#### ORDINANCE NO. 3383

(Establish Henderson Municipal Code Section 14.18.045 – West Henderson Phase 1 Water Backbone Infrastructure Rates)

> AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF HENDERSON, NEVADA, TO ESTABLISH SECTION 14.18.045 – WEST HENDERSON PHASE 1 WATER BACKBONE INFRASTRUCTURE RATES – OF THE HENDERSON MUNICIPAL CODE.

- WHEREAS, with the exception of the Inspirada master-planned community, the area generally bounded by Las Vegas Boulevard to the west, St. Rose Parkway to the north, the master-planned communities of Seven Hills and Anthem to the east, the Sloan Canyon National Conservation Area to the south ("West Henderson") is forecasted to increase in population by approximately 70,000 people by the year 2050; and
- WHEREAS, between now and the year 2050, West Henderson is expected to add considerable new commercial development, including both retail and industrial development projects; and
- WHEREAS, the existing water backbone infrastructure in West Henderson does not have sufficient capacity to meet the water service requirements for projected residential and commercial developments in West Henderson; and
- WHEREAS, Article II, Section 2.280.1(b) of the Henderson City Charter gives the City of Henderson City Council (the "City Council") authority to provide for the construction of any facility necessary for the provision of water service; and
- WHEREAS, Article II, Section 2.280.1(c) of the Henderson City Charter gives the City Council authority to fix charges and rates to be paid for services, facilities or commodities furnished by the City's water utility; and
- WHEREAS, Henderson Municipal Code (HMC) Section 14.18.020 provides that the assessment and collection of all fees and charges shall be made in accordance with the established procedures of the City; and
- WHEREAS, in addition, section 278.02591 of the Nevada Revised Statutes (NRS) allows a governing body to establish an analysis of the cost to construct infrastructure in an area which is undeveloped land and which is likely to become developed and NRS 278.02598 allows the governing body, through that analysis, to distribute equitably the infrastructure development costs among those persons who wish to develop the land; and
- WHEREAS, the land in West Henderson is largely undeveloped and is likely to become developed; and
- WHEREAS, water backbone infrastructure must be constructed to enable the City to provide water service in the West Henderson area; and

- WHEREAS, on May 7, 2013, the City Council approved an agreement between the City and Carollo Engineers, Inc. for professional engineering services to provide strategic infrastructure planning support to determine the water backbone infrastructure required to provide water service to approximately 4,850 acres of land within West Henderson based on existing zoning; and
- WHEREAS, the boundaries of said 4,850 acres of land within West Henderson are depicted and legally described in the West Henderson Pressure Zone Areas attached as Exhibit A, consisting of three pages, ("WH PZ Boundary") which is incorporated by reference herein; and
- WHEREAS, the City's West Henderson 2630 Pressure Zone Water Service Area and the 2760 Pressure Zone Water Service Area ("WH 2630/2760 Pressure Zones") are located within the WH PZ Boundary; and
- WHEREAS, the City's Demographer has estimated that the WH 2630/2760 Pressure Zones will have an estimated buildout population of 45,313 residents; and
- WHEREAS, on September 6, 2016, the City Council ratified an agreement between the City and Carollo Engineers, Inc. for professional engineering services to assist with updating the water backbone infrastructure planning, which included a phasing strategy for funding and constructing the water infrastructure needs for West Henderson ("WH Infrastructure Phasing Strategy"); and
- WHEREAS, the results of the WH Infrastructure Phasing Strategy produced the City of Henderson, Nevada Technical Memorandum West Henderson Water Infrastructure Phasing Strategy Update dated November 2016 (revised December 14, 2016) attached as Exhibit B, consisting of 43 pages, ("WH Phasing TM") and incorporated by reference herein; and
- WHEREAS, the WH Phasing TM identifies an estimated total quantity of thirty-five thousand, six-hundred twelve (35,612) Equivalent Dwelling Units ("EDU") within the WH 2630/2760 Pressure Zones; and
- WHEREAS, the WH Phasing TM identifies a two-phased strategy for designing, constructing, and funding the water backbone infrastructure needs within the WH PZ Boundary, with such phased strategy involving the City preparing the conceptual water backbone infrastructure master-planning for both phases, a conceptual plan for constructing the first phase, and funding the first phase of that backbone infrastructure ("Phase 1"); and

Editor's Note: Pursuant to City Charter Section 2.090(3), language to be omitted is red and enclosed in [brackets], and language proposed to be added is in <u>blue italics and underlined</u>.

- WHEREAS, the WH Phasing TM identifies the engineer's opinion of probable cost for Phase 1 to be approximately Eighty-Seven Million dollars (\$87.0M) in 2016 dollars; and
- WHEREAS, while West Henderson projects will benefit from the majority of the Phase 1 water backbone infrastructure, a portion of that infrastructure (approximately Twenty-Two Million Six Hundred Thousand dollars (\$22.6M)) provides additional reservoir storage capacity that increases the reliability of and benefits the greater City public water system; and
- WHEREAS, the engineer's opinion of probable cost for the portion of the Phase 1 water backbone infrastructure that directly benefits projects projected to be served by the water backbone infrastructure within the WH PZ Boundary is estimated to be Sixty-Four Million Four Hundred Thousand dollars (\$64.4M) in 2016 dollars; and
- WHEREAS, the City has determined that, although each customer is responsible for constructing and paying for water backbone infrastructure, given the significant acreage and extensive coordination required to ensure orderly development it provides a public benefit for the City to assume responsibility for planning and constructing the Phase 1 water backbone infrastructure and establishing rates for Phase 1 to enable the City to pay for this infrastructure through rates collected from customers who benefit from it; and
- WHEREAS the City, based upon an assumed inflation of 1.5% per year through the construction timeframe for the Phase 1 water backbone infrastructure and financing at 2% over a 20-year period, estimates it will incur a total financial obligation of Eighty-Nine Million, Eight Hundred Thousand dollars (\$89.8M) for the portion of Phase 1 that directly benefits projects served by the Phase 1 water backbone infrastructure within the WH PZ Boundary; and
- WHEREAS, the City may include all costs associated with Phase 1 water backbone infrastructure, including the types of costs identified in HMC 14.16.050.A.5.a through HMC 14.16.050.A.5.f, when calculating the rate for that water backbone infrastructure; and
- WHEREAS, in order for the City to recover the costs it has incurred and will incur to plan, design, construct and finance the Phase 1 water backbone infrastructure in the WH PZ Boundary, the City shall establish specific rates, per EDU, with such rates being assessed to projects that benefit from the Phase 1 water backbone infrastructure; and

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- WHEREAS, the initial rate for Phase 1 shall be \$2,580 per EDU for the 2630 Pressure Zone (referred to as the phase 1A 2630 PZ water infrastructure rate in HMC 14.18.045) and \$4,329 per EDU for the 2760 Pressure Zone (referred to as the phase 1A 2760 PZ water infrastructure rate in HMC 14.18.045) and may be increased; and
- WHEREAS, the initial rate for Phase 2 development for shared Phase 1 backbone infrastructure shall be \$454 per EDU for the 2630 Pressure Zone (referred to as the phase 1B 2630 PZ water infrastructure rate in HMC 14.18.045) and \$883 per EDU for the 2760 Pressure Zone (referred to as the phase 1B 2760 PZ water infrastructure rate in HMC 14.18.045) and may be increased; and
- WHEREAS, in addition, NRS 278.02598 allows the City Council to distribute equitably the infrastructure development costs among those persons who wish to develop the land, and the Phase 1 water backbone infrastructure is also part of the City's comprehensive plan for West Henderson infrastructure; and
- WHEREAS, a Business Impact Statement was posted by the City of Henderson to collect comments on potential impacts of the required contribution created by the West Henderson Phase 1 water backbone infrastructure rates; and
- WHEREAS, the City of Henderson staff addressed the comments from the Business Impact Statement in the West Henderson Phase 1 water backbone infrastructure rates; and

NOW, THEREFORE, the City Council of the City of Henderson, Nevada, does ordain:

- SECTION 1. The WH Infrastructure Phasing Strategy is hereby adopted as the analysis of the cost to construct the water backbone infrastructure for Phase 1 and also provide the basis for the City Council to fix the WH phase 1 rates (defined in HMC 14.18.045.B).
- SECTION 2. Section 14.18.045 West Henderson Phase 1 Water Backbone Infrastructure Rates – is established as follows:

14.18.045 - West Henderson Phase 1 Water Backbone Infrastructure Rates

<u>A.</u> <u>Planning and design of water backbone infrastructure for the West</u> <u>Henderson 2630 Pressure Zone and the West Henderson 2760 Pressure</u> <u>Zone, construction of that infrastructure, financing of that construction, and</u> <u>phasing of that construction are required to support water service to existing</u> <u>and future developments in the West Henderson area. The director has the</u> <u>right to determine the size and capacity of the water backbone infrastructure,</u>

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> phasing of construction of the water backbone infrastructure, and method of financing the construction, taking into account projected service needs of the West Henderson area served and the need for the orderly and efficient development of the city's public infrastructure system. The West Henderson 2630 Pressure Zone ("2630 PZ") and the West Henderson 2760 Pressure Zone ("2760 PZ") are located in West Henderson. A depiction of the 2630 PZ and the 2760 PZ is in the department service rules.

В. The rate charged to projects that the city determines will receive a benefit from the water backbone infrastructure planned, designed, constructed, and/or financed for a portion of the 2630 PZ as part of phase 1 is referred to as the "phase 1A 2630 PZ water infrastructure rate." The rate charged to projects that the city determines will receive a benefit from a portion of the pipelines that are a part of the water backbone infrastructure planned, designed, constructed, and/or financed for the 2630 PZ as part of phase 1 is referred to as the "phase 1B 2630 PZ water infrastructure rate." The rate charged to projects that the city determines will receive a benefit from water backbone infrastructure planned, designed, constructed, and/or financed for a portion of the 2760 PZ as part of phase 1 is referred to as the "phase 1A 2760 PZ water infrastructure rate." The rate charged to projects that the city determines will receive a benefit from a portion of the pipelines that are a part of the water backbone infrastructure planned, designed, constructed, and/or financed for the 2760 PZ as part of phase 1 is referred to as the "phase 1B 2760 PZ water infrastructure rate." These rates are addressed in this section 14.18.045. The amount charged for the phase 1A 2630 PZ water infrastructure rate, phase 1B 2630 PZ water infrastructure rate, phase 1A 2760 PZ water infrastructure rate, and the phase 1B 2760 PZ water infrastructure rate (collectively, "WH phase 1 rates") shall be in addition to system development, regional connection, and other applicable charges for water service.

C. Effective January 23, 2017, all new projects that the city determines will receive a benefit from existing or future water backbone infrastructure planned, designed, constructed, and/or financed for the 2630 PZ or for the 2760 PZ shall be charged and pay the phase 1A 2630 PZ water infrastructure rate, phase 1B 2630 PZ water infrastructure rate, phase 1A 2760 PZ water infrastructure rate, and/or the phase 1B 2760 PZ water infrastructure rate, as the city determines is appropriate. The amount(s) charged shall be based upon the total EDUs proposed for the project, as reflected in the civil improvement plans for the project approved by the city, and the rate(s) used will be the one(s) in effect on the date the city processes the building permit for the project or, if a project is not required to obtain a building permit from

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> the city, at the rate in effect on the date the city approves the civil improvement plans for the project.

D. Any project that was initiated at the city before January 23, 2017 and whose approval was conditioned on city being paid the rate(s) established or other amount charged by the city for existing or future water backbone infrastructure planned, designed, constructed, and/or financed for the 2630 PZ or for the 2760 PZ shall be charged and pay the phase 1A 2630 PZ water infrastructure rate, phase 1B 2630 PZ water infrastructure rate, phase 1A 2760 PZ water infrastructure rate, and/or the phase 1B 2760 PZ water infrastructure rate, as the city determines is appropriate. The amount(s) charged shall be based upon the total EDUs proposed for the project, as reflected in the civil improvement plans for the project approved by the city, and the rate(s) used will be the one(s) in effect on the date the city processes the building permit for the project or January 23, 2017, whichever is later.

E. Effective January 23, 2017, all projects that proceed with additional improvements to a property that result in an increase in water usage above the usage previously proposed - as reflected in the civil improvement plans, in the building permit or by other means of receiving city approval for such additional improvements - and that the city determines will receive a benefit from existing or future water backbone infrastructure planned, designed, constructed, and/or financed for the 2630 PZ or for the 2760 PZ shall be charged and pay the phase 1A 2630 PZ water infrastructure rate, phase 1B 2630 PZ water infrastructure rate, phase 1A 2760 PZ water infrastructure rate, and/or the phase 1B 2760 PZ water infrastructure rate, as the city determines is appropriate. Whether there is an increase in water usage shall be determined by the director in his or her sole discretion. The rate(s) charged shall be based upon the increase in total additional EDUs associated with the property improvements and at the rate in effect on the date the city processes the building permit for the proposed improvements or, if a project is not required to obtain a building permit from the city, at the rate in effect on the date the city approves the civil improvement plans for the proposed improvements or provides its approval of the additional improvements by other means.

<u>F.</u> As provided for in this title, Equivalent Dwelling Unit (EDU) is defined as "a measure of water demand equivalent to the amount of water [use] generated ... annually by an average single-family residential dwelling unit. One EDU is equivalent to 0.75 acre-feet of water per year." For the purpose of calculating the total EDUs attributable to each project being assessed a rate under this Section, the EDU Calculation Table in subsection 14.18.045.K shall apply. However, where it is determined by the director that the "EDU

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> Calculation Factor" or "EDU %" reflected in that table does not adequately reflect the water demands placed upon the city's water system by a proposed project, then city shall not use that table and instead shall use an alternate method in order to determine the appropriate amount to charge that project for its equitable share of the water backbone infrastructure planned, designed, constructed, and/or financed for 2630 PZ and/or 2760 PZ as part of phase 1. Final determination of such alternate method shall be made by the director.

> The initial phase 1A 2630 PZ water infrastructure rate shall be \$2,580 G. per EDU. The initial phase 1B 2630 PZ water infrastructure rate shall be \$454 per EDU. The initial phase 1A 2760 PZ water infrastructure rate shall be \$4,329 per EDU. The initial phase 1B 2760 PZ water infrastructure rate shall be \$883 per EDU. Initially, these rates have been based upon estimated costs for the city to fund the planning, design, construction, and/or financing of the phase 1 water infrastructure for the 2630 PZ and the 2760 PZ. The city manager may adjust each rate once each calendar year by an amount that (1) for the phase 1A 2630 PZ water infrastructure rate, is no more than five percent (5%) of the phase 1A 2630 PZ water infrastructure rate in effect the immediately preceding period; (2) for the phase 1B 2630 PZ water infrastructure rate, is no more than five percent (5%) of the phase 1B 2630 PZ water infrastructure rate in effect the immediately preceding period; (3) for the phase 1A 2760 PZ water infrastructure rate, is no more than five percent (5%) of the phase 1A 2760 PZ water infrastructure rate in effect the immediately preceding period: and (4) for the phase 1B 2760 PZ water infrastructure rate. is no more than five percent (5%) of the phase 1B 2760 PZ water infrastructure rate in effect the immediately preceding period. The city will identify the then-current phase 1A 2630 PZ water infrastructure rate, the thencurrent phase 1B 2630 PZ water infrastructure rate, the then-current phase 1A 2760 PZ water infrastructure rate, and the then-current phase 1B 2760 PZ water infrastructure rate in the department service rules. Unless otherwise approved in writing by the director at his or her sole discretion, the rate(s) assessed shall be paid to the city at the earliest of the following times: when the city issues a building permit; prior to issuance of a certificate of occupancy; or prior to commencement of temporary or permanent water service.

> <u>H.</u> For five (5) years after a certificate of occupancy is issued for a project or an improvement is made to a project, the city has the right to audit that project to confirm that the project's average annual water usage is substantially the same as the total EDUs proposed for the project or project improvement. If the city determines the project is using more EDUs than proposed, the city may require the original developer of the project or project improvement, as applicable, to pay the difference between the total EDUs

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> charged the project and total EDUs actually used at the property at the phase 1A 2630 PZ water infrastructure rate, phase 1B 2630 PZ water infrastructure rate, phase 1A 2760 PZ water infrastructure rate, phase 1B 2760 PZ water infrastructure rate, as appropriate, in effect on the date the city prepares a bill for the additional payment.

<u>I.</u> If the phase 1A 2630 PZ water infrastructure rate, phase 1B 2630 PZ water infrastructure rate, phase 1A 2760 PZ water infrastructure rate, or the phase 1B 2760 PZ water infrastructure rate is adjusted after the city receives a payment, the city is not obligated to true-up the payment received or to refund/collect any difference.

J. If a customer requests to design, construct, and pay for all or a portion of the phase 1 water backbone water infrastructure for the 2630 PZ and/or for the 2760 PZ, the city may enter into a special refunding agreement acceptable to the city and in accordance with applicable provisions in section 14.16.050 that provides for repayment of a portion of those costs from WH phase 1 rates collected, or to be collected, by the city from customers that will receive a benefit from existing or future water backbone infrastructure planned, designed, constructed, and/or financed for the 2630 PZ or for the 2760 PZ.

#### K. EDU Calculation Table

Type of Development	EDU Calculation Factor				
Low Density Single-Family: RS-4, RS-6, RS-					
8, and RMH	<u>1.0 EDU/lot</u>				
Medium-Density Residential: RM-10 and RM-	and the second				
<u>16</u>	0.81 EDU/unit				
Medium-Density Residential and High-	0.51 EDU/unit				
Density Multifamily Residential: RH-24 and					
<u>RH-36</u>	the second s				
Commercial and Industrial <sup>(1)</sup>	See Commercial and Industrial Meter				
	Equivalency Chart (Potable Water) <sup>(2)</sup>				
<sup>(1)</sup> Commercial and Industrial includes all non-	residential, mixed-use, and special-				
purpose districts, including, but not limited to,	schools, churches, public facilities,				
recreational vehicle parks, convalescent/assis	ted living facilities, etc.				
(2) The EDU calculation factor shall be based of	on meter size as reflected in the				
Commercial and Industrial Mater Equivalency Chart (Petable Water)					
	Unart (1 Utable Water).				
Commercial and Industri	al Mater Equivalancy Chart				
(Potable Water)					

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		<u>2630 PZ</u> Charge (per meter) <sup>(b)</sup>		<u>2760 PZ</u> Charge (per meter) <sup>(b)</sup>		
<u>Meter</u> <u>Size</u> (inch) <sup>(a)</sup>	<u>EDU %</u>	phase 1A	phase 1B	phase 1A	phase 1B	
3/4"	1.00	\$2,580	<u>\$454</u>	\$4,329	<u>\$883</u>	
<u>1"</u>	1.67	<u>\$4,309</u>	<u>\$758</u>	\$7,229	\$1,475	
1-1/2"	3.33	<u>\$8,591</u>	<u>\$1,512</u>	\$14,416	\$2,940	
<u>2"</u>	5.33	<u>\$13,751</u>	<u>\$2,420</u>	\$23,074	\$4,706	
<u>3"</u>	11.67	<u>\$30,109</u>	<u>\$5,298</u>	<u>\$50,519</u>	\$10,305	
<u>4"</u>	21.00	\$54,180	\$9,534	\$90,909	\$18,543	
<u>6"</u>	46.67	\$120,409	\$21,188	\$202,034	\$41,210	
<u>8"</u>	80.00	\$206,400	\$36,320	\$346,320	\$70,640	
<u>10"</u>	126.67	\$326,809	\$57,508	\$548,354	\$111,850	
12"	166.67	\$430,009	\$75,668	\$721,514	\$147,170	

<sup>(a)</sup> When a combination fire and domestic system is utilized, the charges shall be based on the size of the meter that would be required in order to accommodate all non-fire flow demands. Said meter sizing shall be based on the American Water Works Association standards for sizing meters or other nationally recognized method as approved by the director.

<sup>(b)</sup> Based upon the phase 1A 2630 PZ water infrastructure rate of \$2,580 per EDU, phase 1B 2630 PZ water infrastructure rate of \$454 per EDU, phase 1A 2760 PZ water infrastructure rate of \$4,329 per EDU, and phase 1B 2760 PZ water infrastructure rate of \$883 per EDU.

- SECTION 3. The WH Infrastructure Phasing Strategy meets the applicable criteria established in NRS 278.02591.2.
- SECTION 4. Each project must pay City that project's equitable share of the water backbone infrastructure planned, designed, constructed, and/or financed for the 2630 PZ and/or 2760 PZ as part of phase 1 in accordance with the applicable procedure in HMC Chapter 14.18 and/or through a development agreement.
- SECTION 5. If any section, subsection, sentence, clause, phrase, provision or portion of this Ordinance, or the application thereof to any person or circumstances, is for any reason held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining

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portions or provisions of this Ordinance or their applicability to distinguishable situations or circumstances.

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- SECTION 6. All ordinances, or parts of ordinances, sections, subsections, phrases, sentences, clauses or paragraphs contained in the Municipal Code of the City of Henderson, Nevada, in conflict herewith are repealed and replaced as appropriate.
- SECTION 7. A copy of this Ordinance shall be filed with the office of the City Clerk, and notice of such filing shall be published once by title in the Review Journal, a newspaper having general circulation in the City of Henderson, at least ten (10) days prior to the adoption of said Ordinance, and following approval shall be published by title (or in full if the Council by majority vote so orders) together with the names of the Councilmen voting for or against passage for at least one (1) publication before the Ordinance shall become effective. This Ordinance is scheduled for publication on January 20, 2017, in the Review Journal.

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PASSED, ADOPTED, AND APPROVED THIS 17th DAY OF JANUARY, 2017.

Andy Hafen, Mayor

ATTEST:

abrina Mercadante/MMC, City Clerk

The above and foregoing Ordinance was first proposed and read in title to the City Council on January 3, 2017 which was a Regular Meeting, and referred to a Committee of the following Councilmen:

#### "COUNCIL AS A WHOLE"

Thereafter on January 17, 2017, said Committee reported favorably on the Ordinance and forwarded it to the Regular Meeting with a do-pass recommendation. At the Regular Meeting of the Henderson City Council held January 17, 2017, the Ordinance was read in title and adopted by the following roll call vote:

Those voting aye:

Andy Hafen, Mayor Councilmembers: Debra March John F. Marz Gerri Schroder Dan H. Stewart

Those voting nay: Those abstaining: Those absent: None None None

Andy Hafen, Mayo

ATTEST:

MC, City Clerk a Mercadant

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### Exhibit A West Henderson Pressure Zone Areas

[Attached]



#### WEST HENDERSON PRESSURE ZONE AREAS

The following describes the 2630 and 2760 Pressure Zones in the West Henderson area located in Sections 3, 4, 8, 9, 10, 11, 14, 15, 16, 17, 20, 21, and 22, Township 23 South, Range 61 East, M.D.M., Clark County, Nevada, described as follows:

The South Half (S 1/2) of Section 3.

TOGETHER WITH: That portion of the North Half (N 1/2) of Section 3, lying southeast of the northwesterly line of Lot 1 of the Henderson Quail Air Center in Book 141, Page 79 of Plats, Clark County, Nevada and the prolongation of said line to the northeasterly line of Lot 1 of the Sage Mountain Commerce Center in Book 111, Page 6 of Plats, Clark County, Nevada and south of the northeasterly and northwesterly lines of said Lot 1 of the Sage Mountain Commerce Center.

TOGETHER WITH: All of the South Half (S 1/2) of Section 4, lying southeast of State Highway 146, also known as the St. Rose Parkway.

TOGETHER WITH: All of Section 8, lying southeast of State Highway 146, also known as the St. Rose Parkway, and east of the easterly right-of-way of I-15.

TOGETHER WITH: All of Section 9, excepting that portion of the Northeast Quarter (NE 1/4) of the Northwest Quarter (NW 1/4) lying northwest of State Highway 146, also known as the St. Rose Parkway.

TOGETHER WITH: All of Section 10.

Together with: The South Half (S 1/2) of the Southwest Quarter (SW 1/4) of the Northeast Quarter (NE 1/4) of the Southwest Quarter (SW 1/4); the West Half (W 1/2) of the Southeast Quarter (SE 1/4) of the Southwest Quarter (SW 1/4); the Southwest Quarter (SW 1/4) of the Southwest Quarter (SW 1/4); the Southwest Quarter (SW 1/4) of the Southwest Quarter (SW 1/4) of the Southwest Quarter (SW 1/4) of the South Half (S 1/2) of the South Half (S 1/2) of the Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4) of Section 11.

TOGETHER WITH: The Northwest Quarter (NW 1/4) of the Northeast Quarter (NE 1/4) of the Southwest Quarter (SW 1/4); the Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4) of the Northeast Quarter (NE 1/4) of the Southwest Quarter (SW 1/4); the Northwest Quarter (NW 1/4) of the Northeast Quarter (NE 1/4) of the Southwest Quarter (SW 1/4); the Northwest Quarter (SW 1/4); the North Half (N 1/2) of the Northwest Quarter (NW 1/4) of the Southwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4); the North Half (N 1/2) of the Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4); the Southwest Quarter (SW 1/4); the Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4); the Southwest Quarter (SE 1/4) of the Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4); the Northwest Quarter (SW 1/4); the West Half (W 1/2) of the East Half (E 1/2) of the Northwest Quarter (NW 1/4) and the West Half (W 1/2) of the Northwest Quarter (NW 1/4) of Section 14.

TOGETHER WITH: The North Half (N 1/2); the Northeast Quarter (NE 1/4) of the Northeast Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the North Half (N 1/2) of the Southeast

Quarter (SE 1/4) of the Northeast Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the Southeast Quarter (SE 1/4) of the Southeast Quarter (SE 1/4) of the Southeast Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the North Half (N 1/2) of the Northwest Quarter (NW 1/4) of the Northeast Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the Southeast Quarter (SE 1/4); the Southeast Quarter (SE 1/4) of the Northwest Quarter (NW 1/4) of the Northwest Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the Northwest Quarter (NW 1/4) of the Northwest Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the Northwest Quarter (NW 1/4) of the Northwest Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the Northwest Quarter (NW 1/4) of the Northwest Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the Northwest Quarter (NW 1/4) of the Southeast Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the Northwest Quarter (NW 1/4) of the Southeast Quarter (SE 1/4); of the Southeast Quarter (SE 1/4); the Northwest Quarter (NW 1/4) of the Southeast Quarter (SE 1/4); of the Southeast Quarter (SE 1/4) of the Southeast Quarter (SE 1/4); of the Southeast Quarter (SE 1/4) of Section 15.

TOGETHER WITH: All of Section 16.

TOGETHER WITH: All of Section 17, lying east of the easterly right-of-way of I-15.

TOGETHER WITH: All of Section 20, lying north of the 2663-foot Contour line and east of the easterly right-of-way of I-15.

TOGETHER WITH: All of Section 21, lying north of the 2663-foot Contour line.

TOGETHER WITH: The Northwest Quarter (NW 1/4) of Section 22.

Containing 4847 Acres, more or less.



### Exhibit B

City of Henderson, Nevada Technical Memorandum West Henderson Water Infrastructure Phasing Strategy Update dated November 2016 (revised December 14, 2016)

[Attached]



*Carollo* 

#### **CITY OF HENDERSON, NEVADA**

TECHNICAL MEMORANDUM WEST HENDERSON WATER INFRASTRUCTURE PHASING STRATEGY UPDATE

> FINAL November 2016 (Revised December 14, 2016)

376 EAST WARM SPRINGS ROAD, SUITE 250 • LAS VEGAS, NEVADA 89119 • pw:\\Carollo/Documents\Client/NV/Henderson/10353A00/Deliverables\West Henderson Phasing Update TM (Final-11/2016)

P. 702.792.3711 . F. 702.792.4533

### **CITY OF HENDERSON, NEVADA**

### TECHNICAL MEMORANDUM

### WEST HENDERSON WATER INFRASTRUCTURE PHASING STRATEGY UPDATE

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### LIST OF REVISIONS

0	11/22/2016	Table B.1.1, removed "Undefined" land use category and revised "Total Acreage - All Land Uses"
0	11/22/2016	Section 2.0, Page 3, revised study area acreage from 4,845 acres to 4,850 acres
3	12/14/2016	Section 12.0, Page 18, revised "associated bond financing costs" to read "any other financing costs". Replaced Appendix E with revised letter from City.

**Technical Memorandum** 

## WEST HENDERSON WATER INFRASTRUCTURE PHASING STRATEGY UPDATE

### 1.0 PROJECT BACKGROUND

The purpose of this Technical Memorandum (TM) is to provide the engineering basis for determining the project cost and the cost for each Equivalent Dwelling Unit (EDU) for the infrastructure associated with the City of Henderson, Nevada (City) West Henderson 2630 and 2760 Pressure Zone Water Infrastructure Improvements. This TM serves to update the planning study previously documented in the "West Henderson Backbone Water Infrastructure Special Refunding Project," prepared by Carollo Engineers. This update is necessary to incorporate changes in the water supply source assumptions for West Henderson. Previously, the planning for all future supplies to West Henderson assumed full buildout demands to be met through the Southern Nevada Water Authority's (SNWA) Bermuda Rate of Flow Control Station (ROFCS). Current planning assumes water supplies being provided to West Henderson in two distinct phases. The first phase assumes a maximum of 20 million gallons per day (mgd) will be provided through the Bermuda ROFCS and additional required supplies will come from the SNWA Horizon Ridge ROFCS.

In addition, the previous approach presented a "buildout" or ultimate infrastructure framework only. As stated above, the current approach defines two incremental phases of infrastructure development that are expected to occur, thus providing guidance to the City in developing 5- and 10-year capital improvement plans.

It should also be noted that, similar to the previous planning study, the scope of this technical memorandum covers water service and associated infrastructure for the 2630 and 2760 pressure zones. It does not consider water service or infrastructure requirements for the remainder of West Henderson that lies within the corporate boundaries of the City, but extends outside of these pressure zones. See Figure 1 for details of the study area boundaries.

It is recognized that development may occur to some degree in each pressure zone in each planning phase. Therefore, the updated approach allocates infrastructure cost by planning phase and pressure zone. This provides the City with flexibility to adjust the infrastructure plan, based on actual growth patterns. If adjustments are necessary, this technical memorandum will be amended, accordingly.



As reflected in the cost per EDU per pressure zone shown below, the buildout projections for the West Henderson backbone water system consist of a phased approach, based upon two separate infrastructure phases. The second phase of infrastructure constructed, will build upon the framework of infrastructure put in place by the first phase. Given the water pipelines constructed as a part of the Phase 1 backbone water infrastructure are being sized to meet the capacity needs for the complete buildout of the study area, all developments that occur within the 2630 and 2760 pressure zones will be responsible for paying a proportionate share of the costs, on a \$/EDU basis, for the construction of those pipelines. The costs associated with the remainder of the Phase 1 water backbone infrastructure will be distributed on a \$/EDU basis, based upon the capacity of each reservoir and pump station, and pressure zone served.

Phased construction costs yield the cost of EDU per phase, per pressure zone, based upon the following formulas:

Total Cost for Backbone Infrastructure (\$)

Cost per EDU =

Total EDUs Served by Backbone Infrastructure

The engineering study necessary to determine the construction cost and cost per EDU was determined by:

- Modeling the potable water service area for demand based on the current approved land use plan.
- Integrating the new backbone infrastructure with existing infrastructure.
- Routing the pipelines through anticipated traffic corridors.
- Calculating pipeline size based on established City modeling and performance criteria.
- Calculating reservoir storage volumes.
- Calculating pump station capacities.
- Establishing land acquisition requirements.

### 2.0 LOCATION

The West Henderson Water Infrastructure Phasing Strategy Update Project is located at the southwest City boundary as presented on Figure 1 and described in Appendix A. The West Henderson 2630 and 2760 pressure zones encompass an area of approximately ② 4,850 acres within incorporated City limits, and unincorporated Clark County areas within the service area. Approximately 700 acres located within the service area are unincorporated Clark County areas. It is anticipated that the unincorporated Clark County areas may be annexed into the City in the future, or may obtain water service from the City and therefore the unincorporated Clark County areas are included in the water demand analysis and factored into the cost per EDU for the West Henderson service area. The City's estimated buildout population for the service area is 45,313.

## 3.0 INFRASTRUCTURE PLANNING PHASES

There are two infrastructure planning phases established for development in West Henderson:

- Phase 1 Year 2025 2033
- Phase 2 Year 2033 2043

These planning phases were defined using annual water demand projections developed for West Henderson from 2016 through year 2043. The system capacity added in each phase is sufficient to meet the demands of that planning year and includes enough reserve capacity to enable growth to continue to the next planning year.

## 4.0 PRESSURE ZONES

There are two pressures zones located in the West Henderson service area: Pressure Zone 2630 and Pressure Zone 2760. At final buildout, 40 mgd of water supply is modeled to originate from the SNWA South Valley Lateral (SVL). 20 mgd will come from the Bermuda ROFCS, and be pumped to reservoirs located within each pressure zone. An additional 20 mgd of water supply is modeled to originate from the SNWA Horizon Ridge ROFCS, and be pumped to reservoirs located within each pressure zone.

## 5.0 MODELING CRITERIA

Modeling criteria for the West Henderson Water Infrastructure Phasing Strategy Update Project is based on sizing the pipelines for peak hour demands (PHD), which for the buildout condition was greater than the maximum day demands plus fire flow requirements. Scenarios were modeled for PHD and maximum day demands plus fire flow requirements for each planning Phase. Table 1 presents the system performance criteria used in modeling the West Henderson Backbone Water Infrastructure. All system performance criteria for pressure and flow meet the City's requirements. Pipe velocity criteria are generally met with the proposed backbone infrastructure. In some cases, minor exceedances were allowed to pipe velocity criteria where maximum head loss criteria were met.

Table 1         Hydraulic Modeling Performance Criteria           West Henderson Water Infrastructure Phasing Strategy Update           City of Henderson, Nevada					
Minimum Pressure During Maximum Day	40 psi				
Minimum Pressure During Peak Hour	30 psi				
Minimum Residual Pressure During a Fire Flow Event	20 psi				
Maximum Velocity During Peak Hour Demand	4 fps (1)				
Maximum Velocity During a Fire Flow Event	20 fps				
Maximum Head Loss During Peak Hour Demand	5 ft/1,000 ft				
Maximum Head Loss During a Fire Flow Event	10 ft/1,000 ft				
Maximum Fire Flow and duration (non-residential)	6,000 gpm for 4 hrs				
Maximum Day to Average Day Demand Peaking Factor (MDD/ADD)	1.7 (2)				
Peak Hour to Average Day Demand Peaking Factor (PHD/MDD)	1.7				

Notes:

- (1) Maximum Velocity Criteria for some pipelines exceed the 4 fps in the Peak Hour analysis for a portion of the 16-inch pipeline in 2760. The final design for this pipeline will require a detailed Hydraulic Analysis to confirm the required size at buildout.
- (2) The Maximum Day to Average Day Demand Peaking Factor (MDD/ADD) has been adjusted from 2.0 down to 1.7 in order to take into account the reduction in maximum day demand value assumed for West Henderson. See Section 6 below, for further clarification.

Abbreviations:

psi = pounds per square inch; fps = feet per second; ft = foot/feet; gpm = gallons per minute; hrs = hours

Other criteria relevant to the West Henderson water infrastructure study area model include:

- Demands were calculated for areas inside the City limits and all unincorporated Clark County areas within the study area based on land use and the City's EDU per acre factors as summarized in Appendix B.
- Reservoir 36 is an existing above grade reservoir, with a capacity of 3.5 million gallons (MG) located at Site 36. Reservoir 36A (R-36A) will be constructed at Site 36 above grade to complement the hydraulics of the existing system.
- Pressure Reducing Valve 88 (PRV-88) is assumed closed during the modeling scenarios.
- 4. SNWA is assumed the sole source of potable water supplied from the SVL. 20 mgd will be provided through the COH Bermuda ROFCS and 20 mgd will be provided through the Horizon Ridge ROFCS to meet the demands for the West Henderson study area. An additional 15 mgd will be provided through the Horizon Ridge ROFCS, and is necessary to meet long-term operational and planning needs that provide a higher level of system reliability for the City's water system.

Appendix C includes a summary of the major assumptions used to guide this study.

## 6.0 POTABLE WATER DEMAND

Water demands were updated from the July 2014 analysis to reflect a more current understanding of demand trends in areas adjacent to West Henderson and increased conservation within the City in general. Previously, a maximum day demand value of 0.93 gpm/EDU was used to determine the system capacity for West Henderson. The City's current demand projections for West Henderson assume that water-efficient landscaping and fixtures will be in place for most, if not all, new development, which may reduce the demand per EDU. Taking into account current customer water use trends and recognizing there is potential for per-capita water demands to be less in the future, the buildout demand projections were reduced by approximately 16 percent to 0.78 gpm/EDU. The maximum day demand (MDD) and peak hour demand (PHD) for <u>all</u> land areas within the West Henderson Water Infrastructure Phasing Strategy study area are presented in Table 2 by pressure zone and Phase.

Table 2         Potable Water MDD and PHD Zone 2630 and Zone 2760           West Henderson Water Infrastructure Phasing Strategy Update City of Henderson, Nevada						date
Maximum Day Demand (mgd)				Peak Hour Demand (mgd)		
Phase	PZ 2630	PZ 2760	Total	PZ 2630	PZ 2760	Total
1	4.35	4.35	8.7	7.4	7.4	14.8
2	8.95	8.95	17.9	15.2	15.2	30.4
Ultimate	20.0	20.0	40.0	34.0	34.0	68.0

Projected potable water demands for land areas located within the service area, but not currently incorporated into the City limits are presented in Table 3. The unincorporated Clark County area potable water demand represents approximately 16 percent of the total MDD presented in Table 3.

Table 3Unincorporated Clark County Area MDD and PHD Zone 2630 and Zone 2760 West Henderson Water Infrastructure Phasing Strategy Update City of Henderson, Nevada					0 and date	
al contin	Maximum Day Demand (mgd)			Peak Hour Demand (mgd)		
Phase	PZ 2630	PZ 2760	Total	PZ 2630	PZ 2760	Total
Ultimate	3.5	2.8	6.3	5.9	4.8	10.7

## 7.0 SUPPLY SOURCE

Currently, all water supplies to West Henderson are through PRV-88, which is connected to the P-19A/R-36 transmission line. It is anticipated that once the City's Bermuda Pump Station is constructed it will be the primary supply source for West Henderson. PRV-88 may remain in place for emergencies or to provide operational flexibility.

During Phase 1, the City's Bermuda Pump Station will supply the initial West Henderson Demands. The 20 mgd buildout capacity of the City's Bermuda Pump Station may be phased between years 2025 and 2033 to align with future projected growth needs until the Phase 2 infrastructure is constructed after year 2033.

During Phase 2, the P-19A/R-36 transmission line is planned to be re-purposed to convey water supplies from the Horizon Ridge ROFCS through a new, future pump station. The existing pipeline currently serves the 2760 Pressure Zone, but will be repurposed to serve the 2630 Pressure Zone, feeding R-35. A new transmission line from the Horizon Ridge ROFCS will be needed and will connect to the P-19/R-36 transmission line at approximately Sun City Anthem Drive and Eastern Avenue. This will enable P-19 to continue to fill R-21 with existing infrastructure.

Table 4	West Hend West Hend City of Hen	erson Supply erson Water In derson, Neva	Source nfrastructu da	re Phasing Strategy	Update	
	- 1	Maximum Water Supply (mgd)				
Phase	Year	PRV-88 <sup>(1)</sup>	R-36 <sup>(2)</sup>	City Bermuda Pump Station <sup>(3)</sup>	Horizon Ridge ROFCS <sup>(4)</sup>	
Current	2016 - 2025	1.0	0	0	0	
1	2025 - 2033	0	1.0	20	0	
2	2033 - 2043	0	0	20	35	

The West Henderson supply source is summarized in Table 4 by planning phase.

#### Notes:

(1) Currently provides supply to Zone 2630 (M-Resort).

- (2) May provide some support to Zone 2760 while capacity is available from the Inspirada Development to leverage existing infrastructure.
- (3) City Bermuda Pump Station buildout capacity of 20 mgd, may be phased to align with future projected growth needs until the Phase 2 backbone water system is constructed.
- (4) Will require separating P-19A/R-36 and P-19A/R-21 transmission line to re-purpose for Horizon Ridge supplies to R-35. The buildout capacity of 35 mgd, may be phased to align with future projected growth needs.

## 8.0 PROJECT ELEMENTS

### 8.1 Pipelines

The West Henderson Water Infrastructure Phasing Strategy Update includes a system-wide assessment and provides an overall plan to achieve a complete water system, and includes pipelines 12 inches and larger. However, only the transmission pipelines that convey water between pump stations and reservoirs are included within the Phase 1 backbone water infrastructure costs. The remainder of the pipelines included on Figure 2 and Figure 3 are illustrated to demonstrate a complete and functional system. Pipeline routing is modeled using the probable traffic corridors established in the City of Henderson Master Streets & Highways Plan dated November 2011.

Table 5 presents the total breakdown of pipeline diameter and lengths by planning Phase. Costs for backbone pipelines are allocated 100 percent to the Phase in which they are planned to be constructed (see Note 2 in Table 5). The pipeline design parameters are based on the City of Henderson pipeline requirements as required by the Henderson Utility Guidelines (HUGS).

Table 5	Pipeline Diameters and Leng West Henderson Water Infra City of Henderson, Nevada	gths By Phase structure Phasing Strat	tegy Update
	Pi	peline Length (feet)	A Share Share
Diameter (inch)	Phase 1	Phase 2	Phase 1 or Phase 2 <sup>(2)</sup>
12	0	0	13,157
16	8,000	0	39,798
20	0	0	1,366
24 (1)	0	0	53,717
30	23,486	0	5,474
36	2,349	0	1,656
42	4,411	15,700	0
Total	38,246	15,700	115,168
Total (mi)	7	3	22

Notes:

(1) Some portions of the 24-inch pipeline shown on Figure 2 are scheduled to be installed by others, and not included in this project.

(2) Pipelines shown to be constructed by developers may be constructed during Phase 1 or Phase 2 because the timing of development is currently unknown.





### 8.2 Pump Stations

At final buildout, half of the water supply (20 mgd) for the West Henderson study area is modeled to originate from the SNWA SVL through the Bermuda ROFCS. The City of Henderson Bermuda Pump Station (COH-Bermuda) will be located adjacent to the existing Bermuda Pump Station (operated by the Las Vegas Valley Water District). The COH-Bermuda PS is physically located within Zone 2630; however, the capacity of the COH-Bermuda PS is modeled to provide capacity for Pressure Zone 2630 and Pressure Zone 2760.

The COH-Bermuda PS will use canned Vertical Turbine Pumps (VTPs). Pump Station 35 (P-35), and Pump Station (P-42) will incorporate a cast-in-place concrete wet well connected to an expandable below-grade baffled reservoir. A separate air-conditioned building constructed of CMU will be used for electrical equipment.

### 8.2.1 Zone 2630 Pump Stations

COH-Bermuda is located in Zone 2630. The modeled capacity of the COH-Bermuda PS is approximately 14,000 GPM. The capacity of the COH-Bermuda PS is based on one half of the combined MDD for Zone 2630 and Zone 2760. It is anticipated that the COH-Bermuda PS may be constructed in two phases. At buildout, the COH-Bermuda PS would have six duty and one standby canned VTPs. Cost of the COH-Bermuda PS construction is included in the Engineers Opinion of Probable Construction Cost. COH-Bermuda PS design parameters are provided in Table 6.

Table 6         COH-Bermuda PS Design Parameters           West Henderson Water Infrastructure Phasing Strategy Update           City of Henderson, Nevada				
Parameter	Phase 1			
Type of Pump <sup>(1)</sup>	Canned VTPs			
Station Buildout Capacity (g	pm) 14,000			
Pump Capacity (gpm)	2,400			
Number of Pumps (2)	7			
Total Dynamic Head (ft)	190			
Horse Power	200			
Notes:				

(1) Three- or four-stage VTP, depending on manufacturer.

(2) One redundant pump installed for facility reliability.

### 8.2.2 Zone 2760 Pump Stations

There are two pump stations modeled for Zone 2760, Pump Station 35 (P-35), and Pump Station 42 (P-42). Zone 2760 Pump Station design parameters are provided in Table 7.

Table 7 Zone 2760 Pump Stat West Henderson Wat City of Henderson, N	tion Design Parameters ter Infrastructure Phasing evada	) Strategy Update
Parameter	P-35	P-42
Station Capacity by Phase (mgd)	6.2.5	- Antipation -
Phase 1	5.0	5.0
Phase 2	5.0 +15.0 <sup>(1)</sup>	5.0
Total	25.0 (1)	10.0
Type of Pump	VTPs in V	Vet Well (2)
Station Buildout Capacity (gpm)	17,500	7,000
Total Dynamic Head (ft)	180	180
Pump Capacity (gpm)	3,500	2,400
Number of Pumps	5+1 <sup>(3)</sup>	3+1 (3)
Horsepower	300	200
Notes:	and the solution of the	14 18 18 19 PM

(1) 15 mgd is for City water system operational flexibility and reliability.

(2) Three or four stage VTP, depending on pump manufacturer.

(3) One redundant pump will be installed.

### 8.3 Reservoirs

Chapter 445A of the Nevada Administrative Code (NAC), states:

NAC 445A.6674 Storage capacity. (NRS 445A.860) Except as otherwise provided in NAC 445A.66755:

- 1. A supplier of water shall ensure that:
  - (a) An existing public water system maintains a storage capacity that, as determined by an engineer on the basis of historical data, accepted engineering judgment and a network hydraulic analysis, is sufficient to ensure that the total capacity of the public water system will meet current and anticipated demands for water while maintaining the pressures indicated in <u>NAC 445A.6711</u>.
  - (b) A new public water system maintains a storage capacity that is sufficient to provide the amount of water required for sufficient operating storage, emergency reserve and fire demand.

- Storage requirements for fire demand must be calculated according to the requirements of the fire authority. The Division or the appropriate district board of health shall evaluate the design of a public water system based upon appropriate documentation of those requirements.
- 3. A supplier of water for an existing public water system shall ensure that the total storage capacity and capacity of booster pumps for each zone of pressure in the distribution system are sufficient to meet the maximum day demand within that zone. Water stored in a higher zone of pressure may be provided to serve a lower zone of pressure if:
  - (a) An appropriate pressure regulator is installed between the zones; and
  - (b) The requirements for the higher zone of pressure are not compromised.

Therefore, in order to ensure the above requirements are met for West Henderson while increasing overall water system reliability for existing and future customers, reservoir capacity is based on providing a 24-hour, maximum day storage volume.

All reservoirs are modeled as below grade, cast-in-place concrete, with the exception of R-36A. R-36A is modeled as an above-grade reservoir to complement the existing hydraulics at Site 36, where an existing above-grade reservoir exists (R-36). All below-grade reservoirs will use a metal raised seam roof. Cost of reservoir construction is included in the Engineers Opinion of Probable Construction Cost. Two reservoirs are provided at each site for reliability.

#### 8.3.1 Zone 2630 Reservoirs

There are two reservoirs modeled for Zone 2630. Table 8 presents the volume of each reservoir serving Zone 2630.

Table 8 Zone 2 West H City of	630 Reservoir Sizing lenderson Water Infrast Henderson, Nevada	ructure Phasing Strat	egy Update		
		Volume (MG)			
Reservoir Sites	Phase 1	Phase 2	Total		
R-35	5.0	5.0	10.0		
R-42	5.0	5.0	10.0		
Total Reservoir Volu	me Zone 2630		20.0		

### 8.3.2 Zone 2760 Reservoirs

There are three reservoirs modeled for Zone 2760. Table 9 presents the volume of each reservoir serving Zone 2760. The existing R-36 serves as the additional reservoir required to meet the total 23.5 MG storage requirement required for the 2760 Pressure Zone.

Table 9	9 Zone 2760 Reservoir Sizing West Henderson Water Infrastructure Phasing Strategy Update City of Henderson, Nevada				
11 12 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ester a parte	the state of the	Volume (MG)		
Reservo	Phase 2	Total			
R-36 (E)	kisting)	N/A	N/A	3.5	
R-4	13	5.0	5.0	10.0	
R-36	6A	5.0	5.0	10.0	
Total Rese	rvoir Volum	e Zone 2760		23.5	

## 9.0 LAND ACQUISITION

All reservoir and pump station sites are proposed to be located on BLM-owned land. The City has stated it is already in the process of preparing grant applications to submit to BLM, for issuance of Recreation and Public Purpose (R & PP) leases to secure these sites for future use by the City. Therefore, all land acquisition costs incorporated into the Engineers Opinion of Probable Project Cost for each phase, are intended to cover costs associated with securing necessary rights-of-way for the pipeline corridors. Anticipated land requirements are provided in Table 10.

Table 10	Anticip West H City of	ated Land Requirements enderson Water Infrastructure Henderson, Nevada	Phasing Strategy Update
Site		Attributes	Required Land Acquisition (acres)
COH-	PS	COH-PS	5.0
Site 3	35	R-35, R-35A, P-35	6.0
Site 4	42	R-42, R-42A, P-42	6.0
Site 4	43	R-43, R-43A	4.0
Total			21.0

## 10.0 ENGINEERS OPINION OF PROBABLE PROJECT COST

The Engineers Opinion of Probable Construction Cost for each phase is presented in Table 11, with a breakdown by infrastructure component included in Appendix D. The cost estimates are based on standard methodologies and best practices as prescribed by the Association for the Advancement of Cost Engineering (AACE). This is a Class 5 cost estimate (order of magnitude cost estimate), in accordance with AACE, the expected accuracy of the cost estimate is +50 percent to -30 percent. An Engineers Opinion of Probable Construction Cost for the proposed replacement infrastructure is also provided.

Table 11	Engineers Opin West Henderso Water Infrastruc City of Henders	ion of Probable Pr n 2630 and 2760 P cture Phasing Stra on, Nevada	oject Cost ressure Zone – tegy Update	
Phase	City Contribution (\$M)	Developer Contribution (\$M)	Total Estimated Project Cost <sup>(1)</sup> (\$M)	Total Estimated Project Cost - Escalated (\$M) <sup>(2)</sup>
1	\$22.6	\$64.4	\$87.0	\$100.0
2 (3)	\$58.2	\$50.6	\$108.8	-
Total	\$80.8	\$115.0	\$195.8	-

Notes:

(1) Total estimated project costs per phase reflect current market conditions (2016) and thus do not account for inflation or the projected market conditions at the time the projects are projected to be constructed.

(2) The cash flow associated with the construction activity was analyzed with a 1.5 percent cost escalation per year through 2033 when it is anticipated that the Phase 1 water backbone infrastructure will be fully constructed. The 1.5 percent cost escalation per year is presented as an example for planning purposes, only. The City may elect to modify the cost escalation at a different rate based on yearly review or more often, as overall economic factors change.

(3) Escalation of Phase 2 costs were not considered because the planning horizon is too distant.

## 11.0 COST PER EQUIVALENT DWELLING UNIT (EDU)

Based upon the Engineers Opinion of Probable Project Cost for Phases 1 and 2, along with applying the methodology described in Section 1.0 of this report, yields a cost per equivalent dwelling unit (\$/EDU) for each phase, as summarized in Table 12, Table 13, and Table 14.

Backbone Infrastructure Required	Size	Cost	EDUs Served	\$/EDU
West Henderson 2630 Pressure Zor	ne – Phase	1:	a march 1983	0
1. Bermuda Pump Station <sup>(1)</sup>	10 mgd	\$10,254,882	8,903	\$1,152
2. Reservoirs R35 + R42 <sup>(2)</sup>	3.5 MG	\$6,074,045	8,903	\$682
3. Pipelines - Phase 1 (3)	Varies	\$6,113,706	17,806	\$343
4. Land Acquisition (4)	1 LS	\$1,183,256	17,806	\$66
Total	Cost per E	DU, Phase 1 = 2	2630 PZ (5) =	\$2,243
City Water System Reliability 2630 F	Pressure Z	one – Phase 1:	6.64	all and
1. Reservoirs R35 + R42 <sup>(2)</sup>	6.5 MG	\$11,280,370	N/A	N/A
West Henderson 2760 Pressure Zor	ne – Phase	1:	Nerse March	The state
1. Bermuda Pump Station <sup>(1)</sup>	10 mgd	\$10,254,882	8,903	\$1,152
2. Pump Stations P35 + P42	10 mgd	\$10,254,882	8,903	\$1,152
3. Reservoirs R36A + R43 <sup>(2)</sup>	3.5 MG	\$6,074,045	8,903	\$682
4. Pipelines - Phase 1 (3)	Varies	\$13,018,005	17,806	\$731
5. Land Acquisition (4)	1 LS	\$1,183,256	17,806	\$66
Tota	Cost per l	EDU, Phase 1 - 2	2760 PZ (5) =	\$3,783
City Water System Reliability 2760 F	Pressure Z	one – Phase 1:	R Same	STR.
1. Reservoirs (R36A + R43)	6.5 MG	\$11,280,370	N/A	N/A

- (3) The proportional cost allocation of the Phase 1 backbone water pipelines benefitting the entire 2630 and 2760 pressure zones (i.e. Phases 1 and 2).
- (4) The Land Acquisition cost is split equally and provides benefit to the 2630 and 2760 pressure zones (i.e. Phases 1 and 2).
- (5) Total cost per EDU reflects current market conditions (2016) and thus do not account for inflation or the projected market conditions at the time the projects are projected to be constructed.

Table 13Engineers Opinion of West Henderson 263 Water Infrastructure City of Henderson, N	f Probable P 0 and 2760 P Phasing Stra evada	roject Cost Per Pressure Zone - ategy Update	EDU (\$/EDU) - Phase 2	
Backbone Infrastructure Required	Size	Cost	EDUs Served	\$/EDU
West Henderson 2630 Pressure Zo	ne – Phase 2	2:	E and a start of	
1. Horizon Ridge Pump Station <sup>(1)</sup>	10 mgd	\$10,254,882	8,903	\$1,152
2. Reservoirs R35A + R42A (2)	3.5 MG	\$6,074,045	8,903	\$682
3. Pipelines - Phase 2 (3)	42-in	\$3,269,572	8,903	\$367
4. Land Acquisition (4)	1 LS	\$591,628	8,903	\$66
Tot	tal Cost per l	EDU, Phase 2 -	2630 PZ <sup>(5)</sup> =	\$2,268
West Henderson 2760 Pressure Zo	ne – Phase 2	2:	Second -	
1. Horizon Ridge Pump Station <sup>(1)</sup>	10 mgd	\$10,254,882	8,903	\$1,152
2. PS Expansions P35 + P42	10 mgd	\$10,254,882	8,903	\$1,152
3. Reservoirs R36A + R43 <sup>(2)</sup>	3.5 MG	\$6,074,045	8,903	\$682
4. Pipelines - Phase 2 <sup>(3)</sup>	42-in	\$3,269,572	8,903	\$367
5. Land Acquisition (4)	1 LS	\$591,628	8,903	\$66
Tot	tal Cost per l	EDU, Phase 1 -	2760 PZ <sup>(5)</sup> =	\$3,420
City Water System Reliability - Pha	ase 2:	1.1.1.1.1.1.1.1	1444	
1. Reservoirs R35A + R42A (2)	6.5 MG	\$11,280,370	N/A	N/A
1. Horizon Ridge Pump Station <sup>(1)</sup>	15 mgd	\$15,382,322	N/A	N/A
2. Reservoirs R36B + R43A (2)	6.5 MG	\$11,280,370	N/A	N/A
3. Pump Station P35A (6)	15 mgd	\$15,382,322	N/A	N/A
4. 42" Diameter Pipeline (7)	15,700 LF	\$4,904,358	N/A	N/A
Total Cost City Water System	n Reliability	\$58,229,742	1.1.1	

Notes:

- (1) The cost for the Horizon Ridge PS is split 20 mgd for West Henderson and 15 mgd for City water system reliability. For West Henderson, the costs are further split equally between the 2630 and 2760 pressure zones (10 mgd per zone).
- (2) The costs for the R35A, R42A, R36B, and R43A are split to reflect a 35% benefit to West Henderson EDUs, and 65% benefit for City's water system reliability.
- (3) The proportional cost allocation of the 42-inch diameter water pipeline benefitting the remainder of EDUs within the West Henderson 2630 and 2760 pressure zones.
- (4) The Land Acquisition cost is split equally between the 2630 and 2760 pressure zones.
- (5) Total cost per EDU reflects current market conditions (2016) and thus do not account for inflation or the projected market conditions at the time the projects are projected to be constructed.
- (6) New Pump Station P35A for City water system reliability.
- (7) The proportional cost allocation for the 42-inch diameter pipeline providing system reliability.

Table 14Engineers Opinion of Probable Project Cost Per EDU Summary (\$/ElWest Henderson Water Infrastructure Phasing Strategy Update City of Henderson, Nevada						
1.2	Total Estimated	Equivalen Unit (	t Dwelling (EDU)	Preliminary Cost Per EDU <sup>(2)</sup>		
Phase	Project Cost <sup>(1)</sup> (\$M)	Zone 2630	Zone 2760	Zone 2630	Zone 2760	
1	\$64.4	8,903	8,903	\$2,243	\$3,783	
2	\$50.6	8,903	8,903	\$2,268 + \$410 = \$2,678	3,420 + \$798 = \$4,217	
Total	\$115.0	17,806	17,806		NO P	

Notes:

3

(1) Total estimated project cost, per phase, benefitting West Henderson developers/property owners. Costs reflect current market conditions (2016) and thus do not account for inflation or the projected market conditions at the time the projects are projected to be constructed.

(2) Cost per EDU to be assessed, per pressure zone, for each phase. Cost per EDU reflect current market conditions (2016) and thus do not account for inflation or the projected market conditions at the time the projects are projected to be constructed. Cost per EDU also do not account for additional financing charges to be applied, prior to finalizing the cost per EDU, per pressure zone for each phase.

## **12.0 FINANCING STRATEGY**

The City is considering assuming the responsibility for constructing the infrastructure for Phase 1. If this were to occur, additional costs would need to be included in order to account for escalation in construction costs, the interest payments, and any other financing costs. The City's estimate of adjustments to the \$/EDU costs to account for these factors is included in Appendix E.

**Technical Memorandum** 

**APPENDIX A – STUDY AREA LEGAL DESCRIPTION** 



#### WEST HENDERSON PRESSURE ZONE AREAS

The following describes the 2630 and 2760 Pressure Zones in the West Henderson area located in Sections 3, 4, 8, 9, 10, 11, 14, 15, 16, 17, 20, 21, and 22, Township 23 South, Range 61 East, M.D.M., Clark County, Nevada, described as follows:

The South Half (S 1/2) of Section 3.

TOGETHER WITH: That portion of the North Half (N 1/2) of Section 3, lying southeast of the northwesterly line of Lot 1 of the Henderson Quail Air Center in Book 141, Page 79 of Plats, Clark County, Nevada and the prolongation of said line to the northeasterly line of Lot 1 of the Sage Mountain Commerce Center in Book 111, Page 6 of Plats, Clark County, Nevada and south of the northeasterly and northwesterly lines of said Lot 1 of the Sage Mountain Commerce Center.

TOGETHER WITH: All of the South Half (S 1/2) of Section 4, lying southeast of State Highway 146, also known as the St. Rose Parkway.

TOGETHER WITH: All of Section 8, lying southeast of State Highway 146, also known as the St. Rose Parkway, and east of the easterly right-of-way of I-15.

TOGETHER WITH: All of Section 9, excepting that portion of the Northeast Quarter (NE 1/4) of the Northwest Quarter (NW 1/4) lying northwest of State Highway 146, also known as the St. Rose Parkway.

TOGETHER WITH: All of Section 10.

Together with: The South Half (S 1/2) of the Southwest Quarter (SW 1/4) of the Northeast Quarter (NE 1/4) of the Southwest Quarter (SW 1/4); the West Half (W 1/2) of the Southeast Quarter (SE 1/4) of the Southwest Quarter (SW 1/4); the Southwest Quarter (SW 1/4) of the Southwest Quarter (SW 1/4); the Southwest Quarter (SW 1/4) of the Southwest Quarter (SW 1/4) of the South Half (S 1/2) of the South Half (S 1/2) of the Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4) of Section 11.

TOGETHER WITH: The Northwest Quarter (NW 1/4) of the Northeast Quarter (NE 1/4) of the Southwest Quarter (SW 1/4); the Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4) of the Northeast Quarter (NE 1/4) of the Southwest Quarter (SW 1/4); the Northwest Quarter (NW 1/4) of the Northeast Quarter (NE 1/4) of the Southwest Quarter (SW 1/4) of the Southwest Quarter (SW 1/4); the North Half (N 1/2) of the Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4) of the Southwest Quarter (SW 1/4); the North Half (N 1/2) of the Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4); the Southwest Quarter (SW 1/4); the Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4); the Southwest Quarter (SW 1/4); the Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4); the Southwest Quarter (SW 1/4); the West Half (W 1/2) of the East Half (E 1/2) of the Northwest Quarter (NW 1/4) and the West Half (W 1/2) of the Northwest Quarter (NW 1/4) of Section 14.

TOGETHER WITH: The North Half (N 1/2); the Northeast Quarter (NE 1/4) of the Northeast Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the North Half (N 1/2) of the Southeast

Quarter (SE 1/4) of the Northeast Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the Southeast Quarter (SE 1/4) of the Southeast Quarter (SE 1/4) of the Southeast Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the North Half (N 1/2) of the Northwest Quarter (NW 1/4) of the Northeast Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the Southeast Quarter (SE 1/4) of the Northwest Quarter (NW 1/4) of the Northwest Quarter (NW 1/4) of the Northwest Quarter (SE 1/4); the Northwest Quarter (NW 1/4) of the Northwest Quarter (NW 1/4) of the Southeast Quarter (SE 1/4); the Northwest Quarter (NW 1/4) of the Northwest Quarter (NW 1/4) of the Southeast Quarter (SE 1/4); the Northwest Quarter (NW 1/4) of the Northwest Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the Northwest Quarter (NW 1/4) of the Southeast Quarter (NE 1/4) of the Southeast Quarter (NE 1/4) of the Southeast Quarter (SE 1/4); the Northwest Quarter (NW 1/4) of the Southeast Quarter (SE 1/4); of the Southeast Quarter (SE 1/4); the Southeast Quarter (NW 1/4) of the Southeast Quarter (SE 1/4); the Southeast Quarter (NW 1/4) of the Southeast Quarter (SE 1/4); of the Southeast Quarter (SE 1/4); of the Southeast Quarter (SE 1/4) and the Southwest Quarter (SW 1/4) of Section 15.

TOGETHER WITH: All of Section 16.

TOGETHER WITH: All of Section 17, lying east of the easterly right-of-way of I-15.

TOGETHER WITH: All of Section 20, lying north of the 2663-foot Contour line and east of the easterly right-of-way of I-15.

TOGETHER WITH: All of Section 21, lying north of the 2663-foot Contour line.

TOGETHER WITH: The Northwest Quarter (NW 1/4) of Section 22.

Containing 4847 Acres, more or less.



**Technical Memorandum** 

## APPENDIX B – WEST HENDERSON WATER INFRASTRUCTURE BACKGROUND INFORMATION

B.1 - West Henderson Projected Land Use and EDUs per Zone

- Table B.1.1 2630 Pressure Zone Land Use and Acreage
- Table B.1.2 2630 Pressure Zone EDUs
- Table B.1.3 2760 Pressure Zone Land Use and Acreage
- Table B.1.4 2760 Pressure Zone EDUs
- B.2 West Henderson Water Demand Projections

**Technical Memorandum** 

## APPENDIX B.1 – WEST HENDERSON PROJECTED LAND USE AND EDUS PER ZONE

pw:\\Carollo/Documents\Client/NV/Henderson/10353A00/Deliverables\West Henderson Phasing Update TM (Final-11/2016)

Land Use Type	Inside City	Unincorporated Clark County Area	Total
Very Low Density Residential	0.0	0.0	0.0
Low-Density Residential	335.1	128.8	463.9
Medium-Density Residential	99.7	19.6	119.3
High-Density Residential	97.2	8.5	105.7
Public and Semi-Public	0.0	20.2	20.2
PS – Parks	80.0	0.0	80.0
PS – Schools	70.0	0.0	70.0
PS – Other	352.0	0.0	352.0
Neighborhood Commercial	0.0	0.0	0.0
Commercial	305.9	39.9	345.8
Tourist Commercial	351.0	125.9	476.9
Transit-Oriented Development	0.0	0.0	0.0
Business Industrial	427.9	5.1	433.1
Total Acreage - All Land Uses	2,118.8	348.1	2,466.9

State of the second		Equivalent Dwelling Units (EDUs)		
Land Use Type	EDUs/ Acre	Inside City	Unincorporated Clark County Area	Total
Very Low Density Residential	3.00	0.0	0.0	0.0
Low-Density Residential	8.00	2,681.0	1,030.2	3,711.2
Medium-Density Residential	12.96	1,292.2	254.2	1,546.4
High-Density Residential	18.36	1,783.9	156.1	1,939.9
Public and Semi-Public	14.40	0.0	290.6	290.6
PS – Parks	14.40	1,152.0	0.0	1,152.0
PS – Schools	1.20	84.0	0.0	84.0
PS – Other	7.65	2,692.8	0.0	2,692.8
Neighborhood Commercial	7.65	0.0	0.0	0.0
Commercial	7.65	2,339.8	305.5	2,645.4
Tourist Commercial	7.65	2,685.2	963.3	3,648.4
Transit-Oriented Development	12.96	0.0	0.0	0.0
Business Industrial	0.22	94.2	1.1	95.3
Undefined	0.0	0.0	0.0	0.0
Total EDUs - All Land Uses		14,805	3,001.0	17,806

Table B.1.3         2760 Pressure Zone Land Use and Acreage           West Henderson Water Infrastructure Phasing Strategy Update           City of Henderson, Nevada					
Land Use Type	Inside City	Unincorporated Clark County Area	Total		
Very Low Density Residential	0.0	0.0	0.0		
Low-Density Residential	224.3	4.7	229.0		
Medium-Density Residential	55.2	0.0	55.2		
High-Density Residential	41.5	0.0	41.5		
Public and Semi-Public	0.0	38.5	38.5		
PS – Parks	80.0	0.0	80.0		
PS – Schools	70.0	0.0	70.0		
PS – Other	309.7	0.0	309.7		
Neighborhood Commercial	4.8	0.0	4.8		
Commercial	512.3	0.3	512.6		
Tourist Commercial	186.4	294.8	481.2		
Transit-Oriented Development	186.7	15.5	202.2		
Business Industrial	343.9	0.0	343.9		
Undefined	0.0	14.4	14.4		
Total Acreage - All Land Uses	2,014.8	368.2	2,383.0		

pw:\\Carollo/Documents\Client/NV/Henderson/10353A00/Deliverables\West Henderson Phasing Update TM (Final-11/2016)

Land Upa Tuna		Equivale	nt Dwelling Units	(EDUs)	
Land Use Type	EDUS/Acre	Inside City	Outside City	Total	
Very Low Density Residential	3.00	0.0	0.0	0.0	
Low-Density Residential	8.00	1,794.3	37.9	1,832.2	
Medium-Density Residential	12.96	715.9	0.0	715.9	
High-Density Residential	18.36	762.3	0.0	762.3	
Public and Semi-Public	14.40	0.0	554.3	554.3	
PS – Parks	14.40	1,152.0	0.0	1,152.0	
PS – Schools	1.20	84.0	0.0	84.0	
PS – Other	7.65	2,369.2	0.0	2,369.2	
Neighborhood Commercial	7.65	36.3	0.1	36.4	
Commercial	7.65	3,919.3	2.0	3,921.3	
Tourist Commercial	7.65	1,426.2	2,255.2	3,681.4	
Transit-Oriented Development	12.96	2,419.9	201.1	2,621.0	
Business Industrial	0.22	75.7	0.0	75.7	
Undefined	0.0	0.0	0.0	0.0	
Totals - All Land Uses	A. Barris	14,755.1	3,050.6	17,805.7	

**Technical Memorandum** 

## APPENDIX B.2 – WEST HENDERSON WATER DEMAND PROJECTIONS

<u>Note</u>: West Henderson water demand projections were provided by City of Henderson, Department of Utility Services' staff. These projections were utilized to determine the estimated timeframe for constructing the three phases of the West Henderson water infrastructure.

	Cumulative Growth					Annual Growth					411	
and the second second	Total			mgd			Total	Total	Contraction of the	mgd		1000
1. 1. 1. 1.	Inspirada	Total WH	TOTAL		12.00	Total	Inspirada	WH	TOTAL	12-2-1		Total
Year	EDUs	EDUs	EDUs	Inspirada	WH	mgd	EDUs	EDUs	EDUs	Inspirada	WH	mgd
2016	2,000	769	2,769	2.30	0.86	3.17	2,000	769	2,769	2.30	0.86	3.17
2017	2,600	974	3,574	3.00	1.09	4.09	600	205	805	0.69	0.23	0.92
2018	3,212	1,200	4,412	3.70	1.35	5.05	612	226	838	0.71	0.25	0.96
2019	3,836	1,448	5,284	4.42	1.63	6.05	624	248	872	0.72	0.28	1.00
2020	4,836	1,721	6,557	5.57	1.93	7.50	1,000	273	1,273	1.15	0.31	1.46
2021	5,861	2,022	7,883	6.75	2.27	9.02	1,025	300	1,325	1.18	0.34	1.52
2022	6,912	2,352	9,264	7.96	2.64	10.60	1,051	330	1,381	1.21	0.37	1.58
2023	7,989	2,715	10,704	9.20	3.05	12.25	1,077	363	1,440	1.24	0.41	1.65
2024	9,093	3,115	12,208	10.47	3.50	13.97	1,104	400	1,504	1.27	0.45	1.72
2025	10,224	3,535	13,759	11.78	3.97	15.75	1,131	420	1,551	1.30	0.47	1.77
2026	11,384	3,975	15,359	13.11	4.47	17.58	1,160	441	1,600	1.34	0.50	1.83
2027	12,572	4,438	17,011	14.48	4.99	19.47	1,189	463	1,651	1.37	0.52	1.89
2028	13,500	4,924	18,424	15.55	5.53	21.08	928	486	1,414	1.07	0.55	1.61
2029	13,500	5,434	18,934	15.55	6.10	21.66	0	510	510	0.00	0.57	0.57
2030	13,500	5,970	19,470	15.55	6.71	22.26	0	536	536	0.00	0.60	0.60
2031	13,500	6,532	20,032	15.55	7.34	22.89	0	562	562	0.00	0.63	0.63
2032	13,500	7,123	20,623	15.55	8.00	23.55	0	591	591	0.00	0.66	0.66
2033	13,500	7,728	21,228	15.55	8.70	24.25	0	605	605	0.00	0.70	0.70
2034	13,500	8,379	21,879	15.55	9.43	24.98	0	651	651	0.00	0.73	0.73
2035	13,500	9,062	22,562	15.55	10.20	25.75	0	684	684	0.00	0.77	0.77
2036	13,500	9,780	23,280	15.55	11.00	26.55	0	718	718	0.00	0.81	0.81
2037	13,500	10,534	24,034	15.55	11.85	27.40	0	754	754	0.00	0.85	0.85
2038	13,500	11,326	24,826	15.55	12.74	28.29	0	791	791	0.00	0.89	0.89
2039	13,500	12,157	25,657	15.55	13.67	29.22	0	831	831	0.00	0.93	0.93
2040	13,500	13,029	26,529	15.55	14.65	30.20	0	873	873	0.00	0.98	0.98
2041	13,500	13,945	27,445	15.55	15.68	31.23	0	916	916	0.00	1.03	1.03
2042	13,500	14,907	28,407	15.55	16.76	32.31	0	962	962	0.00	1.08	1.08
2043	13,500	15,917	29,417	15.55	17.90	33.45	0	1,010	1,010	0.00	1.13	1.13

MDD EDU: 0.78 gpm/EDU

pw:\\Carollo/Documents\Client/NV/Henderson/10353A00/Deliverables\West Henderson Phasing Update TM (Final-11/2016)

**Technical Memorandum** 

## APPENDIX C – WEST HENDERSON WATER INFRASTRUCTURE PLANNING ASSUMPTIONS

The following assumptions were used in the West Henderson Water Infrastructure Phasing Strategy Update:

- The land use assumptions and EDUs per acre were based on the City's land use plan and estimated EDU factors.
- The maximum day demand for West Henderson was calculated using 0.78 gpm per EDU.
- Interim demands for Phase 1 and Phase 2 were distributed evenly between Pressure Zones 2630 and 2760.
- 4. The "backbone" infrastructure installed in Phase 1 is sized for buildout conditions.
- 5. Storage capacity requirements for West Henderson are based on providing 35% of maximum day demands. Storage capacity requirements for added City water system reliability are based on providing 65% of maximum day demands. Therefore the total storage volume for new reservoirs serving West Henderson will provide volume equivalent to one day of maximum day demand.

Technical Memorandum

# **APPENDIX D – DETAILED COST ESTIMATES**



Client: City of Location: Hend Zip Code: 89052 Carollo Job 10353 NO. 1 Pipelind 16-Inch 30-Inch 36-Inch 42-Inch 2 Reserv R-35 (M R-42 (M R-43 (M R-36 A	Pipelines (ft) Pipeli	Jpdate	PM: Date: By: Reviewed: 23,486 2,349 4,411 5.0 5.0 5.0 5.0	Wesley November 7, 2016 Wesley EJM/LMF TOTAL \$1,408,000 \$7,750,278 \$930,153 \$2,038,099 \$5,500,000 \$5,500,000
Location: Hend Zip Code: 89052 Carollo Job 10353 NO. 1 Pipelind 16-Inch 30-Inch 36-Inch 42-Inch 2 Reserv R-35 (M R-43 (M R-43 (M R-36A) 3 Pump \$	Pipelines (ft) Pipeli		Date: By: Reviewed: 23,486 2,349 4,411 5.0 5.0 5.0	November 7, 2016 Wesley EJM/LMF TOTAL \$1,408,000 \$7,750,278 \$930,153 \$2,038,099 \$5,500,000 \$5,500,000
Zip Code: 89052 Carollo Job 10353 NO. 1 Pipeline 16-Inch 30-Inch 36-Inch 42-Inch 2 Reserv R-35 (M R-42 (M R-43 (M R-36A) 3 Pump \$	Pipelines (ft) Pipeli		By: Reviewed: 8,000 23,486 2,349 4,411 5.0 5.0 5.0	Wesley EJM/LMF TOTAL \$1,408,000 \$7,750,278 \$930,153 \$2,038,099 \$5,500,000 \$5,500,000
Carollo Job         10353           NO.         1           1         Pipeline           16-Inch         30-Inch           30-Inch         36-Inch           2         Reserv           R-35 (M         R-42 (M           R-43 (M         R-36A           3         Pump \$	BA.00  DESCRIPTION  Pipelines (ft)  Pipelines (ft)  Pipelines (ft)  Pipelines (ft)  Dir Storage (MG)  IG) IG) IG) IG) IMG)		Reviewed: 8,000 23,486 2,349 4,411 5.0 5.0 5.0 5.0	EJM/LMF TOTAL \$1,408,000 \$7,750,278 \$930,153 \$2,038,099 \$5,500,000 \$5,500,000
NO.           1         Pipeline           16-Inch         30-Inch           36-Inch         42-Inch           2         Reserv           R-35 (M         R-42 (M           R-43 (M         R-36A           3         Pump \$	DESCRIPTION Pipelines (ft) Pipelines (ft) P		8,000 23,486 2,349 4,411 5.0 5.0 5.0 5.0	TOTAL \$1,408,000 \$7,750,278 \$930,153 \$2,038,099 \$5,500,000 \$5,500,000
1         Pipeline           16-Inch         30-Inch           30-Inch         36-Inch           2         Reserv           2         Reserv           R-35 (M         R-42 (M           R-43 (M         R-36A           3         Pump \$	Pipelines (ft) Pipelines (ft) Pipelines (ft) Pipelines (ft) Dir Storage (MG) IG) IG) IG) IG)		8,000 23,486 2,349 4,411 5.0 5.0 5.0	\$1,408,000 \$7,750,278 \$930,153 \$2,038,099 \$5,500,000 \$5,500,000
1 Pipeline 16-Inch 30-Inch 36-Inch 42-Inch 2 Reserv R-35 (M R-42 (M R-43 (M R-36 A 3 Pump \$	Pipelines (ft) Pipelines (ft)		8,000 23,486 2,349 4,411 5.0 5.0 5.0	\$1,408,000 \$7,750,278 \$930,153 \$2,038,099 \$5,500,000 \$5,500,000
16-Inch 30-Inch 36-Inch 42-Inch 2 Reserv R-35 (M R-35 (M R-43 (M R-43 (M R-36A) 3 Pump \$	Pipelines (ft) Pipelines (ft) Pipelines (ft) Pipelines (ft) Dir Storage (MG) MG) MG) MG)		8,000 23,486 2,349 4,411 5.0 5.0 5.0	\$1,408,000 \$7,750,278 \$930,153 \$2,038,099 \$5,500,000 \$5,500,000
30-Inch 36-Inch 42-Inch 2 Reserv R-35 (M R-42 (M R-43 (M R-36A) 3 Pump \$	Pipelines (ft) Pipelines (ft) Pipelines (ft) Dir Storage (MG) IG) IG) IG) IG)		23,486 2,349 4,411 5.0 5.0 5.0	\$7,750,278 \$930,153 \$2,038,099 \$5,500,000 \$5,500,000
2 Reserv 2 Reserv R-35 (M R-42 (M R-43 (M R-36A) 3 Pump \$	Pipelines (ft) Pipelines (ft) oir Storage (MG) IG) IG) IG) MG)		2,349 4,411 5.0 5.0 5.0	\$930,153 \$2,038,099 \$5,500,000 \$5,500,000
2 Reserv 2 Reserv R-35 (M R-42 (M R-43 (M R-36A 3 Pump \$	Pipelines (ft) pir Storage (MG) IG) IG) IG) IG) IG)		4,411 5.0 5.0 5.0	\$2,038,099 \$5,500,000 \$5,500,000
2 Reserv R-35 (M R-42 (M R-43 (M R-36A 3 Pump \$	bir Storage (MG) IG) IG) IG) MG)		5.0 5.0 5.0	\$5,500,000 \$5,500,000
R-35 (M R-42 (M R-43 (M R-36A 3 Pump \$	IG) IG) IG) IG) MG)		5.0 5.0 5.0	\$5,500,000 \$5,500,000
R-42 (N R-43 (N R-36A 3 Pump \$	1G) 1G) MG)		5.0 5.0	\$5,500,000
R-43 (M R-36A 3 Pump \$	1G) MG)		5.0	05 500 500
8-36A	(MG)	1.1		\$5,500,000
3 Pump S			5.0	\$5,500,000
	stations (MGD)			Contraction of the second
COH B	ermuda (MGD)	EN CONTRACTS	20.0	\$13,000,000
P-42 (N	IGD)	and the second second	5.0	\$3,250,000
P-35 (N	IGD)	and the	5.0	\$3,250,000
A Land A	caulsition	Contraction of the		\$1 500 000
4 Land A				\$1,000,000
	TOTAL DIRE	ECT COST	and the second	\$55,126,529
Conting	lency	in the contract of	8.0%	\$4,410,122
		Subtotal	Pres in the	\$59,536,652
Genera	I Contractor Overhead, Profit & Risk		10.0%	\$5,953,665
NR LATIN		Subtotal	a section and	\$65,490,317
Escalat	ion to Mid-Point		0.0%	\$0
		Subtotal		\$65,490,317
Sales T	ax (Based on 89052)		8.1%	\$5,304,716
R. R. L. M. C. R.	B. A MARTINE	Subtotal		\$70,795,033
Bid Ma	ket Allowance		5.0%	\$3,539,752
TOTAL	ESTIMATED CONSTRUCTION COS	т		\$74,334,784
Facia	paring Lagel 9 Administration Food	1945-194	12.0%	\$9 020 174
Owne	er's Reserve for Change Orders		5.0%	\$3,716,739
				400.074.007
TOTAL	ESTIMATED PROJECT COST	Sec. No.	and the second second	\$86,971,697

variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.



Project: Client: Location: Zip Code: Carollo Job	PROJECT SUMM West Henderson PHASE 2 City of Henderson Water Infrastucture U Henderson, NV 89052 10353A.00	ARY pdate	Estimate Class: CSM: PM: Date: By: Reviewed:	5 Freestone Wesley November 7, 2016 Wesley EJM/LMF
NO.	DESCRIPTION			TOTAL
1	Pipelines			
	16-Inch Pipelines (ft)		-	\$0
	30-Inch Pipelines (ft)			\$0
	36-Inch Pipelines (ft)			\$0
	42-Inch Pipelines (ft) - West Henderson		15,700	\$4,144,800
	42-Inch Pipelines (ft) - System Reliability		15,700	\$3,108,600
2	Reservoir Storage (MG)		1	3
	R-35 (MG) - Expansion		5.0	\$5,500,000
	R-42 (MG) - Expansion		5.0	\$5,500,000
	R-43 (MG) - Expansion		5.0	\$5,500,000
	R-36A (MG) - Expansion		5.0	\$5,500,000
3	Pump Stations (MGD)			and the second
	Horizon Ridge for West Henderson Portion (	MGD)	20.0	\$13,000,000
	Horizon Ridge for System Reliability (MGD)		15.0	\$9,750,000
5 × 3	P-42 (MGD) - Expansion		5.0	\$3,250,000
22	P-35 (MGD) - Expansion		5.0	\$3,250,000
and the second	P-35 (MGD) - for System Reliability		15.0	\$9,750,000
4	Land Acquisition			\$750,000
-	TOTAL DIF	RECT COST		\$69,003,400
10.00	Contingency		8.0%	\$5,520,272
1.1.1.1.1.1		Subtotal	THE REPORT	\$74,523,672
	General Contractor Overhead, Profit & Risk		10.0%	\$7,452,367
		Subtotal		\$81,976,039
	Escalation to Mid-Point		0.0%	SC
		Subtotal		\$81,976,039
	Sales Tax (Based on 89052)		8.1%	\$6,640,059
1		Subtotal		\$88,616,098
	Bid Market Allowance		5.0%	\$4,430,805
	TOTAL ESTIMATED CONSTRUCTION CO	ST		\$93,046,903
	Engineering, Legal & Administration Fees	-	12.0%	\$11,165,628
	Owner's Reserve for Change Orders		5.0%	\$4,652,345
	TOTAL ESTIMATED PROJECT COST	1	Torona Maria	\$108.864.877

of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment, nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

THE REAL PROPERTY OF THE REAL PROPERTY OF	San Print Print Print Print	ALC: NOT THE OWNER.		263	0 Pressure Zo	ine Cost	276	Pressure Zo	ne Cost
Phase 1 Infrastructure	Size	Unit	Cost	Cost (S)	EDUs	Cost per EDU (\$)	Cost (\$)	EDUs	Cost per EDU (\$)
Pump Stations:	1		1923 4.4 1 2 2 3			ACCOUNTS ON THE OWNER.			
COH Bermuda PS - Construction cost	20.0	MGD	\$17,529,712				-	and the second second	and a state of the state of the
COH Bermuda PS - Eng, Admin (12%) + C.O. (5%)			\$2,980,051			W Tool Wall and Wall	Second Contraction	and the second	
COH Bermuda PS - Project cost		_	\$20,509,763	\$10,254,882	8,903	\$1,152	\$10,254,882	8,903	\$1,15
P35 + P42 - Construction cost	10.0	MGD	\$8,764,856				-		The second s
P35 + P42 - Eng, Admin (12%) + C.O. (5%)			\$1,490,026				Line of the local data	And in the owner of	and the second s
P35 + P42 - Project cost			\$10,254,882	\$0	0	\$0	\$10,254,882	8,903	\$1,15
Reservoirs:			1.1.1.1				17 States	1 140.0	
R35 + R42 - Construction cost <sup>(3)</sup>	3.5	MG	\$5,191,492	1.20		1	-	-	And the second second
R35 + R42 - Eng, Admin (12%) + C.O. (5%)			\$882,554			Supervised in succession	-	and the second s	
R35 + R42 - Project cost			\$6,074,045	\$6,074,045	8,503	\$682	\$0	\$0	\$1
R36A + R43 - Construction cost <sup>(1)</sup>	3.5	MG	\$5,191,492				-		
R36A + R43 - Eng, Admin (12%) + C.O. (5%)			\$882,554				-	-	
R36A + R43 - Project cost			\$6,074,045	\$0	0	50	\$6,074,045	8,903	\$68
Pipelines:								-	
16-inch diameter line (P35-toR36)	8,000	LF	\$1,408,000	50		-	\$1,408,000	17,806	The second second
30-inch diameter line (8PS-to-R35)	8,416	LF	\$2,777,363	\$1,388,681	17,806	the second second	\$1,388,681	17,806	
30-inch diameter line (BPS-to-R42)	15,069	LF	\$4,972,915	\$2,486,458	17,806	-	\$2,486,458	17,806	Constant Street Street
36-in diameter line (P42-to-R43)	2,349	LF	\$930,153	\$0			\$930,153	17,806	
42-inch diameter line (P42-to-R43)	4,411	LF	\$2,038,099	\$0		The second s	\$2,038,099	17,806	Statistics and
Total Pipeline Direct Cost	and the second s	and the state	\$12,126,529	\$3,875,139		and an other state	\$8,251,391	-	Sector Sector
Total Pipelines - Construction Cost	5		\$16,351,890	\$5,225,390			\$11,126,500	Section of the local diversion of the	
Total Pipelines - Eng, Admin (12%) + C.O. (5%)			\$2,779,821	\$888,316		and the second s	\$1,891,505	State of the	No. of Concession, Name
Total Pipelines - Project cost			\$19,131,711	\$6,113,706	17,806	\$343	\$13,018,005	17,806	\$73
Land:								1	Constant of the
Land Acquisition - Construction Cost	2	LS	\$2,022,659	-		The second second	State State State		Contraction of the
Land Acquisition - Eng, Admin (12%) + C.O. (5%)			\$343,852			Sul Man Hersel	-	-	
Land Acquisition - Project cost			\$2,366,511	\$1,183,256	17,805	\$66	\$1,183,256	17,806	\$6
TOTAL COST - DEVELOPER PARTICIPA	TION		\$64,410,958	\$23,625,889	-	The supervised and the supervised of the supervi	\$40,785,069	1.10	And a state of the lot of the

EDU Rate - Phase 1 EDU Rate - Phase 1 and 2 Total Assessment

8903 17806

\$1,834		
\$410		
\$2,244		

\$2,986 \$798 \$3,783

West Henderson Backbone Water Inf Delineation By Pressure 2	rastructure - 2 Ione (City Parti	0 MGD To icipation)	otal w/ Cost
Phase 1 Infrastructure	Size	Unit	Cost
Reservoirs:			
R35 + R42 - Construction cost <sup>(1)</sup>	6.5	MG	\$9,641,342
R35 + R42 - Eng, Admin (12%) + C.O. (5%)			\$1,639,028
R35 + R42 - Project cost			\$11,280,370
R36A + R43 - Construction cost <sup>(1)</sup>	6.5	MG	\$9,641,342
R36A + R43 - Eng, Admin (12%) + C.O. (5%)			\$1,639,028
R36A + R43 - Project cost			\$11,280,370
TOTAL COST CITY PARTICIPA	ATION	10000	\$22,560,740

Notes:

 Notes:

 (1) City is agreeable to pay for the "oversizing costs" associated with the increased volume for West Henderson reservoirs (for system reliability). Oversizing amount is equal to the difference between the current reservoir sizing criteria of 2x Operational Storage (i.e. (PHD - MDD) x 6-hours) and the new proposed criteria for West Henderson of one MDD.

 - MDD = Maximum Day Demand; PHD = Peak Hour Demand

 - Operational Storage = 2 x ((PHD - MDD) x 6-hours) = 2 x (0.7 MDD + 1.0 MDD) x 6-hours) = 2 x (0.7 MDD x 0.25) = 2 x 0.175 MDD = 0.35 MDD

 - Difference = 1.0 MDD = 0.65 MDD

Ph I Cost Est - Developer Contribution 10-31-16	\$64,410
Ph I Cost Est - City Contribution 10-31-16	\$22,560
TOTAL PROJECT COST - PHASE 1	\$86.971

10,958 50,740 71,697

PHASE 2 - West Henderson Backbone Water Infrastructure - 20 MGD Total w/ Cost Delineation By Pressure Zone									
Carl Courses and Carl Courses and Carl Courses	SUC SUC	J.B.S.C.S.S.S.	St. Coloradora	253	Pressure Zo	ine Cost	276	O Pressure Zo	ne Cost
Phase 2 Infrastructure	Size	Unit	Cost	Cost (S)	EDUs	Cost per EDU (\$)	Cost (\$)	EDUs	Cost per EDU (\$)
Pump Stations:				A State State		Margaret and Party	A CONTRACTOR	and the second	
COH Horizon Ridge P5 - Construction cost	20.0	MGD	\$17,529,712	-		AVAILABLE AVAILABLE	-	-	A CONTRACTOR OF STREET
COH HR PS - Eng, Admin (12%) + C.O. (5%)			\$2,980,051	and the second second		IN THE REAL		A CONTRACT	
COH Horizon Ridge PS - Project cost			\$20,509,763	\$10,254,882	8,903	\$1,152	\$10,254,882	8,903	\$1,152
P35 + P42 - Construction cost (EXPANSION)	10.0	MGD	\$8,764,856	-				-	
P35 + P42 - Eng, Admin (12%) + C.O. (5%)			\$1,490,026	-	-	Two readers to	and the second s		and the second second
P35 + P42 - Project cost		-	\$10,254,882	\$0	0	50	\$10,254,882	8,903	\$1,152
Reservoirs:			11						
R35 + R42 - Construction cost (EXPANSION)	3.5	MG	\$5,191,492			Course and the	Maryle Marine	1.1.1	and the second s
R35 + R42 - Eng, Admin (12%) + C.O. (5%)			\$882,554				State of the State of the		
R35 + R42 - Project cost			\$6,074,045	\$6,074,045	8,903	\$682	\$0	\$0	\$0
R36A + R43 - Construction cost (EXPANSION)	3.5	MG	\$5,191,492			-	The second s		Carlo Carlos
R36A + R43 - Eng, Admin (12%) + C.O. (5%)			\$882,554			Careford Design		a local and the	
R36A + R43 - Project cost			\$6,074,045	\$0	٥	\$0	\$6,074,045	8,903	\$682
Pipelines:	-							-	
16-inch diameter line (P35-toR36)	0	LF	\$0	\$0		and the local data	50	Lawrence and	
30-inch diameter line (BPS-to-R35)	0	LF	\$0	50		COMPANY OF A	\$0	-	
30-inch diameter line (BPS-to-R42)	0	LF	\$0	\$0			\$0	Che and the second	
36-in diameter line (P42-to-R43)	0	LF	\$0	\$0			50		The second second
42-inch diameter line (P42-to-R43)	15,700	LF	\$4,144,800	\$2,072,400			\$2,072,400		MARKS SHOWING
Total Pipeline Direct Cost	1.1.1.1		\$4,144,800	52,072,400		A DESCRIPTION OF THE	\$2,072,400	ANTENA S	States and states and
Total Pipelines - Construction Cost			\$5,589,012	\$2,794,506		mene alle and the	\$2,794,506	and the second second second	
Total Pipelines - Eng, Admin (12%) + C.O. (5%)		1.	\$950,132	\$475,066			\$475,066	The second second	Section Sectio
Total Pipelines - Project cost	and a second		\$6,539,144	\$3,269,572	8,903	\$367	\$3,269,572	8,903	\$367
Land:		1 - 1					4	1	The second
Land Acquisition - Construction Cost	1	LS	\$1,011,330	-			Contraction of	11-11-3	1
Land Acquisition - Eng, Admin (12%) + C.O. (5%)			\$171,926	1-	han and the	Manufacture data	-	and the	
Land Acquisition - Project cost			\$1,183,256	\$591,628	8,903	\$66	\$591,628	8,903	\$66
TOTAL COST - DEVELOPER PARTICIPA	TION	A PROPERTY	\$50,635,135	\$20,190,127	-	ALL STREET, ST	\$30,445,008	-	State of the state

EDU Rate - Phase 1 (Prop. of pipelines & land) EDU Rate - Phase 2 **Total Assessment** 

West Henderson Backbone Water Infrastructure - City Participation (System Reliability)						
Phase 2 Infrastructure	Size	Unit	Cost			
Pump Stations:						
COH Horizon Ridge PS - Construction cost	15.0	MGD	\$13,147,284			
COH HR PS - Eng, Admin (12%) + C.O. (5%)			\$2,235,038			
COH Horizon Ridge PS - Project cost			\$15,382,322			
P35A	15.0	MGD	\$13,147,284			
P35 + P42 - Eng, Admin (12%) + C.O. (5%)			\$2,235,038			
P35A			\$15,382,322			
Reservoirs:						
R35 + R42 - Construction cost (EXPANSION)	6.5	MG	\$9,641,342			
R35 + R42 - Eng, Admin (12%) + C.O. (5%)			\$1,639,028			
R35 + R42 - Project cost			\$11,280,370			
R36A + R43 - Construction cost (EXPANSION)	6.5	MG	\$9,641,342			
R36A + R43 - Eng, Admin (12%) + C.O. (5%)			\$1,639,028			
R36A + R43 - Project cost			\$11,280,370			
Pipelines:		-				
42-inch diameter line (P42-to-R43)	15,700	LF	\$3,108,600			
Total Pipeline Direct Cost			\$3,108,600			
Total Pipelines - Construction Cost			\$4,191,759			
Total Pipelines - Eng, Admin (12%) + C.O. (5%)			\$712,599			
Total Pipelines - Project cost			\$4,904,358			
TOTAL COST CITY PARTICIPATION	Contract and	fice and	\$58,229,742			

8903

8903

Notes:

Note:
 (1) City is agreeable to pay for the "oversizing costs" associated with the increased volume for West Henderson reservoirs (for system reliability). Oversizing amount is equal to the difference between the current reservoir sizing criteria of 2x Operational Storage (i.e. (PHD - MDD) x 6-hours) and the new proposed criteria for West Henderson of one MDD.
 MDD = Maximum Day Demand; PHD = Peak Hour Demand
 Operational Storage 2 x ((PHD - MDD) x 6-hours) = 2 x (0.7 MDD × 0.25) = 2 x 0.175 MDD = 0.35 MDD
 Difference = 1.0 MDD - 0.35 MDD = 0.65 MDD

Phase 1 Cost Est (10-31-16) Phase 2 Cost Est (10-31-16) TOTAL COST CONTRIBUTION

City Contribution \$22,560,740 Developer Contribution \$64,410,958 \$58,229,742 \$50,635,135 \$80,790,482 \$115,046,093

Total Project Cost \$86,971,697 \$108,864,877 \$195,836,574

\$410 \$2,268

\$3,420

\$798

**Technical Memorandum** 

**APPENDIX E – WEST HENDERSON FINANCIAL ANALYSIS** 



CITY OF HENDERSON 240 Water Street P. O. Box 95050 Henderson, NV 89009

December 13, 2016

Lisa M. Freestone, P.E., Vice President Carollo Engineers, Inc. 376 East Warm Springs Road, Suite 250 Las Vegas, Nevada 89119

#### Subject: West Henderson Water Infrastructure Phasing Strategy Update 2630 and 2760 PZ Rate Adjustments

Dear Ms. Freestone:

As we've discussed to date, we have utilized the phase 1 water backbone infrastructure costs reflected in the subject draft report, dated August 2016, and based on that information, we have added a 1.5% inflation factor to those costs. This additional inflation factor is necessary in order to account for the projected timeframes when it is anticipated the City will be constructing the associated infrastructure. Additionally, the ordinance authorizes the City Manager to adjust rates on an annual basis. This will enable the City to recover costs associated with financing over a 20-year period at 2%.

Taking into account the above additional considerations, please see the adjusted rates, on a \$/EDU basis, for the 2630 and 2760 pressure zones.

Ms. Lisa Freestone December 13, 2016 Page Two

Phase 1 Cost per EDU (\$/EDU) - 2630 and 2760 PZs West Henderson Water Infrastructure Phasing Strategy Update City of Henderson Nevada									
Phase 1	Equivalent Dwelling Unit (EDU)	Total Cost based on 2016 Dollars	Total Cost based on 2016 Dollars Inflated to Construction Timeframe	Inflated Constructio					
Zone 2630	8,903	\$ 16,328,928	\$ 18,928,675	\$	2,126				
Zone 2630	17,806	\$ 7,296,962	\$ 8,076,125	\$	454				
Totals per Zone 2630		\$ 23,625,890	\$ 27,004,800	\$	2,580				
Zone 2760	8,903	\$ 26,583,810	\$ 30,680,706	\$	3,446				
Zone 2760	17,806	\$ 14,201,261	\$ 15,726,039	\$	883				
Totals per Zone 2760		\$ 40,785,071	\$ 46,406,745	\$	4,329				

Please don't hesitate in calling me if you have any questions.

Sincerely,

Kyle R. Okaniura, P.E. Deputy Director – Utility Planning & Business Operations

KO:an