

**MASTER PLAN REPORT  
FOR  
RECLAIMED WATER DISTRIBUTION SYSTEM  
AT  
SPANISH SPRINGS BUSINESS CENTER**



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RECLAIMED WATER DISTRIBUTION SYSTEM  
AT  
SPANISH SPRINGS BUSINESS CENTER**

**WASHOE COUNTY, NEVADA**

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## **INTRODUCTION**

This report describes the master plan for the reclaimed water distribution system at the Spanish Springs Business Center located in Washoe County, Nevada. The Spanish Springs Business Center (the “Center”) is a 411 acre master-planned commercial-industrial park located west of Pyramid Highway, north of West Calle de la Plata, and south of Pebble Creek Subdivision (see Figure 1 - Site Location Map), developed by Spanish Springs Associates Limited Partnership (the “Master Developer”).

Reclaimed water from the Truckee Meadows Water Reclamation Facility, operated by the City of Sparks, is conveyed to the north into the Spanish Springs Valley via an underground piped system. The reclaimed water system is designed to be used for irrigation of landscaping in the surrounding area. In 2003, AMEC Infrastructure, Inc., completed the design of the City of Sparks Spanish Springs Effluent Pipeline Extension Phase 5B Effluent Pipeline Extension, dated November 25, 2003, which includes the design of the effluent main beginning near the intersection of Pyramid Lake Highway and Eagle Canyon Road. It provides reclaimed water west to the Shaw Middle School and Spanish Springs High School and north to the Boneyard Flat at the Spanish Springs Business Center. The effluent transmission pipeline construction was completed in early 2004. In anticipation of the reclaim water becoming available within the business center, the Master Developer has also installed distribution pipelines in the Center to distribute the reclaimed water to business center parcels for landscape irrigation use. The purpose of this report is to evaluate available pressures and flows of the existing reclaimed water distribution system at the Center and to provide a guide for future design of the distribution lines in the reclaimed water system. Please refer to the *Spanish Springs Business Center Design/Submittal Guidelines* for information and requirements on connecting to the reclaimed water system within parcels at the Center.

## **EXISTING RECLAIMED WATER SYSTEM**

The City of Sparks has constructed a water main transmission system that distributes reclaimed water from the Truckee Meadows Water Reclamation Facility to several locations throughout the Reno/Sparks area including the Spanish Springs Valley. The city has constructed a 20 inch diameter main that enters into the Spanish Springs Business Center at West Calle de la Plata approximately 3,000 feet west of Pyramid Highway. The 20 inch diameter main traverses north through the middle of the business center along the Central Channel alignment to Sha-Neva Road. At Sha-Neva Road the main reduces in size to an 8 inch diameter pipe and heads

northeasterly along the sanitary sewer force main alignment for approximately 1,500 feet to its terminus. At the Sha-Neva Road the pipe distributes water to the east to a water truck fill station and to the west to the Rocky Acres gravel pit. At the Master Developer's request the city also constructed a 16 inch diameter main easterly on the south side of West Calle de la Plata to the Center's fire suppression pump house. The 16 inch main was installed to provide the potential for reclaimed water to be used to supply water to the ESFR fire pump system, which currently is supplied domestic water from Washoe County's community water system.

After reaching the fire pump house, the reclaimed water main then necks down in size to an 8 inch diameter main which runs adjacent to West Calle de la Plata and eventually ties into 6 inch diameter distribution line installed by the Master Developer located at the northwesterly property corner of 145 Isidor Court (Hawco Office Building I). The Master Developer has installed the distribution system consisting of purple 6 inch diameter pressure class 150 pipe in the area of Isidor Court (Phase I) and within or adjacent to the right-of-way of Ingenuity Avenue and Digital Court (Phase II). The distribution pipelines on Ingenuity Avenue and Digital Court currently do not connect to the city installed main at the Boneyard Flat, but will be connected by the Master Developer in later this year.

By the spring of 2005 additional pressure class 150 pipe should be installed within the right-of-way or adjacent to all streets in the Center east of the Central Channel (Phase III). As discussed in the next section some pressures from the city's reclaimed water transmission main may reach 175 psi, thus requiring pressure reducing valves to be installed upstream of the pressure class 150 pipe. Refer to Figure 2 for the existing distribution system layout and approximate location for the proposed pressure reducing stations.

## **EXISTING RECLAIMED WATER SYSTEM HYDRAULICS**

AMEC Infrastructure, Inc. has provided calculations predicting pressure in the 20 inch main at the location of the Central Channel and West Calle de la Plata (at Station 119+00 on the AMEC improvement plans), which are as follows:

Static pressure -  
136 psi;  
Residual pressure -  
115 psi;

Minimum residual pressure -  
74 psi;  
Maximum pressure -  
175 psi.

The static and residual pressures of 136 psi and 115 psi, respectively, should typically be supplied to the Center during nighttime operation. The minimum residual pressure of 74 psi may occur during daytime operation when the Rocky Acres gravel pit begins use of the water. The maximum pressure of 175 psi may occur at nighttime when little or no use is placed upon the system. These pressures will typically be supplied unless a malfunction occurs in the water system. A model using Haestad Methods WaterCAD (v6.5) software has been created in order to mimic the pressure computations made by AMEC for the 20 inch main with the above-listed pressures (see appendix for computations). This model simulating pressure in the city's 20 inch transmission main has been expanded to proposed full build-out conditions so that pressures for the rest of the reclaimed water infrastructure can be approximated. Field tests should be performed in order to determine exact pressures and available flow.

## **DESIGN REQUIREMENTS**

Design and construction requirements for the reclaimed water system shall comply with all City of Sparks standards and *Standard Specifications for Public Works Construction*. Additionally, design, construction and maintenance of the reclaimed water system within the Center shall conform to the Master Service Agreement between the City of Sparks and the Master Developer. Irrigation system design, construction, and maintenance of the reclaimed water system within each parcel in the Center shall be the responsibility of each parcel owner. Designers should refer to the *Spanish Springs Business Center Design/Submittal Guidelines* for information on extending the reclaimed water system within parcels at the Center.

## **PROPOSED RECLAIMED WATER SYSTEM**

As previously mentioned, a model using Haestad Methods WaterCAD (v6.5) software has been created in order to mimic pressure computations made by AMEC for the existing 20 inch transmission main. The model of the existing City of Sparks system has been expanded into additional reclaimed water system models that are used to compute pressures throughout the Center for nighttime and daytime operating conditions at all nodes, based on assumed irrigation demands.

The first model covers areas of the distribution system that are currently installed including other areas that will be constructed by the spring of 2005. This “as-built” model will continue as a work in progress, receiving updates to the model as additional pipe is installed to further expand the distribution system. This model provides calculated pressures during assumed demands within the Center in the “as-built” condition and will serve to locate areas that may need looping of the distribution system in order to provide sufficient flows to all parcels. Please refer to Figure 3 for the spring 2005 distribution system layout schematic.

Another model is intended to compute pressures during assumed flows of an anticipated full build-out distribution system for the Center. The “full build-out” model consists of the existing reclaimed water distribution system as of December 2004, the distribution system that will be built by the spring of 2005, and the anticipated distribution system when all business center parcels are developed. The “full build-out” model, however, only provides a preliminary concept of development in the Center in order to provide irrigation flows to each potential Center parcel, excluding the final phase of the Center on the western boundary (Phase IV).

The final phase of the Center is located in the upper elevations of the Center. Pressures and flows conveyed at the 20 inch transmission main may be insufficient for parcels located in the final phase with existing elevations in the range of 4560 to 4640 feet. The infrastructure to provide reclaimed water in this phase may include larger main sizes or nighttime only irrigation, as determined by the City of Sparks. The “full build-out” model will be updated in the future to match the configuration of proposed streets and parcels in Phase IV. Please refer to Figure 4 for the full build-out distribution system layout schematic. The Appendix also contains tables of pipe sizes and other data for the water system models.

## **PROPOSED RECLAIMED WATER SYSTEM HYDRAULIC RESULTS**

Both the “as-built” and “full build-out” models have been run to determine available pressure at each node (junction) when estimated irrigation demands are flowing at several nodes. The models have been run for the conditions of maximum and minimum pressures during daytime and nighttime operation. Some of the results of the calculations are as follows:

**“As-built Model – Spring ‘05”**

**Daytime Operating Conditions for Business Center Reclaimed Water System**

	Junction Name Calculated Pressure (psi)	
Minimum Static Pressure	J-15	64
Maximum Static Pressure	J-1	78
Minimum Residual Pressure	J-22	48
Maximum Residual Pressure	J-1	78

**Nighttime Operating Conditions for Business Center Reclaimed Water System**

	Junction Name Calculated Pressure (psi)	
Minimum Static Pressure	J-15	126
Maximum Static Pressure	J-1	139
Minimum Residual Pressure	J-22	89
Maximum Residual Pressure	J-1	119
Maximum Possible System Pressure	Ranges from 165 psi to 178 psi	

**“Full Build-out Model”**

**Daytime Operating Conditions for Business Center Reclaimed Water System**

	Junction Name Calculated Pressure (psi)	
Minimum Static Pressure – Phases I-III	J-15	64
Minimum Static Pressure – Phase IV	J-34	34
Maximum Static Pressure	J-1	77
Minimum Residual Pressure – Phases I-III	J-22	48
Minimum Residual Pressure – Phase IV	J-34	32
Maximum Residual Pressure	J-16	76

**Nighttime Operating Conditions for Business Center Reclaimed Water System**

	Junction Name Calculated Pressure (psi)	
Minimum Static Pressure – Phases I-III	J-31	121
Minimum Static Pressure – Phase IV	J-34	100
Maximum Static Pressure	J-1	139
Minimum Residual Pressure – Phases I-III	J-22	89
Minimum Residual Pressure – Phase IV	J-34	74 (elev. 4603’)
Maximum Residual Pressure	J-16	117
Maximum Possible System Pressure	Ranges from 139 psi to 178 psi	



Typically irrigation systems with sprinklers need pressures in the range of 20 psi to 70 psi, drip systems need less pressure. As noted in the above tables, there are some conditions in which pressures may be too low (e.g. Phase IV during daytime operating condition) or too high (maximum pressures) for an irrigation system.

Additionally, the models show that maximum pressures may reach 178 psi, which exceeds the allowable pressures in the existing 150 psi class pipe the Master Developer has installed in Phases I-III of the Center. In order to reduce the pressures below 150 psi in Phases I-III, two pressure reducing stations are recommended. One pressure reducing station will serve the area bounded by West Calle de la Plata on the south, the Central Channel on the west, Sha-Neva Road on the north, and Pyramid Highway on the east. The other pressure reducing station will serve the area bounded by Sha-Neva Road on the south, the Boneyard Flat on the west, Pebble Creek Subdivision on the north, and Pyramid Highway on the east. The following tables show the results of the pressure calculations for the reclaimed water distribution system with the pressure reducing stations in place:

**“Full Build-out Model with PRVs”**

**Nighttime Operating Conditions for Business Center Reclaimed Water System**

**Residual Pressures—east of Central Channel & South of Sha-Neva Rd. (Phases I & III):**

PRV set at 80 psi, pressure range = 55-65psi; PRV set at 100 psi, pressure range = 76-85psi

**Residual Pressures—east of Boneyard Flat & North of Sha-Neva Rd. (Phase II):**

PRV set at 80 psi, pressure range = 70-74psi; PRV set at 100 psi, pressure range = 90-94psi

**Residual Pressures—west of Central Channel & South of Sha-Neva Rd. (Phases III & IV):**

No PRV, press. range = 74 (elev. 4603’)-112psi (press.=58psi at elev. 4640’ high pt. Ph. IV)

As seen in the previous table, the pressure reducing valve (PRV) will keep pressures in the required operating range for irrigation systems and below the 150 psi allowed in the existing pipe in the Center. From this analysis it appears that optimum setting for the PRV is 100 psi for Phases I and III, and 90 psi for Phase II. These pressure settings can be adjusted in the future as needed. For the remainder of the Center located west of the Central Channel a PRV may not be installed if the Master Developer installs pressure class 200 pipe. An evaluation of the cost effectiveness of installing a PRV verses the installation of pressure class 200 pipe will be done to determine which of the two options is the more efficient solution. If a PRV is not installed for the area west of the Central Channel, individual users of the reclaimed water in that area will have to install appropriate pressure reducing devices to protect their irrigation systems.

The results listed in this section are based upon the calculated pressures given by AMEC Infrastructure for the City of Sparks reclaimed water main through the business center. The pressures determined by AMEC are subject to change and therefore, the results of this section will change accordingly. Updated pressure information for the City of Sparks reclaimed water main should be obtained to verify the validity of the above results. Please refer to the Appendix for more detailed calculation results.

## **RECOMMENDATIONS**

The reclaimed water distribution system will need to continue to expand with the future development of the Center. Exact distribution system water main sizes and locations will be determined during the design of future infrastructure. The model for the reclaimed water system should be updated as needed to match all new construction and any pressure changes in the City of Sparks reclaimed water main system. Two separately located pressure reducing stations will need to be constructed in order to allow the use of the existing 150 psi class pipe. A third pressure reducing station or 200 psi class pipe should be installed for the area located west of the Central Channel. All applicable codes must be complied with when designing and constructing the reclaimed water distribution system.

# **APPENDIX**

## **CALCULATIONS**