIT□ □2□2□□□ CFT

SKG ENTERPRISES, INC.
9260 E. RAINTREE DRIVE
SUITE 140
SCOTTSDALE, AZ. 85260
PH) 480-998-5600
FAX) 480-998-5603
WWW.SKGAZ.COM

CERTIFICATE NO. 25970
SHAWN K. GASHGARI
Expires 03-31-16

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

PRELIMINARY
NOT FOR CONSTRUCTION
OR FOR RECORDING

REATA RANCH
EROSION PROTECTION EXHIBIT
CITY OF SCOTTSDALE, ARIZONA

job no. □□□
design UP
approved G
date 2□ □

revisions

EXHIBIT
□

Scour Analysis - Reata Ranch

						Neill's Equation					Lacey's Equation				Blench's Equation					
River	Reach	River Sta.	100-Year Peak Discharge ($ft.^3/sec.$)	Top Width (ft.)	Unit Water Discharge ($ft.^3/sec./ft.$)	Velocity ($ft.^2/sec.$)	Average Depth (ft.)	Bank Full Discharge (ft.)	Multiplying Factor	Neill's Equation Scour Depth (ft.)	Mean Grain Size (mm)	Lacey's Silt Factor	Multiplying Factor	Lacey's Equation Scour Depth (ft.)	Blench's Zero Bed Factor (ft./sec.)	Multiplying Factor	Blench's Equation Scour Depth (ft.)	Maximum Scour Depth (ft.)	Minimum Toe Length Req. (ft.)	Toe Length Provided (ft.)
RVW10T4	R1	0.373	990	401.99	2	5.94	0.4	990	0.5	0.2	0.6	1.36	0.5	2.6	2.2	0.6	1.4	3	4.5	6.0
RVW10T4	R1	0.31	990	319.65	3	4.58	0.7	990	0.5	0.3	0.6	1.36	0.5	2.6	2.2	0.6	1.7	3	4.5	6.0
RVW10T4	R1	0.222	2215	418.35	5	8.23	0.6	2215	0.5	0.3	0.6	1.36	0.5	3.4	2.2	0.6	2.4	3	4.5	6.0
RVW10T4	R1	0.21	2215	388.19	6	6.39	0.9	2215	0.5	0.4	0.6	1.36	0.5	3.4	2.2	0.6	2.5	3	4.5	6.0
RVW10T4	R1	0.205	Lat Struct																	
RVW10T4	R1	0.145	2215	118.29	19	10.25	1.8	2215	0.5	0.9	0.6	1.36	0.5	3.4	2.2	0.6	5.5	6	9.0	9.0
RVW10T4	R1	0.034	2215	132.37	17	7.16	2.3	2215	0.5	1.2	0.6	1.36	0.5	3.4	2.2	0.6	5.1	5	7.5	7.5
RVW10T3	R1	0.615	815	138.7	6	5.75	1.0	815	0.5	0.5	0.6	1.36	0.5	2.4	2.2	0.6	2.5	3	4.5	6.0
RVW10T3	R1	0.520	815	126.45	6	5.95	1.1	815	0.5	0.5	0.6	1.36	0.5	2.4	2.2	0.6	2.7	3	4.5	6.0
RVW10T3	R1	0.438	815	149.58	5	5.69	1.0	815	0.5	0.5	0.6	1.36	0.5	2.4	2.2	0.6	2.4	2	3.0	6.0
RVW10T3	R1	0.411	815	107.15	8	6.27	1.2	815	0.5	0.6	0.6	1.36	0.5	2.4	2.2	0.6	3.0	3	4.5	6.0
RVW10T3	R1	0.357	815	151.5	5	5.60	1.0	815	0.5	0.5	0.6	1.36	0.5	2.4	2.2	0.6	2.4	2	3.0	6.0
RVW10T3	R1	0.356	815	88.32	9	2.79	3.3	815	0.5	1.7	0.6	1.36	0.5	2.4	2.2	0.6	3.4	3	4.5	6.0
RVW10T3	R1	0.300	Culvert																	
RVW10T3	R1	0.290	815	72.75	11	6.51	1.7	815	0.5	0.9	0.6	1.36	0.5	2.4	2.2	0.6	3.9	4	6.0	6.0
RVW10T3	R1	0.289	815	81.04	10	5.58	1.8	815	0.5	0.9	0.6	1.36	0.5	2.4	2.2	0.6	3.6	4	6.0	6.0
RVW10T3	R1	0.259	815	135.76	6	5.80	1.0	815	0.5	0.5	0.6	1.36	0.5	2.4	2.2	0.6	2.6	3	4.5	6.0
RVW10T3	R13	0.200	1570	143.96	11	7.11	1.5	1570	0.5	0.8	0.6	1.36	0.5	3	2.2	0.6	3.8	4	6.0	6.0
RVW10T3	R13	0.123	1570	165.84	9	6.73	1.4	1570	0.5	0.7	0.6	1.36	0.5	3	2.2	0.6	3.5	3	4.5	6.0
RVW10T2	R1	0.845	755	189.03	4	6.01	0.7	755	0.5	0.3	0.6	1.36	0.5	2.4	2.2	0.6	2.0	2	3.0	6.0
RVW10T2	R1	0.843	755	107.66	7	6.10	1.1	755	0.5	0.6	0.6	1.36	0.5	2.4	2.2	0.6	2.9	3	4.5	6.0
RVW10T2	R1	0.747	755	97.65	8	7.17	1.1	755	0.5	0.5	0.6	1.36	0.5	2.4	2.2	0.6	3.1	3	4.5	6.0
RVW10T2	R1	0.711	755	429.89	2	5.08	0.3	755	0.5	0.2	0.6	1.36	0.5	2.4	2.2	0.6	1.1	2	3.0	6.0
RVW10T2	R1	0.684	755	282.05	3	5.54	0.5	755	0.5	0.2	0.6	1.36	0.5	2.4	2.2	0.6	1.5	2	3.0	6.0
RVW10T2	R1	0.663	755	325.25	2	5.04	0.5	755	0.5	0.2	0.6	1.36	0.5	2.4	2.2	0.6	1.4	2	3.0	6.0
RVW10T2	R1	0.581	755	48.46	16	7.80	2.0	755	0.5	1	0.6	1.36	0.5	2.4	2.2	0.6	4.9	5	7.5	7.5
RVW10T2	R1	0.540	755	60.96	12	7.35	1.7	755	0.5	0.8	0.6	1.36	0.5	2.4	2.2	0.6	4.2	4	6.0	6.0
RVW10T2	R1	0.530	755	54.62	14	7.84	1.8	755	0.5	0.9	0.6	1.36	0.5	2.4	2.2	0.6	4.5	4	6.0	6.0
RVW10T2	R1	0.520	755	42.99	18	8.31	2.1	755	0.5	1.1	0.6	1.36	0.5	2.4	2.2	0.6	5.3	5	7.5	7.5
RVW10T2	R1	0.450	755	42.01	18	8.39	2.1	755	0.5	1.1	0.6	1.36	0.5	2.4	2.2	0.6	5.4	5	7.5	7.5
RVW10	R1	9.689	735	235.93	3	4.74	0.7	735	0.5	0.3	0.6	1.36	0.5	2.3	2.2	0.6	1.7	2	3.0	6.0
RVW10	R1	9.564	735	345.95	2	3.03	0.7	735	0.5	0.4	0.6	1.36	0.5	2.3	2.2	0.6	1.3	2	3.0	6.0
RVW10	R1	9.429	1045	296.98	4	4.82	0.7	1045	0.5	0.4	0.6	1.36	0.5	2.6	2.2	0.6	1.8	3	4.5	6.0
RVW10	R1	9.252	1045	268.75	4	6.52	0.6	1045	0.5	0.3	0.6	1.36	0.5	2.6	2.2	0.6	1.9	3	4.5	6.0
RVW10	R1	9.176	1045	211.84	5	6.59	0.7	1045	0.5	0.4	0.6	1.36	0.5	2.6	2.2	0.6	2.3	3	4.5	6.0
RVW10	R1	9.175	Lat Struct																	
RVW10	R1	9.104	1045	298.07	4	7.23	0.5	1045	0.5	0.2	0.6	1.36	0.5	2.6	2.2	0.6	1.8	3	4.5	6.0
RVW10	R1	9.103	Lat Struct																	
RVW10	R1	9.102	880	152.01	6	7.25	0.8	880	0.5	0.4	0.6	1.36	0.5	2.5	2.2	0.6	2.5	3	4.5	6.0
RVW10	R1	9.011	Lat Struct																	
RVW10	R1	8.937	400	65.29	6	5.91	1.0	400	0.5	0.5	0.6	1.36	0.5	1.9	2.2	0.6	2.6	3	4.5	6.0
RVW10	R1	8.936	Lat Struct																	
RVW10	R1	8.826	170	47.74	4	2.12	1.7	170	0.5	0.8	0.6	1.36	0.5	1.4	2.2	0.6	1.8	2	3.0	6.0
RVW10	R2	8.740	2285	290.17	8	5.79	1.4	2285	0.5	0.7	0.6	1.36	0.5	3.4	2.2	0.6	3.1	3	4.5	6.0
RVW10	R2	8.586	2285	302.07	8	6.25	1.2	2285	0.5	0.6	0.6	1.36	0.5	3.4	2.2	0.6	3.0	3	4.5	6.0
RVW10	R2	8.467	2285	185.92	12	7.40	1.7	2285	0.5	0.8	0.6	1.36	0.5	3.4	2.2	0.6	4.2	4	6.0	6.2

						Neill's Equation					Lacey's Equation				Blench's Equation					
River	Reach	River Sta.	100-Year Peak Discharge ($ft.^3/sec.$)	Top Width (ft.)	Unit Water Discharge ($ft.^3/sec./ft.$)	Velocity ($ft.^2/sec.$)	Average Depth (ft.)	Bank Full Discharge (ft.)	Multiplying Factor	Neill's Equation Scour Depth (ft.)	Mean Grain Size (mm)	Lacey's Silt Factor	Multiplying Factor	Lacey's Equation Scour Depth (ft.)	Blench's Zero Bed Factor (ft./sec.)	Multiplying Factor	Blench's Equation Scour Depth (ft.)	Maximum Scour Depth (ft.)	Minimum Toe Length Req. (ft.)	Toe Length Provided (ft.)
RVW10	R2	8.354	2285	211.88	11	7.08	1.5	2285	0.5	0.8	0.6	1.36	0.5	3.4	2.2	0.6	3.8	4	6.0	6.0
RVW10	R2	8.353	2285	139.91	16	4.27	3.8	2285	0.5	1.9	0.6	1.36	0.5	3.4	2.2	0.6	5.0	5	7.5	7.5
RVW10	R2	8.300	Culvert																	
RVW10	R2	8.135	2285	101.42	23	9.02	2.5	2285	0.5	1.2	0.6	1.36	0.5	3.4	2.2	0.6	6.2	6	9.0	9.0
RVW10	R2	8.134	2285	161.08	14	7.72	1.8	2285	0.5	0.9	0.6	1.36	0.5	3.4	2.2	0.6	4.6	5	7.5	7.5
RVW10	R3	7.984	3925	654.17	6	7.94	0.8	3925	0.5	0.4	0.6	1.36	0.5	4.1	2.2	0.6	2.6	4	6.0	6.0
RVW10	R3	7.886	3925	655.86	6	8.91	0.7	3925	0.5	0.3	0.6	1.36	0.5	4.1	2.2	0.6	2.6	4	6.0	6.0
RVW10	R3	7.784	3925	777.07	5	5.44	0.9	3925	0.5	0.5	0.6	1.36	0.5	4.1	2.2	0.6	2.3	4	6.0	6.0
RVW10	R3	7.678	3925	591.39	7	8.91	0.7	3925	0.5	0.4	0.6	1.36	0.5	4.1	2.2	0.6	2.8	4	6.0	6.0
RVW10	R3	7.611	3925	659.92	6	6.06	1.0	3925	0.5	0.5	0.6	1.36	0.5	4.1	2.2	0.6	2.6	4	6.0	6.0
RVW10	R3	7.596	3925	430.97	9	8.87	1.0	3925	0.5	0.5	0.6	1.36	0.5	4.1	2.2	0.6	3.4	4	6.0	6.0
RVW10	R3	7.541	3925	690.82	6	9.78	0.6	3925	0.5	0.3	0.6	1.36	0.5	4.1	2.2	0.6	2.5	4	6.0	6.0
RVW10	R3	7.491	3925	460.96	9	9.44	0.9	3925	0.5	0.5	0.6	1.36	0.5	4.1	2.2	0.6	3.3	4	6.0	6.0
RVW10	R3	7.450	3925	576.08	7	8.56	0.8	3925	0.5	0.4	0.6	1.36	0.5	4.1	2.2	0.6	2.8	4	6.0	6.0
RVW10	R3	7.382	3925	574.19	7	9.94	0.7	3925	0.5	0.3	0.6	1.36	0.5	4.1	2.2	0.6	2.8	4	6.0	6.0
RVW10	R3	7.331	3925	516.62	8	9.58	0.8	3925	0.5	0.4	0.6	1.36	0.5	4.1	2.2	0.6	3.0	4	6.0	6.0
RVW10	R3	7.283	3925	458.96	9	10.62	0.8	3925	0.5	0.4	0.6	1.36	0.5	4.1	2.2	0.6	3.3	4	6.0	6.0
RVW10	R3	7.240	3925	408.82	10	10.13	0.9	3925	0.5	0.5	0.6	1.36	0.5	4.1	2.2	0.6	3.5	4	6.0	6.0
RVW10	R3	7.215	3925	501.65	8	10.35	0.8	3925	0.5	0.4	0.6	1.36	0.5	4.1	2.2	0.6	3.1	4	6.0	6.0
RVW10	R3	7.193	3925	441.41	9	4.83	1.8	3925	0.5	0.9	0.6	1.36	0.5	4.1	2.2	0.6	3.3	4	6.0	6.0
RVW10	R3	7.174	3925	455.70	9	7.91	1.1	3925	0.5	0.5	0.6	1.36	0.5	4.1	2.2	0.6	3.3	4	6.0	6.0
RVW10	R3	7.155	3925	492.95	8	8.10	1.0	3925	0.5	0.5	0.6	1.36	0.5	4.1	2.2	0.6	3.1	4	6.0	6.0
RVW10	R3	7.076	3925	665.71	6	8.20	0.7	3925	0.5	0.4	0.6	1.36	0.5	4.1	2.2	0.6	2.5	4	6.0	6.0
RVW10	R3	6.982	3925	502.03	8	8.09	1.0	3925	0.5	0.5	0.6	1.36	0.5	4.1	2.2	0.6	3.1	4	6.0	6.0
RVW10	R3	6.977	3925	501.11	8	6.54	1.2	3925	0.5	0.6	0.6	1.36	0.5	4.1	2.2	0.6	3.1	4	6.0	6.0
RVW10	R3	6.849	3925	539.10	7	7.82	0.9	3925	0.5	0.5	0.6	1.36	0.5	4.1	2.2	0.6	2.9	4	6.0	6.0
RVW10	R3	6.697	3925	462.10	8	3.22	2.6	3925	0.5	1.3	0.6	1.36	0.5	4.1	2.2	0.6	3.2	4	6.0	6.0

Notes:
See Exhibit 5 for cross section location
See Appendix C (HEC RAS Model) for channel velocity
Assume mean grain size to be 0.6 mm

Regime Equation (Pemberton and Lara, 1984)

Condition	Value of Z		
	Neill $d_s = Z\ d_f$	Lacey $d_s = Z\ d_m$	Blench $d_s = Z\ d_{fo}$
Equation Types A and B			
Straight reach	0.5	0.25	1/ 0.6
Moderate bend	0.6	0.5	
Severe bend	0.7	0.75	
Right angle bends		1.0	1.25
Vertical rock bank or wall		1.25	

APPENDIX II

Preliminary Utility Plan

OWNER:
BRAUN ROBERT W TR
3625 E. MEADOW BROOK AVE.
PHOENIX, AZ 85018

CIVIL ENGINEER:
SUSTAINABILITY ENGINEERING GROUP
8280 E GELDING DR., SUITE 101
SCOTTSDALE, AZ 85260
PHONE: 480-588-7226
ATTN: ALI FAKIH

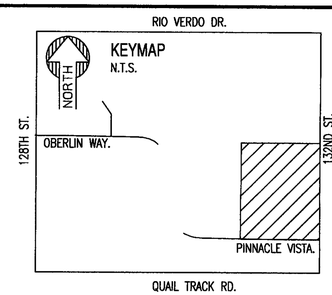
PRELIMINARY UTILITY PLAN

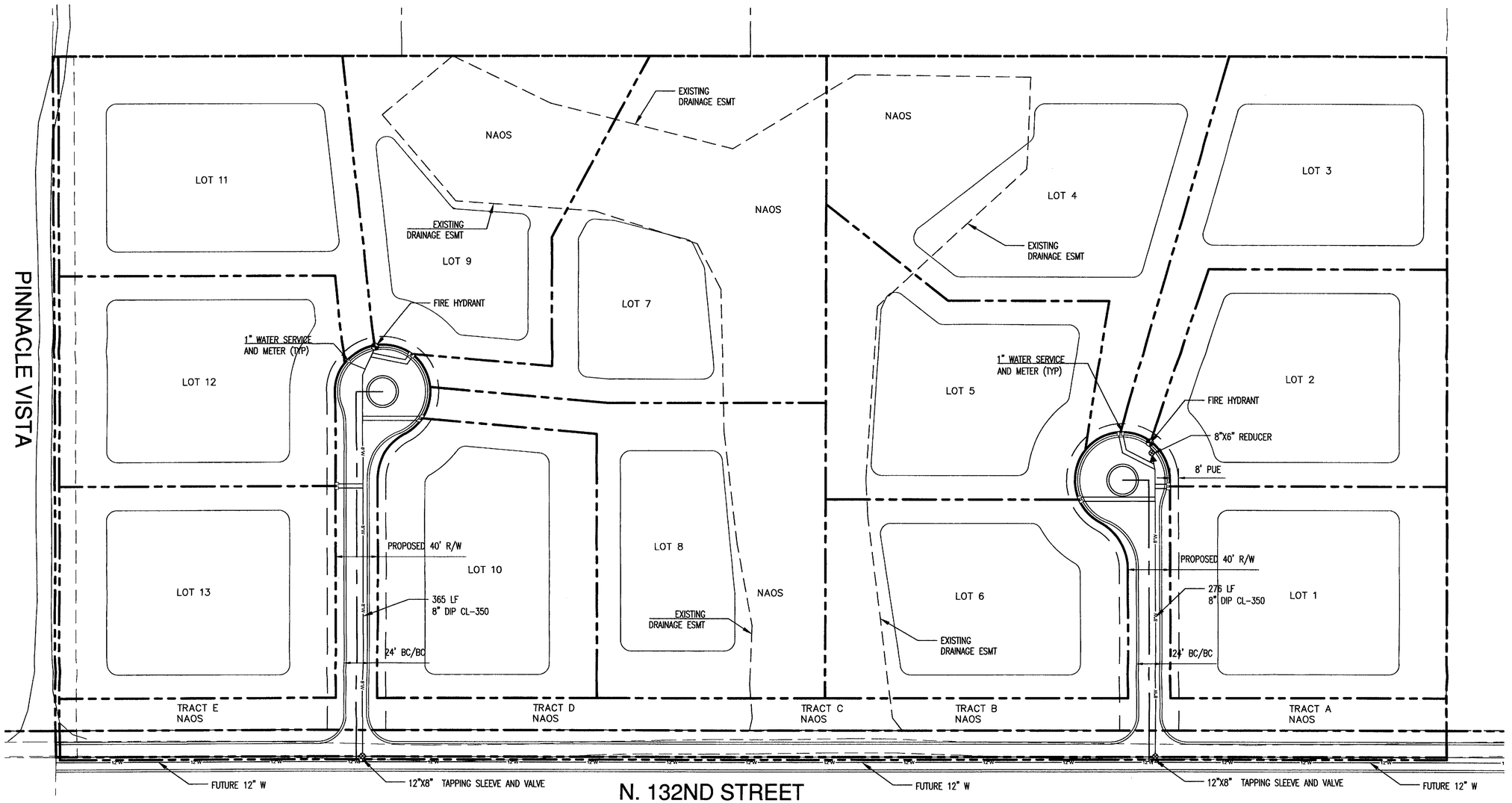
BRAUN 20 ACRES

NWC 132ND ST. & PINNACLE VISTA RD., SCOTTSDALE, AZ 85259

LEGEND

- PROPOSED HYDRANT
- PROPOSED VALVE
- PROPOSED REDUCER
- PROPOSED WATER SERVICE





0' 50' 100' 150'
SCALE: 1" = 50'
NORTH

Call at least two full working days before you begin excavation.
ARIZONA 811
Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)
In Maricopa County (602) 263-1100

NOTE TO CONTRACTOR:
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NOT FOR CONSTRUCTION

SEG SUSTAINABILITY ENGINEERING GROUP
8280 E. GELDING DR #101, SCOTTSDALE, ARIZONA 85260
WWW.AZSEG.COM TEL. 480.588.7226

LAND DEVELOPMENT SERVICES

PROJECT: BRAUN 131ST SCOTTSDALE RESIDENTIAL DEVELOPMENT

LOCATION: NWC 132ND STREET AND PINNACLE VISTA RD. SCOTTSDALE, AZ 85259

DRAWN	TAPIA
DESIGNED	TAPIA
CHECKED	COUNSELL
PROJ. MGR.	MALONEY

DATE: 07-27-17
ISSUED FOR: ZONING

REVISION NO.:	DATE:
1	
2	
3	
4	

JOB NO.: 170601

SHEET TITLE: PRELIMINARY UTILITY PLAN

SHEET NO.: C4.00

File Copy

PRELIMINARY SEWER CAPACITY REPORT

Braun Property – 20 acres
Scottsdale, AZ

Prepared For:

LAND DEVELOPMENT SERVICES

7525 E. Camelback Rd., Suite #104
Scottsdale, AZ 85251
P: 480.946.5020

ACCEPTED AS PRELIMINARY REPORT W/COMMENTS

Prepared by:

City of Scottsdale
Water Resources Administration
9379 E. San Salvador
Scottsdale, AZ 85258

09/20/2017

EXPIRES 9/30/2017

Sustainability Engineering Group
8280 E. Gelding Drive, Suite 101
Scottsdale, AZ 85260
480.588.7226 www.azSEG.com

Project Number: 170601

Original Submittal Date: August 3, 2017

Case No.: TBD Plan Check No.: TBD

14-ZN-2017
9/1/2017

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1. INTRODUCTION

1.1 SUMMARY OF PROPOSED DEVELOPMENT:

The property is a proposed residential development of +/- 20.0 net acres (+/-19.3 gross acres) of undeveloped land located within the City of Scottsdale. The property is to be developed with a lot configuration for thirteen (13) residential units with lot sizes ranging from 52,500 sf to 80,800 sf. The overall development will include two 24' wide cul-de-sac roadways entering from 132nd Street. The site is located on the NWC 132nd Street and East Pinnacle Vista Rd.

1.2 LEGAL DESCRIPTION:

The project property consists of one (1) parcel of land located on the NWC 132nd Street and East Pinnacle Vista Rd. It is further defined as being in the E ½ of the SE ¼ of the NW ¼ of Section 36, Township 5 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Scottsdale, Arizona; Parcel ID number is APN: 216-77-024C. Refer to **FIGURE 1 - Vicinity Map** for the project's location with respect to major cross streets

1.3 EXISTING AND PROPOSED SITE ZONING AND LAND USES:

The parcels are currently zoned R1-70 ESL and will remain. The purpose of this report is to support an application for a ESL Density Incentive in accordance with the City of Scottsdale zoning ordinance and the environmentally sensitive land ordinance. The property is currently undeveloped and is proposed as a single family residential development consisting of thirteen (13) lots.

1.4 REFERENCES:

The project site is shown in the City's General Plan to be in the Dynamite Foothills area. Conceptual Land Use Maps identify the land use as Rural Neighborhoods.

2. DESIGN DOCUMENTATION

2.1 DESIGN COMPLIANCE:

With the overall acreage of the site equivalent to +/-19.3 gross acres containing a proposed 13 residential units, the overall proposed gross density for the site will be 0.67 DU/acre. The property is in a location of Scottsdale that is not reasonably accessible to an existing sanitary sewer system. Refer to **FIGURES 3 & 4** for the City quarter section map **(QS 50-59 and QS 50-55)**. It is unknown if, and when a reasonably accessible public sewer system will be constructed near the project. Consequently, the site developer is proposing individual onsite disposal systems (Septic) for the 13 residential units. The subject parcel is located within an area of the City of Scottsdale identified as an "existing septic area". Refer to **FIGURE 5** showing the site location identified as a City of Scottsdale Septic System area. In addition, the density of the

subdivision is within the A.A.C Title 18, Article 9 requirements of "One lot per acre" meeting the minimum septic system requirements. The proposed onsite disposal systems will be designed in accordance with the City of Scottsdale design standards and the Arizona Administrative Code Title 18-9. The follow setbacks for onsite Wastewater disposal facilities (including reserve areas) are applicable to this development;

The Septic System shall be per COS DSPM, chapters 7-1.300 & 7-1.301

- 10 feet from Buildings
- The Arizona Department of Water Resources Well Registry shows that the closest domestic water well is located approximately 330 feet from the site. This exceeds the requirement of A.A.C 18-9-A312-C which requires a 100-foot setback.
- 5 feet from property lines
- An existing drainage easement with a drainage area of more than 20 acres traverses through the middle of the site. This wash will affect the placement of onsite disposal areas on lots 4 through 9. The setback shall be 50 foot from the drainage easement, and reduced to 25 foot in areas that have erosion protection.
- 5 feet from a domestic water service line.
- Downslopes or cut banks greater than 15%. (measured from the bottom of the lowest point of disposal pipe or drip lines, to the closest point of daylighting on the surface)
  - 10 feet for Treatment Works
  - 20 feet for Trench, Bed, chamber technology, or gravel-less trench
  - 3 feet for subsurface drip lines.
- 5 feet from driveways
- 5 feet from swimming pool excavations
- 5 feet from easements (other than drainage) easements.

Per COS DSPM, chapter 7-1.301, The Owner is responsible for the design, construction, & operation & Maintenance of Septic System. Design & Construction shall be per MCESD Requirements.

3. EXISTING CONDITIONS

3.1 EXISTING ZONING & LAND USE:

Land ownership includes 20.05 +/- net acres (19.26+/- gross acres) of undeveloped land designated as R1-70 Low Density Residential.

3.2 EXISTING TOPOGRAPHY, VEGETATION AND LANDFORM FEATURES:

The site slopes from west to east and contains average cross-slopes generally ranging from 2% to 15%. Predominantly, the buildable areas of the site contain slopes ranging from 2% to 10%. The Rio Verde Wash 10 Tributary 3 splits the center of the property. FIRM Map Number 04013C1331M dated November 4, 2015 indicates this site is designated as Zone "X" with a portion of the property zone AE where the Rio Verde Wash 10 Tributary 3 crosses the site. A CLOMR has been approved by FEMA for improvements along this tributary, but the improvements have yet to be completed. A recorded drainage easement along this tributary exists for installing these drainage improvements. Two thirds of the AE zone have base flood elevations determined while the western one third was not part of the detailed study. The layout of the residential lots is such that the developable envelopes are outside of the

determined flood plain and the dedicated drainage easement. Finished floor elevations for the home sites will be set a minimum one (1) foot above the high-water elevations of this tributary. Refer to **FIGURE 2** for an aerial of the overall project existing conditions.

3.3 EXISTING UTILITIES:

The property is in a location of Scottsdale that is not reasonably accessible to an existing sanitary sewer system. Refer to **FIGURES 3 & 4** for the City quarter section map **(QS 50-59 and QS 50-55)** ✓

4. PROPOSED CONDITIONS

4.1 SITE PLAN:

The property is proposed to be developed with a lot configuration for thirteen (13) residential units. The development will include two 24' wide road cul-de-sac roadways entering from N 132nd Street. Refer to the Preliminary Utility Plan in **Appendix I** for proposed site layout. ✓

4.2 PROPOSED SEWER SYSTEM:

Since onsite disposal systems are being proposed an onsite proposed sewer system will not be constructed. ✓

4.3 MAINTENANCE RESPONSIBILITIES:

The proposed onsite disposal systems (Septic Systems) will be private, and will be the responsibility of the home owner to maintain, and operate. The City will not accept Onsite Septic System for Operation and Maintenance per DSPM, Chapter 7-1.301.

5. SANITARY SYSTEM COMPUTATIONS

5.1. SEWER FLOW DEMANDS:

DS&PM, Chapter 7 Section 7-1.403 – Wastewater specifies that for residential uses, average day sanitary sewer loadings will designed using 100 gallons per person per day and a peaking factor of 4. Residential densities are to assume 2.5 persons per dwelling unit. ✓

Therefore, the average design flow is:
13 du x 100 gpcpd x 2.5 people/du = **3,250 gpd (Average)** ✓

5.2. VARIANCE FROM STATED DESIGN FLOWS:

Stated design flows for the on-site system will be used as recommended.

5.3. SEWER SYSTEM ANALYSIS (Off-Site):

Since onsite disposal systems are being proposed an offsite sewer system analysis is not applicable. ✓

5.4. DEMAND FACTORS:

DS&PM requires a peak factor of 4. Therefore, from Section 5.1: 3,250 gpd x 4 = **13,000 gpd (Peak)**

5.5. SEWER CAPACITY CALCULATIONS

Since onsite disposal systems are being proposed an offsite sewer system analysis is not applicable. ✓

6. SUMMARY

6.1 SUMMARY OF PROPOSED IMPROVEMENTS:

- The proposed site constraints meet the criteria allowing the use of onsite disposal systems specified in the Arizona Administrative Code Title 18-9-A312 and the City of Scottsdale DS&PM. ✓
- According to ADWR Well Registrations there are no registered wells within 100 feet of the proposed site. ✓
- Percolation Tests will be conducted by a qualified geotechnical engineer for the design and sizing of the proposed onsite disposal leach fields in accordance with R-18-9-A310. ✓

6.2 PROJECT SCHEDULE:

As a residential development, the infrastructure is proposed to be constructed in a single phase to accommodate dwelling unit growth. The dwelling units may be phased based on consumer demand. The onsite disposal systems will be permitted and constructed by each home owner at the time each home is constructed. ✓

7 SUPPORTING MAPS

7.1 SANITARY SEWER PLAN

Refer to Preliminary Utility Plan located in Appendix I. This Preliminary Utility Plan summarizes important information regarding the location of the proposed private onsite disposal system with regards to Register Water Wells and Flood Plains adjacent or within the site.

8 REFERENCES

1. *COS QS Sewer Plan number 28-54 and 29-54*
2. *City of Scottsdale Design Standards & Policies Manual, 2010 (Chapter 7 – Wastewater)*
3. *Arizona Administrative Code Title 18, Section 9.*

FIGURE 1
VICINITY MAP

OWNER:
BRAUN ROBERT W TR
3625 E. MEADOW BROOK AVE.
PHOENIX, AZ 85018

CIVIL ENGINEER:
SUSTAINABILITY ENGINEERING GROUP
8280 E GELDING DR., SUITE 101
SCOTTSDALE, AZ 85260
PHONE: 480-588-7226
ATTN: ALI FAKIH

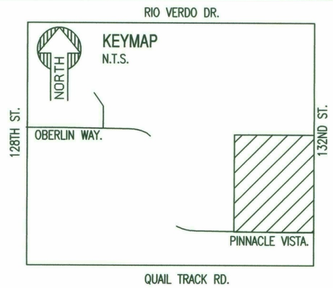
PRELIMINARY UTILITY PLAN

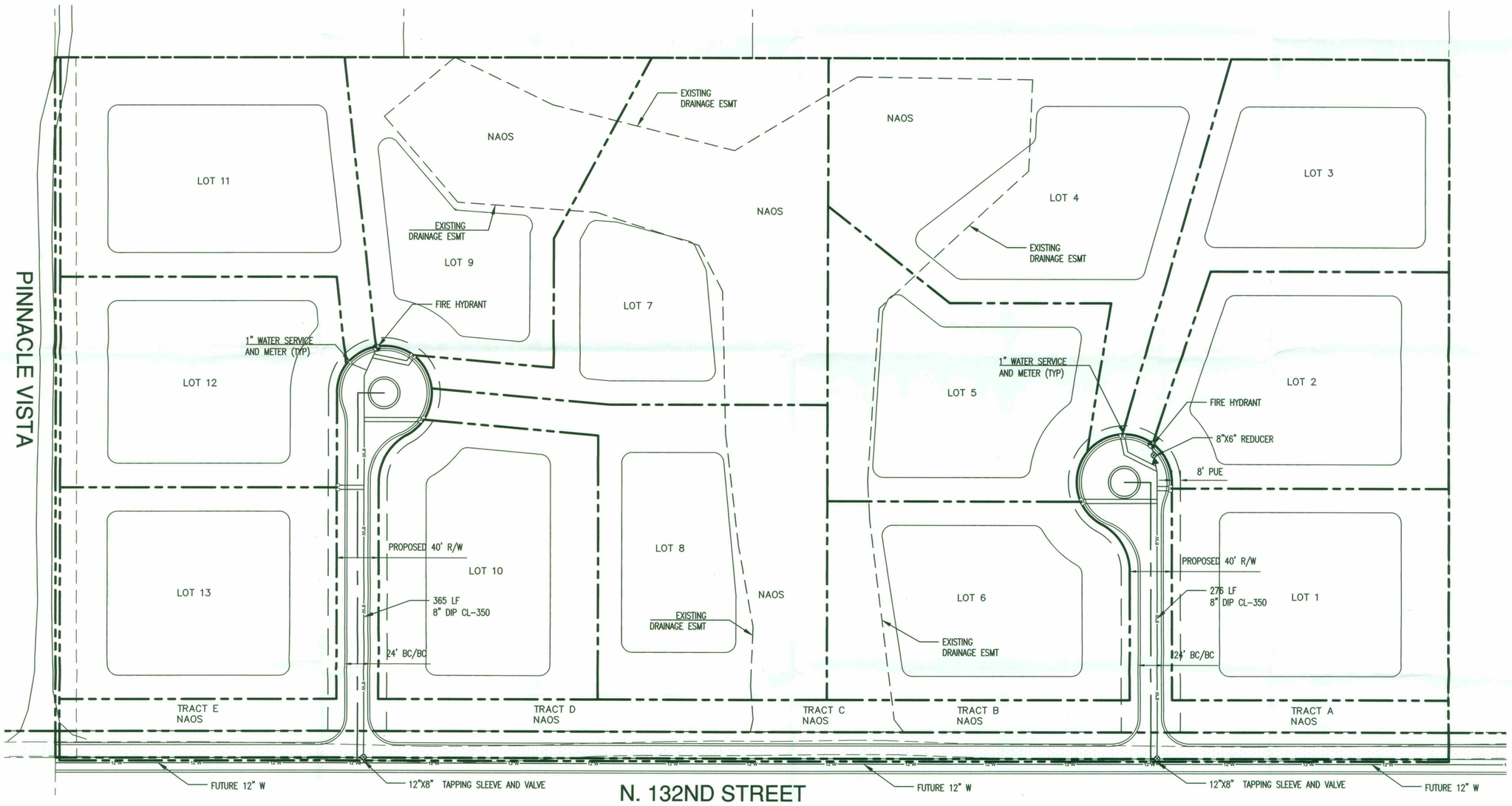
BRAUN 20 ACRES

NWC 132ND ST. & PINNACLE VISTA RD., SCOTTSDALE, AZ 85259

LEGEND

- PROPOSED HYDRANT
- PROPOSED VALVE
- PROPOSED REDUCER
- PROPOSED WATER SERVICE





0' 50' 100' 150'
SCALE: 1" = 50'

NORTH

Call at least two full working days before you begin excavation.
ARIZONA 811 Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)
In Maricopa County (602) 263-1100

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SHEET TITLE: PRELIMINARY UTILITY PLAN

SHEET NO.: C4.00

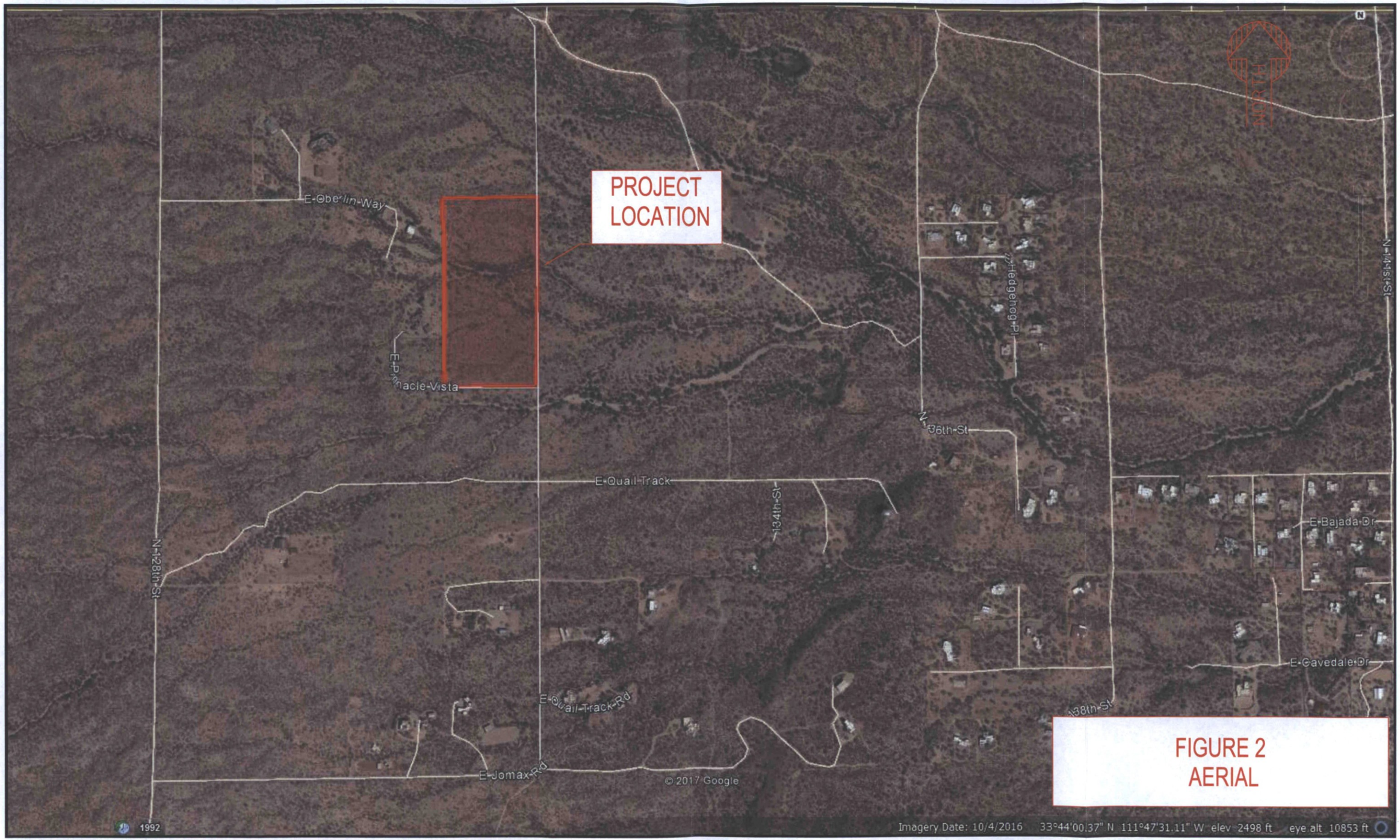

FIGURE 2
AERIAL

51-59

50-58

49-59

50-60

GENERAL NOTES:

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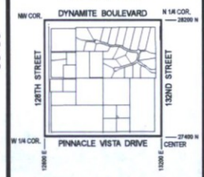
LEGEND:

- Cleanout
- Lift Station
- Manhole
- Non-GPS Point
- Plug
- Sewer Service Point
- Sewer Tap Point
- Sewer Valve
- Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Sewer Main - Private

VICINITY MAP



NORTH

SCALE: 1" = 100'

0 50 100 200

The map scale of 1" = 100' is based on a full size print of 30" x 36"

SEWER

QUARTER SECTION MAP

50-59

NW 1/4 SEC. 36 T5N R5E

FIGURE 3

SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS
3629 North Drinkwater Boulevard
Scottsdale, Arizona 85251

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THE CITY OF SCOTTSDALE

30-JUL-17

51-55

49-55

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50-56

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- Sewer Main - Gravity
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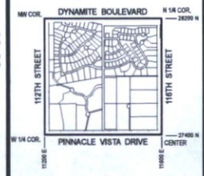
VICINITY MAP



NORTH

SCALE: 1" = 100'

0 50 100 200

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SEWER

QUARTER SECTION MAP

50-55

NW 1/4 SEC. 34 T5N R5E

FIGURE 4

SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS
3629 North Drinkwater Boulevard
Scottsdale, Arizona 85251

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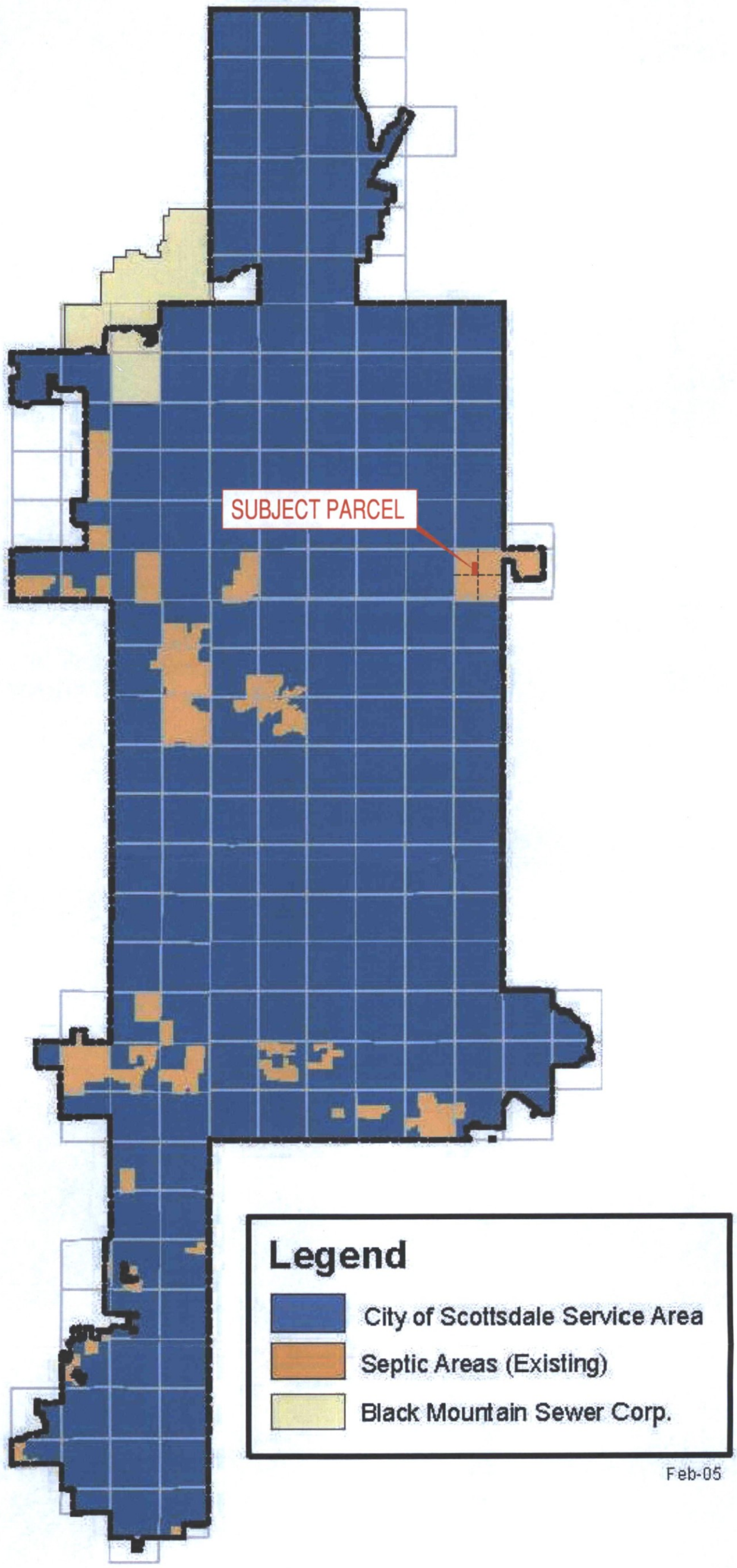

FIGURE 7.1-1 WASTEWATER SERVICE AREAS

FIGURE 5

ADWR - WELL REGISTRY INFORMATION

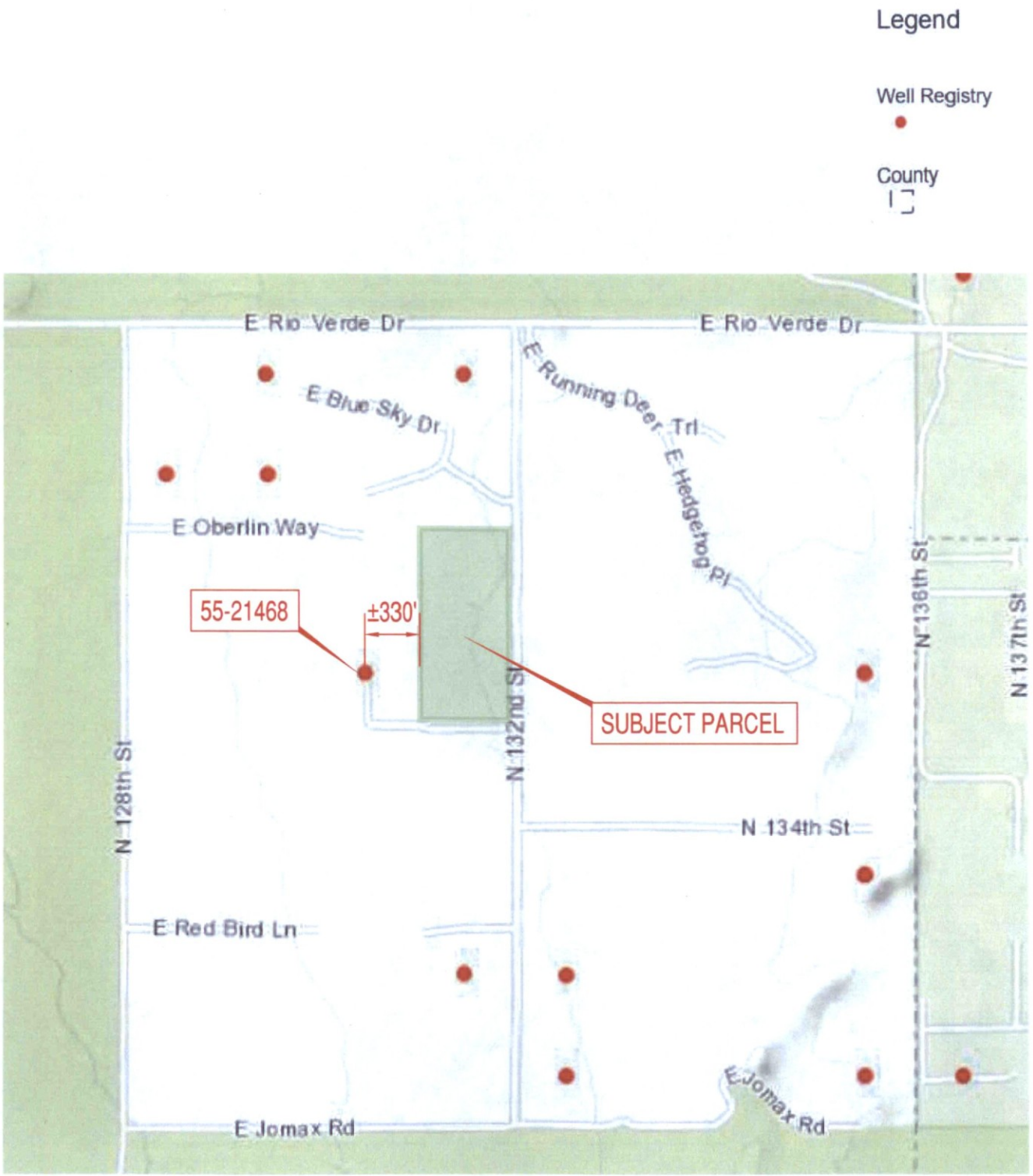

FIGURE 6

APPENDIX I

Preliminary Utility Plan