APPENDIX A – WATER QUALITY REGULATIONS

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A.1 OVERVIEW

A number of drinking water regulations apply to the City of Goodyear's current and potential future water treatment operations. Certain rules, such as the MDBP regulations, dictate finished water quality requirements while others, such as the Unregulated Contaminant Monitoring Rule (UCMR) impose monitoring requirements on the water system for contaminants not yet regulated. The regulations relevant to Goodyear include:

- National Primary and Secondary Drinking Water Regulations
- Regulations pertaining to chemical contaminants
  - Lead and Copper Rule (LCR)
  - Radionuclides Rule
  - Arsenic Rule
- MDBP Regulations / Regulations pertaining to microbial contaminants and disinfection byproducts.
  - Surface Water Treatment Rule (SWTR)
  - Interim Enhanced Surface Water Treatment Rule (IESWTR)
  - Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)
  - Stage 1 and Stage 2 Disinfectants/Disinfection By-Products Rule (D/DBPR)
  - Total Coliform Rule (TCR)
  - Filter Backwash Recycling Rule (FBRR)
- Regulations pertaining to monitoring of unregulated contaminants
  - Unregulated Contaminant Monitoring Program (UCMR)
- Future regulations pertaining to contaminants of emerging concern (CECs)
- Compliance with each of these regulations is discussed in the following sections.

A.1.1 National Primary and Secondary Drinking Water Regulations

The National Primary Drinking Water Regulations (NPDWRs) established by the Environmental Protection Agency (EPA), are legally enforceable primary standards intended to protect the public from consuming water containing contaminants that present a risk to human health. The regulations set maximum contaminant levels (MCLs), maximum contaminant level goals (MCLGs), and treatment technique requirements for a total of 87 contaminants.

Secondary regulations are not legally enforceable, and function as guidelines for water utilities to provide aesthetically pleasing drinking water. Taste and odor, for example, is an aesthetic issue, as opposed to a health issue, and secondary drinking water regulations are therefore applicable. The secondary standards set secondary MCLs for a total of 15 compounds that do not present a health risk at these levels.

The primary and secondary drinking water standards are presented in Table A.1.

Table A.1 Finished Water Quality Standards and Goals
2016 Integrated Water Master Plan
City of Goodyear

Parameter (mg/L unless otherwise noted)	EPA Primary MCL	EPA Secondary MCL	EPA MCLG	Arizona Primary MCL
GENERAL WATER QUALITY PARAMETERS				
Turbidity (NTU) (1)	0.3	None	None	0.3
Alkalinity (as $CaCO_3$)	None	None	None	None
Color (Color Units)	None	15	None	None
Conductivity (µmho/cm)	None	None	None	None
Corrosivity	None	Non-corrosive	None	None
Foaming Agents	None	0.5	None	None
pH (units)	None	6.5-8.5	None	None
Total Dissolved Solids	None	500	None	None
Hardness (as $CaCO_3$)	None	None	None	None
TASTE AND ODOR				
Odor (Threshold Odor Unit)	None	3	None	None
MIB (ng/L) (1)(2)	None	None	None	None
Geosmin (ng/L) (1)(2)	None	None	None	None
MICROBIOLOGICAL CONTAMINANTS				
Total Coliform (#/mL)	<5% Positive	None	Zero	<5% Positive
Standard Plate Counts (cfu/mL)	TT	None	None	None
Giardia lamblia (cyst/100L)	TT	None	Zero	None
Cryptosporidium (oocyst/100L) (1)	TT	None	Zero	None
Viruses (#/mL)	TT	None	Zero	None
Legionella (#/mL)	TT	None	Zero	None

Table A.1 Finished Water Quality Standards and Goals 2016 Integrated Water Master Plan City of Goodyear				
Parameter (mg/L unless otherwise noted)	**EPA Primary MCL**	**EPA Secondary MCL**	**EPA MCLG**	**Arizona Primary MCL**
DISINFECTION BY-PRODUCTS				
Total Trihalomethanes (1)	0.080 LRAA	None	None	0.10
Haloacetic acids(5) (1)	0.060 LRAA	None	None	None
Bromate (3)	0.010	None	Zero	None
Chlorite	1.0	None	0.8	None
DBP PRECURSOR				
Total Organic Carbon	TT	None	None	None
DISINFECTANT RESIDUAL				
Free Chlorine	4.0	None	4.0	None
Chloramine (as free chlorine)	4.0	None	4.0	None
Chlorine dioxide	0.8	None	0.8	None
INORGANIC				
Aluminum	None	0.05-0.2	None	None
Antimony	0.006	None	0.006	0.006
Arsenic	0.010	None	Zero	0.05
Asbestos (million/L)	7	None	7	7
Barium	2.0	None	2.0	2.0
Beryllium	0.004	None	0.004	0.004
Cadmium	0.005	None	0.005	0.005
Chloride	None	250	None	None
Chromium	0.1	None	0.1	0.1
Copper	TT AL=1.3	1	1.3	None
Cyanide	0.2	None	0.2	0.2
Fluoride	4.0	2.0	4.0	4.0
Iron	None	0.3	None	None
Lead	TT AL=0.015	None	Zero	None

Table A.1 Finished Water Quality Standards and Goals 2016 Integrated Water Master Plan City of Goodyear				
Parameter (mg/L unless otherwise noted)	**EPA Primary MCL**	**EPA Secondary MCL**	**EPA MCLG**	**Arizona Primary MCL**
Manganese	None	0.05	None	None
Mercury	0.002	None	0.002	0.002
Nickel (4)	None	None	None	None
Nitrate (as N)	10	None	10	10
Nitrite + Nitrate (as N)	10	None	10	10
Nitrite (as N)	1	None	1	1
Selenium	0.05	None	0.05	0.05
Silver	None	0.1	None	None
Sulfate	None	250	500	None
Thallium	0.002	None	0.0005	0.002
Zinc	None	5	None	None
RADIONUCLIDES				
Beta Particle and Photon Emitters (millirem/yr)	4	None	None	4
Combined Radium-226 + 228 (pCi/L)	5	None	None	5
Gross Alpha (pCi/L)	15	None	None	15
Radon (pCi/L) (5)	None	None	Zero	None
Strontium 90 (pCi/L)	None	None	None	8
Tritium (pCi/L)	None	None	None	**20,000**
Uranium (µg/L)	30	None	Zero	None

Table A.1 Finished Water Quality Standards and Goals 2016 Integrated Water Master Plan City of Goodyear				
Parameter (mg/L unless otherwise noted)	**EPA Primary MCL**	**EPA Secondary MCL**	**EPA MCLG**	**Arizona Primary MCL**
ORGANICS				
Volatile Organics				
Benzene	0.005	None	Zero	0.005
Carbon Tetrachloride	0.005	None	Zero	0.005
Dichloroethane (1,2-)	0.005	None	Zero	0.005
Dichloroethylene (1,1-)	0.007	None	0.007	0.007
Dichloroethylene (cis-1,2-)	0.07	None	0.07	0.07
Dichloroethylene (trans-1,2-)	0.1	None	0.1	0.1
Dichloromethane	0.005	None	Zero	0.005
Dichloropropane (1,2-)	0.005	None	Zero	0.005
Dichloropropene (1,3-)	None	None	None	None
Ethylbenzene	0.7	None	0.7	0.7
m-Dichlorobenzene	None	None	None	None
Monochlorobenzene	0.1	None	0.1	0.1
o-Dichlorobenzene	0.6	None	0.6	0.6
p-Dichlorobenzene	0.075	None	0.075	0.075
Styrene	0.1	None	0.1	0.1
Tetrachloroethylene	0.005	None	Zero	0.005
Toluene	1	None	1	1
Trichlorobenzene (1,2,4-)	0.07	None	0.07	0.07
Trichloroethane (1,1,2-)	0.005	None	0.003	0.005
Trichloroethane (1,1,1-)	0.2	None	0.2	0.2
Trichloroethylene (TCE)	0.005	None	Zero	0.005
Vinyl Chloride	0.002	None	Zero	0.002
Xylenes (Total)	10	None	10	10

Table A.1 Finished Water Quality Standards and Goals 2016 Integrated Water Master Plan City of Goodyear				
Parameter (mg/L unless otherwise noted)	**EPA Primary MCL**	**EPA Secondary MCL**	**EPA MCLG**	**Arizona Primary MCL**
Synthetic Organics				
2,3,7,8-TCDD (Dioxin)	$3x10^{-8}$	None	Zero	$3x10^{-8}$
2,4,5-TP (Silvex)	0.05	None	0.05	0.05
2,4-D	0.07	None	0.07	0.07
Acifluorfen	None	None	Zero	None
Acrylamide	TT	None	Zero	None
Acrylonitrile	None	None	Zero	None
Alachlor (Lasso)	0.002	None	Zero	0.002
Aldicarb (Tenik) (6)	0.003	None	0.001	None
Aldicarb Sulfone (6)	0.003	None	0.001	None
Aldicarb Sulfoxide (6)	0.004	None	0.001	None
Atrazine (Atranex, Crisazina)	0.003	None	0.003	0.003
Bentazon	None	None	None	None
Benzoapyrene (PAH)	0.0002	None	Zero	0.0002
Carbofuran (Furadan 4F)	0.04	None	0.04	0.04
Chlordane	0.002	None	Zero	0.002
Cyanazine	None	None	0.001	None
Dalapon	0.2	None	0.2	0.2
Di(2-ethylhexyl) adipate	0.4	None	0.4	0.4
Dibromochloropropane	0.0002	None	Zero	0.0002
Diethylhexyl Phthalate	0.006	None	Zero	0.006
Dinoseb	0.007	None	0.007	0.007
Diquat	0.02	None	0.02	0.02
Endothall	0.1	None	0.1	0.1
Endrin	0.002	None	0.002	0.002
Epichlorohydrin	TT	None	Zero	None
Ethylene Dibromide	0.00005	None	Zero	0.00005
Glyphosate	0.7	None	0.7	0.7
Heptachlor Epoxide	0.0002	None	Zero	0.0002

Table A.1 Finished Water Quality Standards and Goals 2016 Integrated Water Master Plan City of Goodyear				
Parameter (mg/L unless otherwise noted)	**EPA Primary MCL**	**EPA Secondary MCL**	**EPA MCLG**	**Arizona Primary MCL**
Heptachlor (H-34,Heptox)	0.0004	None	Zero	0.0004
Hexachlorobenzene	0.001	None	Zero	0.001
Hexachlorobutadiene	None	None	0.001	None
Hexachlorocyclopentadiene	0.05	None	0.05	0.05
Lindane	0.0002	None	0.0002	0.0002
Methoxychlor (Marlate)	0.04	None	0.04	0.04
Oxamyl (Vydate)	0.2	None	0.2	0.2
Pentachlorophenol	0.001	None	Zero	0.001
Phenols	None	None	None	None
Picloram	0.5	None	0.5	0.5
Polychlorinated Biphenyls	0.0005	None	Zero	0.0005
Simazine	0.004	None	0.004	0.004
Toxaphene	0.003	None	Zero	0.003

Notes:
(1) Finished water quality goals for these parameters are more stringent than those required by regulations.
(2) A level of 5-10 ng/L has been adopted by other utilities in Arizona and appears to be a good trigger for customer complaints.
(3) EPA commits to review the bromate MCL as part of a 6-year review and determine whether the MCL should remain at 0.010 mg/L or be reduced to 0.005 mg/L or a lower concentration.
(4) Nickel has been remanded back to the EPA for further consideration. There is currently no EPA legal limit on the amount of Nickel in drinking water.
(5) The proposed MCL for Radon is 300 pCi/L and the proposed Alternative MCL is 4000 pCi/L.
(6) Effective date postponed.
(7) Turbidity cannot exceed 1 NTU at anytime, in 95% of the samples.
(8) *Giardia* and *Cryptosporidium* goals have been established based on historical NFWR water quality.

Abbreviations:
TT = Treatment Technique; AL = Action Level

A.1.2 Lead and Copper Rule

The LCR was promulgated by the EPA on June 7, 1991. Under the provisions of the LCR, water systems serving greater than 10,000 people are required to sample household taps from 100 "worst case" home sites for lead and copper. If the lead and copper concentrations in the 90th percentile of home tap samples are greater than the action levels established for these metals, namely, 0.015 milligram per liter (mg/L) for lead and 1.3 mg/L

for copper, then the utility must conduct a public education program. As such, treated water is characteristically unstable due to the addition of pH depressing compounds such as alum. This may cause metals such as lead and copper to leach out from household plumbing and result in exceedances of the action levels.

The rule also requires utilities to sample 25 sites in the distribution system for certain water quality parameters including pH, alkalinity, and calcium. These parameters may be used to determine the Langelier Saturation Index (LSI) of water, which is a corrosivity index, and is the measure of water's ability to dissolve or precipitate calcium carbonate. This determination will help utilities optimize their corrosion control treatment. Under this regulation, there are two ways in which a utility is considered to have "optimized" corrosion control:

- Demonstrate to regulatory agency that it has performed corrosion control steps "equivalent" to those required by EPA.
- If the difference between the highest level of lead in the source water and the 90th percentile tap samples is less than the practical quantitation level (PQL) for lead (0.05 mg/L).

The Final Lead and Copper Rule Short-Term Revisions and Clarifications (also known as the Lead and Copper Rule Minor Revisions, or (LCRMR) was promulgated on October 10, 2007. The compliance date for the rule was April 7, 2008. The LCRMR does not change the action levels for lead or copper, however, it requires utilities to provide a notification of tap water monitoring results for lead to home and building occupants.

A.1.2.1 Possible Revisions to the Lead and Copper Rule

The EPA continues to explore the possibility of developing long-term revisions to the LCR. Changes under consideration include the following:

- Modifying the definition of the tiering classifications for monitoring sites
- Changing sampling requirements for copper to include sampling for new copper installations
- Changing the sampling protocol for non-residential buildings (i.e., schools), and possibly requiring sampling in schools
- Providing guidance on partial lead service line replacement

A.1.3 Radionuclides Rule

On December 7, 2000, the EPA announced the Radionuclides Rule, and revised the existing standards for radionuclides and established a new standard for uranium. The rule became effective on December 8, 2003, and monitoring requirements were phased in between December 2000 and December 2003. The rule requires systems to determine initial compliance using average of four quarterly samples, or appropriate grandfathered data under State direction. The requirements of the rule are presented in Table A.2.

Table A.2 Regulated Contaminants Per Radionuclides Rule 2016 Integrated Water Master Plan City of Goodyear		
Regulated Radionuclide	**MCL**	**MCLG**
Beta/photon emitters (1)	4 mrem/yr	0 mrem/yr
Gross alpha particle	15 pCi/L	0 pCi/L
Combined radium 226/229	5 pCi/L	0 pCi/L
Uranium	30 µg/L	0 µg/L

Note:
(1) A total of 168 beta particles and photon emitters may be used to calculate compliance with the MCL.

Abbreviations:
mrem/yr = millirem per year; pCi/L = picocuries per liter; µg/L = micrograms per liter

A.2 ARSENIC RULE

EPA published the Final Arsenic Rule on January 22, 2001, which mandated that the arsenic MCL in drinking water would be 10 µg/L, a reduction from 50 µg/L. It also established an MCLG of zero for arsenic. Due to delays in the announcement of the rule, the effective date was delayed until February 22, 2002.

A.3 SURFACE WATER TREATMENT RULE

While the City of Goodyear does not currently provide treated surface water to its customers, at some point in the future the City will likely do so by either purchasing capacity in a surface water treatment plant (WTP) with another entity (e.g., private utility or neighboring municipality) or building a WTP in the City's service area. Therefore, water treatment regulations that may be relevant to Goodyear in the future are provided here.

On June 29, 1989, the EPA published the final SWTR for drinking water systems using surface water sources. The SWTR requires that treatment be provided to reduce turbidity, *Giardia*, *Legionella*, viruses, and heterotrophic plate count (HPC) bacteria. The SWTR established treatment and performance standards to provide a minimum reduction of 99.9 percent (3-log) for *Giardia* cysts, and 99.99 percent (4-log) for viruses. The overall reduction of *Giardia* and viruses is to be achieved through a combination of physical removal by pretreatment and filtration, and inactivation by disinfection.

Treatment effectiveness under this rule is determined through turbidity measurements:

- The turbidity of representative samples of a system's combined filtered water must be less than or equal to 0.5 nephelometric turbidity units (NTU) in at least 95 percent of the measurements taken each month (subsequently reduced to 0.3 NTU by IESWTR.
- The turbidity level of representative samples of a system's combined filtered water must at no time exceed 5 NTU (subsequently reduced to 1 NTU by IESWTR).

Well operated conventional treatment plants that meet or exceed the 0.5 NTU effluent turbidity standard are credited with a 2.5-log removal of *Giardia* cysts and a 2-log removal of viruses. The remainder of the overall 3-log Giardia cyst and 4-log virus treatment is to be provided by inactivation using disinfection.

The rule requires utilities to demonstrate compliance with primary disinfection requirements by meeting minimum "CT" requirements, where C is the residual disinfectant concentration in mg/L, and T is the effective contact time with the disinfectant in minutes. The ability to meet minimum "CT" requirements is a function of the actual detention time at the plant, water temperature, pH, required log removal (Giardia, Cryptosporidium, or virus), disinfection type (i.e., chlorine), and disinfectant residual concentration.

In addition to primary disinfection requirements, the SWTR also requires protection against microbial contamination in the distribution system. Specifically, the SWTR outlines secondary disinfection or distribution system disinfection requirements to inactivate microbiological pathogens including *Legionella* and HPC bacteria. Secondary disinfection refers to application of a disinfectant to meet regulatory requirements for distribution system bacteriological quality as set forth in the TCR.

A.4 INTERIM ENHANCED SURFACE WATER TREATMENT RULE

The IESWTR was promulgated by the EPA in 1998, and was the first regulation to specifically address chlorine resistant pathogens such as Cryptosporidium. In addition to the requirements of the SWTR, the rule establishes a MCLG of zero for Cryptosporidium. It also lowered the combined filter effluent turbidity standard to less than or equal to 0.3 NTU in 95 percent of all measurements. At no time can any one turbidity measurement exceed 1 NTU. Systems that meet the turbidity standard are assumed to provide at least 2-log Cryptosporidium removal through filtration.

The rule also establishes criteria for systems that must establish a disinfection profile by collecting additional data related to the disinfection process and DBP formation.

A.5 LONG-TERM 2 ENHANCED SURFACE WATER TREATMENT RULE

The LT2ESWTR was promulgated by the EPA in 2006, and requires proportional or watershed-based treatment levels based on *Cryptosporidium* levels in the source water. The rule assigns utilities to one of four 'bins', and each bin has associated requirements for additional *Cryptosporidium* treatment, as indicated in Table A.3.

Table A.3 *Cryptosporidium* Inactivation Requirements Per LT2ESWTR
2016 Integrated Water Master Plan
City of Goodyear

Bin No.	Average *Cryptosporidium* Concentration (oocysts/L)	Additional *Cryptosporidium* Treatment Required		
		Conventional Filtration, Diatomaceous Earth Filtration, or Slow Sand Filtration	Direct Filtration	Alternative Filtration Technologies
1	< 0.075	No additional treatment	No additional treatment	No additional treatment
2	0.075 to < 1.0	1 log (1)	1.5 log (1)	Note (3)
3	1.0 to < 3.0	2 log (2)	2.5 log (2)	Note (4)
4	≥ 3.0	2.5 log (2)	3 log (2)	Note (5)

Notes:
(1) Systems may use any technology or combination of technologies from toolbox.
(2) Systems must achieve at least 1 log of the required treatment using ozone, chlorine dioxide, UV, membranes, bag/cartridge filters, or in-bank filtration.
(3) Total Cryptosporidium removal and inactivation should be at least 4 log.
(4) Total Cryptosporidium removal and inactivation should be at least 5 log.
(5) Total Cryptosporidium removal and inactivation should be at least 5.5 log.

A.6 STAGE 1 AND STAGE 2 DISINFECTANTS AND DISINFECTION BY-PRODUCTS RULE

The Stage 1 D/DBPR was finalized on December 16, 1998 and became effective for public water systems serving more than 10,000 people on January 1, 2002. It establishes MCLs for DBPs and maximum residual disinfection levels (MRDLs) for disinfectants. The rule replaces the previous total trihalomethane (TTHM) MCL of 0.1 mg/L (100 µg/L) with 0.08 mg/L (80 µg/L). It also regulates the sum of five haloacetic acids (HAA5) at 60 µg/L, and establishes the MCL for bromate at 10 µg/L. MCL compliance is calculated using the running annual average (RAA) of all locations from all monitoring locations across the system, computed quarterly. The MRDL for chlorine is established at 4.0 mg/L.

The rule also requires total organic carbon (TOC) monitoring and TOC removal to be investigated by enhanced coagulation or enhanced softening. The rule further specifies the

percentage of influent TOC that must be removed based on the raw water TOC and alkalinity levels, as shown in Table A.4.

Table A.4 Percentage of TOC Reduction Requirements Per Stage 1 DBPR
2016 Integrated Water Master Plan
City of Goodyear

Raw Water TOC (mg/L)	Raw Water Alkalinity (mg/L as $CaCO_3$)		
	< 60	60 – 120	> 120
> 2.0 – 4.0	35%	25%	15%
> 4.0 – 8.0	45%	35%	25%
> 8.0	50%	40%	30%

Abbreviation:
$CaCO_3$ = calcium carbonate

The Stage 2 version of the D/DBPR rule was finalized in December 2005, and published in the Federal Register on January 4, 2006. It strengthens the initial requirements of the Stage 1 rule and aims at reducing occurrences of DBP concentration spikes in the distribution system. Utilities are required to conduct an evaluation of their distribution system, known as an Initial Distribution System Evaluation, to identify locations with high DBP concentrations. Once identified, these locations are established as the sampling sites for compliance monitoring.

MCLs for TTHMs and HAA5 remain unchanged. However, the rule requires that MCL compliance be calculated using the locational running annual average (LRAA), i.e., each sampling site must not individually exceed the MCLs. Systems are also required to determine if they have exceeded an operational evaluation level, which is identified using compliance monitoring results. A system that exceeds an operational evaluation level is required to submit a report to their state identifying actions that may be taken to mitigate future high DBP levels.

The MCL for bromate remains at 10 µg/L, based upon current alternative technology utilization and upon current understanding of bromate formation as a result of bromide concentrations. EPA is committed to review the bromate MCL as part of a 6-year review to determine whether the MCL should remain at 10 µg/L or be reduced to 5 µg/L or lower.

Table A.5 summarizes the requirements of the Stage 1 and Stage 2 DBPRs.

Table A.5 Stage 1 and Stage 2 DBPR Regulated Contaminants and Disinfectants 2016 Integrated Water Master Plan City of Goodyear				
	Stage 1 DBPR		**Stage 2 DBPR**	
Regulated Contaminant	**MCL (mg/L)**	**MCLG (mg/L)**	**MCL (mg/L)**	**MCLG (mg/L)**
TTHM	0.080		Unchanged (1)	
Chloroform		-		0.07
Bromodichloromethane		Zero		Unchanged (1)
Dibromochloromethane		0.06		Unchanged (1)
Bromoform		Zero		Unchanged (1)
HAA5	0.060		Unchanged (1)	
Monochloroacetic acid		-		
Dichloroacetic acid		Zero		Unchanged (1)
Trichloroacetic acid		0.3		0.2
Bromoacetic acid		-		-
Dibromoacetic acid		-		-
Bromate (plants that use ozone)	0.010	Zero	Unchanged (1)	Unchanged (1)
Chlorite (plants that use chlorine dioxide)	1.0	0.8	Unchanged (1)	Unchanged (1)
Regulated Disinfectants	**MRDL (2) (mg/L)**	**MRDLG (2) (mg/L)**	**MRDL (mg/L)**	**MRDLG (mg/L)**
Chlorine	4.0 as Cl_2	4	Unchanged (1)	Unchanged (1)
Chloramines	4.0 as Cl_2	4	Unchanged (1)	Unchanged (1)
Chlorine Dioxide	0.8	0.8	Unchanged (1)	Unchanged (1)

Notes:

(1) Stage 2 DBPR did not revise the MCL or MRDL for this contaminant/disinfectant. MCL compliance be calculated using the Locational Running Annual Average.

(2) Stage 1 DBPR included MRDLs and maximum residual disinfection level goals (MRDLGs) for disinfectants, which are similar to MCLs and MCLGs.

A.7 FILTER BACKWASH RECYCLING RULE

The FBRR was promulgated by the EPA in June 2001 and establishes regulations governing the way that certain recycle streams (spent filter backwash water, thickener supernatant, and liquids from dewatering processes) are handled within the treatment processes of conventional and direct filtration systems. The purpose of the rule is to

minimize *Cryptosporidium* concentrations in the treated water as a result of recycling sludge supernatant and filter backwash wastewater to the head of the treatment plant. The main requirement of the rule is that systems that recycle backwash waste must do so prior to the point of application of primary coagulant. The rule also requires utilities to submit a Recycle Notification Form to the State that includes a plant schematic showing the origin of all recycle flows and the typical recycle flows observed.

A.8 TOTAL COLIFORM RULE

The TCR was promulgated in June 1989, and establishes an MCLG of zero for total and fecal coliforms, and an MCL based on the percentage of positive samples collected during a compliance period. The required number of samples to be collected in a month depends on the number of people served. The rule limits no more than 5 percent total coliform-positive (TC-positive) samples per month for systems collecting at least forty samples per month and no more than 1 TC-positive sample per month for systems collecting fewer than forty samples per month. If a system incurs a monthly MCL violation, it needs to be reported to the state and to the public in a specific timeframe. All TC-positive samples must be analyzed for the presence of *Escherichia coli* (*E. coli*) or fecal coliforms. If two consecutive samples are TC-positive and one is also fecal coliform- or *E. coli*-positive, then this is defined as an acute violation of the MCL; the system must notify the state and the public using mandatory language developed by the EPA and collect repeat samples.

Secondary disinfection is required under the TCR in accordance with the following:

- A minimum disinfectant residual of 0.2 mg/L free chlorine or 0.5 mg/L chloramines measured as total chlorine, must be present throughout the distribution system continually.
- A sample with HPCs less than 500 cfu/100 mL is assumed to carry the required minimum residual.

A.8.1 Revised Total Coliform Rule

The EPA is required to review and revise, as appropriate, each of the NPDWRs no less often than every six years. In July 2003, the EPA determined that it was appropriate to revise the TCR to provide even greater protection against waterborne pathogens in the distribution system. The EPA proposed specific revisions to the TCR on July 14, 2010, and released the draft Proposed TCR Assessments and Corrective Actions Guidance Manual for comment on August 13, 2010. The final Revised Total Coliform Rule (RTCR) was signed by the EPA administrator on December 20, 2012, and the EPA is in the process of submitting it for publication in the Federal Register. The 1989 TCR remains effective until March 31, 2016. The compliance date for the RTCR requirement is April 1, 2016.

The RTCR is establishing a MCL and MCLG of zero for *E. coli,* which is a more specific indicator of fecal contamination than total coliforms, and is proposing to eliminate the MCL

and MCLG for total coliform, replacing it with a treatment technique instead. Under the proposed treatment technique requirements, a system that exceeds a specified frequency of total coliform occurrence or that incurs an *E. coli* MCL violation must conduct an assessment of the distribution system and correct any sanitary defects found. The rule also requires systems to reconsider choices for the analytical methods used to control false positives and negatives. The final rule is expected to be promulgated in 2012, with compliance required three years from the date on which the rule is promulgated.

A.9 UNREGULATED CONTAMINANTS MONITORING PROGRAM AND THE CONTAMINANT CANDIDATE LIST

A.9.1 Background

The 1996 SDWA amendments led to the development of the National Contaminants Occurrence Database (NCOD), which is a database that the EPA maintains on regulated and unregulated contaminants occurring in public water systems. The database includes data from the following sources: unregulated contaminants occurrence data collected by EPA's Unregulated Contaminants Monitoring (UCM) program, EPA's 6-year review of NPDWRs, and water quality information on the nation's surface and ground waters collected by various federal and local agencies.

A.9.2 UCM Program

The UCM program requires that EPA issue a list of no more than 30 unregulated contaminants every five years, to be monitored by public water systems. Such periodic monitoring provides EPA with a basis for setting national drinking water regulations in the future. The first UCMR (UCMR 1) was published in September 1999, the second (UCMR 2) was published in January 2007, and the third (UCMR 3) was published in May 2012. UCMR 3 requires systems to conduct assessment monitoring for 21 compounds including pharmaceuticals, volatile organic compounds, metals, and perfluorinated compounds. Monitoring under UCMR 3 will run from January 2013 to December 2015.

Additional information on EPA's UCM program can be found on EPA's website: http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/index.cfmhttp://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/

A.9.3 Contaminant Candidate List

Each of the UCMR lists that the EPA generates under the UCM program is largely based on the Candidate Contaminant List (CCL), which is a list that EPA maintains of priority contaminants that are known to occur in public water systems but that are currently unregulated. The UCM program and CCL complement each other, and similar to the UCM program, the EPA uses the CCL to prioritize research and data collection efforts for future regulations. The EPA publishes the CCL periodically and decides whether to regulate at

least five or more compounds present on the most recent list (called Regulatory Determinations/RegDet) every five years.

The most recent version of the list, CCL3, was published in October 2009. It is anticipated that a subset of 32 candidate contaminants from CCL3 will be selected for further evaluation as will hexavalent chromium (which was not on CCL3). With respect to new MCLs that could affect water utilities, of chief interest among the candidate contaminants being evaluated for RegDet 3 include volatile organic compounds (VOCs), nitrosamines, and hexavalent chromium. A brief summary of these compounds, including existing and anticipated federal guidelines, is presented in the Contaminants of Emerging Concern section below.

Additional information on the CCL and RegDets can be found on EPA's website: http://water.epa.gov/scitech/drinkingwater/dws/ccl/index.cfm

A.10 GROUND WATER RULE

The Ground Water Rule was proposed on May 10, 2000, and was published in November 2006. The Ground Water Rule specifies the appropriate use of disinfection in groundwater and contains other provisions to protect public health. The final requirements of the Ground Water Rule are:

- **Sanitary Survey** – Water systems will be required to perform a sanitary survey every three years to review the following eight elements:
  - Source
  - Treatment
  - Distribution system
  - Finished water storage
  - Pumps, pump facilities, and control
  - Monitoring, reporting, and data verification
  - Water system management and operations
  - Water system operator compliance with state requirements
- **Source Water Monitoring** – Groundwater system (GWS) with a distribution system TCR sample that tests positive for total coliform is required to conduct triggered source water monitoring to evaluate whether the total coliform presence in the distribution system is due to fecal contamination in the ground water source. A GWS that does not provide at least 4-log treatment of viruses must conduct triggered source water monitoring upon being notified that a TCR sample is total coliform-positive. Within 24 hours of receiving the total coliform-positive notice, the system must collect at least one ground water sample from each ground water source (unless the groundwater system has an approved triggered source water monitoring plan that specifies the applicable source for collecting source samples). The groundwater

system must test the ground water source sample(s) for the presence of one of three State-specified fecal indicators (*E. coli*, enterococci, or coliphage). If the source sample is fecal indicator-positive, this rule requires the groundwater system to notify the State and the public. Unless directed by the State to take immediate corrective action, the groundwater system must collect and test five additional source water samples for the presence of the same State-specified fecal indicator within 24 hours. If any one of the five additional source water samples tests positive for the State-specified fecal indicator (*E. coli*, enterococci, or coliphage), this rule requires the groundwater system to notify the State and the public and comply with the treatment technique requirements, which require the system to take one of four corrective actions discussed in the following section.

- **Treatment Technique Requirements** – This rule requires a groundwater system to comply with the treatment technique requirements if a significant deficiency is identified during a sanitary survey. Also, the rule requires a groundwater system to comply with the treatment technique requirements if one of the five additional ground water source samples (or at State discretion, the initial source sample) has tested positive for fecal contamination (i.e., the sample is positive for one of the three fecal indicators and is not invalidated by the State). The treatment technique requires that a groundwater system implement at least one of the following corrective actions: correct all significant deficiencies; provide an alternate source of water; eliminate the source of contamination; or provide treatment that reliably achieves at least 4-log treatment of viruses. Furthermore, the groundwater system must inform the public served by the water system of any uncorrected significant deficiencies and/or fecal contamination in the ground water source.
- **Compliance Monitoring** – Compliance monitoring requirements are the final defense against viral and bacterial pathogens provided by this rule. All groundwater systems that provide at least 4-log treatment of viruses using chemical disinfection, membrane filtration, or a State-approved alternative treatment technology must conduct compliance monitoring to demonstrate treatment effectiveness.

A.11 CONTAMINANTS OF EMERGING CONCERN

Emerging contaminants are a group of priority pollutants that are not typically regulated by the EPA, and include carcinogenic VOCs, N-Nitroso-diethylamine (NDMA), hexavalent chromium, perchlorate, and methyl tertiary butyl ether (MTBE). Also among these contaminants are endocrine disrupting compounds (EDCs) and pharmaceutical and personal care products (PPCPs).

A.11.1 Volatile Organic Compounds

The EPA announced in February 2011 that it plans to regulate a group of up to 16 carcinogenic VOCs (including 8 currently regulated compounds and 8 unregulated compounds) with one NPDWR. The proposed Carcinoganic VOC Rule (cVOC Rule) is expected to be published in September 2013 with a final rule sometime in 2015.

The group of VOCs regulated under this rule will include the two currently regulated compounds, trichloroethylene (TCE) and tetrachloroethylene (PCE). The current MCLs for these contaminants are 0.005 milligram per liter, however, the EPA determined in March 2010 as part of its second 6-year review that the drinking water standards for these two contaminants need to be revised. At this time, it is not completely clear how revised MCLs for TCE and PCE will fit into the cVOC Rule. The EPA has indicated that if it does not decide to regulate the carcinogenic VOCs as a group, then it will move forward with revising the drinking water standards for TCE and PCE in 2012.

A.11.2 Nitrosamines

Nitrosamines are a group of chemical compounds, a number of which are classified by the EPA as probable human carcinogens, with 10^{-6} cancer risk levels at ng/L concentrations. Nitrosamines are a byproduct of manufacturing processes such as rocket fuels, foods, and beverages, and can enter the treatment plant from upstream industrial and wastewater treatment plant discharges. These compounds can also be formed within the treatment plant or distribution system as a byproduct of chloramines and chlorine reacting with organic nitrogen precursors.

A total of six nitrosamines, including NDMA, were monitored as part of UCMR2. As of March 2011, UCMR2 data indicate that NDMA is the predominant nitrosamine occurring in drinking water. Further, NDMA was detected three times more frequently in surface waters than ground waters and ten times more frequently in surface water plants using chloramines versus chlorine alone. NDMA was also detected at higher concentrations at maximum residence time locations in the distribution system as compared to entry points.

The EPA is considering regulating the nitrosamines as a group since most of them have common treatment/control processes. It is also considering setting the MCLG at zero since all the nitrosamines are probable carcinogens. The EPA is waiting for all of the data from UCMR2 to become available before moving forward with proposing a regulation.

A.11.3 Hexavalent Chromium

Chromium is a metallic ion that occurs naturally in water along with iron, though usually in significantly smaller amounts. It is also produced by steel manufacturing plants and can be discharged into surface water bodies from such plants. Chromium will quickly convert to the hexavalent form, Cr-VI, in the presence of oxygen. Cr-VI is carcinogenic, and is being evaluated by the EPA for regulation.

The EPA is currently conducting an Integrated Risk Information System (IRIS) toxicological assessment of Cr-VI. The draft assessment for Cr-VI oral injection will be combined with the draft assessment for Cr-VI inhalation exposure. Release of a final IRIS Cr-VI assessment is not expected until at least 2014. It is unlikely we will have a proposed MCL before early 2016.

A.11.4 Perchlorate

Perchlorate is a manmade chemical that is used in the manufacture of rocket fuels and explosives. It can also occur naturally in the environment. The discovery of perchlorate in water supplies has caused a lot of concern due to the potential harmful impact of this chemical on the functioning of the thyroid gland. Perchlorate was included in all of the three CCLs that EPA has published to date. Based on data collected from its UCM program and comments received from the public, the EPA made a determination to regulate perchlorate in drinking water in February 2011. It intends to publish a proposed NPDWR for public comment and review within 24 months of making the regulatory determination.

In spite of a lack of a federal MCL, some states have developed their own MCLs for perchlorate. An MCL of 6 µg/L became effective in California in October 2007. The state of Arizona has established an advisory level of 14 µg/L for perchlorate in drinking water.

A.11.5 Methyl Tertiary Butyl Ether

MTBE is a chemical compound that is manufactured from methanol and isobutylene, and it is almost exclusively used as a gasoline additive. It does not occur naturally in the environment. Contamination of the raw water source is possible by ways of petrochemical spills and leaks from fuel storage tanks. There is limited data on the harmful health effects of MTBE on human health; however, the chemical has caused cancer in laboratory rats. Low levels of MTBE can result in offensive taste and odor in drinking water.

A national standard for MTBE does not exist, although some states have set their own standards. California set a secondary MCL of 5 µg/L in 1999 to address taste and odor issues, and a primary MCL of 13 µg/L in 2000 to address health impacts. In 1997, the EPA issued a Drinking Water Advisory on MTBE recommending 20-40 ppb to address taste and odor concerns.

A.11.6 Endocrine Disrupting Chemicals and Pharmaceuticals and Personal Care Products

EDCs are chemicals, both naturally occurring and manmade, that interfere with the normal function of the endocrine or hormonal system in animals and humans. The EPA currently regulates certain suspected EDCs including atrazine, DDT, dioxin, lead, cadmium, and mercury. If adverse effects on the endocrine system are determined at concentrations lower than current MCLs, then revised regulations may be established for these compounds.

PPCPs, including EDCs, refer to all pharmaceuticals used for human health and cosmetic purposes, as well as veterinary drugs. Typical PPCPs include pharmaceuticals, over-the-counter medications, perfumes, detergents, insect repellents, steroids, and antibiotics. PPCPs can enter surface water bodies from a variety of sources including industrial and municipal effluents, agricultural runoffs, and hospital residues.

Existing literature indicates that some PPCPs at or above 0.1 ng/L will induce endocrine-mediated changes in aquatic life. The health impacts on humans have not been observed because PPCPs occur in the environment at very low concentrations. A recent study conducted by Dr. Shane Snyder at Southern Nevada Water Authority has shown that PPCPs at the levels found in municipal wastewater effluents do not pose a health risk to humans (presented at the 21st Annual Water Reuse Symposium). Currently these PPCPs are not regulated by the EPA.

A.12 SECONDARY WATER QUALITY ISSUES

Taste and odor compounds and total dissolved solids are water quality characteristics that are drinking water concerns. They do not pose a threat to public health but are concerns because of secondary, non-health related issues. Future regulation of taste and odor compounds and total dissolved solids is unlikely, but secondary standards exist for these water quality parameters, which are discussed in the following sections.

A.12.1 Taste and Odor Compounds

Consumers of Colorado River water from the Central Arizona Project (CAP) Canal have complained of a musty/moldy taste and odor. The taste and odor problems in the CAP water have been attributed to 2-methylisoborneol (MIB) and geosmin, which are compounds produced by blue-green algae. These taste and odor compounds have been determined to originate mostly in reservoirs and the lower reaches of canals.

Concentrations of taste and odor compounds in water above 0.010 mg/L affect consumers' perception of drinking water quality and safety. Taste and odor compounds can lead to reduced water consumption and reliance on bottled water for drinking. These compounds can be removed during the water treatment process using powdered activated carbon, ozone oxidation and filtration with granular activated carbon media, and other methods.

A.12.2 Total Dissolved Solids

Total dissolved solids are the quantity of salts dissolved in drinking water. Total dissolved solids include:

- Anions – carbonate, chloride, sulfate, etc.
- Cations – sodium, calcium, magnesium, etc.

Total dissolved solids are derived from several sources, including natural geologic formation, irrigation return flows, residential sources (human waste, water softeners, food waste), and industrial sources. The potential impacts of high total dissolved solids in drinking water are:

- Objectionable mineral taste
- Color
- Infrastructure corrosion or scaling (depending on water chemistry)
- Reduced applications for reclaimed water

No NPDWR exists for total dissolved solids, but USEPA has issued a secondary standard of 500 mg/L. The World Health Organization has established a recommended total dissolved solids standard of 1,000 mg/L for taste.

APPENDIX B – WATER INFRASTRUCTURE UNIT COSTS

8 mgd Conventional WTP Conceptual Cost

Cost Items	Cost
General Conditions	$1,607,769
Site Construction	$2,679,614
Yard Piping	$1,607,769
Treatment Facility	
Intake Structure and Bar Screen	$656,519
Pre-Sedimentation Basin	$1,635,824
Raw Water Pump Station	$1,156,153
Ozone Contact Basin	$0
Rapid Mix, Flocculation and Sedimentation	$2,336,687
Filtration	$3,176,913
Finished Water Reservoir and Pump Station	$2,553,431
Wastewater Recovery Basin and Pump Station	$471,199
Sludge Thickener and Pump Station	$826,498
Chemical Storage and Feed System	$577,174
Operation Building and Lab	$329,237
Sludge Handling and Dewatering Facility	$930,818
EI&C	$5,359,228
TOTAL DIRECT COST	**$25,904,834**
Contingency	$5,180,967
General Contractor Overhead, Profit & Risk	$3,108,580
Escalation to Mid-Point	$1,367,775
Sales Tax (Based on 50% Materials) @ 4%	$1,422,486
Bid Market Allowance @ 0%	$0
TOTAL CONSTRUCTION COST	**$36,984,642**

$4.78/gallon

16 mgd Conventional WTP Conceptual Cost

Cost Items	Cost
General Conditions	$2,559,605
Site Construction	$4,266,008
Yard Piping	$2,559,605
Treatment Facility	
Intake Structure and Bar Screen	$995,097
Pre-Sedimentation Basin	$2,479,446
Raw Water Pump Station	$1,752,400
Ozone Contact Basin	$2,701,943
Rapid Mix, Flocculation and Sedimentation	$3,541,755
Filtration	$4,815,300
Finished Water Reservoir and Pump Station	$3,870,278
Wastewater Recovery Basin and Pump Station	$714,204
Sludge Thickener and Pump Station	$1,252,736
Chemical Storage and Feed System	$874,832
Operation Building and Lab	$334,001
Sludge Handling and Dewatering Facility	$1,410,857
EI&C	$8,532,017
TOTAL DIRECT COST	**$42,660,085**
Contingency	$8,532,017
General Contractor Overhead, Profit & Risk	$5,119,210
Escalation to Mid-Point	$2,252,452
Sales Tax (Based on 50% Materials) @ 4%	$2,342,551
Bid Market Allowance @ 0%	$0
TOTAL CONSTRUCTION COST	**$60,906,315**

$3.81/gallon

Conceptual Cost Estimate Details

Basic Assumption

Items	Value	Unit
WTP Design Capacity	8	mgd
Current ENR (Feb 2016)	10182	-
Scale Factor n	0.6	-
Location Factor Conversion (RS Means)	1.00	-

Cost Component Description	Reference	Year of Reference	ENR CCI of Reference	Location Factor of Reference	Baseline Cost of Reference	Firm Capacity of Reference	Goodyear WTP Capacity	Capacity Ratio	Adjustment Factor	Adjusted Ratio; % of Direct; Quantity	Pre-Escalation Cost	Escalation Ratio Based on ENR CCI	Location Factor Adjustment	Include Process in Train? 1/0	CAP Cost (In 2015 $)	Comments
GENERAL CONDITIONS																
General Conditions										6%					$1,607,769	
Subtotal															***$1,607,769***	
SITE WORKS																
Site Works										10%					$2,679,614	
Subtotal															***$2,679,614***	
YARD PIPING																
Yard Piping										6%					$1,607,769	
Subtotal															***$1,607,769***	
INTAKE STRUCTURE AND BAR SCREEN																
Intake Structure	Greenway WTP	2002	6538	1.0	$159,570	16.0 mgd	8.0 mgd	0.66	1	0.66	$105,277	1.56	1.00	1	$163,954	
Bar Screen Structure	Greenway WTP	2002	6538	1.0	$371,930	16.0 mgd	8.0 mgd	0.66	1	0.66	$245,382	1.56	1.00	1	$382,148	
Bar Screen Equipment	Greenway WTP	2002	6538	1.0	$107,465	16.0 mgd	8.0 mgd	0.66	1	0.66	$70,900	1.56	1.00	1	$110,417	
Subtotal														***1***	***$656,519***	
PRE-SEDIMENTATION BASIN																
Pre-Sedimentation Structure	Greenway WTP	2002	6538	1.0	$1,592,086	16.0 mgd	8.0 mgd	0.66	1	0.66	$1,050,385	1.56	1.00	1	$1,635,824	
Mixing Equipment (included under floculation basin cost)																
Subtotal														***1***	***$1,635,824***	
RAW WATER PUMP STATION																
Pump Station Structure	Greenway WTP	2002	6538	1.0	$544,483	16.0 mgd	8.0 mgd	0.66	1	0.66	$359,225	1.56	1.00	1	$559,441	
Pump Equipment (include all process pumps in WTP)	Greenway WTP	2002	6538	1.0	$401,757	16.0 mgd	8.0 mgd	0.66	1	0.66	$265,061	1.56	1.00	1	$412,794	
Sluice/Weir Gates (include all gates in WTP)	Greenway WTP	2002	6538	1.0	$179,000	16.0 mgd	8.0 mgd	0.66	1	0.66	$118,096	1.56	1.00	1	$183,918	
Subtotal														***1***	***$1,156,153***	
OZONE CONTACT BASIN																
Ozone Contact Basin Structure	Greenway WTP	2002	6538	1.0	$559,805	16.0 mgd	8.0 mgd	0.66	1	0.66	$369,334	1.56	1.00	1	$575,184	
Ozone Generator Structure	Greenway WTP	2002	6538	1.0	$282,000	16.0 mgd	8.0 mgd	0.66	1	0.66	$186,051	1.56	1.00	1	$289,747	
Ozone System	Greenway WTP	2002	6538	1.0	$719,000	16.0 mgd	8.0 mgd	0.66	1	0.66	$474,363	1.56	1.00	1	$738,753	
LOX Building	Greenway WTP	2002	6538	1.0	$174,149	16.0 mgd	8.0 mgd	0.66	1	0.66	$114,895	1.56	1.00	1	$178,933	
Subtotal														***0***	***$0.00***	
RAPID MIXING, FLOCCULATION AND SEDIMENTATION																
Flocculation Basin Structure	Greenway WTP	2002	6538	1.0	$724,085	16.0 mgd	8.0 mgd	0.66	1	0.66	$477,718	1.56	1.00	1	$743,977	
Final Sedimentation Structure	Greenway WTP	2002	6538	1.0	$1,375,975	16.0 mgd	8.0 mgd	0.66	1	0.66	$907,805	1.56	1.00	1	$1,413,776	
Mixing Equipment (including all mixers in WTP)	Greenway WTP	2002	6538	1.0	$174,149	16.0 mgd	8.0 mgd	0.66	1	0.66	$114,895	1.56	1.00	1	$178,933	
Subtotal														***1***	***$2,336,687***	
FILTERS																
Filter Structure	Greenway WTP	2002	6538	1.0	$2,473,380	16.0 mgd	8.0 mgd	0.66	1	0.66	$1,631,822	1.56	1.00	1	$2,541,330	
Air System	Greenway WTP	2002	6538	1.0	$103,200	16.0 mgd	8.0 mgd	0.66	1	0.66	$68,087	1.56	1.00	1	$106,035	
Filter Media	Greenway WTP	2002	6538	1.0	$515,389	16.0 mgd	8.0 mgd	0.66	1	0.66	$340,030	1.56	1.00	1	$529,548	
Subtotal														***1***	***$3,176,913***	

Cost Component Description	Reference	Year of Reference	ENR CCI of Reference	Location Factor of Reference	Baseline Cost of Reference	Firm Capacity of Reference	Goodyear WTP Capacity	Capacity Ratio	Adjustment Factor	Adjusted Ratio; % of Direct; Quantity	Pre-Escalation Cost	Escalation Ratio Based on ENR CCI	Location Factor Adjustment	Include Process in Train? 1/0	CAP Cost (In 2015 $)	Comments
FINISHED WATER RESERVOIR AND PUMP STATION																
Finished Water Reservoir Structure	Greenway WTP	2002	6538	1.0	$1,221,340	16.0 mgd	8.0 mgd	0.66	1	0.66	$805,784	1.56	1.00	1	$1,254,893	
Finished Water Pump Station Structure	Greenway WTP	2002	6538	1.0	$647,748	16.0 mgd	8.0 mgd	0.66	1	0.66	$427,354	1.56	1.00	1	$665,543	
Disinfection Building	Greenway WTP	2002	6538	1.0	$392,470	16.0 mgd	8.0 mgd	0.66	1	0.66	$258,934	1.56	1.00	1	$403,252	
Chlorination System	Greenway WTP	2002	6538	1.0	$223,600	16.0 mgd	8.0 mgd	0.66	1	0.66	$147,521	1.56	1.00	1	$229,743	
Pump Equipment (include under raw water pump station)																
Subtotal														***1***	***$2,553,431***	
WASHWATER RECOVERY BASIN AND PUMP STATION																
Washwater Recovery Basin Structure	Greenway WTP	2002	6538	1.0	$458,600	16.0 mgd	8.0 mgd	0.66	1	0.66	$302,563	1.56	1.00	1	$471,199	
Washwater Pumps (include under raw water pump station)																
Subtotal														***1***	***$471,199***	
SLUDGE THICKENER AND PUMP STATION																
Sludge Thickener Structure	Greenway WTP	2002	6538	1.0	$155,870	16.0 mgd	8.0 mgd	0.66	1	0.66	$102,836	1.56	1.00	1	$160,152	
Thickener Sludge Pump Station Structure	Greenway WTP	2002	6538	1.0	$327,529	16.0 mgd	8.0 mgd	0.66	1	0.66	$216,089	1.56	1.00	1	$336,527	
Sludge Collector	Greenway WTP	2002	6538	1.0	$321,000	16.0 mgd	8.0 mgd	0.66	1	0.66	$211,781	1.56	1.00	1	$329,819	
Pump Equipment (include under raw water pump station)																
Subtotal														***1***	***$826,498***	
CHEMICAL STORAGE AND FEED SYSTEM																
Chemical Building Structure	Greenway WTP	2002	6538	1.0	$794,547	16.0 mgd	8.0 mgd	0.66	25%	0.16	$131,051	1.56	1.00	1	$204,094	Assume using canopy instead of masonry building. Assume 75% cost reduction
FRP Tanks	Greenway WTP	2002	6538	1.0	$42,105	16.0 mgd	8.0 mgd	0.66	1	0.66	$27,779	1.56	1.00	1	$43,262	
Metering Pumps	Greenway WTP	2002	6538	1.0	$321,000	16.0 mgd	8.0 mgd	0.66	1	0.66	$211,781	1.56	1.00	1	$329,819	
Subtotal														***1***	***$577,174***	
OPERATION BUILDING AND LAB																
Operation Building Structure	Carollo	2002	10182	1.0	$200	1.0 SF	1600.0 SF	1600.00	1	1600.00	$320,000	1.00	1.00	1	$320,000	Assume $200/sf. AJSWTP 40' x 20'. Morenci 15'x32'. Assume 40'x40' for this WTP
Safety Equipment	Greenway WTP	2002	6538	1.0	$7,320	16.0 mgd	8.0 mgd	0.66	1	0.66	$4,829	1.56	1.00	1	$7,521	
Lab Equipment	Greenway WTP	2002	6538	1.0	$1,670	16.0 mgd	8.0 mgd	0.66	1	0.66	$1,102	1.56	1.00	1	$1,716	
Subtotal														***1***	***$329,237***	
SLUDGE HANDLING AND DEWATERING FACILITY																
Sludge Dewatering Facility	Apache Junction SWTP	2015	10031	1.0	$399,154	2.0 mgd	8.0 mgd	2.30	1	2.30	$917,014	1.02	1.00	1	$930,818	EQ basin and sludge thickening tank has been included above. AJSWTP cost including BFP, Conveyor, submersible pumps (filtrate pump station), shade structure, and 20% adder for construction and misc. mechanical
Subtotal														***1***	***$930,818***	
ELECTRICAL INSTRUMENT AND CONTROL																
Electrical										10.0%					$2,679,614	
Instrument and Control										10.0%					$2,679,614	
Subtotal															***$5,359,228***	
TOTAL DIRECT COST															**$26,796,142**	

Contingency	20.0%	$5,359,228
Subtotal		$32,155,371
General Contractor Overhead, Profit & Risk	10.0%	$3,215,537
Subtotal		$35,370,908
Escalation to Mid-Point	4.0%	$1,414,836
Subtotal		$36,785,744
Sales Tax (based on 50% Materials)	4.0%	$1,471,430
Subtotal		$38,257,174
Bid Market Allowance	0.0%	$0
Subtotal		$38,257,174
TOTAL ESTIMATED CONSTRUCTION COST =		**$38,257,174**
		$4.78 $/gallon

Conceptual Cost Estimate Details

Basic Assumption

Items	Value	Unit
WTP Design Capacity	16	mgd
Current ENR (Feb 2016)	10182	-
Scale Factor n	0.6	-
Location Factor Conversion (RS Means)	1.00	-

Cost Component Description	Reference	Year of Reference	ENR CCI of Reference	Location Factor of Reference	Baseline Cost of Reference	Firm Capacity of Reference	Goodyear WTP Capacity	Capacity Ratio	Adjustment Factor	Adjusted Ratio; % of Direct; Quantity	Pre-Escalation Cost	Escalation Ratio Based on ENR CCI	Location Factor Adjustment	Include Process in Train? 1/0	CAP Cost (In 2015 $)	Comments
GENERAL CONDITIONS																
General Conditions										**6%**					$2,559,605	
Subtotal															***$2,559,605***	
SITE WORKS																
Site Works										**10%**					$4,266,008	
Subtotal															***$4,266,008***	
YARD PIPING																
Yard Piping										**6%**					$2,559,605	
Subtotal															***$2,559,605***	
INTAKE STRUCTURE AND BAR SCREEN																
Intake Structure	Greenway WTP	2002	6538	1.0	$159,570	16.0 mgd	16.0 mgd	1.00	1	1.00	$159,570	1.56	1.00	1	$248,507	
Bar Screen Structure	Greenway WTP	2002	6538	1.0	$371,930	16.0 mgd	16.0 mgd	1.00	1	1.00	$371,930	1.56	1.00	1	$579,228	
Bar Screen Equipment	Greenway WTP	2002	6538	1.0	$107,465	16.0 mgd	16.0 mgd	1.00	1	1.00	$107,465	1.56	1.00	1	$167,361	
Subtotal														*1*	***$995,097***	
PRE-SEDIMENTATION BASIN																
Pre-Sedimentation Structure	Greenway WTP	2002	6538	1.0	$1,592,086	16.0 mgd	16.0 mgd	1.00	1	1.00	$1,592,086	1.56	1.00	1	$2,479,446	
Mixing Equipment (included under flocculation basin cost)																
Subtotal														*1*	***$2,479,446***	
RAW WATER PUMP STATION																
Pump Station Structure	Greenway WTP	2002	6538	1.0	$544,483	16.0 mgd	16.0 mgd	1.00	1	1.00	$544,483	1.56	1.00	1	$847,954	
Pump Equipment (include all process pumps in WTP)	Greenway WTP	2002	6538	1.0	$401,757	16.0 mgd	16.0 mgd	1.00	1	1.00	$401,757	1.56	1.00	1	$625,679	
Sluice/Weir Gates (include all gates in WTP)	Greenway WTP	2002	6538	1.0	$179,000	16.0 mgd	16.0 mgd	1.00	1	1.00	$179,000	1.56	1.00	1	$278,767	
Subtotal														*1*	***$1,752,400***	
OZONE CONTACT BASIN																
Ozone Contact Basin Structure	Greenway WTP	2002	6538	1.0	$559,805	16.0 mgd	16.0 mgd	1.00	1	1.00	$559,805	1.56	1.00	1	$871,816	
Ozone Generator Structure	Greenway WTP	2002	6538	1.0	$282,000	16.0 mgd	16.0 mgd	1.00	1	1.00	$282,000	1.56	1.00	1	$439,175	
Ozone System	Greenway WTP	2002	6538	1.0	$719,000	16.0 mgd	16.0 mgd	1.00	1	1.00	$719,000	1.56	1.00	1	$1,119,740	
LOX Building	Greenway WTP	2002	6538	1.0	$174,149	16.0 mgd	16.0 mgd	1.00	1	1.00	$174,149	1.56	1.00	1	$271,212	
Subtotal														*1*	***$2,701,943***	
RAPID MIXING, FLOCCULATION AND SEDIMENTATION																
Flocculation Basin Structure	Greenway WTP	2002	6538	1.0	$724,085	16.0 mgd	16.0 mgd	1.00	1	1.00	$724,085	1.56	1.00	1	$1,127,659	
Final Sedimentation Structure	Greenway WTP	2002	6538	1.0	$1,375,975	16.0 mgd	16.0 mgd	1.00	1	1.00	$1,375,975	1.56	1.00	1	$2,142,884	
Mixing Equipment (including all mixers in WTP)	Greenway WTP	2002	6538	1.0	$174,149	16.0 mgd	16.0 mgd	1.00	1	1.00	$174,149	1.56	1.00	1	$271,212	
Subtotal														*1*	***$3,541,755***	
FILTERS																
Filter Structure	Greenway WTP	2002	6538	1.0	$2,473,380	16.0 mgd	16.0 mgd	1.00	1	1.00	$2,473,380	1.56	1.00	1	$3,851,936	
Air System	Greenway WTP	2002	6538	1.0	$103,200	16.0 mgd	16.0 mgd	1.00	1	1.00	$103,200	1.56	1.00	1	$160,719	
Filter Media	Greenway WTP	2002	6538	1.0	$515,389	16.0 mgd	16.0 mgd	1.00	1	1.00	$515,389	1.56	1.00	1	$802,645	
Subtotal														*1*	***$4,815,300***	
FINISHED WATER RESERVOIR AND PUMP STATION																
Finished Water Reservoir Structure	Greenway WTP	2002	6538	1.0	$1,221,340	16.0 mgd	16.0 mgd	1.00	1	1.00	$1,221,340	1.56	1.00	1	$1,902,062	
Finished Water Pump Station Structure	Greenway WTP	2002	6538	1.0	$647,748	16.0 mgd	16.0 mgd	1.00	1	1.00	$647,748	1.56	1.00	1	$1,008,775	
Disinfection Building	Greenway WTP	2002	6538	1.0	$392,470	16.0 mgd	16.0 mgd	1.00	1	1.00	$392,470	1.56	1.00	1	$611,216	
Chlorination System	Greenway WTP	2002	6538	1.0	$223,600	16.0 mgd	16.0 mgd	1.00	1	1.00	$223,600	1.56	1.00	1	$348,225	
Pump Equipment (include under raw water pump station)																
Subtotal														*1*	***$3,870,278***	

Cost Component Description	Reference	Year of Reference	ENR CCI of Reference	Location Factor of Reference	Baseline Cost of Reference	Firm Capacity of Reference	Goodyear WTP Capacity	Capacity Ratio	Adjustment Factor	Adjusted Ratio; % of Direct; Quantity	Pre-Escalation Cost	Escalation Ratio Based on ENR CCI	Location Factor Adjustment	Include Process in Train? 1/0	CAP Cost (In 2015 $)	Comments
WASHWATER RECOVERY BASIN AND PUMP STATION																
Washwater Recovery Basin Structure	Greenway WTP	2002	6538	1.0	$458,600	16.0 mgd	16.0 mgd	1.00	1	1.00	$458,600	1.56	1.00	1	$714,204	
Washwater Pumps (include under raw water pump station)																
Subtotal														*1*	***$714,204***	
SLUDGE THICKENER AND PUMP STATION																
Sludge Thickener Structure	Greenway WTP	2002	6538	1.0	$155,870	16.0 mgd	16.0 mgd	1.00	1	1.00	$155,870	1.56	1.00	1	$242,745	
Thickener Sludge Pump Station Structure	Greenway WTP	2002	6538	1.0	$327,529	16.0 mgd	16.0 mgd	1.00	1	1.00	$327,529	1.56	1.00	1	$510,080	
Sludge Collector	Greenway WTP	2002	6538	1.0	$321,000	16.0 mgd	16.0 mgd	1.00	1	1.00	$321,000	1.56	1.00	1	$499,912	
Pump Equipment (include under raw water pump station)																
Subtotal														*1*	***$1,252,736***	
CHEMICAL STORAGE AND FEED SYSTEM																
Chemical Building Structure	Greenway WTP	2002	6538	1.0	$794,547	16.0 mgd	16.0 mgd	1.00	25%	0.25	$198,637	1.56	1.00	1	$309,348	Assume using canopy instead of masonry building. Assume 75% cost reduction
FRP Tanks	Greenway WTP	2002	6538	1.0	$42,105	16.0 mgd	16.0 mgd	1.00	1	1.00	$42,105	1.56	1.00	1	$65,573	
Metering Pumps	Greenway WTP	2002	6538	1.0	$321,000	16.0 mgd	16.0 mgd	1.00	1	1.00	$321,000	1.56	1.00	1	$499,912	
Subtotal														*1*	***$874,832***	
OPERATION BUILDING AND LAB																
Operation Building Structure	Carollo	2002	10182	1.0	$200	1.0 SF	1600.0 SF	1600.00	1	1600.00	$320,000	1.00	1.00	1	$320,000	Assume $200/sf. AJSWTP 40' x 20'. Morenci 15'x32'. Assume 40'x40' for this WTP
Safety Equipment	Greenway WTP	2002	6538	1.0	$7,320	16.0 mgd	16.0 mgd	1.00	1	1.00	$7,320	1.56	1.00	1	$11,400	
Lab Equipment	Greenway WTP	2002	6538	1.0	$1,670	16.0 mgd	16.0 mgd	1.00	1	1.00	$1,670	1.56	1.00	1	$2,601	
Subtotal														*1*	***$334,001***	
SLUDGE HANDLING AND DEWATERING FACILITY																
Sludge Dewatering Facility	Apache Juction SWTP	2015	10031	1.0	$399,154	2.0 mgd	16.0 mgd	3.48	1	3.48	$1,389,934	1.02	1.00	1	$1,410,857	EQ basin and sludge thickening tank has been included above. AJSWTP cost including BFP, Conveyor, submersible pumps (filtrate pump station), shade structure, and 20% adder for construction and misc. mechanical
Subtotal														*1*	***$1,410,857***	
ELECTRICAL INSTRUMENT AND CONTROL																
Electrical										10.0%					$4,266,008	
Instrument and Control										10.0%					$4,266,008	
Subtotal															***$8,532,017***	
TOTAL DIRECT COST															**$42,660,085**	

Contingency	20.0%	$8,532,017
Subtotal		$51,192,102
General Contractor Overhead, Profit & Risk	10.0%	$5,119,210
Subtotal		$56,311,312
Escalation to Mid-Point	4.0%	$2,252,452
Subtotal		$58,563,764
Sales Tax (based on 50% Materials)	4.0%	$2,342,551
Subtotal		$60,906,315
Bid Market Allowance	0.0%	$0
Subtotal		$60,906,315
TOTAL ESTIMATED CONSTRUCTION COST =		**$60,906,315**
		$3.81 $/gallon

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ENR PRESENT:

PROJECT : Integrated Water and Wastewate Master Plan — **LOCATION FACTOR:** 0.887

JOB # : 9264A.00 — **DATE :** October-14

CLIENT : City of Goodyear — **ENR :** 9886

ELEMENT : Water Main Construction — **BY :** SJT

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	8" Cl 52 Cldi Mj Pipe In Open Trench	1	LF	$34.05	$0.00	$ 34	$ 34	
	TOTAL PIPING (per LF)							**$34.05**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	0.7	CY	$4.38	$0.00	$ 4	$ 3	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.2	CY	$55.55	$0.00	$ 56	$ 10	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.5	CY	$11.99	$0.00	$ 12	$ 6	
	10% Site Specific Requirements	1	LS	$3.25	$0.00	$ 3	$ 3	
	TOTAL EARTHWORK (per LF)							**$35.70**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.6	SY	$5.70	$0.51	$6.21	$ 3	
REPLACEMENT	4" Ac Paving On 8" Abc	0.6	SY	$27.94	$2.24	$30.18	$ 17	
	TOTAL PAVING (per LF)							**$25.54**
FITTINGS	8" 90° Cldi Mj Bend	2	EA	$1,157.21	$0.00	$1,157.21	$2,314.42	
& VALVES	8" Dimj Awwa Butterfly Valve, No Op	1	EA	$557.13	$0.00	$557.13	$ 557	
	C.I. Valve Box	1	EA	$436.67	$0.00	$436.67	$ 437	
	Air Release Valve Assembly	1	EA	$1,045.32	$0.00	$1,045.32	$ 1,045	
	TOTAL (per 1/4 Mile)						$ 4,354	
	TOTAL FITTING & VALVES (per LF)							**$3.30**
	TOTAL HYDRANT (per LF)							**$18.06**
	OVERHEAD (10%)							**$11.66**
	CONSTRUCTION PROFIT (6%)							**$7.00**
	SALES TAX (65% of above costs at 9.8%)							**$7.43**
	CONTINGENCY (15%)							**$17.50**
	GENERAL CONDITIONS (15%)							**$17.50**
	TOTAL CONSTRUCTION COST, LF							**$177.73**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$248.82**

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ENR PRESENT:

PROJECT : Integrated Water and Wastewate Master Plan — **LOCATION FACTOR:** 0.887

JOB # : 9264A.00 — **DATE :** October-14

CLIENT : City of Goodyear — **ENR :** 9886

ELEMENT : Water Main Construction — **BY :** SJT

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	12" Cl 52 Cldi Mj Pipe In Open Trench	1	LF	$47.75	$0.00	$ 48	$ 48	
	TOTAL PIPING (per LF)							**$47.75**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	0.7	CY	$4.38	$0.00	$ 4	$ 3	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.2	CY	$55.55	$0.00	$ 56	$ 11	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.4	CY	$11.99	$0.00	$ 12	$ 5	
	10% Site Specific Requirements	1	LS	$3.32	$0.00	$ 3	$ 3	
	TOTAL EARTHWORK (per LF)							**$36.49**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.6	SY	$5.70	$0.51	$6.21	$ 3	
REPLACEMENT	4" Ac Paving On 8" Abc	0.6	SY	$27.94	$2.24	$30.18	$ 17	
	TOTAL PAVING (per LF)							**$25.54**
FITTINGS	12" 90° Cldi Mj Bend	2	EA	$1,745.80	$0.00	$1,745.80	$3,491.60	
& VALVES	12" Dimj Awwa Butterfly Valve, No Op	1	EA	$799.79	$0.00	$799.79	$ 800	
	C.I. Valve Box	1	EA	$613.27	$0.00	$613.27	$ 613	
	Air Release Valve Assembly	1	EA	$1,045.32	$0.00	$1,045.32	$ 1,045	
	TOTAL (per 1/4 Mile)						$ 5,950	
	TOTAL FITTING & VALVES (per LF)							**$4.51**
	OVERHEAD (10%)							**$11.43**
	CONSTRUCTION PROFIT (6%)							**$6.86**
	SALES TAX (65% of above costs at 9.8%)							**$7.28**
	CONTINGENCY (15%)							**$17.14**
	GENERAL CONDITIONS (15%)							**$17.14**
	TOTAL CONSTRUCTION COST, LF							**$174.13**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$243.78**

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ENR PRESENT:

PROJECT : Integrated Water and Wastewate Master Plan — **LOCATION FACTOR:** 0.887

JOB # : 9264A.00 — **DATE :** September-15

CLIENT : City of Goodyear — **ENR :** 9886

ELEMENT : Water Main Construction — **BY :** ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	12" Cl 52 Cldi Mj Pipe In Open Trench	1	LF	$47.75	$0.00	$ 48	$ 48	
	TOTAL PIPING (per LF)							**$47.75**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	0.7	CY	$4.38	$0.00	$ 4	$ 3	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.2	CY	$55.55	$0.00	$ 56	$ 11	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.4	CY	$11.99	$0.00	$ 12	$ 5	
	10% Site Specific Requirements	1	LS	$3.32	$0.00	$ 3	$ 3	
	TOTAL EARTHWORK (per LF)							**$36.49**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.6	SY	$5.70	$0.51	$6.21	$ 3	
REPLACEMENT	4" Ac Paving On 8" Abc	0.6	SY	$27.94	$2.24	$30.18	$ 17	
	TOTAL PAVING (per LF)							**$25.54**
FITTINGS	12" 90° Cldi Mj Bend	2	EA	$1,745.80	$0.00	$1,745.80	$3,491.60	
& VALVES	12" Dimj Awwa Butterfly Valve, No Op	1	EA	$799.79	$0.00	$799.79	$ 800	
	C.I. Valve Box	1	EA	$613.27	$0.00	$613.27	$ 613	
	Air Release Valve Assembly	1	EA	$1,045.32	$0.00	$1,045.32	$ 1,045	
	TOTAL (per 1/4 Mile)						$ 5,950	
	TOTAL FITTING & VALVES (per LF)							**$4.51**
	TOTAL HYDRANT (per LF)							**$18.06**
	OVERHEAD (10%)							**$11.43**
	CONSTRUCTION PROFIT (6%)							**$6.86**
	SALES TAX (65% of above costs at 9.8%)							**$7.28**
	CONTINGENCY (15%)							**$17.14**
	GENERAL CONDITIONS (15%)							**$17.14**
	TOTAL CONSTRUCTION COST, LF							**$192.19**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$269.06**

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JOB # : 9264A.00 — **DATE :** October-14

CLIENT : City of Goodyear — **ENR :** 9886

ELEMENT : Water Main Construction — **BY :** SJT

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	16" Cl 52 Cldi Mj Pipe In Open Trench	1	LF	$62.54	$0.00	$ 63	$ 63	
	TOTAL PIPING (per LF)							**$62.54**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	0.9	CY	$4.38	$0.00	$ 4	$ 4	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.2	CY	$55.55	$0.00	$ 56	$ 13	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.6	CY	$11.99	$0.00	$ 12	$ 7	
	10% Site Specific Requirements	1	LS	$3.80	$0.00	$ 4	$ 4	
	TOTAL EARTHWORK (per LF)							**$41.82**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.6	SY	$5.70	$0.51	$6.21	$ 4	
REPLACEMENT	4" Ac Paving On 8" Abc	0.6	SY	$27.94	$2.24	$30.18	$ 18	
	TOTAL PAVING (per LF)							**$26.89**
FITTINGS	16" 90° Cldi Mj Bend	2	EA	$2,568.92	$0.00	$2,568.92	$5,137.85	
& VALVES	16" Dimj Awwa Butterfly Valve, No Op	1	EA	$1,234.48	$0.00	$1,234.48	$ 1,234	
	C.I. Valve Box	1	EA	$613.27	$0.00	$613.27	$ 613	
	Air Release Valve Assembly	1	EA	$1,045.32	$0.00	$1,045.32	$ 1,045	
	TOTAL (per 1/4 Mile)						$ 8,031	
	TOTAL FITTING & VALVES (per LF)							**$6.08**
	OVERHEAD (10%)							**$13.73**
	CONSTRUCTION PROFIT (6%)							**$8.24**
	SALES TAX (65% of above costs at 9.8%)							**$8.75**
	CONTINGENCY (15%)							**$20.60**
	GENERAL CONDITIONS (15%)							**$20.60**
	TOTAL CONSTRUCTION COST, LF							**$209.24**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$292.94**

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ELEMENT : Water Main Construction — **BY :** ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	20" Cl 52 Cldi Mj Pipe In Open Trench	1	LF	$72.38	$0.00	$ 72	$ 72	
	TOTAL PIPING (per LF)							**$72.38**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	1.0	CY	$4.38	$0.00	$ 4	$ 4	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.3	CY	$55.55	$0.00	$ 56	$ 16	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.6	CY	$11.99	$0.00	$ 12	$ 7	
	10% Site Specific Requirements	1	LS	$4.10	$0.00	$ 4	$ 4	
	TOTAL EARTHWORK (per LF)							**$45.14**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.6	SY	$5.70	$0.51	$6.21	$ 4	
REPLACEMENT	4" Ac Paving On 8" Abc	0.6	SY	$27.94	$2.24	$30.18	$ 19	
	TOTAL PAVING (per LF)							**$28.23**
FITTINGS	20" 90° Cldi Mj Bend	2	EA	$3,704.97	$0.00	$3,704.97	$7,409.93	
& VALVES	20" Dimj Awwa Butterfly Valve, No Op	1	EA	$1,792.80	$0.00	$1,792.80	$ 2,514	
	C.I. Valve Box	1	EA	$613.27	$0.00	$613.27	$ 613	
	Air Release Valve Assembly	1	EA	$1,045.32	$0.00	$1,045.32	$ 1,045	
	TOTAL (per 1/4 Mile)						$ 11,583	
	TOTAL FITTING & VALVES (per LF)							**$8.77**
	OVERHEAD (10%)							**$15.45**
	CONSTRUCTION PROFIT (6%)							**$9.27**
	SALES TAX (65% of above costs at 9.8%)							**$9.84**
	CONTINGENCY (15%)							**$23.18**
	GENERAL CONDITIONS (15%)							**$23.18**
	TOTAL CONSTRUCTION COST, LF							**$235.45**
TOTAL PROJECT COST (1.4 times Const Cost), LF								**$329.64**

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CLIENT : City of Goodyear — **ENR :** 9886

ELEMENT : Water Main Construction — **BY :** SJT

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	24" Cl 52 Cldi Mj Pipe In Open Trench	1	LF	$83.80	$0.00	$ 84	$ 84	
	TOTAL PIPING (per LF)							**$83.80**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	1.0	CY	$4.38	$0.00	$ 4	$ 5	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.3	CY	$55.55	$0.00	$ 56	$ 18	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.6	CY	$11.99	$0.00	$ 12	$ 7	
	10% Site Specific Requirements	1	LS	$4.41	$0.00	$ 4	$ 4	
	TOTAL EARTHWORK (per LF)							**$48.47**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.7	SY	$5.70	$0.51	$6.21	$ 4	
REPLACEMENT	4" Ac Paving On 8" Abc	0.7	SY	$27.94	$2.24	$30.18	$ 20	
	TOTAL PAVING (per LF)							**$29.58**
FITTINGS	24" 90° Cldi Mj Bend	2	EA	$5,179.03	$0.00	$5,179.03	$10,358.06	
& VALVES	24" 150# Fxf Awwa Butterfly Valve, No	1	EA	$9,124.84	$0.00	$9,124.84	$ 9,125	
	C.I. Valve Box	1	EA	$613.27	$0.00	$613.27	$ 613	
	Air Release Valve Assembly	1	EA	$1,045.32	$0.00	$1,045.32	$ 1,045	
	TOTAL (per 1/4 Mile)						$ 21,141	
	TOTAL FITTING & VALVES (per LF)							**$16.02**
	OVERHEAD (10%)							**$17.79**
	CONSTRUCTION PROFIT (6%)							**$10.67**
	SALES TAX (65% of above costs at 9.8%)							**$11.33**
	CONTINGENCY (15%)							**$26.68**
	GENERAL CONDITIONS (15%)							**$26.68**
	TOTAL CONSTRUCTION COST, LF							**$271.02**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$379.43**

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PROJECT : Integrated Water and Wastewate Master Plan — **LOCATION FACTOR:** 0.887

JOB # : 9264A.00 — **DATE :** September-15

CLIENT : City of Goodyear — **ENR :** 9886

ELEMENT : Water Main Construction — **BY :** ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	30" Cl 52 Cldi Mj Pipe In Open Trench	1	LF	$105.77	$0.00	$ 106	$ 105.77	
	TOTAL PIPING (per LF)							**$105.77**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	1.3	CY	$4.38	$0.00	$ 4	$ 5.84	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14.19	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.4	CY	$55.55	$0.00	$ 56	$ 22.31	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.8	CY	$11.99	$0.00	$ 12	$ 8.99	
	10% Site Specific Requirements	1	LS	$5.13	$0.00	$ 5	$ 5.13	
	TOTAL EARTHWORK (per LF)							**$48.47**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5.32	
DEMO &	Remove 4"-6" Asphalt Pavement	0.7	SY	$5.70	$0.51	$ 6	$ 4.49	
REPLACEMENT	4" Ac Paving On 8" Abc	0.7	SY	$27.94	$2.24	$ 30	$ 21.79	
	TOTAL PAVING (per LF)							**$29.58**
FITTINGS	30" 90° Cldi Mj Bend	2	EA	$11,035.76	$0.00	$11,035.76	$ 22,071.53	
& VALVES	30" Dimj Awwa Butterfly Valve, No Op	1	EA	$4,449.68	$0.00	$4,449.68	$ 4,449.68	
	C.I. Valve Box	1	EA	$613.27	$0.00	$613.27	$ 613.27	
	Air Release Valve Assembly	1	EA	$1,045.32	$0.00	$1,045.32	$ 1,045.32	
	TOTAL (per 1/4 Mile)						$ 28,180	
	TOTAL FITTING & VALVES (per LF)							**$21.35**
	OVERHEAD (10%)							**$20.52**
	CONSTRUCTION PROFIT (6%)							**$12.31**
	SALES TAX (65% of above costs at 9.8%)							**$20.11**
	CONTINGENCY (15%)							**$30.78**
	GENERAL CONDITIONS (15%)							**$30.78**
	TOTAL CONSTRUCTION COST, LF							**$319.66**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$447.53**

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PROJECT : Integrated Water and Wastewate Master Plan — **LOCATION FACTOR:** 0.887

JOB # : 9264A.00 — **DATE :** September-15

CLIENT : City of Goodyear — **ENR :** 9886

ELEMENT : Water Main Construction — **BY :** ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	36" Cl 52 Cldi Mj Pipe In Open Trench	1	LF	$120.10	$0.00	$ 120	$ 120.10	
	TOTAL PIPING (per LF)							**$120.10**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	1.5	CY	$4.38	$0.00	$ 4	$ 6.49	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14.19	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.5	CY	$55.55	$0.00	$ 56	$ 26.61	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.7	CY	$11.99	$0.00	$ 12	$ 8.88	
	10% Site Specific Requirements	1	LS	$5.62	$0.00	$ 6	$ 5.62	
	TOTAL EARTHWORK (per LF)							**$61.78**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5.32	
DEMO &	Remove 4"-6" Asphalt Pavement	0.8	SY	$5.70	$0.51	$ 6	$ 4.83	
REPLACEMENT	4" Ac Paving On 8" Abc	0.8	SY	$27.94	$2.24	$ 30	$ 23.47	
	TOTAL PAVING (per LF)							**$33.63**
FITTINGS	36" 90° Cldi Mj Bend	2	EA	$13,010.61	$0.00	$13,010.61	$ 26,021.22	
& VALVES	36" Dimj Awwa Butterfly Valve, No Op	1	EA	$5,212.12	$0.00	$5,212.12	$ 5,212.12	
	C.I. Valve Box	1	EA	$613.27	$0.00	$613.27	$ 613.27	
	Air Release Valve Assembly	1	EA	$1,045.32	$0.00	$1,045.32	$ 1,045.32	
	TOTAL (per 1/4 Mile)						$ 32,892	
	TOTAL FITTING & VALVES (per LF)							**$24.92**
	OVERHEAD (10%)							**$24.04**
	CONSTRUCTION PROFIT (6%)							**$14.43**
	SALES TAX (65% of above costs at 9.8%)							**$23.56**
	CONTINGENCY (15%)							**$36.06**
	GENERAL CONDITIONS (15%)							**$36.06**
	TOTAL CONSTRUCTION COST, LF							**$374.58**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$524.41**

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PROJECT : Integrated Water and Wastewate Master Plan — **LOCATION FACTOR:** 0.887

JOB # : 9264A.00 — **DATE :** September-15

CLIENT : City of Goodyear — **ENR :** 9886

ELEMENT : Water Main Construction — **BY :** ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	42" Cl 52 Cldi Mj Pipe In Open Trench	1	LF	$134.42	$0.00	$ 134	$ 134.42	
	TOTAL PIPING (per LF)							**$134.42**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	1.6	CY	$4.38	$0.00	$ 4	$ 7.13	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14.19	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.6	CY	$55.55	$0.00	$ 56	$ 31.13	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.7	CY	$11.99	$0.00	$ 12	$ 8.55	
	10% Site Specific Requirements	1	LS	$6.10	$0.00	$ 6	$ 6.10	
	TOTAL EARTHWORK (per LF)							**$67.10**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5.32	
DEMO &	Remove 4"-6" Asphalt Pavement	0.8	SY	$5.70	$0.51	$ 6	$ 5.18	
REPLACEMENT	4" Ac Paving On 8" Abc	0.8	SY	$27.94	$2.24	$ 30	$ 25.15	
	TOTAL PAVING (per LF)							**$35.65**
FITTINGS	42" 90° Cldi Mj Bend	2	EA	$14,970.82	$0.00	$14,970.82	$ 29,941.63	
& VALVES	42" Dimj Awwa Butterfly Valve, No Op	1	EA	$8,509.20	$0.00	$8,509.20	$ 8,509.20	
	C.I. Valve Box	1	EA	$613.27	$0.00	$613.27	$ 613.27	
	Air Release Valve Assembly	1	EA	$1,045.32	$0.00	$1,045.32	$ 1,045.32	
	TOTAL (per 1/4 Mile)						$ 40,109	
	TOTAL FITTING & VALVES (per LF)							**$30.39**
	OVERHEAD (10%)							**$26.76**
	CONSTRUCTION PROFIT (6%)							**$16.05**
	SALES TAX (65% of above costs at 9.8%)							**$26.22**
	CONTINGENCY (15%)							**$40.13**
	GENERAL CONDITIONS (15%)							**$40.13**
	TOTAL CONSTRUCTION COST, LF							**$416.85**
TOTAL PROJECT COST (1.4 times Const Cost), LF								**$583.59**

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ENR PRESENT:

WELL SITES

WELL SIZE FLOWRATE (gpm)	WELL DEPTH (ft)	**WELL DRILLING COST** (ENR CCI = 9886)	**WELL EQUIPING COST** (ENR CCI = 9886)	**WELL TOTAL ONSTRUCTIO COST** (ENR CCI = 9886)	**WELL TOTAL PROJECT COST** (ENR CCI = 9886)
800	700	**$732,000**	**$ 976,000**	**$ 1,708,000**	**$2,391,200**
1300	1300	**$1,089,000**	**$ 1,230,000**	**$ 2,319,000**	**$3,246,600**

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ENR PRESENT:	9886

COST ESTIMATE

PROJECT:	DRILL WELL - 700 FT DEEP	ESTIMATOR:	SJT
JOB NO.:	Integrated Master Plan 2014	DATE:	8-Dec-14
CLIENT:	City of Goodyear	SHEET NO.:	

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Mobilization and Demobilization	1	LS	$ 43,652.47	$ 43,652.47
2	Well drilling	700	LF	$ 141.23	$ 98,860.00
3	Casing & Gravel Pack Installation	500	LF	$ 449.36	$ 224,681.82
4	Well Logging and Sampling	1	LS	$ 64,194.81	$ 64,194.81
5	Well Development and Testing	1	LS	$ 48,788.05	$ 48,788.05
6	Contractor Overhead & Profit (16%)				$ 76,828.34
7	Sales Tax (65% of above costs at 9.8%)				$ 30,587.28
8	Contingency (15%)				$ 72,026.57
9	General Conditions (15%)				$ 72,026.57
	TOTAL CONSTRUCTION COST (DRILLING)				$ 732,000.00
	TOTAL PROJECT COST (DRILLING)				$ 1,024,800.00

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ENR PRESENT:	9886

COST ESTIMATE

PROJECT:	WELL SITE - 150 HP, 800 GPM	ESTIMATOR:	SJT
JOB NO.:	Integrated Master Plan 2014	DATE:	8-Dec-14
CLIENT:	City of Goodyear		

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Mobilization and Demobilization	1	LS	$ 58,232.03	$ 58,232.03
2	150HP Well Pump & 400 ft Pipe Column	1	LS	$ 96,292.21	$ 96,292.21
3	Well Pad (6' x 6' 12")	1.5	CY	$ 577.75	$ 866.63
4	Piping Support Pad - (6'x12'x8")	1.75	CY	$ 577.75	$ 1,011.07
5	Piping - 10" MJ DIP & Excavation	300	LF	$ 112.09	$ 1,011.07
6	10" DIP MJ Fittings	8	EA	$ 1,895.83	$ 15,166.61
7	10" DIP BF Valve	2	EA	$ 2,296.31	$ 4,592.63
8	10" DIP Check Valve	2	EA	$ 4,765.49	$ 9,530.98
9	Misc Pipe Supports	1	LS	$ 641.95	$ 641.95
10	Chlorine Fiberglass Enclosure	1	LS	$ 8,987.27	$ 8,987.27
11	Chlorine Building Slab (6'x6'x8")	1	CY	$ 577.75	$ 577.75
12	Chlorine Equipment & Piping	1	LS	$ 4,493.64	$ 4,493.64
13	Shade Cover over Electrical Equipment	200	SF	$ 25.68	$ 5,135.58
14	Electrical Equipment Slab (10' x 20' x 8")	5	CY	$ 513.56	$ 2,567.79
15	Electrical Serivce, Conduit & Wiring	1	LS	$ 288,876.62	$ 288,876.62
16	RTU in NEMA Enclosure with Antenna	1	LS	$ 25,677.92	$ 25,677.92
17	Pole & Base	1	LS	$ 641.95	$ 641.95
18	Flow Meter, Transmitter and Instrumentation	2	LS	$ 17,448.15	$ 34,896.30
19	Security Allowance	1	LS	$ 9,629.22	$ 9,629.22
20	Site Lighting	4	EA	$ 3,594.91	$ 14,379.64
21	Access Gate	1	EA	$ 1,925.84	$ 1,925.84
22	CMU Wall	300	LF	$ 140.27	$ 42,081.12
23	Site 4" ABC Finish	5625	SF	$ 0.39	$ 2,166.57
24	Concrete Drive	1	EA	$ 1,283.90	$ 1,283.90
25	Asphalt Driveway	1	LS	$ 2,182.62	$ 2,182.62
26	Equipment Testing & Start-up	1	LS	$ 7,703.38	$ 7,703.38
27	Contractor Overhead & Profit (16%)				$ 102,488.37
28	Sales Tax (65% of above costs at 9.8%)				$ 40,803.18
29	Contingency (15%)				$ 96,082.84
30	General Conditions (15%)				$ 96,082.84
	TOTAL CONSTRUCTION COST (EQUIPPING)				$ 976,000.00
	TOTAL PROJECT COST (EQUIPPING)				$ 1,366,400.00

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ENR PRESENT:	9886

COST ESTIMATE

PROJECT:	DRILL WELL - 1300 FT DEEP	ESTIMATOR:	SJT
JOB NO.:	Integrated Master Plan 2014	DATE:	27-Jan-15
CLIENT:	City of Goodyear		

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Mobilization and Demobilization	1	LS	$ 65,000	$ 65,000
2	Well drilling	1300	LF	$ 140	$ 183,600
3	Casing & Gravel Pack Installation	700	LF	$ 450	$ 314,600
4	Well Logging and Sampling	1	LS	$ 83,500	$ 83,500
5	Well Development and Testing	1	LS	$ 68,000	$ 68,000
6	Contractor Overhead & Profit (16%)				$ 114,350
7	Sales Tax (65% of above costs at 9.8%)				$ 45,530
8	Contingency (15%)				$ 107,210
9	General Conditions (15%)				$ 107,210
	TOTAL CONSTRUCTION COST (DRILLING)				$ 1,089,000
	TOTAL PROJECT COST (DRILLING)				$ 1,525,000

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ENR PRESENT:	9886

COST ESTIMATE

PROJECT:	WELL SITE - 400 HP, 1300 GPM	ESTIMATOR:	SJT
JOB NO.:	Integrated Master Plan 2014	DATE:	27-Jan-15
CLIENT:	City of Goodyear		

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Mobilization and Demobilization	1	LS	$ 72,700	$ 72,700
2	400HP Well Pump & 700 ft Pipe Column	1	LS	$ 137,400	$ 137,400
3	Well Pad (6' x 6' 12")	1.5	CY	$ 580	$ 870
4	Piping Support Pad - (6'x12'x8")	1.75	CY	$ 580	$ 1,010
5	Piping - 12" MJ DIP & Excavation	300	LF	$ 230	$ 69,100
6	12" DIP MJ Fittings	8	EA	$ 2,190	$ 17,600
7	12" DIP BF Valve	2	EA	$ 4,010	$ 8,000
8	12" DIP Check Valve	2	EA	$ 7,400	$ 14,900
9	Misc Pipe Supports	1	LS	$ 640	$ 640
10	Chlorine Fiberglass Enclosure	1	LS	$ 9,000	$ 9,000
11	Chlorine Building Slab (6'x6'x8")	1	CY	$ 580	$ 580
12	Chlorine Equipment & Piping	1	LS	$ 4,490	$ 4,490
13	Shade Cover over Electrical Equipment	200	SF	$ 26	$ 5,100
14	Electrical Equipment Slab (10' x 20' x 8")	5	CY	$ 510	$ 2,570
15	Electrical Serivce, Conduit & Wiring	1	LS	$ 321,000	$ 321,000
16	RTU in NEMA Enclosure with Antenna	1	LS	$ 25,700	$ 25,700
17	Pole & Base	1	LS	$ 640	$ 640
18	Flow Meter, Transmitter and Instrumentation	2	LS	$ 17,400	$ 34,900
19	Security Allowance	1	LS	$ 9,600.00	$ 9,600
20	Site Lighting	4	EA	$ 3,590.00	$ 14,400
21	Access Gate	1	EA	$ 1,930.00	$ 1,930
22	CMU Wall	300	LF	$ 140.00	$ 42,100
23	Site 4" ABC Finish	5625	SF	$ 0.40	$ 2,170
24	Concrete Drive	1	EA	$ 1,280.00	$ 1,280
25	Asphalt Driveway	1	LS	$ 2,180.00	$ 2,180
26	Equipment Testing & Start-up	1	LS	$ 7,700.00	$ 7,700
27	Contractor Overhead & Profit (16%)				$ 129,210
28	Sales Tax (65% of above costs at 9.8%)				$ 51,440
29	Contingency (15%)				$ 121,130
30	General Conditions (15%)				$ 121,130
	TOTAL CONSTRUCTION COST (EQUIPPING)				$ 1,230,000
	TOTAL PROJECT COST (EQUIPPING)				$ 1,722,000

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ENR PRESENT:	9886

COST ESTIMATE

PROJECT:	ARSENIC TREATMENT FOR 800 GPM WELL	ESTIMATOR:	JW
JOB NO.:	Integrated Master Plan 2014	DATE:	31-Oct-14
CLIENT:	City of Goodyear		

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	SM (Par.)
1	Existing Hypo Storage/Feed Shed	27	$	$ 5,000	$ 136,533
2	Pressure Vessel Vertical	6	$/ft-dia	$ 5,333	$ 34,133
3	Internal Inlet/Outlet Header System		%	$ 25	$ 89,557
4	Sorbtive Media		$/ft3	$ 209	$ 43,777
5	Backwash tank		$/gal	$ 4	$ 7,200
6	Hypo Chemical Tank		$/gal	$ 7	$ 15,000
7	SM Prefilters		$/gpm	$ 19	$ 41,500
8	Concrete Slab on grade (24" thick)	67	$/cy	$ 800	$ 53,218
9	Concrete Slab on grade (12" thick)	10	$/cy	$ 1,000	$ 9,907
10	Ex./backfill/compact/ABC	130	$/cy	$ 50	$ 6,475
11	Vessel Piping	4	$/filter	$ 15,000	$ 60,000
12	Yard Piping Treatment Influent / Effluent Piping	800	$/gpm	$ 150	$ 120,000
13	Yard Piping Backwash Supply Backwash Waste Piping	800	$/gpm	$ 188	$ 150,000
14	CIVIL		%	$ 10	$ 80,000
15	COATINGS		%	$ 5	$ 40,000
16	E&IC		%	$ 10	$ 80,000
17	**Sub Total**				**$ 967,000**
18					
19	**Contingency and General Conditions**		%	0.300	**$ 290,000**
20	**Contractor Overhead and Profit**		%	0.160	**$ 155,000**
21	**Sales Tax (65% of above at 9.8%)**		%	0.064	**$ 62,000**
22	**Total Construction Cost**				**$ 1,474,000**
23					
24	**Total Project Costs (1.4 times Cons Cost)**				**$ 2,063,600**
25	**Total Project Costs (1.4 times Cons Cost), $/gal**				**$ 1.79**

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ENR PRESENT:	9886

COST ESTIMATE

PROJECT:	1,000 GPM BOOSTER STATION expansion for fire flow	ESTIMATOR:	SJT
JOB NO.:	Integrated Master Plan 2014	DATE:	31-Oct-14
CLIENT:	City of Goodyear		

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Mobilization and Demobilization	1	LS	$ 34,000	$ 34,000
2	Piping - 12" MJ DIP	300	LF	$ 48	$ 14,300
3	12" DIP MJ Fittings	4	EA	$ 5,900	$ 23,600
4	125 hp Vertical Turbine Pump w/ Pump Can	2	EA	$ 42,000	$ 84,000
5	12" Discharge Piping FL DIP (10 FT per pump)	2	EA	$ 1,030	$ 2,050
6	12" FL Check Valve	2	EA	$ 5,800	$ 11,600
7	12" FL BFV	2	EA	$ 1,950	$ 3,910
8	12" DIP FL Fittings	4	EA	$ 2,190	$ 8,800
9	12" DIP FL Pipe - Manifold	30	LF	$ 100	$ 3,080
10	12" Reducers	2	EA	$ 580	$ 1,160
11	12" FL BFVs	2	EA	$ 3,120	$ 6,200
12	Piping Support Pad - (10'x20'x12")	7.5	CY	$ 580	$ 4,330
13	Misc Pipe Supports	1	LS	$ 1,500	$ 1,500
14	Electrical Service, Swichgear, Panels, Wiring, and Conduit	1	LS	$ 32,900	$ 32,900
15	125 hp Motor VFDs	2	EA	$ 33,000	$ 66,000
16	Electrical Pre-Cast Vault/Buidling	1	LS	$ 50,000	$ 50,000
17	RTU in NEMA Enclosure with Antenna	1	LS	$ 25,700	$ 25,700
18	Pole & Base	1	LS	$ 640	$ 640
19	Contractor Overhead & Profit (16%)				$ 59,800
20	Sales Tax (65% of above costs at 9.8%)				$ 23,810
21	Contingency (15%)				$ 56,070
22	General Conditions (15%)				$ 56,070
	TOTAL CONSTRUCTION COST				$ 570,000
	TOTAL PROJECT COST				$ 798,000

Engineers...Working Wonders With Water™

ENR PRESENT:	9886

COST ESTIMATE

PROJECT:	1800 GPM BOOSTER STATION	ESTIMATOR:	SJT
JOB NO.:	Integrated Master Plan 2014	DATE:	27-Jan-15
CLIENT:	City of Goodyear		

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Mobilization and Demobilization (10%)	1	LS	$ 30,900	$ 30,900
2	Material Testing	1	LS	$ 3,210	$ 3,210
3	250hp Vertical Turbine Pump w/ Pump Can	1	EA	$ 78,200	$ 78,200
4	12" Discharge Piping FL DIP (10 FT per pump)	1	EA	$ 1,030	$ 1,030
5	12" FL Check Valve	1	EA	$ 5,800	$ 5,800
6	12" FL BFV	1	EA	$ 1,950	$ 1,950
7	12" DIP FL Fittings	2	EA	$ 2,190	$ 4,390
8	12" Reducers	1	EA	$ 580	$ 580
9	12" FL BFVs	1	EA	$ 3,120	$ 3,120
10	Pressure Transmitters and Instrumentation	2	LS	$ 7,700	$ 15,400
11	Piping Support Pad - (10'x20'x12")	10	CY	$ 580	$ 5,800
12	Misc Pipe Supports	1	LS	$ 1,500	$ 1,500
13	Electrical Service, Swichgear, Panels, Wiring, and Conduit	1	LS	$ 71,400	$ 71,400
14	Electrical Pre-Cast Vault/Buidling	1	LS	$ 64,200	$ 64,200
15	Emergency Generator w/ Fuel Tank	1	LS	$ 43,100	$ 43,100
16	Generator Pad (15'x20'x18")	17	CY	$ 580	$ 9,800
17	Contractor Overhead & Profit (16%)				$ 54,460
18	Sales Tax (65% of above costs at 9.8%)				$ 21,680
19	Contingency (15%)				$ 51,060
20	General Conditions (15%)				$ 51,060
	TOTAL CONSTRUCTION COST				$ 519,000
	TOTAL PROJECT COST				$ 727,000

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ENR PRESENT:	9886

COST ESTIMATE

PROJECT:	8.8 MGD BOOSTER STATION	ESTIMATOR:	ETB
JOB NO.:	Integrated Master Plan 2014	DATE:	27-Jan-15
CLIENT:	City of Goodyear		

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Mobilization and Demobilization (10%)	1	LS	$ 198,327.02	$ 198,327.02
2	Material Testing	1	LS	$ 3,209.74	$ 3,209.74
3	Piping - 24" MJ DIP	300	LF	$ 108.47	$ 32,541.00
4	24" DIP MJ Fittings	4	EA	$ 5,907.45	$ 23,629.80
5	250hp Vertical Turbine Pump w/ Pump Can	3	EA	$ 67,404.55	$ 202,213.64
6	125 hp Vertical Turbine Pump w/ Pump Can	1	EA	$ 53,923.64	$ 53,923.64
7	16" Discharge Piping FL DIP (10 FT per pump)	4	EA	$ 1,270.89	$ 5,083.56
8	16" FL Check Valve	4	EA	$ 18,981.24	$ 75,924.94
9	16" FL BFV	4	EA	$ 5,058.66	$ 20,234.62
10	24" DIP FL Fittings	4	EA	$ 5,907.45	$ 23,629.80
11	24" DIP FL Pipe - Manifold	30	LF	$ 291.99	$ 8,759.68
12	20" Flowmeter	1	EA	$ 16,459.92	$ 16,459.92
13	24" Reducers	2	EA	$ 2,118.45	$ 4,236.91
14	24" FL BFVs	2	EA	$ 5,642.90	$ 11,285.81
15	Pressure Transmitters and Instrumentation	2	LS	$ 7,703.38	$ 15,406.75
16	Piping Support Pad - (10'x20'x12")	7.5	CY	$ 577.75	$ 4,333.15
17	Misc Pipe Supports	1	LS	$ 1,925.84	$ 1,925.84
18	Chlorine Fiberglass Enclosure	1	LS	$ 8,987.27	$ 8,987.27
19	Chlorine Building Slab (6'x6'x8")	1	CY	$ 327.34	$ 327.34
20	Chlorine Equipment & Piping	1	LS	$ 4,493.64	$ 4,493.64
21	10,000 gallon hydromatic tank w/ air comp & controls	1	LS	$ 216,594.00	$ 216,594.00
22	Tank and A/C Pad (10'x20'x12")	7.5	CY	$ 577.75	$ 4,333.15
23	Electrical Service, Swichgear, Panels, Wiring, and Conduit	1	LS	$ 449,367.66	$ 449,367.66
24	250 hp Motor VFDs	3	EA	$ 128,389.61	$ 385,168.83
25	125 hp Motor VFDs	1	EA	$ 42,368.57	$ 42,368.57
26	Electrical Pre-Cast Vault/Buidling	1	LS	$ 64,194.81	$ 64,194.81
27	Emergency Generator w/ Fuel Tank	1	LS	$ 147,391.27	$ 147,391.27
28	Generator Pad (15'x20'x18")	17	CY	$ 577.75	$ 9,821.81
29	RTU in NEMA Enclosure with Antenna	1	LS	$ 25,677.92	$ 25,677.92
30	Pole & Base	1	LS	$ 641.95	$ 641.95
31	Security Allowance	1	LS	$ 9,629.22	$ 9,629.22
32	Site Lighting	4	EA	$ 3,594.91	$ 14,379.64
33	Access Gate	1	EA	$ 1,925.84	$ 1,925.84
34	CMU Wall	590	LF	$ 140.73	$ 83,033.37
35	Site 4" ABC Finish	21780	SF	$ 0.40	$ 8,668.61
36	Concrete Drive	1	EA	$ 1,283.90	$ 1,283.90
37	Asphalt Driveway	1	LS	$ 2,182.62	$ 2,182.62
	Overhead - 10%				$ 218,159.72
	Construction Profit - 6%				$ 130,895.83
	Sales Tax (65% of above costs at 9.8%)				$ 138,967.74
	Contingency - 15%				$ 327,239.59
	General Conditions - 15%				$ 400,443.08
	Total Construction Cost				**$ 3,397,000**
	Total Project Cost				**$ 4,756,000**

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ENR PRESENT:	9886

COST ESTIMATE

PROJECT: 12 MGD BOOSTER STATION
JOB NO.: Integrated Master Plan 2014
CLIENT: City of Goodyear

ESTIMATOR: ETB
DATE: 27-Jan-15

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Mobilization and Demobilization (10%)	1	LS	$ 215,463.90	$ 215,463.90
2	Material Testing	1	LS	$ 3,209.74	$ 3,209.74
3	Piping - 24" MJ DIP	300	LF	$ 108.47	$ 32,541.00
4	24" DIP MJ Fittings	4	EA	$ 5,907.45	$ 23,629.80
5	250 hp Vertical Turbine Pump w/ Pump Can	4	EA	$ 67,404.55	$ 269,618.18
6	16" Discharge Piping FL DIP (10 FT per pump)	4	EA	$ 1,544.52	$ 6,178.09
7	16" FL Check Valve	4	EA	$ 18,981.24	$ 75,924.94
8	16" FL BFV	4	EA	$ 5,058.66	$ 20,234.62
9	24" DIP FL Fittings	4	EA	$ 5,907.45	$ 23,629.80
10	24" DIP FL Pipe - Manifold	30	LF	$ 291.99	$ 8,759.68
11	20" Flowmeter	1	EA	$ 16,459.92	$ 16,459.92
12	24" Reducers	2	EA	$ 2,118.45	$ 4,236.91
13	24" FL BFVs	2	EA	$ 5,642.90	$ 11,285.81
14	Pressure Transmitters and Instrumentation	2	LS	$ 7,703.38	$ 15,406.75
15	Piping Support Pad - (10'x20'x12")	7.5	CY	$ 577.75	$ 4,333.15
16	Misc Pipe Supports	1	LS	$ 1,925.84	$ 1,925.84
17	Chlorine Fiberglass Enclosure	1	LS	$ 8,987.27	$ 8,987.27
18	Chlorine Building Slab (6'x6'x8")	1	CY	$ 407.47	$ 407.47
19	Chlorine Equipment & Piping	1	LS	$ 4,493.64	$ 4,493.64
20	10,000 gallon hydromatic tank w/ air comp & controls	1	LS	$ 216,594.00	$ 216,594.00
21	Tank and A/C Pad (10'x20'x12")	7.5	CY	$ 577.75	$ 4,333.15
22	Electrical Service, Swichgear, Panels, Wiring, and Conduit	1	LS	$ 496,692.92	$ 496,692.92
23	250 hp Motor VFDs	4	EA	$ 128,389.61	$ 513,558.44
24	Electrical Pre-Cast Vault/Buidling	1	LS	$ 64,194.81	$ 64,194.81
25	Emergency Generator w/ Fuel Tank	1	LS	$ 170,758.18	$ 170,758.18
26	Generator Pad (15'x20'x18")	17	CY	$ 577.75	$ 9,821.81
27	RTU in NEMA Enclosure with Antenna	1	LS	$ 25,677.92	$ 25,677.92
28	Pole & Base	1	LS	$ 641.95	$ 641.95
29	Security Allowance	1	LS	$ 9,629.22	$ 9,629.22
30	Site Lighting	4	EA	$ 3,594.91	$ 14,379.64
31	Access Gate	1	EA	$ 1,925.84	$ 1,925.84
32	CMU Wall	590	LF	$ 140.73	$ 83,033.37
33	Site 4" ABC Finish	21780	SF	$ 0.40	$ 8,668.61
34	Concrete Drive	1	EA	$ 1,283.90	$ 1,283.90
35	Asphalt Driveway	1	LS	$ 2,182.62	$ 2,182.62
	Overhead - 10%				$ 237,010.29
	Construction Profit - 6%				$ 142,206.17
	Sales Tax (65% of above costs at 9.8%)				$ 150,975.55
	Contingency - 15%				$ 355,515.43
	General Conditions - 15%				$ 435,044.24
	Total Construction Cost				**$ 3,691,000**
	Total Project Cost				**$ 5,167,000**

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ENR PRESENT:	9886

COST ESTIMATE

PROJECT:	1 - 1.5 MG RESERVOIR	ESTIMATOR:	SJT
JOB NO.:	Integrated Master Plan 2014	DATE:	27-Jan-15
CLIENT:	City of Goodyear		

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Material Test	1	LS	$ 3,210	$ 3,210
2	Excavation	8000	CY	$ 44	$ 353,800
3	Piping - 24" MJ DIP	300	LF	$ 110	$ 32,500
4	24" DIP MJ Fittings	8	EA	$ 5,900	$ 47,300
5	24" DIP BF Valve	3	EA	$ 6,200	$ 18,500
6	Backfill	2800	CY	$ 10	$ 28,000
7	Vapor Barrier	8000	SF	$ 0	$ 3,590
8	1.2 MG Tank Construction	1	LS	$ 1,190,000	$ 1,190,000
9	Chlorine Fiberglass Enclosure	1	LS	$ 9,000	$ 9,000
10	Chlorine Building Slab (6'x6'x8")	1	CY	$ 580	$ 580
11	Chlorine Equipment & Piping	1	LS	$ 4,490	$ 4,490
12	Shade Cover over Electrical Equipment	200	SF	$ 26	$ 5,100
13	Electrical Equipment Slab (10' x 20' x 8")	5	CY	$ 580	$ 2,890
14	Electrical Service, Panels, Wiring, and Conduit	1	LS	$ 23,100	$ 23,100
15	RTU in NEMA Enclosure with Antenna	1	LS	$ 25,700	$ 25,700
16	Pole & Base	1	LS	$ 640	$ 640
17	Level Transmitter and Instrumentation	1	LS	$ 9,600	$ 9,600
18	Security Allowance	1	LS	$ 9,600	$ 9,600
19	Site Lighting	4	EA	$ 3,590.00	$ 14,400
20	Tank Painting	3650	SF	$ 2.40	$ 8,900
21	Access Gate	1	EA	$ 1,930.00	$ 1,930
22	CMU Wall	520	LF	$ 170.00	$ 90,800
23	Site 4" ABC Finish	16700	SF	$ 0.40	$ 6,400.00
24	Concrete Drive	1	EA	$ 1,280.00	$ 1,280
25	Asphalt Driveway	1	LS	$ 2,180.00	$ 2,180
26	Contractor Overhead & Profit (16%)				$ 302,960
27	Sales Tax (65% of above costs at 9.8%)				$ 120,620
28	Contingency (15%)				$ 284,020
29	General Conditions (15%)				$ 284,020
	TOTAL CONSTRUCTION COST				$ 2,885,000
	TOTAL PROJECT COST				$ 4,039,000

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ENR PRESENT:	9886

COST ESTIMATE

PROJECT:	2.6 MG RESERVOIR	ESTIMATOR:	SJT
JOB NO.:	Integrated Master Plan 2014	DATE:	31-Oct-14
CLIENT:	City of Goodyear		

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Material Test	1	LS	$ 3,209.74	$ 3,209.74
2	Excavation	13,800	CY	$ 44.22	$ 610,291.20
3	Piping - 24" MJ DIP	300	LF	$ 83.80	$ 25,140.41
4	24" DIP MJ Fittings	8	EA	$ 6,649.34	$ 53,194.69
5	24" DIP BF Valve	3	EA	$ 9,124.84	$ 27,374.51
6	Backfill	4,800	CY	$ 10.00	$ 48,000.00
7	Vapor Barrier	12,900	SF	$ 0.45	$ 5,796.79
8	2.6 MG Tank Construction	1	LS	$ 2,075,568.18	$ 2,075,568.18
9	Chlorine Fiberglass Enclosure	1	LS	$ 8,987.27	$ 8,987.27
10	Chlorine Building Slab (6'x6'x8")	1	CY	$ 577.75	$ 577.75
11	Chlorine Equipment & Piping	1	LS	$ 4,493.64	$ 4,493.64
12	Shade Cover over Electrical Equipment	200	SF	$ 25.68	$ 5,135.58
13	Electrical Equipment Slab (10' x 20' x 8")	5	CY	$ 577.75	$ 2,888.77
14	Electrical Service, Panels, Wiring, and Conduit	1	LS	$ 23,110.13	$ 23,110.13
15	RTU in NEMA Enclosure with Antenna	1	LS	$ 25,677.92	$ 25,677.92
16	Pole & Base	1	LS	$ 641.95	$ 641.95
17	Level Transmitter and Instrumentation	1	LS	$ 9,629.22	$ 9,629.22
18	Security Allowance	1	LS	$ 9,629.22	$ 9,629.22
19	Site Lighting	4	EA	$ 3,594.91	$ 14,379.64
20	Tank Painting	4,020	SF	$ 2.44	$ 9,806.40
21	Access Gate	1	EA	$ 1,925.84	$ 1,925.84
22	CMU Wall	575	LF	$ 174.61	$ 100,400.68
23	Site 4" ABC Finish	20,450	SF	$ 0.39	$ 7,876.70
24	Concrete Drive	1	EA	$ 1,283.90	$ 1,283.90
25	Asphalt Driveway	1	LS	$ 2,182.62	$ 2,182.62
	Contractor Overhead & Profit (16%)				$ 492,352.44
	Sales Tax (65% of above costs at 9.8%)				$ 196,017.82
	Contingency (15%)				$ 461,580.41
	General Conditions (15%)				$ 564,835.95
	TOTAL CONSTRUCTION COST				$ 4,792,000.00
	TOTAL PROJECT COST				$ 6,708,800.00

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ENR PRESENT:	9886

COST ESTIMATE

PROJECT: 4.0 MG RESERVOIR
JOB NO.: Integrated Master Plan 2014
CLIENT: City of Goodyear

ESTIMATOR: SJT
DATE: 31-Oct-14

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Material Test	1	LS	$ 3,209.74	$ 3,209.74
2	Excavation	21,700	CY	$ 44.22	$ 959,660.80
3	Piping - 24" MJ DIP	300	LF	$ 108.47	$ 32,541.00
4	24" DIP MJ Fittings	8	EA	$ 5,907.21	$ 47,257.65
5	24" DIP BF Valve	3	EA	$ 6,182.12	$ 18,546.36
6	Backfill	6,630	CY	$ 10.00	$ 66,300.00
7	Vapor Barrier	17,700	SF	$ 0.45	$ 7,953.74
8	4.0 MG Tank Construction	1	LS	$ 2,618,409.09	$ 2,618,409.09
9	Chlorine Fiberglass Enclosure	1	LS	$ 8,987.27	$ 8,987.27
10	Chlorine Building Slab (6'x6'x8")	1	CY	$ 577.75	$ 577.75
11	Chlorine Equipment & Piping	1	LS	$ 4,493.64	$ 4,493.64
12	Shade Cover over Electrical Equipment	200	SF	$ 25.68	$ 5,135.58
13	Electrical Equipment Slab (10' x 20' x 8")	5	CY	$ 577.75	$ 2,888.77
14	Electrical Service, Panels, Wiring, and Conduit	1	LS	$ 23,110.13	$ 23,110.13
15	RTU in NEMA Enclosure with Antenna	1	LS	$ 25,677.92	$ 25,677.92
16	Pole & Base	1	LS	$ 641.95	$ 641.95
17	Level Transmitter and Instrumentation	1	LS	$ 9,629.22	$ 9,629.22
18	Security Allowance	1	LS	$ 9,629.22	$ 9,629.22
19	Site Lighting	4	EA	$ 3,594.91	$ 14,379.64
20	Tank Painting	4,700	SF	$ 2.44	$ 11,465.19
21	Access Gate	1	EA	$ 1,925.84	$ 1,925.84
22	CMU Wall	715	LF	$ 174.61	$ 124,846.06
23	Site 4" ABC Finish	31,700	SF	$ 0.39	$ 12,209.85
24	Concrete Drive	1	EA	$ 1,283.90	$ 1,283.90
25	Asphalt Driveway	1	LS	$ 2,182.62	$ 2,182.62
	Contractor Overhead & Profit (16%)				$ 642,070.87
	Sales Tax (65% of above costs at 9.8%)				$ 255,624.46
	Contingency (15%)				$ 601,941.44
	General Conditions (15%)				$ 736,595.74
	TOTAL CONSTRUCTION COST				$ 6,249,000.00
	TOTAL PROJECT COST				$ 8,748,600.00

APPENDIX C – WASTEWATER AND RECLAIMED WATER REGULATIONS

APPENDIX C - WASTEWATER AND RECLAIMED WATER REGULATIONS

The following sections contain a discussion of the water and wastewater regulations that are applicable to the operations of the City's wastewater system. These regulations protect public health and the environment and also define allowed uses for reclaimed water.

1.0 FEDERAL REGULATIONS

Growing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the Clean Water Act. The Act established the basic structure for regulating discharges of pollutants into the waters of the United States. It gave EPA the authority to implement pollution control programs such as setting wastewater standards for industry. The Clean Water Act also continued requirements to set water quality standards for all contaminants in surface waters.

1.1 National Pollutant Discharge Elimination System (NPDES)

The NPDES program regulates the discharges from publicly owned wastewater treatment facilities, other wastewater treatment facilities, industrial facilities, concentrated animal feeding operations, aquiculture, and other “point source” dischargers. The NPDES program also regulates wet weather discharges such as storm water discharges from industrial activities and municipal storm water discharges including, urban storm water runoff, combined sewer overflows, and storm sewer overflows.

NPDES permits are developed to ensure that such discharges to receiving waters are protective of human health and the environment. They establish specific discharge limits, monitoring, and reporting requirements and may require that discharges undertake measures to reduce or eliminate pollution to receiving waters.

1.2 National Pretreatment Standards Program

The National Pretreatment Standards Program is established in the Code of Federal Regulations (40 CFR 403). Its purpose is to control pollutants which pass through or interfere with treatment processes in Publicly Owned Treatment Works (POTWs) or which may contaminate sewage sludge. The rules contained in this program are implemented in the City of Goodyear by Chapter 12 of its City Code.

2.0 STATE LAWS AND REGULATIONS

The Arizona Environmental Quality Act of 1986 was established to develop rules regulations, and guidelines regarding water quality, air quality, solid waste management, and hazardous waste disposal. The Arizona Department of Environmental Quality was established under this Act to implement the Act. In regards to water quality, ADEQ administers rules regarding surface water quality, aquifer protection, drinking water standards, and wastewater collection and treatment standards.

2.1 State Surface Water Quality Standards

Surface water quality standards are regulated by the State in Article 1 - Water Quality Standards For Surface Waters of Chapter 11 of Title 18 of the Arizona Administrative Code (A.A.C.).

The Gila River runs through the City of Goodyear's boundaries and effluent could be discharged to this designated surface water as a means of disposal with a permit. Under the A.A.C., this river has the following designations:

- A&Ww - Aquatic and Wildlife, warm water
- FBC - Full-Body Contact
- FC - Fish Consumption
- AgI - Agricultural Irrigation
- AgL - Agricultural Livestock Watering

Under these designations, any discharges to these surface waters must meet the numeric water quality standards presented in Table C.1. In addition, there are numerous water quality criteria for these designations regulating metals, inorganics, organics, PCBs and other chemical compounds.

2.2 Arizona Pollutant Discharge Elimination System (AzPDES)

Under the AzPDES Permit Program, all facilities that discharge pollutants from any point source into waters of the United States (navigable waters) are required to get an AzPDES permit. Pollutants can enter waters of the United States from a variety of pathways, including agricultural, domestic, and industrial sources. For regulatory purposes, these sources are generally categorized as either point source or non-point sources.

In addition to regulating discharge of pollutants from POTWs, the AzPDES program regulates the land application, generation, transport, and disposal of biosolids, or sewage sludge. Biosolids that are land applied with in the State of Arizona cannot exceed certain pollutant concentrations and must meet pathogen and vector attraction reduction requirements. These requirements are defined in the A.A.C. (A.A.C. R18-9-1000).

Table C.1 Arizona Regulated Surface Water Quality Parameters by Water Designation 2016 Integrated Water Master Plan City of Goodyear				
Regulated Parameter	**FBC**	**A&Ww**	**AgI**	**AgL**
E. coli (cfu/100 mL)	126 mean 235 max	--	--	--
pH	9.0 max 6.5 min 0.5 max change due to discharge	9.0 max 6.5 min 0.5 max change due to discharge	9.0 max 4.5 min	9.0 max 6.5 min
Temperature	--	3.0º C max increase	--	--
Suspended Solids	--	80 mg/L max	--	--
Dissolved Oxygen	--	6.0 mg/L min	--	--
Source: A.A.C. R18-11-109, March 31, 2003				

2.3 Aquifer Protection Permit Program

Discharges to aquifers are protected under two main articles of the Arizona Administrative Code.

Article 4 of Chapter 11 (A.A.C. R18-11-400) defines numeric water quality standards for discharges to aquifers that are designated for drinking water protected uses. This article establishes water quality standards for inorganics, metals, organics, pesticides, polychlorinated biphenyls (PCBs), and radionuclides.

Article 2 of Chapter 9 (A.A.C. R18-9-200) defines the requirements of a sewage treatment facility with regards to permitting, compliance, discharge characterization, reporting, and hydrogeologic studies to determine the impact to an aquifer, if any. This regulation also requires new or expanded facilities to meet Best Available Demonstrated Control Technology (BADCT) requirements to achieve the greatest degree of discharge reduction. BADCT requires property setback limits for noise and odor control, provisions for standby power source, and protection against floods. Treatment performance requirements are established and presented in Table C.2. In addition, a facility must minimize trihalomethane compounds generated as disinfection byproducts using chlorination-dechlorination, ultraviolet, or ozone disinfection systems

Table C.2 Arizona Regulated Wastewater Treatment Requirements for BADCT 2016 Integrated Water Master Plan City of Goodyear	
Regulated Parameter	**Limit (mg/L)**
BOD_5	30 mg/l (30-day average) 45 mg/L (7-day average)
TSS	30 mg/l (30-day average) 45 mg/L (7-day average)
pH	6.0 - 9.0
Removal efficiency for BOD_5, $CBOD_5$ and TSS	85%
Total nitrogen	10 mg/L (5-month geometric mean)
Fecal coliform or E. coli bacteria	Non-detectable (4 of 7 daily samples)
Fecal coliform	23 cfu/100 mL (single sample max)
E. coli bacteria	15 cfu/100 mL (single sample max)
Source: A.A.C. R18-9-B204, November 12, 2005	

2.4 Capacity, Management, Operations, and Maintenance Program (CMOM)

To address sanitary sewer overflows (SSO) in the United States, the U.S. Environmental Protection Agency (EPA), has proposed changes to the NPDES permitting program to improve the capacity, management, operation, and maintenance of municipal sanitary sewer collection systems and to improve public notification of SSO events. However, these changes have not been formally enacted.

The State of Arizona has implemented an optional CMOM general permit under its Aquifer Protection Program. The purpose of the general permit is to give owners and operators of sewage collection systems the opportunity to take a proactive approach to sewage collection system operations and maintenance, capacity improvements, and SSO response by developing CMOM Plans in accordance with specific requirements. In return for operating under this General Permit, ADEQ will evaluate the adequacy of the CMOM Plan when considering their enforcement response to an SSO.

The City of Goodyear may develop a CMOM Plan in the future. If the City seeks the optional CMOM APP, the CMOM plan will need to demonstrate a commitment to providing funding for planning, managing, operating, maintaining, and continuous evaluation of the City's wastewater collection system to eliminate SSOs.

2.5 Reclaimed Water Regulations

Reclaimed water quality standards are regulated in Article 3 - Reclaimed Water Quality Standards of Chapter 11, Title 18 of the A.A.C. These standards and reclaimed water classifications are summarized in Table C.3. Currently, effluent from all three City owned wastewater reclamation facilities is permitted for Class A+ designations and its allowable uses.

Table C.3 Arizona Reclaimed Water Classifications and Requirements
2016 Integrated Water Master Plan
City of Goodyear

	A+	A	B+	B	C
Allowable Uses	Irrigation of food crops, open-access irrigation, fire protection systems, vehicle washing, snowmaking		Surface irrigation of orchards, golf course irrigation, restricted access landscape irrigation, dust control, livestock watering (dairy), street cleaning		Livestock watering (non-dairy), irrigation of sod farms, silviculture
Treatment Requirement	Secondary Treatment, Filtration, Nitrogen Removal, & Disinfection	Secondary Treatment, Filtration, & Disinfection	Secondary Treatment, Nitrogen Removal, & Disinfection	Secondary Treatment, & Disinfection	Secondary Treatment
Turbidity Limits	2 NTU (24-hr avg) 5 NTU (max)	2 NTU (24-hr avg) 5 NTU (max)	--	--	--
Nitrogen Limits	10 mg/L 5-sample mean	--	10 mg/L 5-sample mean	--	--
Fecal Coliform Limits	Non-detectable in 4 out of 7 daily samples 23 MPN or cfu/ 100 mL max	Non-detectable in 4 out of 7 daily samples 23 /100 mL max	200/100 mL in 4 out of 7 daily samples 800 /100 mL max	200/100 mL in 4 out of 7 daily samples 800 /100 mL max	1000/100 mL in 4 out of 7 daily samples 4000 /100 mL max

Source: A.A.C. R18-11-300, December 31, 2008

3.0 REGIONAL AND LOCAL REGULATIONS

3.1 Maricopa County Health Code

Within the agency structure of the County, the Environmental Services Department (MCESD) is responsible for the health and safety of the community. It is the Department's goal to prevent and remove environmental risks. MCESD utilizes the Maricopa County Environmental Health Code (MCEHC) to provide for the needed inspections and approvals related to water and wastewater management.

APPENDIX D – WASTEWATER MODEL CALIBRATION GRAPHS

City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 1 CALIBRATION

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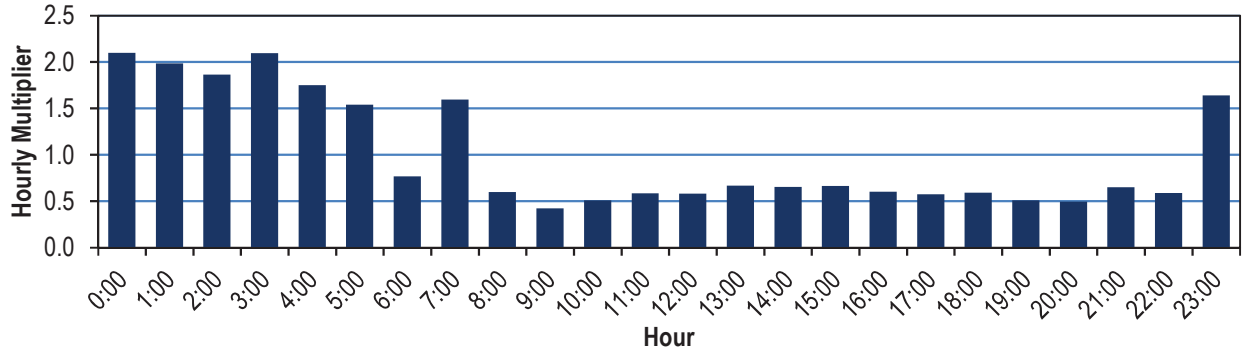
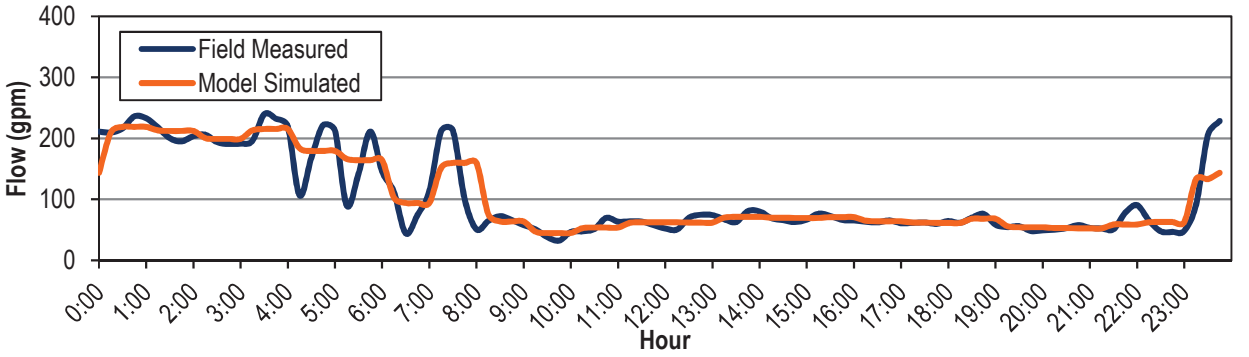
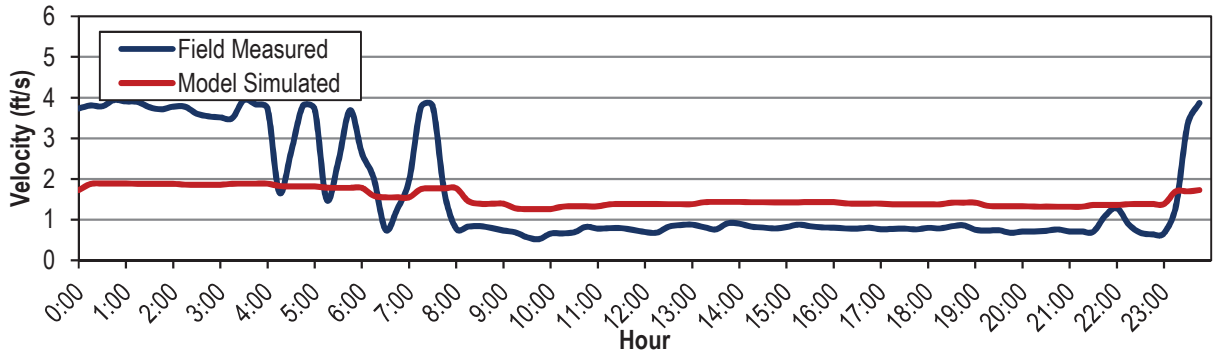
Calibrated Diurnal Pattern



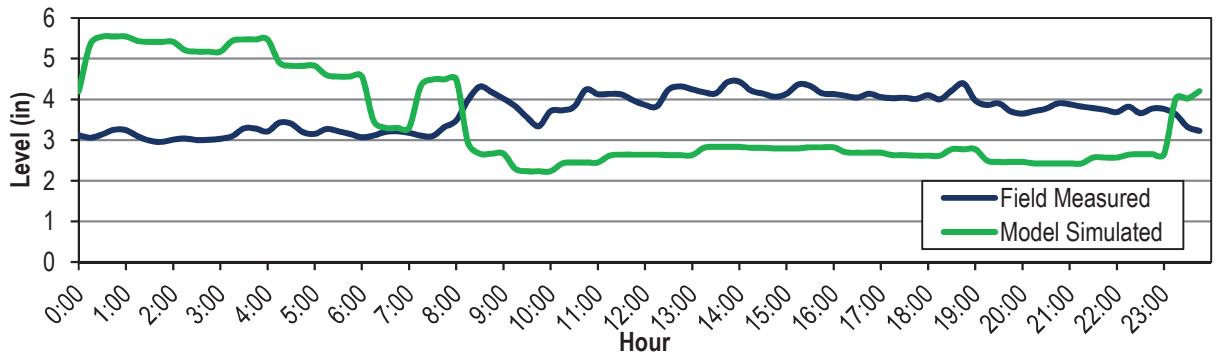
Flow Calibration



Velocity Calibration



Level Calibration



City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 2 CALIBRATION

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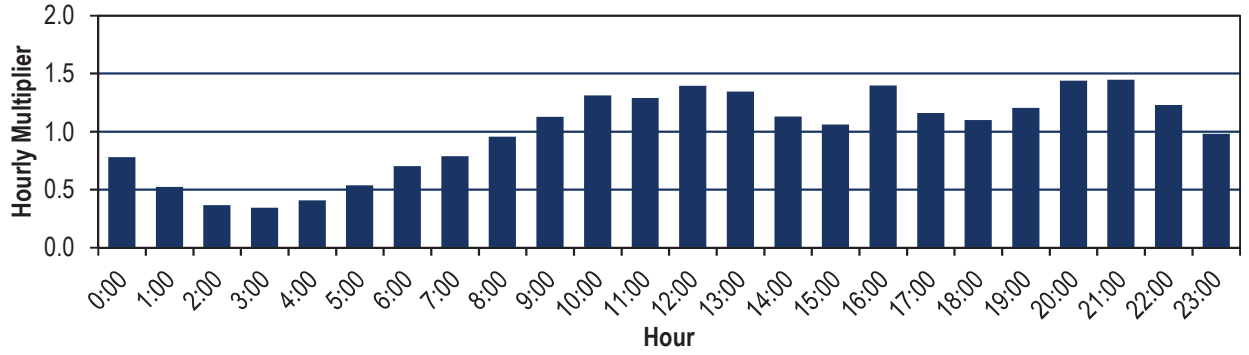
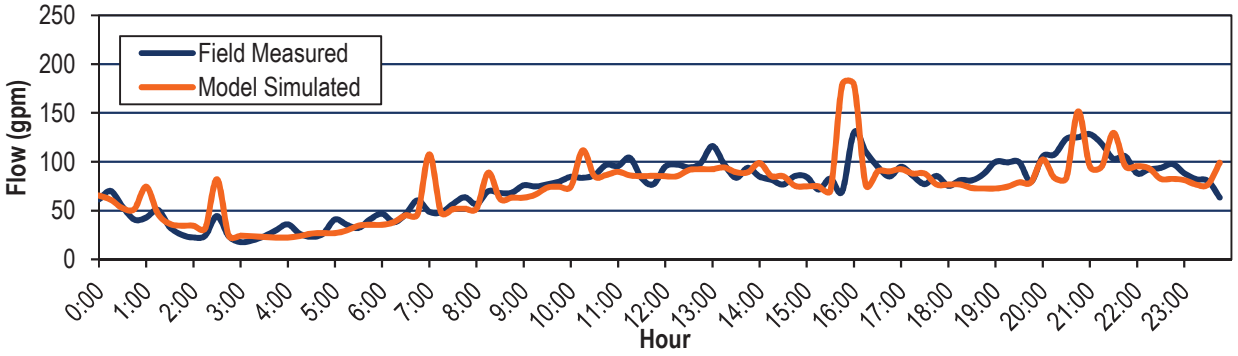
Calibrated Diurnal Pattern



Flow Calibration



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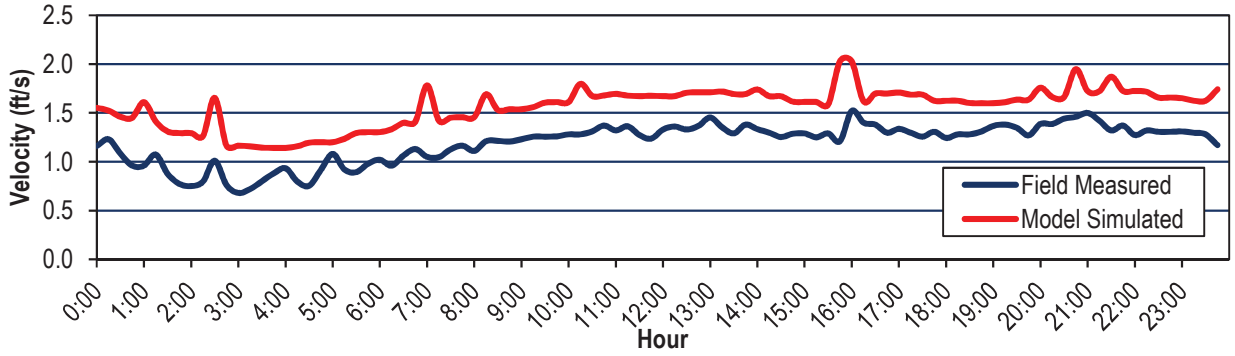

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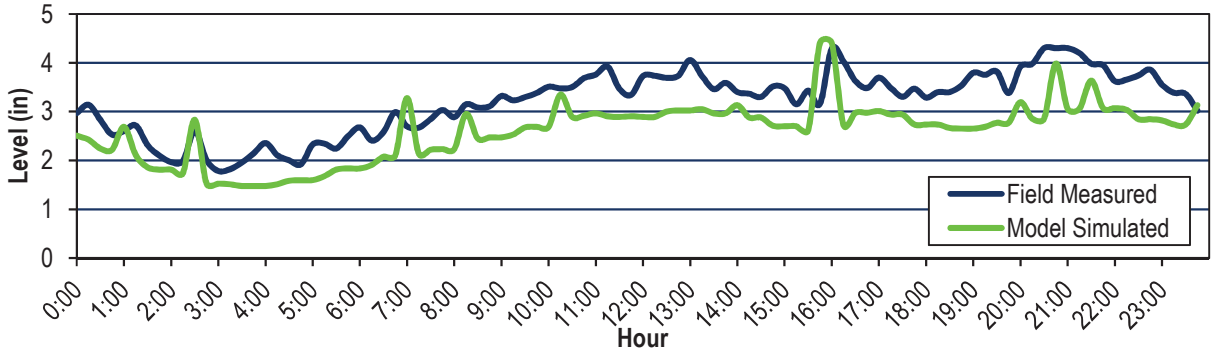

City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 3 CALIBRATION

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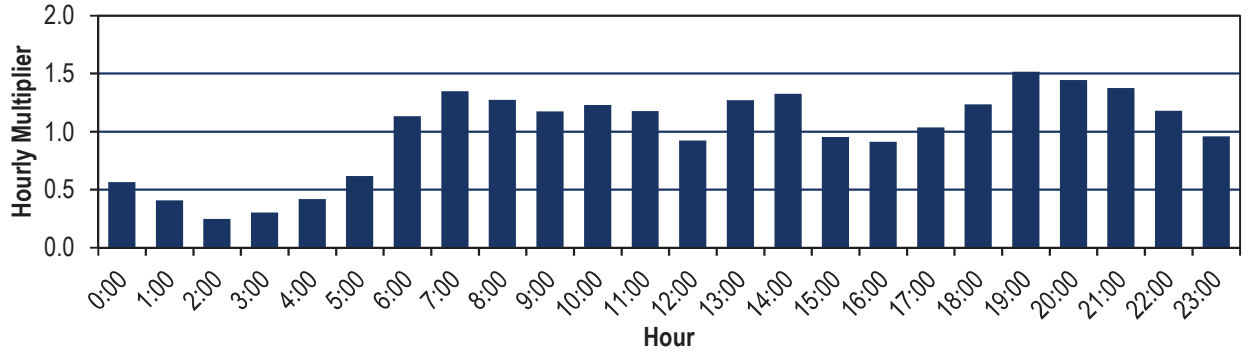
Calibrated Diurnal Pattern



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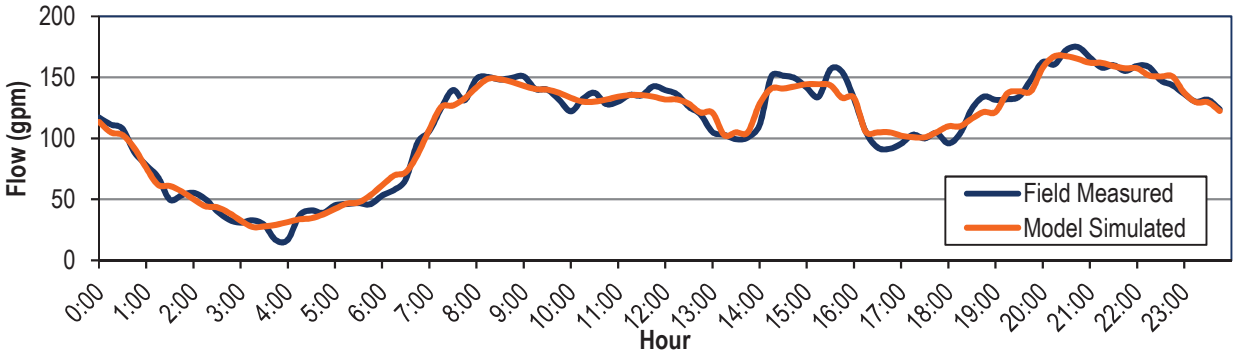

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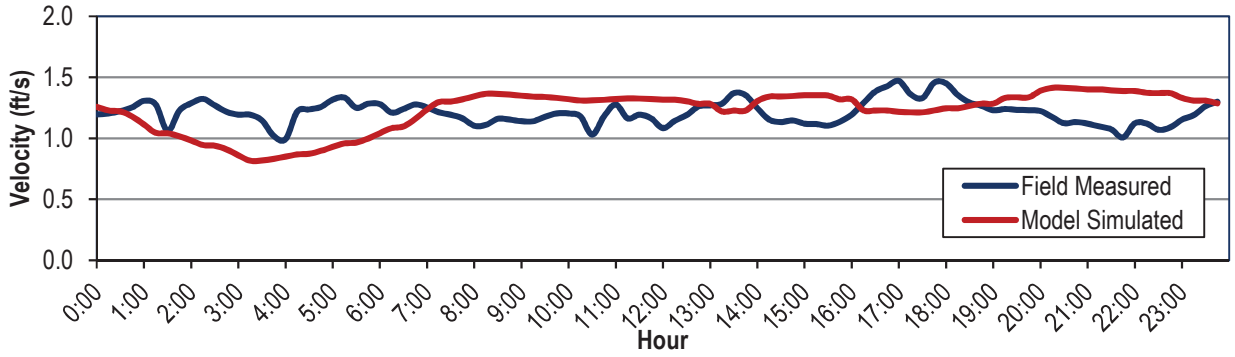

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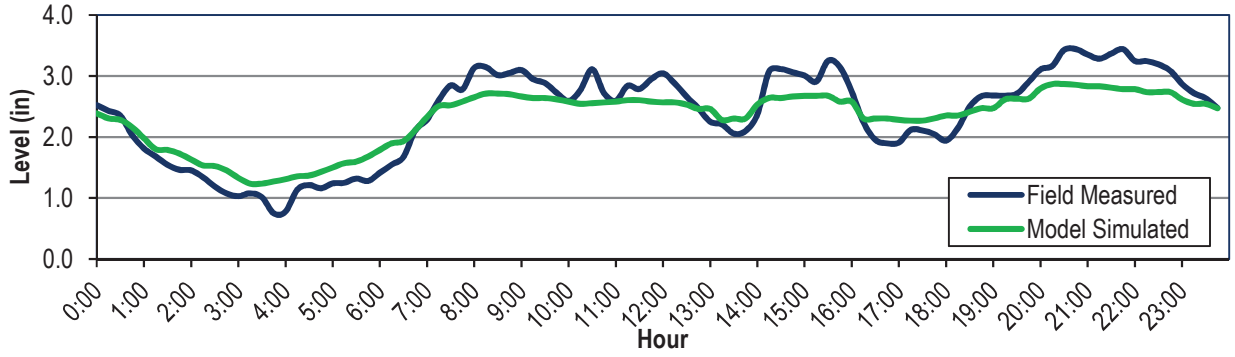

City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 4 CALIBRATION

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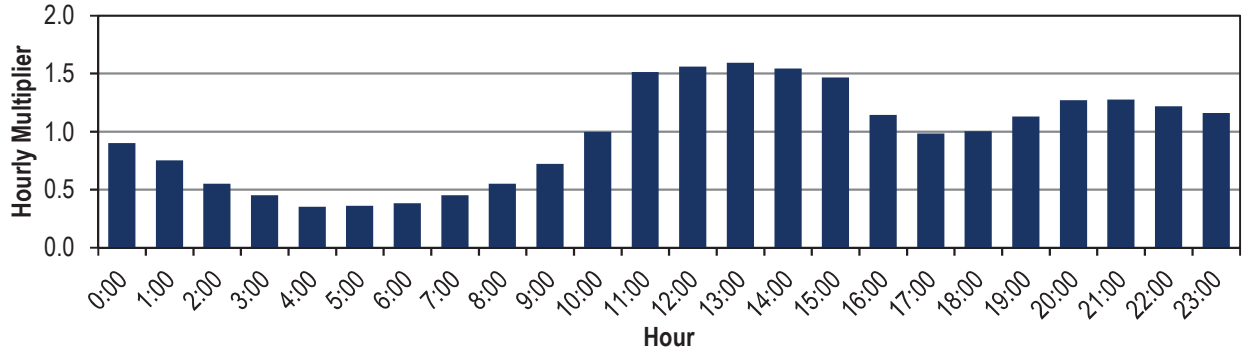
Calibrated Diurnal Pattern



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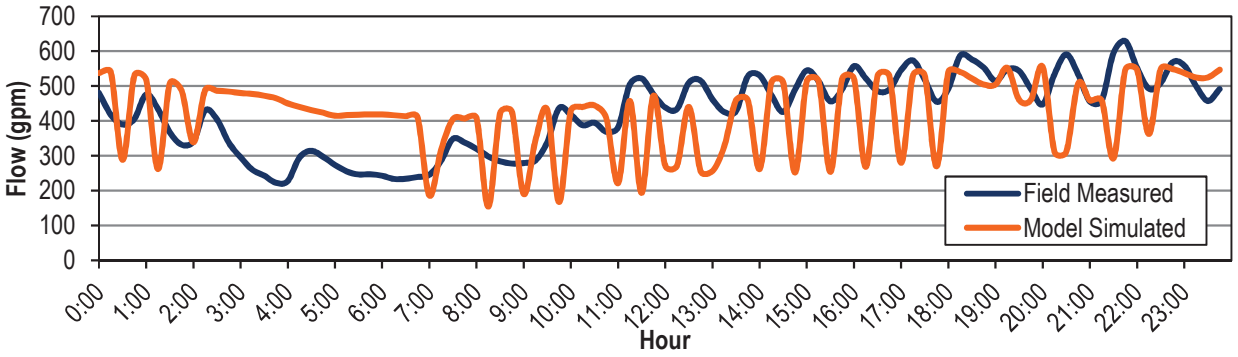

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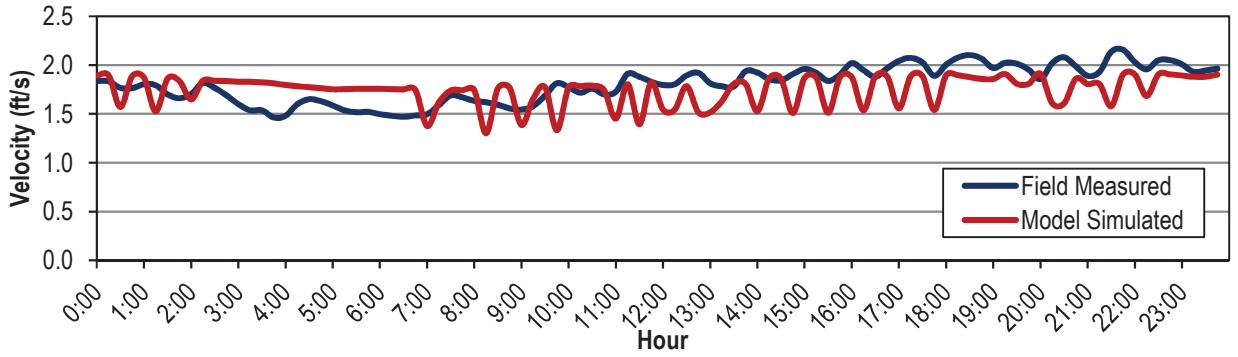

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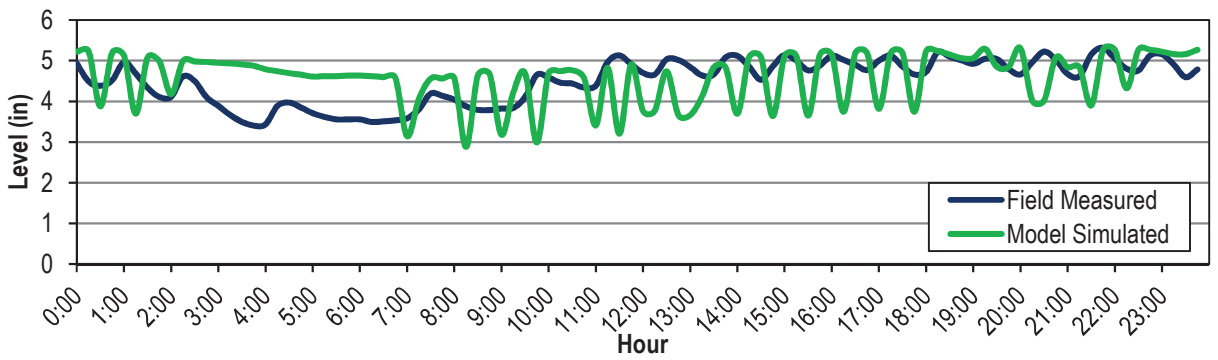

City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 5 CALIBRATION

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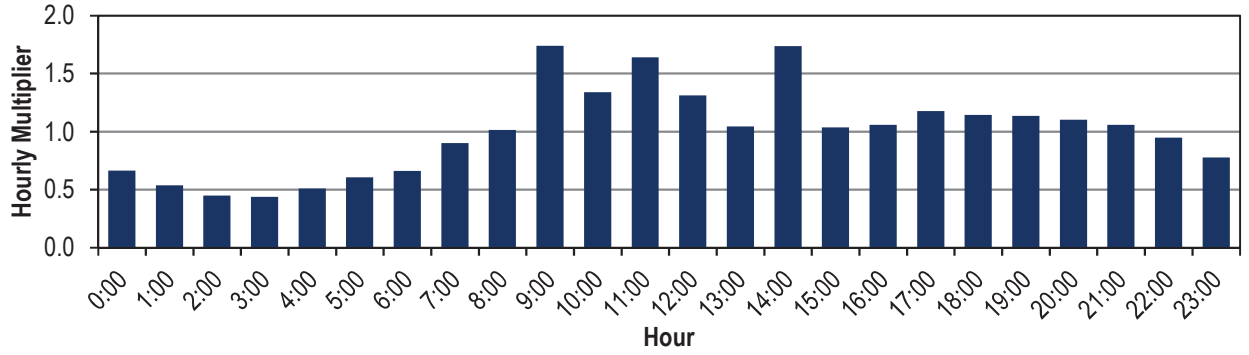
Calibrated Diurnal Pattern



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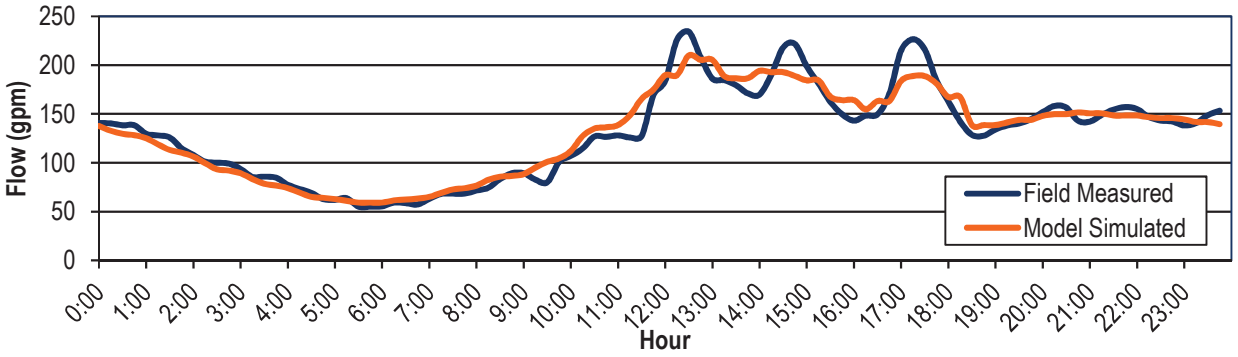
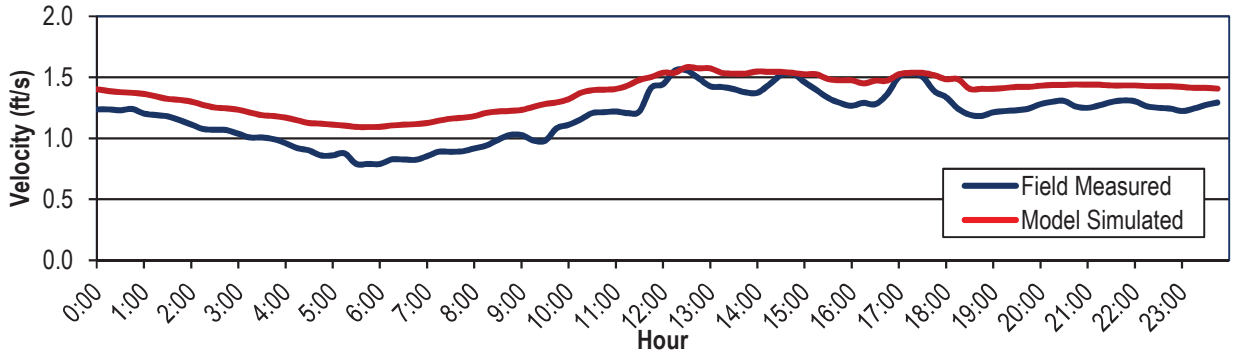
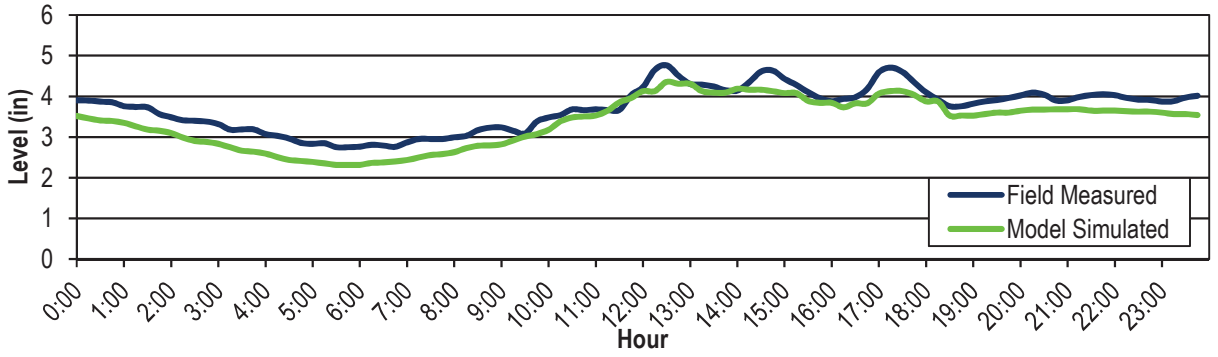


Velocity Calibration



Level Calibration



City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 6 CALIBRATION

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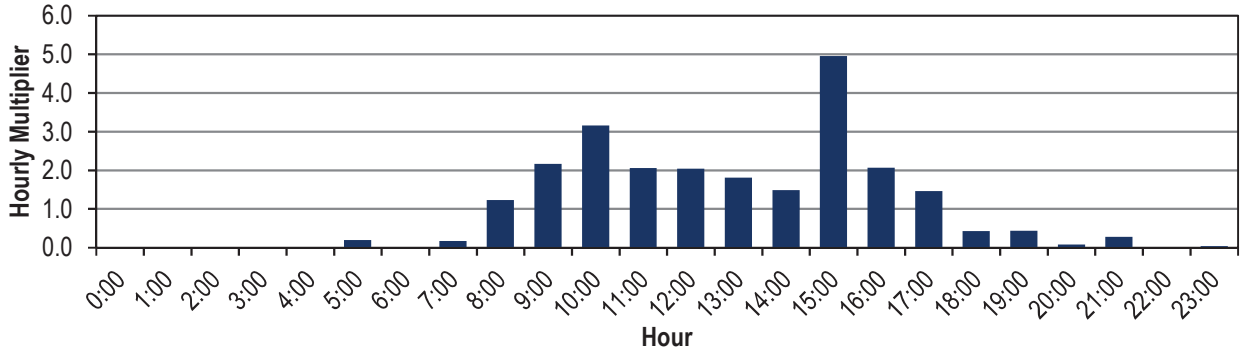
Calibrated Diurnal Pattern



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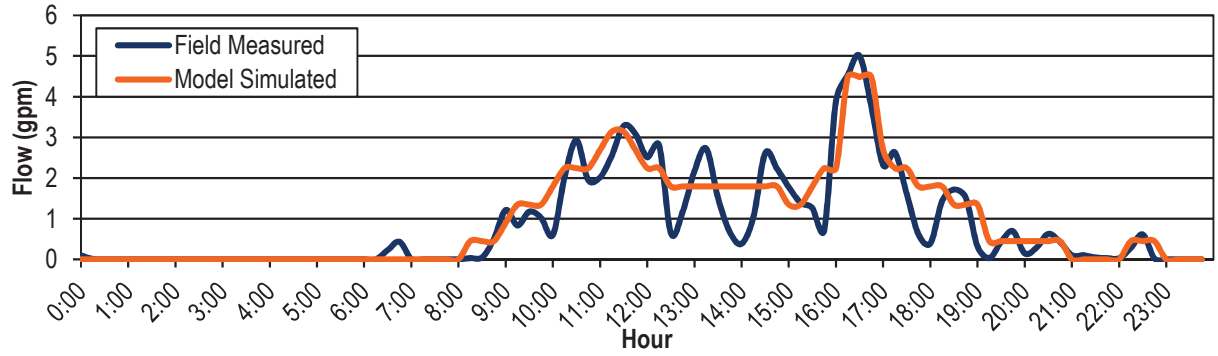

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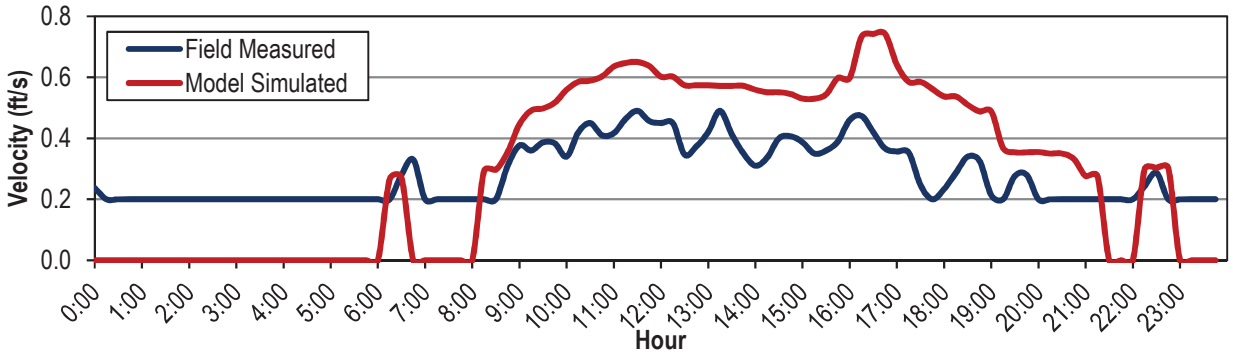

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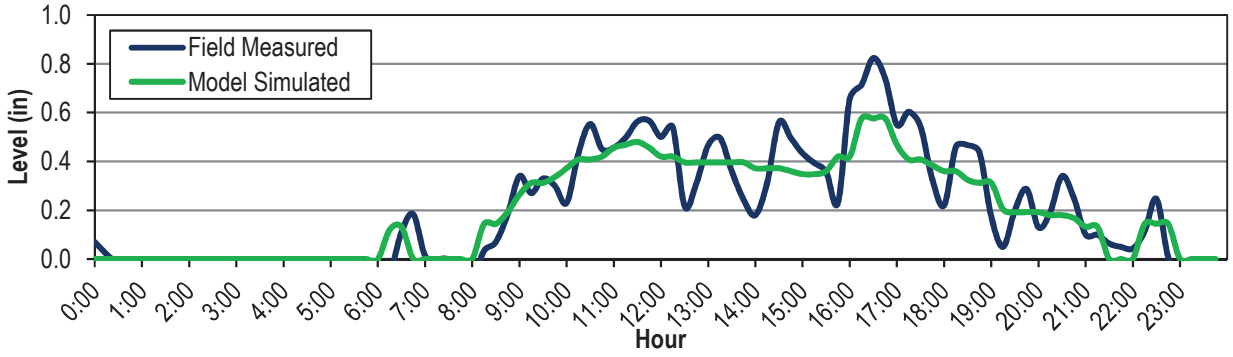

City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 7 CALIBRATION

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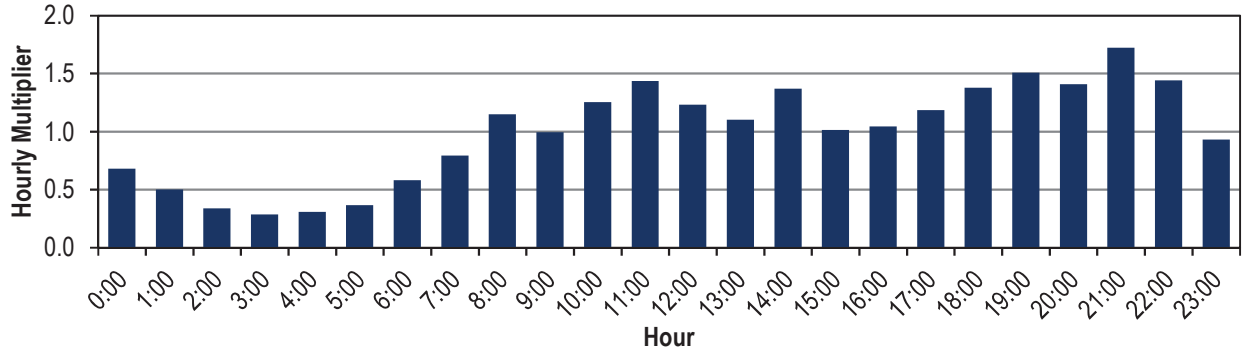
Calibrated Diurnal Pattern



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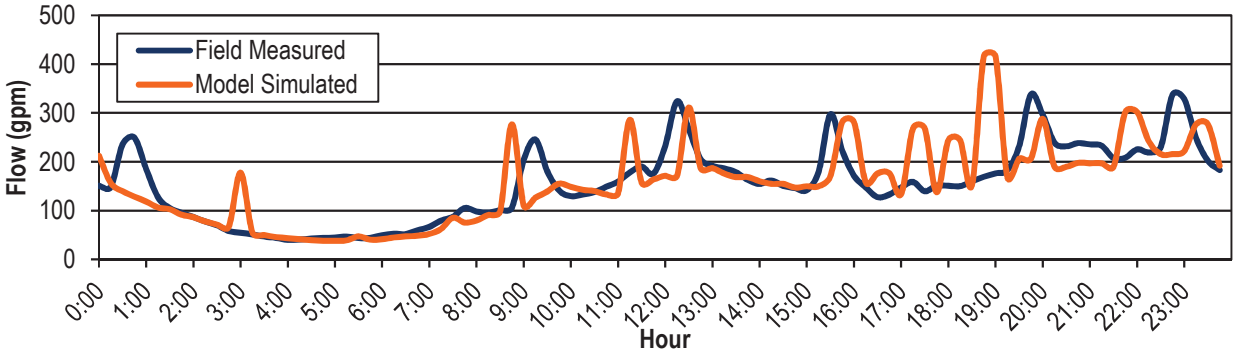

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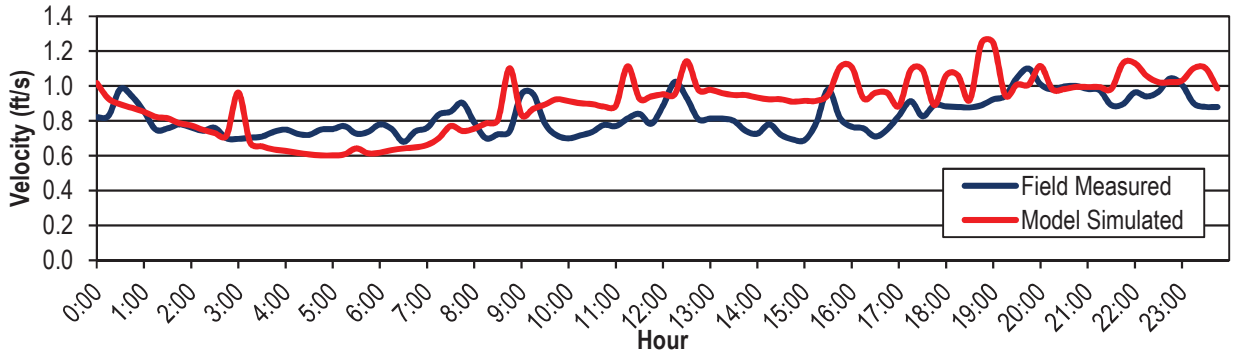

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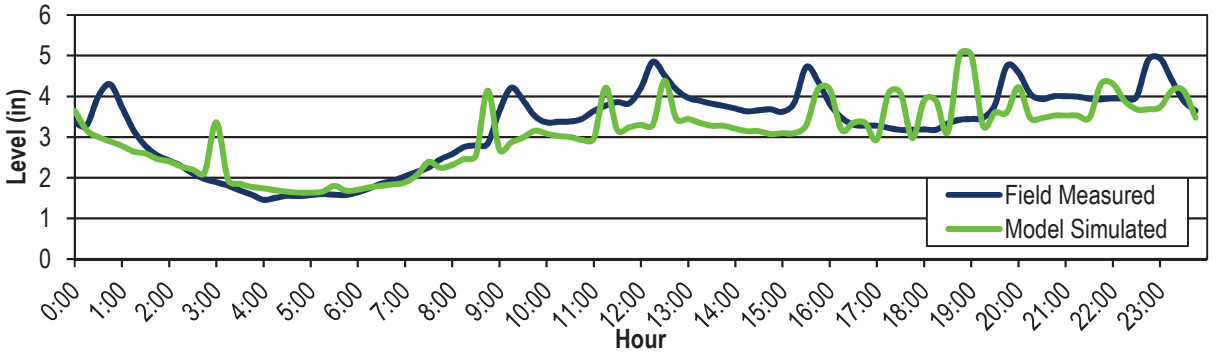

City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 8 CALIBRATION

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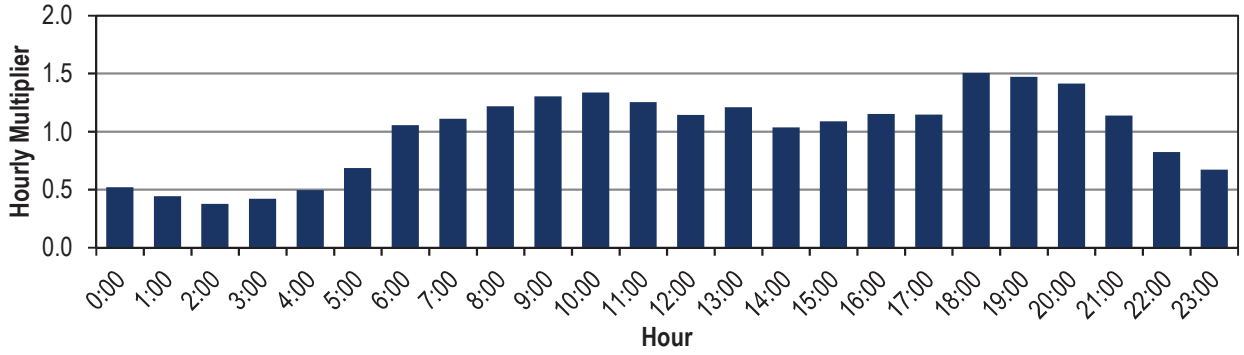
Calibrated Diurnal Pattern



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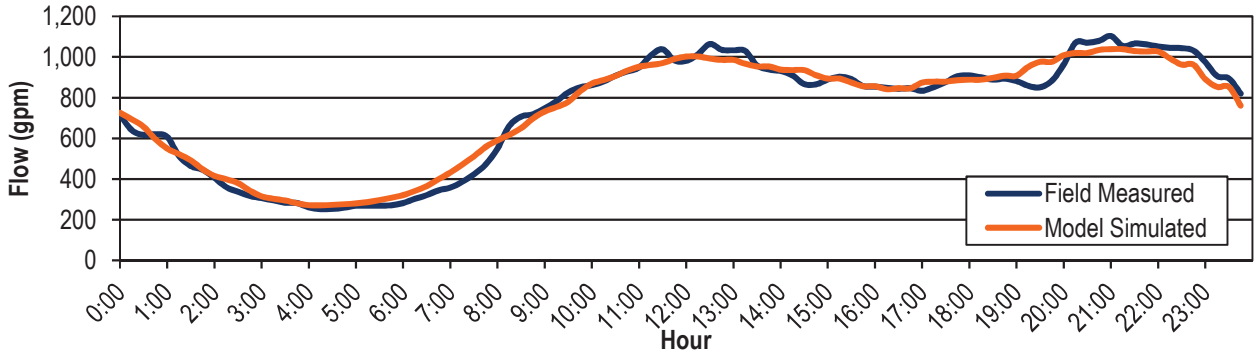

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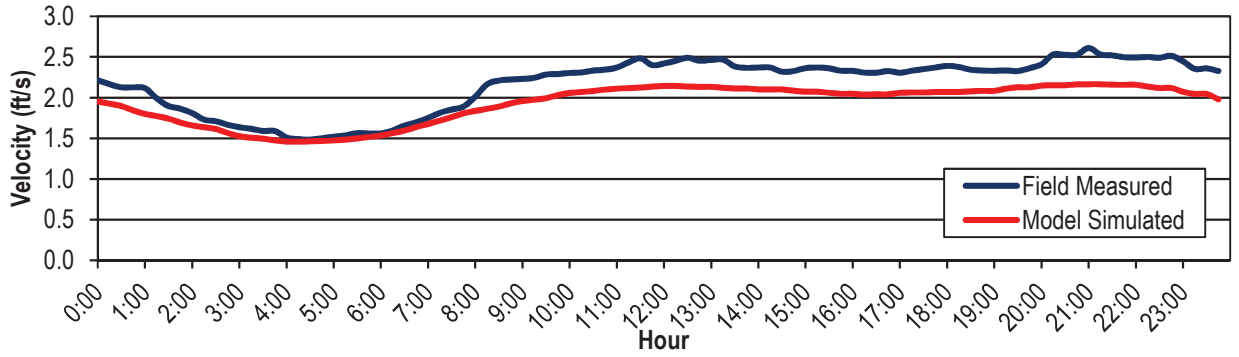

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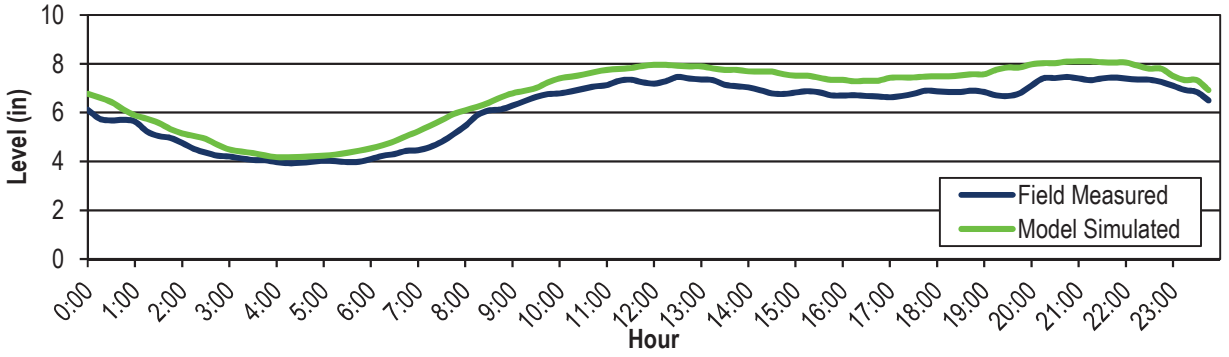

City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 9 CALIBRATION

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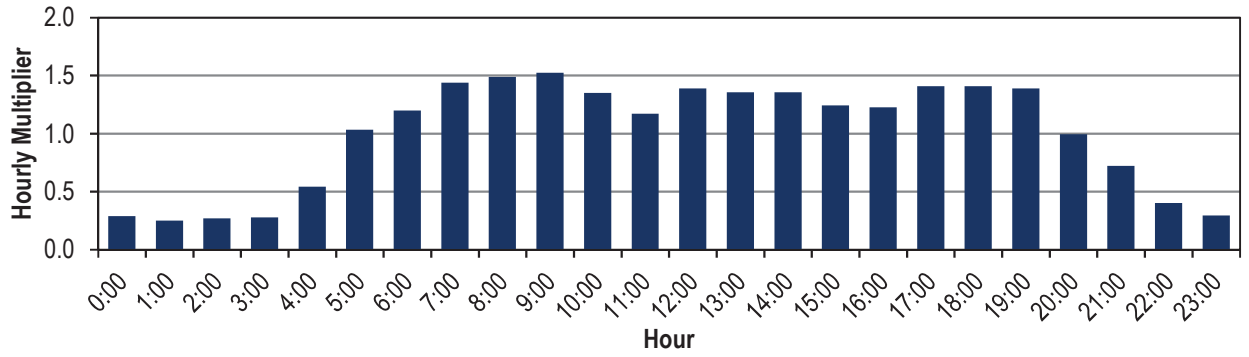
Calibrated Diurnal Pattern



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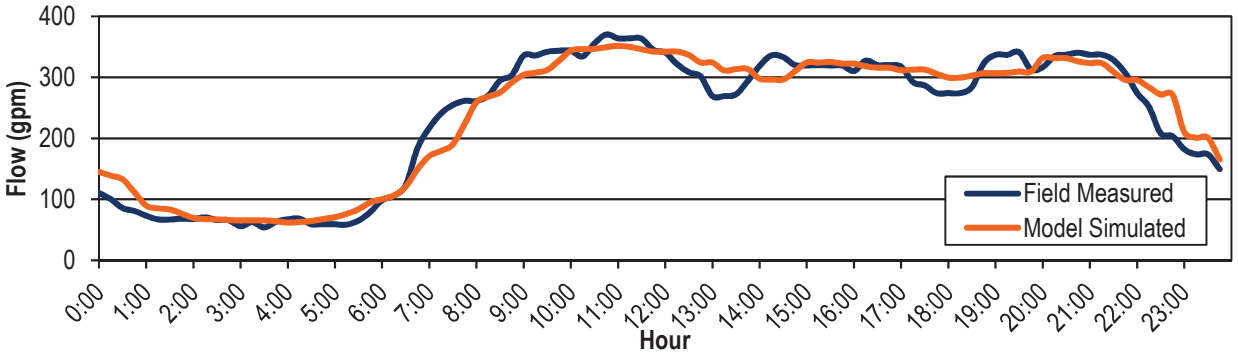
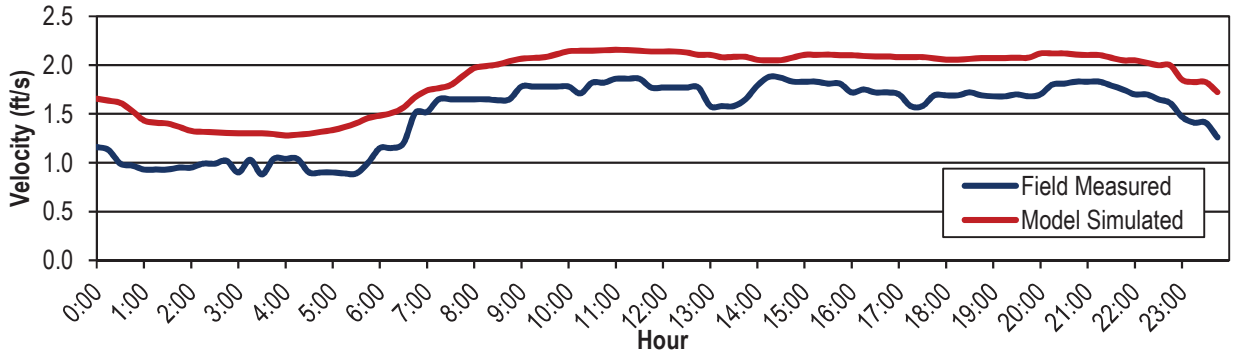


Velocity Calibration



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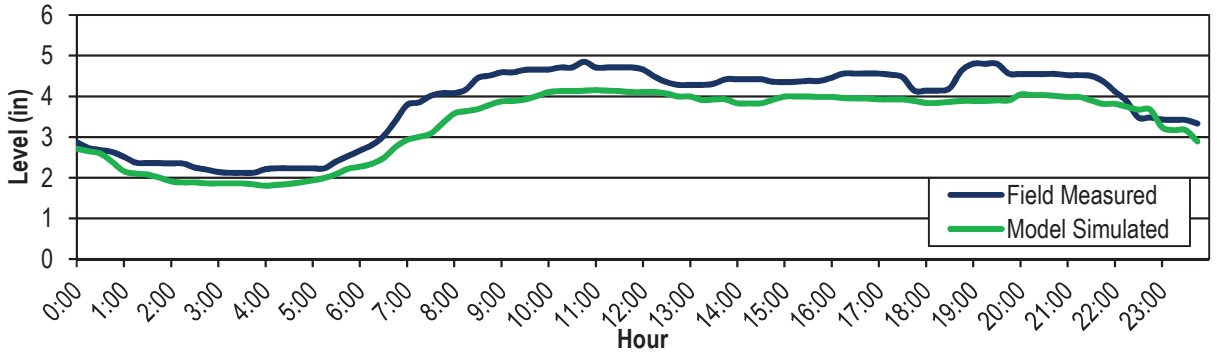

City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 10 CALIBRATION

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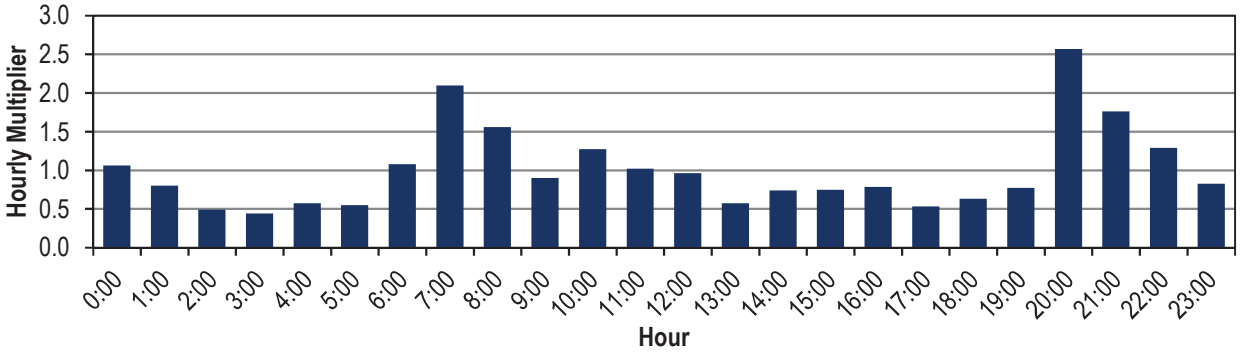
Calibrated Diurnal Pattern



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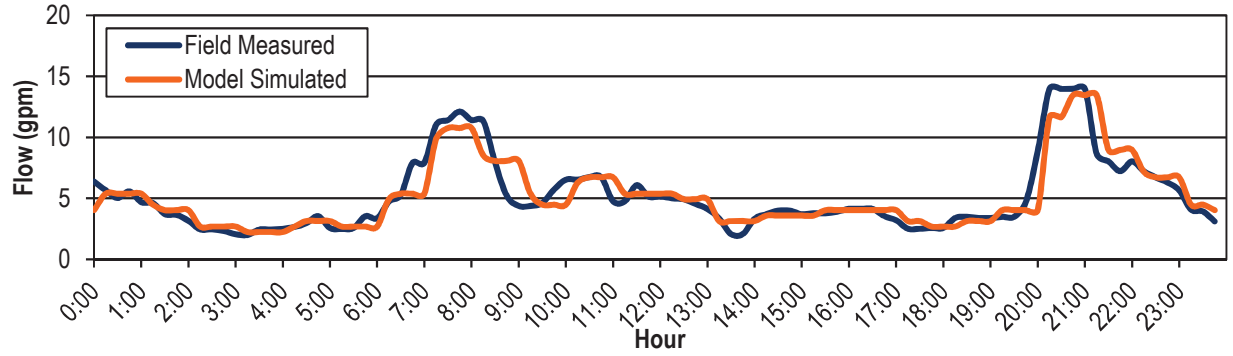

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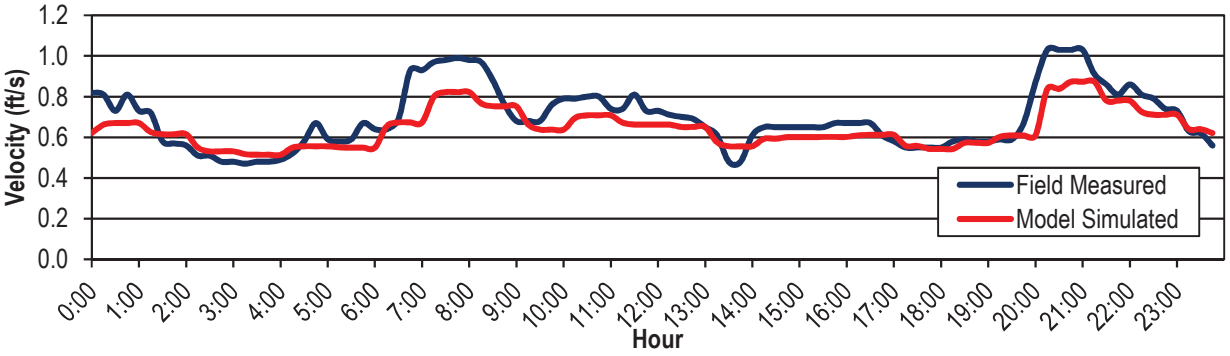

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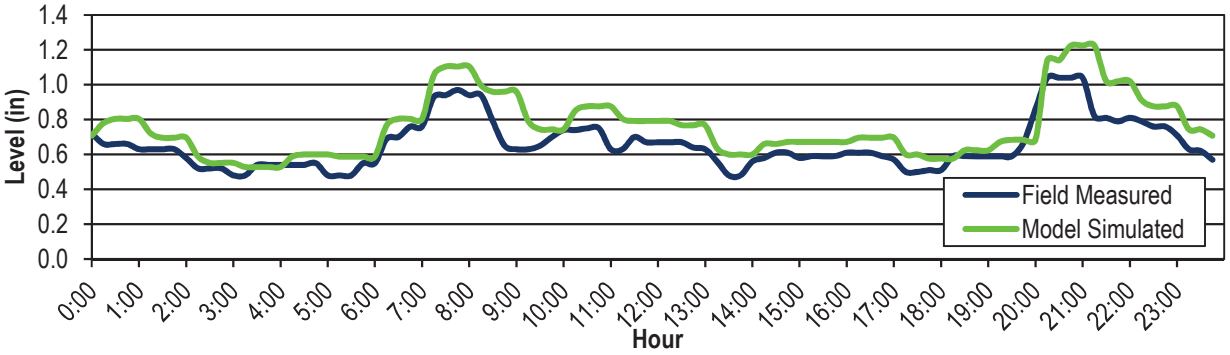

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2016 Integrated Water Master Plan
FLOW METER SITE 11 CALIBRATION

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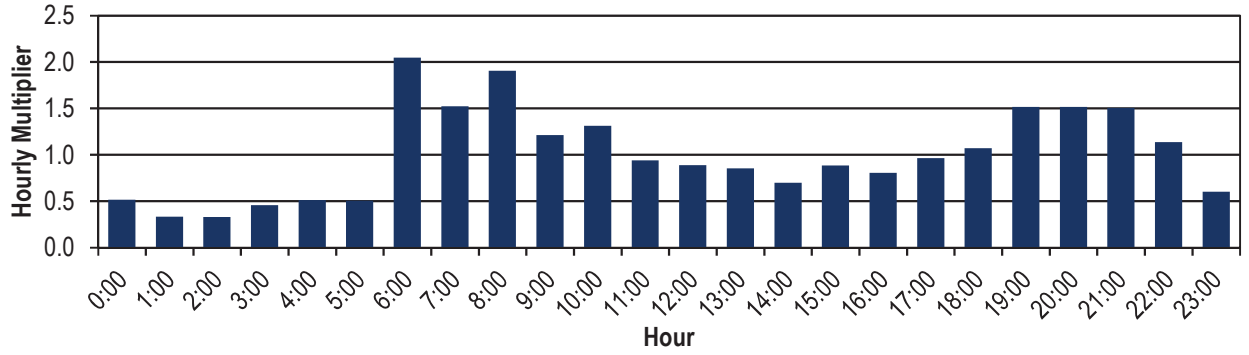
Calibrated Diurnal Pattern



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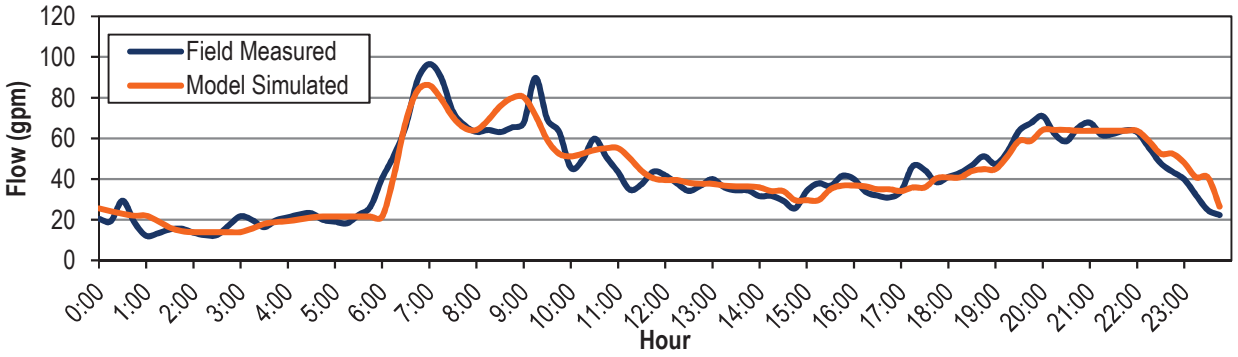
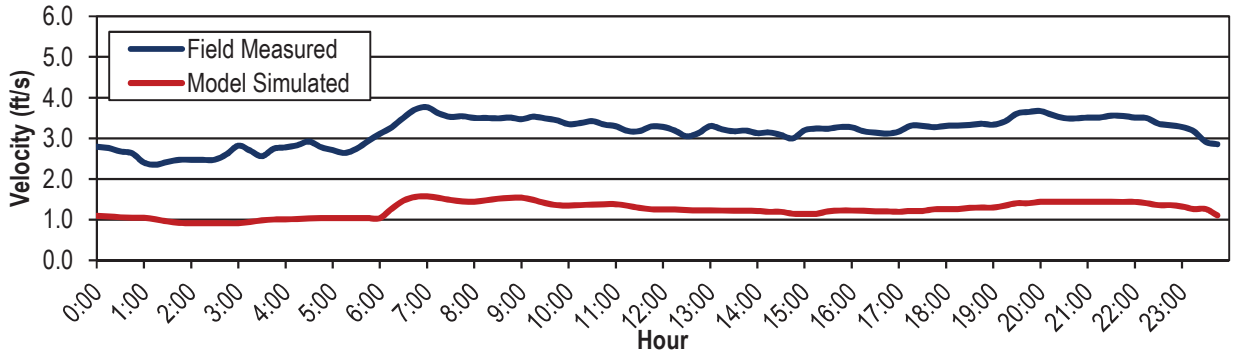


Velocity Calibration



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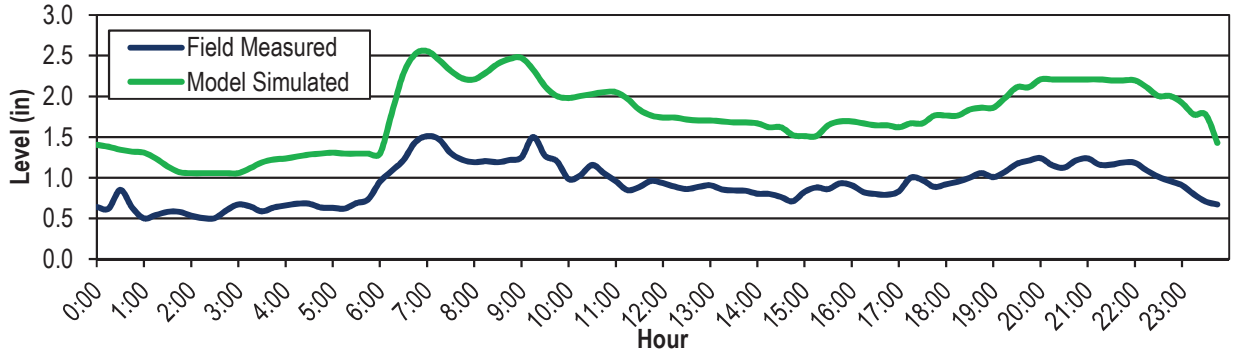

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FLOW METER SITE 12 CALIBRATION

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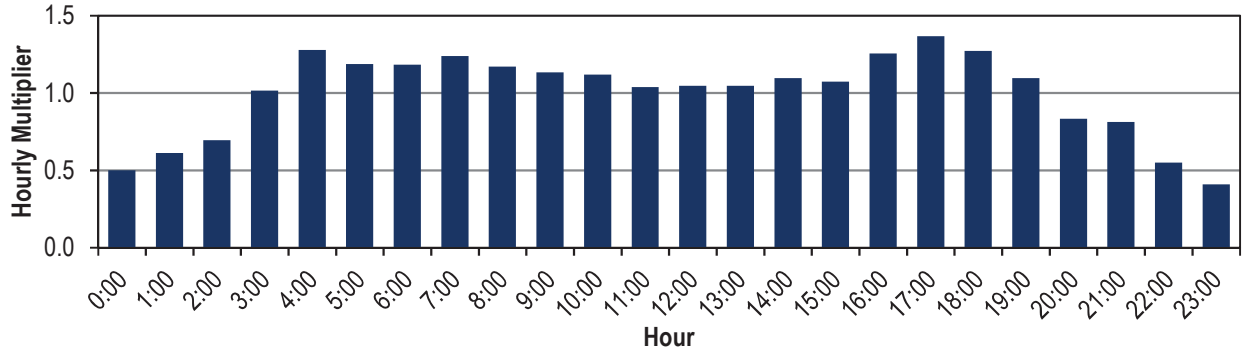
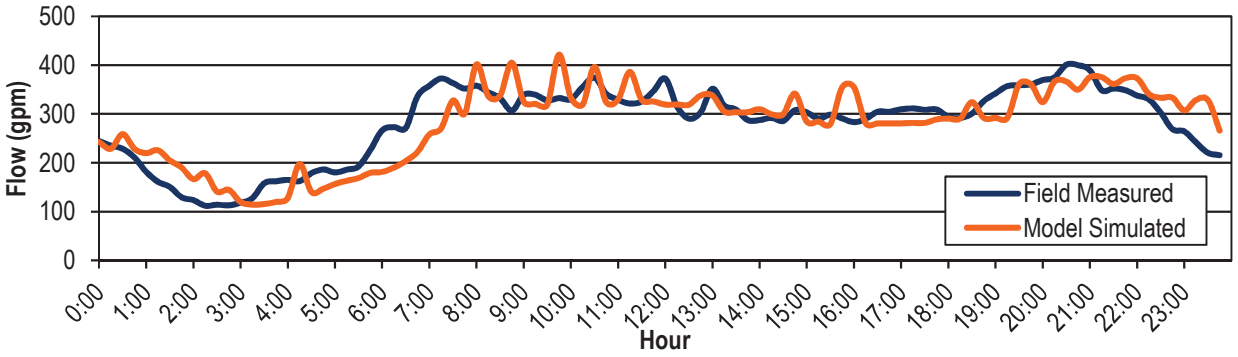
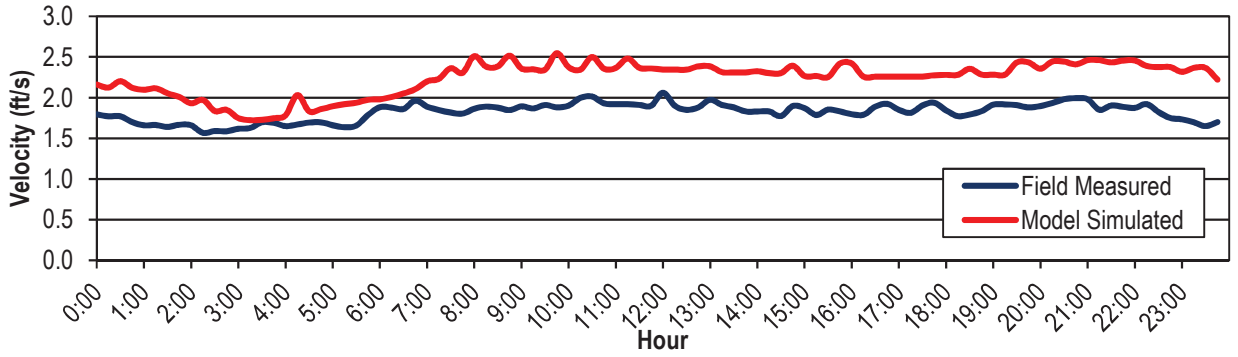
Calibrated Diurnal Pattern



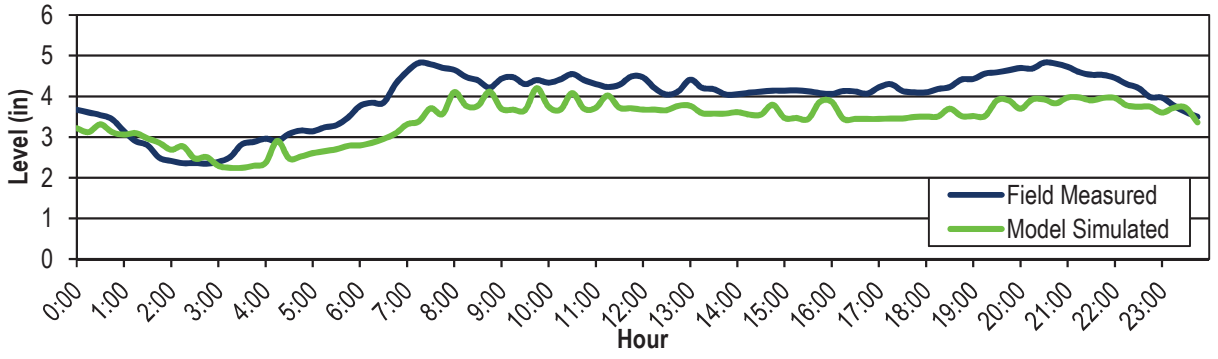
Flow Calibration



Velocity Calibration

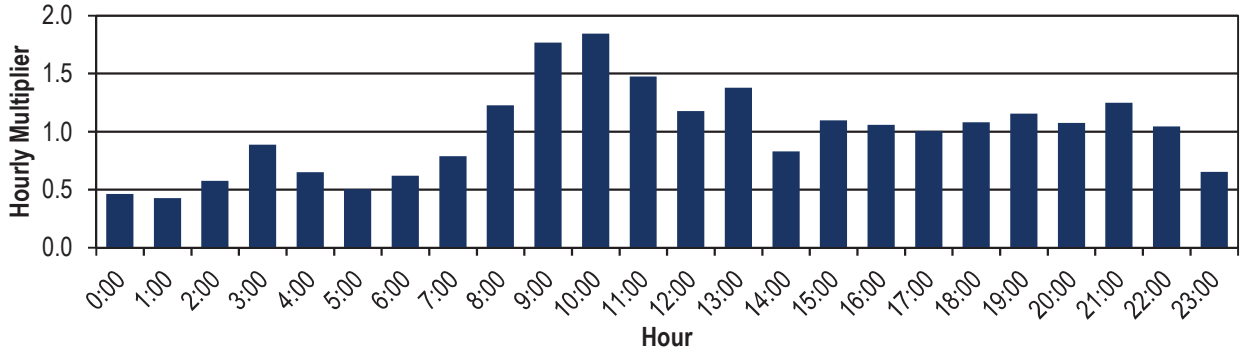


Level Calibration

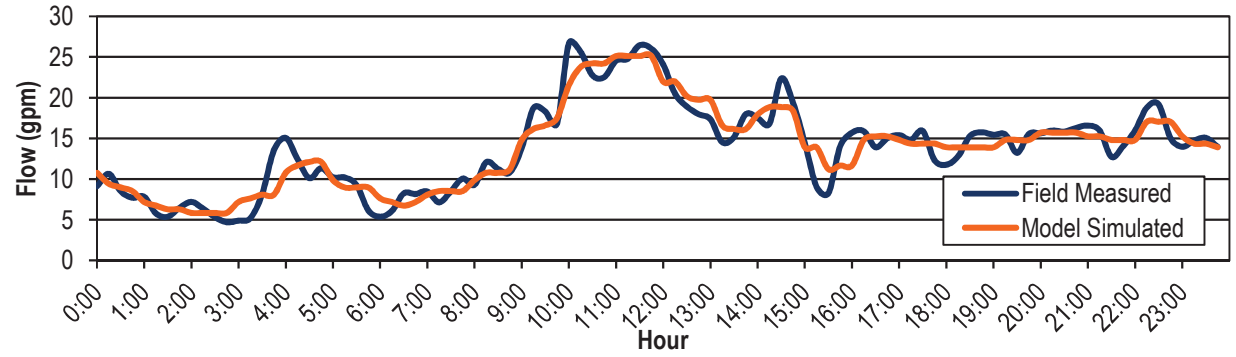


City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 13 CALIBRATION

Calibrated Diurnal Pattern



Flow Calibration



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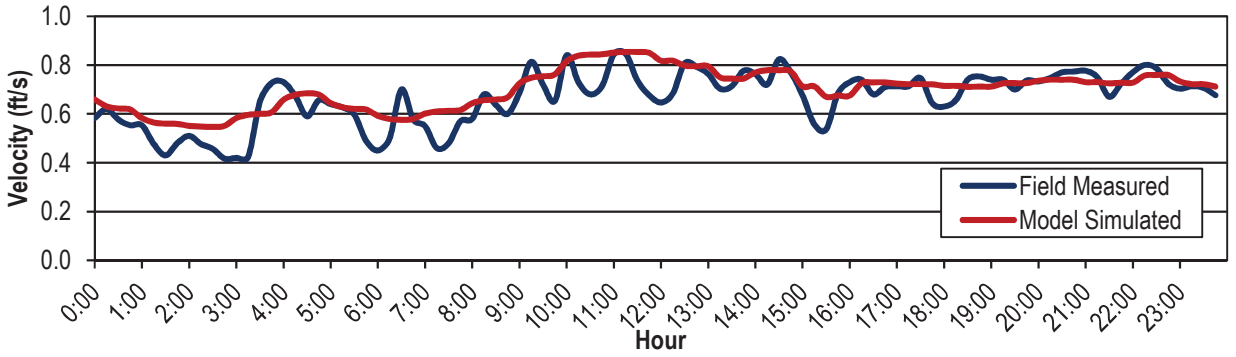

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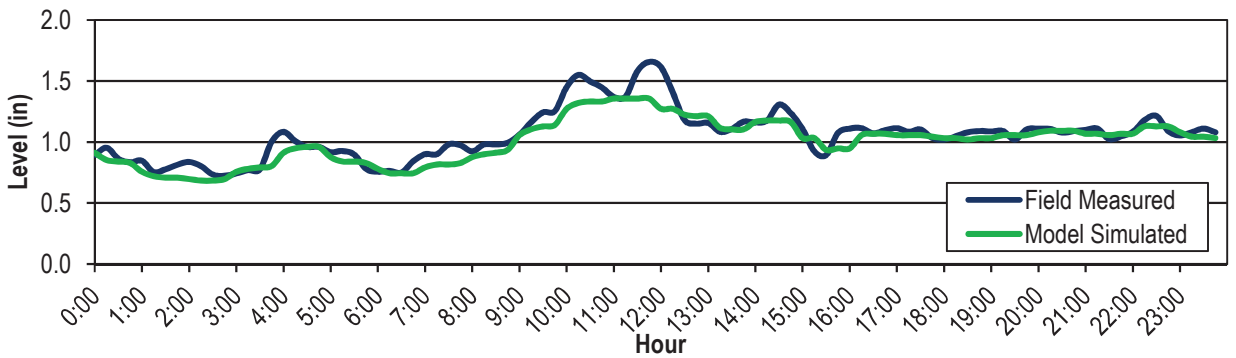

City of Goodyear
2016 Integrated Water Master Plan
FLOW METER SITE 14 CALIBRATION

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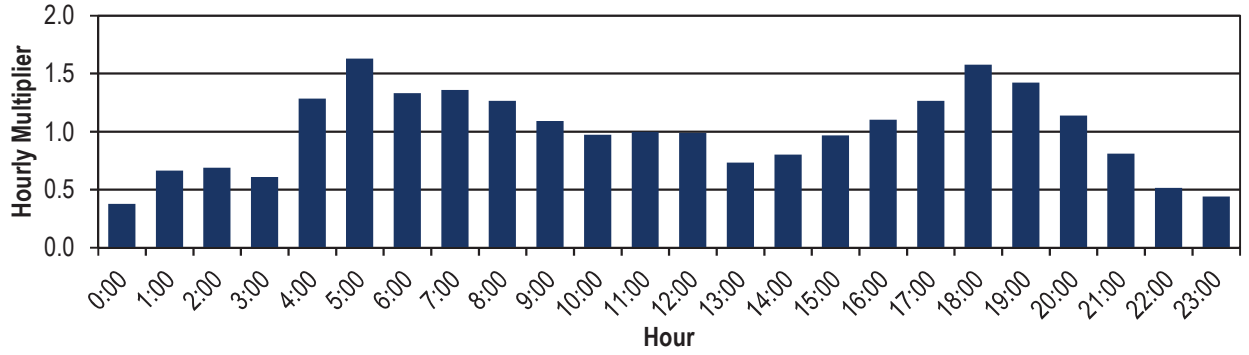
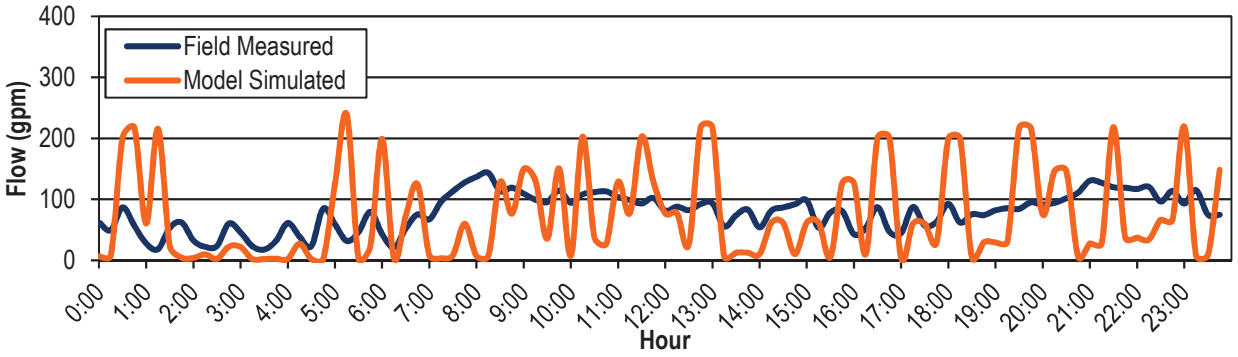
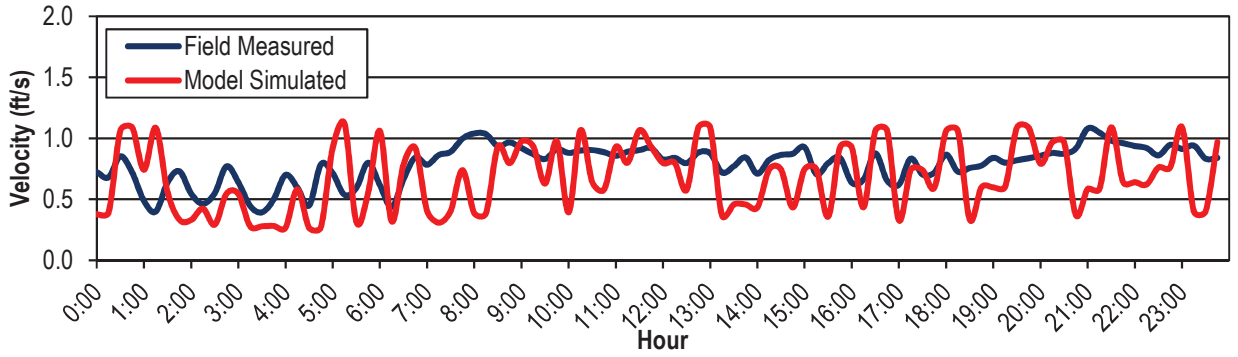
Calibrated Diurnal Pattern



Flow Calibration



Velocity Calibration



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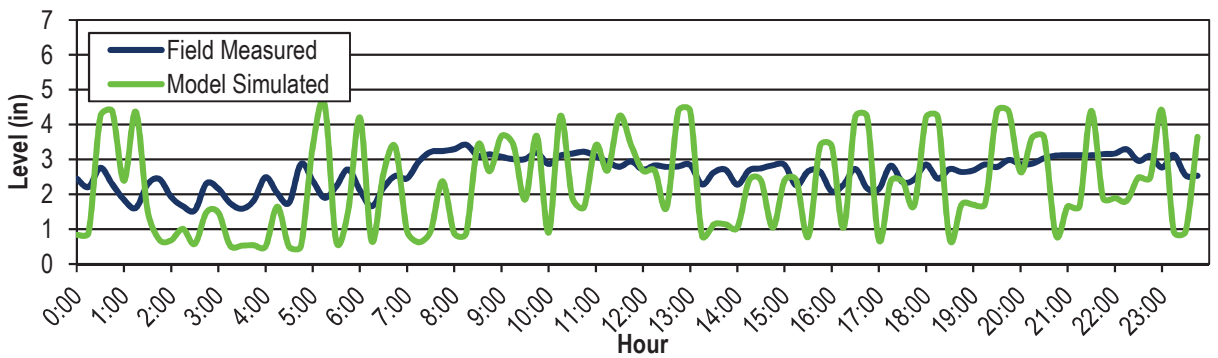

APPENDIX E – WASTEWATER INFRASTRUCTURE UNIT COSTS

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Engineers...Working Wonders With Water™

PROJECT :	**2016 Integrated Water Master Plan**	**LOCATION FACTOR:**	**0.887**
JOB # :	**9728A.00**	**DATE :**	September-15
CLIENT :	**City of Goodyear**	**ENR CCI :**	9886
ELEMENT :	**Gravity Sewer Main Construction**	**BY :**	ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	8" Sdr-35 Pvc Sewer Pipe, In Trench	1	LF	$11.08	$0.00	$ 11	$ 11	
	TOTAL PIPING (per LF)							**$11.08**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	0.7	CY	$4.38	$0.00	$ 4	$ 3	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.2	CY	$55.55	$0.00	$ 56	$ 10	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.5	CY	$11.99	$0.00	$ 12	$ 6	
	10% Site Specific Requirements	1	LS	$3.25	$0.00	$ 3	$ 3	
	TOTAL EARTHWORK (per LF)							**$35.70**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.6	SY	$5.70	$0.51	$6.21	$ 3	
REPLACEMENT	4" Ac Paving On 8" Abc	0.6	SY	$27.94	$2.24	$30.18	$ 17	
	TOTAL PAVING (per LF)							**$25.54**
MANHOLES	48" X 8' Deep Precast Manhole, No Ring & Cover, No Earthwork	10	EA	$1,902.41	$0.00	$1,902.41	$19,024.10	
	24" Dia. X 400 Lb Heavy Traffic Manhole Frame & Cover	10	EA	$407.30	$0.00	$407.30	$ 4,073	
	Concrete Manhole Invert, Single Channel	10	EA	$302.95	$0.00	$302.95	$ 3,030	
	Cast Iron Standard Steps (Precast In Manhole)	10	EA	$17.25	$0.00	$1,045.32	$ 1,045	
	TOTAL (per 1/4 Mile)						$ 27,172	
	TOTAL MANHOLES (per LF)							**$20.58**
	OVERHEAD (10%)							**$9.29**
	CONSTRUCTION PROFIT (6%)							**$5.57**
	SALES TAX (65% of above costs at 9.8%)							**$5.92**
	CONTINGENCY (15%)							**$13.94**
	GENERAL CONDITIONS (15%)							**$13.94**
	TOTAL CONSTRUCTION COST, LF							**$141.56**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$198.18**

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PROJECT : 2016 Integrated Water Master Plan — **LOCATION FACTOR:** 0.887

JOB # : 9728A.00 — **DATE :** September-15

CLIENT : City of Goodyear — **ENR CCI :** 9886

ELEMENT : Gravity Sewer Main Construction — **BY :** ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	10" Sdr-35 Pvc Sewer Pipe, In Trench	1	LF	$15.48	$0.00	$ 15	$ 15	
	TOTAL PIPING (per LF)							**$15.48**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	0.7	CY	$4.38	$0.00	$ 4	$ 3	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.2	CY	$55.55	$0.00	$ 56	$ 11	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.5	CY	$11.99	$0.00	$ 12	$ 6	
	10% Site Specific Requirements	1	LS	$3.44	$0.00	$ 3	$ 3	
	TOTAL EARTHWORK (per LF)							**$37.80**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.6	SY	$5.70	$0.51	$6.21	$ 4	
REPLACEMENT	4" Ac Paving On 8" Abc	0.6	SY	$27.94	$2.24	$30.18	$ 18	
	TOTAL PAVING (per LF)							**$27.16**
MANHOLES	48" X 8' Deep Precast Manhole, No Ring & Cover, No Earthwork	10	EA	$1,902.41	$0.00	$1,902.41	$19,024.10	
	24" Dia. X 400 Lb Heavy Traffic Manhole Frame & Cover	10	EA	$407.30	$0.00	$407.30	$ 4,073	
	Concrete Manhole Invert, Single Channel	10	EA	$302.95	$0.00	$302.95	$ 3,030	
	Cast Iron Standard Steps (Precast In Manhole)	10	EA	$17.25	$0.00	$1,045.32	$ 1,045	
	TOTAL (per 1/4 Mile)						$ 27,172	
	TOTAL MANHOLES (per LF)							**$20.58**
	OVERHEAD (10%)							**$10.10**
	CONSTRUCTION PROFIT (6%)							**$6.06**
	SALES TAX (65% of above costs at 9.8%)							**$6.43**
	CONTINGENCY (15%)							**$15.15**
	GENERAL CONDITIONS (15%)							**$15.15**
	TOTAL CONSTRUCTION COST, LF							**$153.92**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$215.49**

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PROJECT :	**2016 Integrated Water Master Plan**	**LOCATION FACTOR:**	**0.887**
JOB # :	**9728A.00**	**DATE :**	September-15
CLIENT :	**City of Goodyear**	**ENR CCI :**	9886
ELEMENT :	**Gravity Sewer Main Construction**	**BY :**	ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	15" Sdr-35 Pvc Sewer Pipe, In Trench	1	LF	$18.17	$0.00	$ 18	$ 18	
	TOTAL PIPING (per LF)							**$18.17**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	0.9	CY	$4.38	$0.00	$ 4	$ 4	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.2	CY	$55.55	$0.00	$ 56	$ 11	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.6	CY	$11.99	$0.00	$ 12	$ 7	
	10% Site Specific Requirements	1	LS	$3.64	$0.00	$ 4	$ 4	
	TOTAL EARTHWORK (per LF)							**$40.08**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.6	SY	$5.70	$0.51	$6.21	$ 4	
REPLACEMENT	4" Ac Paving On 8" Abc	0.6	SY	$27.94	$2.24	$30.18	$ 18	
	TOTAL PAVING (per LF)							**$27.16**
MANHOLES	48" X 8' Deep Precast Manhole, No Ring & Cover, No Earthwork	10	EA	$1,902.41	$0.00	$1,902.41	$19,024.10	
	24" Dia. X 400 Lb Heavy Traffic Manhole Frame & Cover	10	EA	$407.30	$0.00	$407.30	$ 4,073	
	Concrete Manhole Invert, Single Channel	10	EA	$302.95	$0.00	$302.95	$ 3,030	
	Cast Iron Standard Steps (Precast In Manhole)	10	EA	$17.25	$0.00	$1,045.32	$ 1,045	
	TOTAL (per 1/4 Mile)						$ 27,172	
	TOTAL MANHOLES (per LF)							**$20.58**
	OVERHEAD (10%)							**$10.60**
	CONSTRUCTION PROFIT (6%)							**$6.36**
	SALES TAX (65% of above costs at 9.8%)							**$6.75**
	CONTINGENCY (15%)							**$15.90**
	GENERAL CONDITIONS (15%)							**$15.90**
	TOTAL CONSTRUCTION COST, LF							**$161.50**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$226.10**

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PROJECT :	**2016 Integrated Water Master Plan**	**LOCATION FACTOR:**	**0.887**
JOB # :	**9728A.00**	**DATE :**	September-15
CLIENT :	**City of Goodyear**	**ENR CCI :**	9886
ELEMENT :	**Gravity Sewer Main Construction**	**BY :**	ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	21" Sdr-35 Pvc Sewer Pipe, In Trench	1	LF	$25.29	$0.00	$ 25	$ 25	
	TOTAL PIPING (per LF)							**$25.29**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	0.9	CY	$4.38	$0.00	$ 4	$ 4	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.3	CY	$55.55	$0.00	$ 56	$ 17	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.6	CY	$11.99	$0.00	$ 12	$ 7	
	10% Site Specific Requirements	1	LS	$4.20	$0.00	$ 4	$ 4	
	TOTAL EARTHWORK (per LF)							**$46.19**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.6	SY	$5.70	$0.51	$6.21	$ 4	
REPLACEMENT	4" Ac Paving On 8" Abc	0.6	SY	$27.94	$2.24	$30.18	$ 18	
	TOTAL PAVING (per LF)							**$27.16**
MANHOLES	48" X 8' Deep Precast Manhole, No Ring & Cover, No Earthwork	10	EA	$1,902.41	$0.00	$1,902.41	$19,024.10	
	24" Dia. X 400 Lb Heavy Traffic Manhole Frame & Cover	10	EA	$407.30	$0.00	$407.30	$ 4,073	
	Concrete Manhole Invert, Single Channel	10	EA	$302.95	$0.00	$302.95	$ 3,030	
	Cast Iron Standard Steps (Precast In Manhole)	10	EA	$17.25	$0.00	$1,045.32	$ 1,045	
	TOTAL (per 1/4 Mile)						$ 27,172	
	TOTAL MANHOLES (per LF)							**$20.58**
	OVERHEAD (10%)							**$11.92**
	CONSTRUCTION PROFIT (6%)							**$7.15**
	SALES TAX (65% of above costs at 9.8%)							**$7.59**
	CONTINGENCY (15%)							**$17.88**
	GENERAL CONDITIONS (15%)							**$17.88**
	TOTAL CONSTRUCTION COST, LF							**$181.66**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$254.32**

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PROJECT : 2016 Integrated Water Master Plan
LOCATION FACTOR: 0.887
JOB # : 9728A.00
DATE : September-15
CLIENT : City of Goodyear
ENR CCI : 9886
ELEMENT : Gravity Sewer Main Construction
BY : ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	24" Sdr-35 Pvc Sewer Pipe, In Trench	1	LF	$30.90	$0.00	$ 31	$ 31	
	TOTAL PIPING (per LF)							**$30.90**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	1.0	CY	$4.38	$0.00	$ 4	$ 4	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.3	CY	$55.55	$0.00	$ 56	$ 17	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.6	CY	$11.99	$0.00	$ 12	$ 7	
	10% Site Specific Requirements	1	LS	$4.24	$0.00	$ 4	$ 4	
	TOTAL EARTHWORK (per LF)							**$46.67**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.7	SY	$5.70	$0.51	$6.21	$ 4	
REPLACEMENT	4" Ac Paving On 8" Abc	0.7	SY	$27.94	$2.24	$30.18	$ 21	
	TOTAL PAVING (per LF)							**$30.79**
MANHOLES	48" X 8' Deep Precast Manhole, No Ring & Cover, No Earthwork	10	EA	$1,902.41	$0.00	$1,902.41	$19,024.10	
	24" Dia. X 400 Lb Heavy Traffic Manhole Frame & Cover	10	EA	$407.30	$0.00	$407.30	$ 4,073	
	Concrete Manhole Invert, Single Channel	10	EA	$302.95	$0.00	$302.95	$ 3,030	
	Cast Iron Standard Steps (Precast In Manhole)	10	EA	$17.25	$0.00	$1,045.32	$ 1,045	
	TOTAL (per 1/4 Mile)						$ 27,172	
	TOTAL MANHOLES (per LF)							**$20.58**
	OVERHEAD (10%)							**$12.90**
	CONSTRUCTION PROFIT (6%)							**$7.74**
	SALES TAX (65% of above costs at 9.8%)							**$8.21**
	CONTINGENCY (15%)							**$19.34**
	GENERAL CONDITIONS (15%)							**$19.34**
	TOTAL CONSTRUCTION COST, LF							**$196.49**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$275.08**

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PROJECT : 2016 Integrated Water Master Plan
LOCATION FACTOR: 0.887
JOB # : 9728A.00
DATE : September-15
CLIENT : City of Goodyear
ENR CCI : 9886
ELEMENT : Force Main Construction
BY : ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	6" Cl 52 Cldi Mj Pipe In Open Trench	1	LF	$30.36	$0.00	$ 30	$ 30	
	TOTAL PIPING (per LF)							**$30.36**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	0.7	CY	$4.38	$0.00	$ 4	$ 3	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.2	CY	$55.55	$0.00	$ 56	$ 9	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.5	CY	$11.99	$0.00	$ 12	$ 6	
	10% Site Specific Requirements	1	LS	$3.20	$0.00	$ 3	$ 3	
	TOTAL EARTHWORK (per LF)							**$35.16**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.6	SY	$5.70	$0.51	$6.21	$ 3	
REPLACEMENT	4" Ac Paving On 8" Abc	0.6	SY	$27.94	$2.24	$30.18	$ 17	
	TOTAL PAVING (per LF)							**$25.54**
FITTINGS	6" 90° Cldi Mj Bend	2	EA	$916.06	$0.00	$916.06	$1,832.12	
& VALVES	TOTAL (per 1/4 Mile)						$ 1,832	
	TOTAL FITTING & VALVES (per LF)							**$1.39**
	OVERHEAD (10%)							**$9.24**
	CONSTRUCTION PROFIT (6%)							**$5.55**
	SALES TAX (65% of above costs at 9.8%)							**$5.89**
	CONTINGENCY (15%)							**$13.87**
	GENERAL CONDITIONS (15%)							**$13.87**
	TOTAL CONSTRUCTION COST, LF							**$140.86**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$197.20**

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PROJECT : 2016 Integrated Water Master Plan
LOCATION FACTOR: 0.887
JOB # : 9728A.00
DATE : September-15
CLIENT : City of Goodyear
ENR CCI : 9886
ELEMENT : Force Main Construction
BY : ETB

	DESCRIPTION	QUAN	UNIT	MATERIAL & LABOR	SUB	UNIT COST	SUBTOTAL	TOTAL
PIPE	8" Cl 52 Cldi Mj Pipe In Open Trench	1	LF	$34.05	$0.00	$ 34	$ 34	
	TOTAL PIPING (per LF)							**$34.05**
EXCAV	EARTHWORK							
& BACKFILL	Cat 225 Trackhoe, 1Cy Bucket, Class B (Medium Digging), 0-16' D	0.7	CY	$4.38	$0.00	$ 4	$ 3	
	Trench Bracing, 3' W X 10' D, Wood Planks & X-Bracing	1.0	LF	$14.19	$0.00	$ 14	$ 14	
	Imported Pipe Bed & Zone/Confined Structure Backfill, Class A Material	0.2	CY	$55.55	$0.00	$ 56	$ 10	
	Native Trench Backfill/Unconfined Struct. Bf, Class A Material	0.5	CY	$11.99	$0.00	$ 12	$ 6	
	10% Site Specific Requirements	1	LS	$3.25	$0.00	$ 3	$ 3	
	TOTAL EARTHWORK (per LF)							**$35.70**
PAVING	Asphalt Pavement Cutting	8.0	inFT	$.67	$0.00	$ 1	$ 5	
DEMO &	Remove 4"-6" Asphalt Pavement	0.6	SY	$5.70	$0.51	$6.21	$ 3	
REPLACEMENT	4" Ac Paving On 8" Abc	0.6	SY	$27.94	$2.24	$30.18	$ 17	
	TOTAL PAVING (per LF)							**$25.54**
FITTINGS	8" 90° Cldi Mj Bend	2	EA	$1,157.21	$0.00	$1,157.21	$2,314.42	
& VALVES	TOTAL (per 1/4 Mile)						$ 2,314	
	TOTAL FITTING & VALVES (per LF)							**$1.75**
	OVERHEAD (10%)							**$9.70**
	CONSTRUCTION PROFIT (6%)							**$5.82**
	SALES TAX (65% of above costs at 9.8%)							**$6.18**
	CONTINGENCY (15%)							**$14.56**
	GENERAL CONDITIONS (15%)							**$14.56**
	TOTAL CONSTRUCTION COST, LF							**$147.86**
	TOTAL PROJECT COST (1.4 times Const Cost), LF							**$207.01**