Submitted To The City Of

PARKER

Capital Improvements Plan for 2016-2026 Water Impact Fee

Submitted By

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CITY OF PARKER, TEXAS

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EXECUTIVE SUMMARY

The City of Parker owns and operates their water distribution system comprised of a pumping station, ground storage facilities, elevated storage facility and pipeline infrastructure. This system is being improved and expanded to meet the needs of the water demands imposed by the current residents and future residents of Parker, Texas. A schedule for future improvements and investments in the water distribution system is known as the Capital Improvements Plan. Chapter 395 of the Texas Local Government Code requires the political subdivision create its Capital Improvement Plan to impose impact fees. The Capital Improvement Plan and its costs are required for the calculation of the water impact fee. Birkhoff, Hendricks, and Carter, with assistance of City staff, created the Capital Improvements Plan. Only projects from the Capital Improvement Plan that are required to provide capacity to serve growth during the impact fee (2016-2026) period can be included in the impact fee calculation.

A. INTRODUCTION

In accordance with Chapter 395 of the Texas Local Government Code, the City of Parker has retained Birkhoff, Hendricks & Carter, L.L.P. to establish the Capital Improvement Plan in conjunction with the Water Impact Fee Study. This document establishes the engineering basis for the capital projects and costs which will be included in the water impact fee calculations.

The Capital Improvements Plan consists of the necessary water distribution system improvements to support the projected water demands placed on the distributions system from the growth. The growth projections were obtained from the Land Use Assumptions Report for the Water Impact Fee prepared by the City of Parker Impact Fee Advisory Committee, dated August 29, 2016.

B. FACILITY CAPACITY REQUIEMENTS

C.1 GENERAL

This section of the report discusses the capacity of those facilities that are required to be included in the Impact Fee Capital Improvements Plan and are also eligible in the calculation of the impact fee. The capacities evaluated are the existing available capacities and the increased capacities due to projected growth. These increased capacities serve the growth projected during the impact fee period.

C.2 WATER USAGE

The water distribution system must be improved in accordance with this Capital Improvement Plan in order to support the water demands imposed on the system by the projected growth the City is envisioning within the next 10-year period. The City's existing 2016 residential population is approximately 4,503 residents. In year 2026 the City projects the residential population to grow to approximately 6,969 residents. The City of Parker updated the Water Distribution System Master Plan in February 2016. The Master Plan reports that based on information provided by the City, the residential per capita water usage rate for maximum daily demand is 571 gallons per capita per day (gpcd). Table No. 1 illustrates the water demand rates used to calculate the water demands for the projected population.

TABLE NO. 1

2016 DESIGN WATER DEMAND RATES

Land Use	Maximum Daily Demand Rate	Maximum Hourly Demand Rate
Residential	571 g.p.c.d.	1,091 g.p.c.d.
Commercial	1,500 g.p.a.d.	1,950 g.p.a.d.

g.p.c.d. – gallons per capita per day
g.p.a.d. – gallons per acre per day
residential peaking factor 1.91

Table No. 2 summarizes the calculated water demands for year 2016 and 2026, within the City's planning area.

TABLE NO. 2

WATER DEMANDS

Water Demand Capacities	Maximum Daily Demand (MGD)	Maximum Hourly Demand (MGD)
2016 Water Demands	3.334	5.521
2026 Water Demands	4.742	8.209
Additional Capacity Required:	1.408	2.688

C.3 WATER SUPPLY

The City currently receives treated water supply from the North Texas Municipal Water District (NTMWD) at the East Side Pump Station delivery point located at the southwest corner of the Parker Road and F.M. 1378 intersection. The East Side Pump Station delivery point has capacity to receive up to 3.50 MGD supply rate. It does not have enough capacity to support the additional supply required for the growth within the next ten year period. This site also does not have sufficient area for expansions. Based on the growth projections and the calculated water demands, a second delivery point for water supply will be needed to meet the new water demands. This new delivery point will be the Central Pump Station delivery point. The locations of the existing and proposed delivery point are shown on the Capital Improvement Plan Map included in this report. Table No. 3 summarizes the maximum day supply capacity requirements at each delivery point within the next ten year impact fee period.

TABLE NO. 3

WATER SUPPLY

Water Supply Capacities	East Side Supply (MGD)	Central Supply (MGD)
2016 NTMWD Supply	3.50	0.00
2026 NTMWD Supply	0.00	1.75
Additional Supply Capacity Required:	0.00	1.75

C.4 WATER DISTRIBUTION SYSTEM

The City's existing water distribution system can support the water demands applied to the system from the existing residential population. As the City grows within the next ten-year period, additional water distribution system facilities will need to be constructed to support water demand created from new growth. In addition to facilities the water distribution system will require additional water lines.

The design of the proposed water distribution system is based on three separate demand conditions. The first condition is based on the maximum daily demand. This demand is rate at which water is supplied and the rate which pump stations shall be sized to deliver water to the system. The second condition is the maximum hourly demand rate on the day of maximum demand. Maximum hourly demand rate is used to size distribution lines and to determine the volume of elevated storage. The third condition used is the minimum hourly demand rate on the day of maximum demand. This rate

is used to analyze the refill rates of the elevated storage tank. These three demand conditions were modeled over a three-day period with an Extended Period Simulation (EPS) in the hydraulic water model utilizing the H2O NET water model software.

The existing and proposed distribution lines along with facilities are shown on the Capital Improvement Plan Map presented in this report. The 72-hour EPS model was utilized with the use of a diurnal curve obtained from the 2016 Master Plan Update model for the 2016 and 2026 hydraulic models. Table No. 4 summarizes the maximum hourly demands that the proposed distribution system will need to support.

TABLE NO. 4

WATERLINE DEMANDS

Waterline Capacities	Maximum Hourly Demand (MGD)
2016 Waterline Demands	5.521
2026 Waterline Demands	8.209
Addition Waterline Capacity Required:	2.688

C.5 HIGH SERVICE PUMP STATION

The City currently meets its pumping system demand requirements with the existing East Side Pump Station. This pump station has a firm pumping capacity of 3.60 MGD with the largest pump on standby to meet the Texas Commission on Environmental Quality (TCEQ) regulations. In order to meet the projected maximum daily demands, a second pump station with an initial firm capacity of 1.75 MGD will be required to be in service by year 2020 to meet the additional maximum daily demands. Table No. 5 summarizes the pump station capacities.

TABLE NO. 5

PUMP STATION

Pump Station Capacities	East Side Pump Station (MGD)	Central Pump Station (MGD)
2016 Pumping Capacity	3.50	0.00
2026 Pumping Capacity	0.00	1.75
Additional Pumping Capacity Required:	0.00	1.75

C.6 GROUND STORAGE RESERVOIR

Ground Storage within the system is necessary to provide a dependable supply and during periods of interruption in supply. The volume of ground storage was designed for a 6-hour drawdown for the maximum demand pumping. The East Side Pump Station currently has a 200,000-gallon and a 300,000-gallon ground storage reservoir. These two existing reservoirs serve the East Side delivery point and pump station. The new delivery point will require additional ground storage to meet TCEQ regulations and to provide a dependable supply to the Central Pump Station. Table No. 6 illustrates the ground storage capacity requirements. The ground storage reservoir at the Central Pump Station will need to be constructed, as the pump station is constructed.

TABLE NO. 6

GROUND STORAGE RESERVOIR REQUIREMENTS

Ground Storage Capacities	Ground Storage Added (MG)	Ground Storage Available (MG)
2016 Ground Storage Capacity	0.00	0.50
2026 Ground Storage Capacity	0.75	0.75
Reservoir Capacity Required:	0.75	1.25

C.7 ELEVATED STORAGE

Elevated storage within the system is required by TCEQ to maintain system pressure. In the Parker system elevated storage is sized to meet the maximum hourly demands working in conjunction with the pump stations, while maintaining system pressures.

The City currently has one 1.0-MG elevated storage tank located on Parker Road, adjacent to City Hall, with a high water level at 800-ft MSL. Table No. 7 summarizes the elevated storage requirements to meet maximum hourly demand rates within the 10-year period.

TABLE NO. 7

ELEVATGED STORAGE TANK REQUIREMENTS

Elevated Storage Capacities	**Elevated Storage Added (MG)**	**Elevated Storage Available (MG)**
2016 Elevated Storage Capacities	0.00	1.00
2026 Elevated Storage Capacities	0.00	1.00
Elevated Storage Capacity Required:	0.00	1.00

C. UTILIZED FACILITY CAPACITIES

D.1. GENERAL

This section of the report discusses the water distribution system utilized facilities that are eligible to be included in the Impact Fee Capital Improvements Plan and are also eligible in the calculation of the impact fee. The Capital Improvements Plan makes improvements the water distribution system in order to meet and support the additional water demands created by the projected growth during the 10-year impact fee period. Only the infrastructure and facility projects identified in the Capital Improvements Plan can be eligible for impact fee funding.

D.2. WATER SUPPLY

The City will continue to receive water supply from the North Texas Municipal Water District. The new delivery point will be the Central Pump Station delivery point. For the year 2016, the utilized capacity is 0% since it is not constructed yet. For the year 2026, the utilized capacity was calculated by dividing the 2026 maximum daily demand by the buildout maximum daily demand, then subtracting the utilized capacities (2026-2016). Its utilized capacity during the 10-year period is approximately 62.0%.

2016 Utilized Capacity = 0.0%
2026 Utilized Capacity = 2026 Max Daily Demand / Buildout Max Daily Demand

2026 Utilized Capacity = 4.742 MGD / 7.645 MGD x 100%
= 62.0%

Utilized Capacity during Capital Recovery Fee (CRF) Period = 62.0% - 0.0% = 62.0%

D.3. WATER DISTRIBUTION SYSTEM

The utilized capacity of the water distribution system water lines is associated with waterlines that are 8-inches or more in diameter. The water distribution system was modeled in the hydraulic water model software for the existing year 2016 water model, the 10-year 2026 water model, and the buildout water model. The utilized capacity for the new waterlines was obtained by comparing the maximum hourly flows in the new pipes, between the three water models. For the year 2016, the utilized capacity of the new pipes was 0.0% since they are not serviced yet. For the year 2026, the utilized capacity was calculated by dividing the year 2026 pipe flow with the buildout pipe flow, both obtained from the hydraulic water model pipe line flows. The following are the proposed distribution lines that are shown on the Capital Improvement Plan Map in report.

1. **Church Lane 18-Inch Water Line**: This waterline project consists of approximately 2,490 linear feet of 18-inch waterline beginning at the new Central Pump station, bearing south along Dillehay Drive and terminating at Parker Road by connecting to an existing 12-inch waterline. **Its utilized capacity during CRF period was calculated to be 63.0%.**

   Church Lane 18-Inch Water Line: This waterline project consists of approximately 1,365 linear feet of 18-inch waterline beginning at the new Central Pump station, bearing north along Dillehay Drive and terminating just north of Curtis Road by connecting to the existing 16-inch waterline. **Its utilized capacity during the CFR period was calculated to be 84.0%.**

2. **Chaparral Elevated Storage Tank Waterline**: This waterline project consists of approximately 385 linear feet of 16-inch waterline from the new elevated tank to connect to the existing 16-inch waterline**. Its utilized capacity during the CFR period was calculated to be 63.0%.**

3. **Bois-D-Arc Lane 8-inch Waterline**: This waterline project consists of approximately 1,670 linear feet of 8-inch waterline required along Bois-O-Arc Road for the new pressure reducing valve vault to be in place and operational within the next 10 years. **Its utilized capacity during the CFR period was calculated to be 100.0% utilized by the year 2026.**

D.4. HIGH SERVICE PUMP STATION

The new Central Pump Station will have an initial firm pumping capacity of 1.75 MGD to meet the additional water demands within the next ten-year period. For the year 2016, the utilized capacity is 0.0% since it is not constructed yet. For the year 2026 the utilized capacity was calculated by dividing the 2026 maximum daily demand by the buildout maximum daily demand, then subtracting the utilized capacities (2026-2016). Its utilized capacity during the 10-year period is approximately 62.0%.

2016 Utilized Capacity = 0.0%

2026 Utilized Capacity = 2026 Max Daily Demand / Buildout Max Daily Demand
2026 Utilized Capacity = 4.742 MGD / 7.645 MGD x 100%
= 62.0%

Utilized Capacity during Capital Recovery Fee (CRF) Period = 62.0% - 0.0% = 62.0%

D.5. GROUND STORAGE RESERVOIR

The new Central delivery point and pump station will required additional ground storage to meet TCEQ regulations and to provide a dependable supply for the Central Pump Station. The utilized capacity for the Central Ground Storage Reservoir was calculated the same as for the pump station utilized capacity above which is based on the maximum daily demands and calculating the differences between the 10-year period, then subtracting the utilized capacities (2026-2016). Its utilized capacity during the 10-year period is approximately 62.0%.

2016 Utilized Capacity = 0.0%

2026 Utilized Capacity = 2026 Max Daily Demand / Buildout Max Daily Demand
2026 Utilized Capacity = 4.742 MGD / 7.645 MGD x 100%
= 62.0%
Utilized Capacity during Capital Recovery Fee (CRF) Period = 62.0% - 0.0% = 62.0%

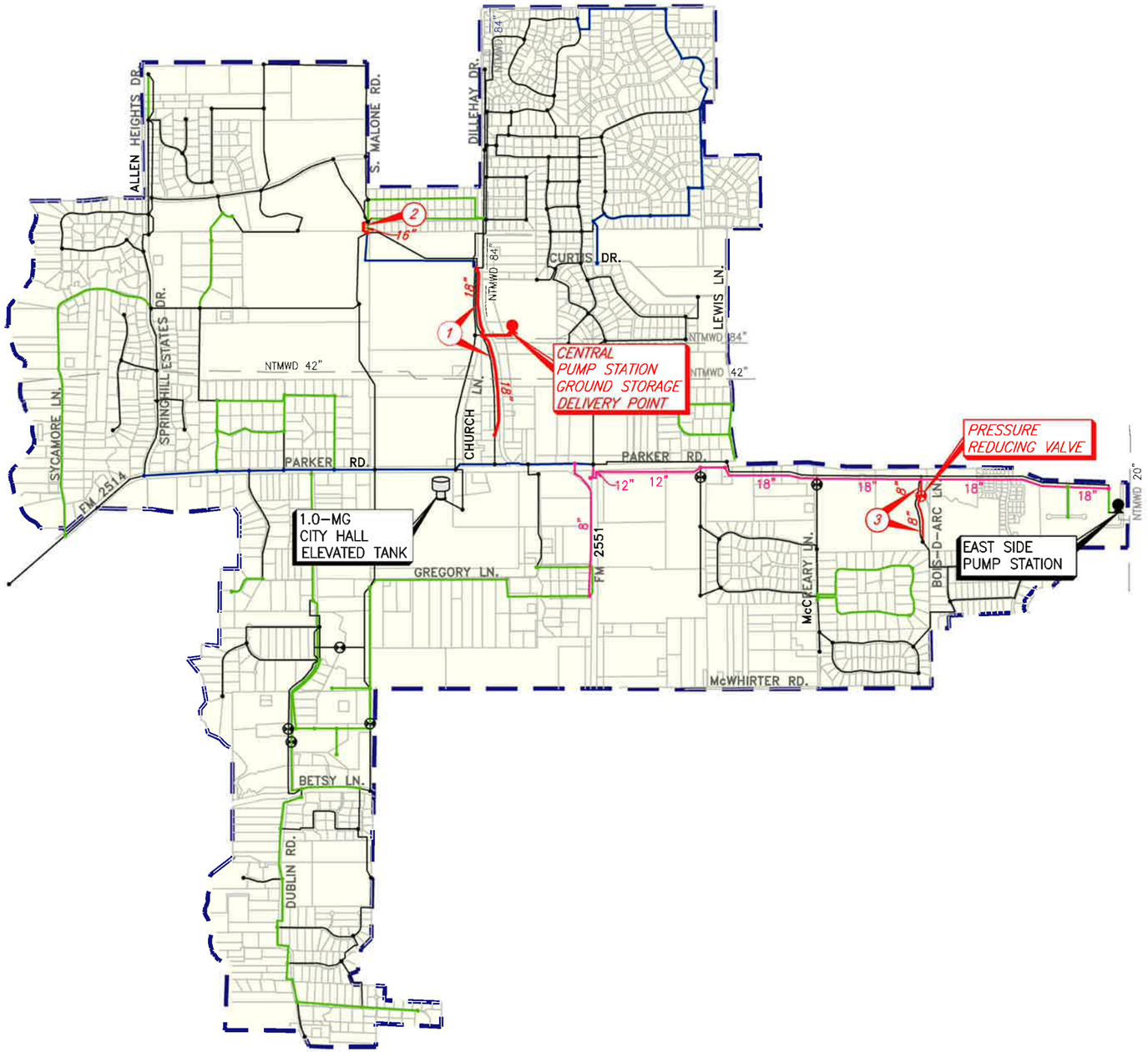
D.6. ELEVATED STORAGE TANK

The existing 1.0 MG Elevated Tank has the capacity to support maximum hourly demands imposed by the projected growth within the next ten years. The utilized capacity for the elevated tank was calculated based on the maximum hourly demands and finding the differences between the 10-year periods. For the year (2016 and 2026) the utilized capacity of the elevated storage tank was calculated by subtracting the max hour demand from the max day demand and dividing the difference by 4 (4 is a constant rate 4-MGD/1-MG) to convert from rate to volume. The 2026 required volume was then divided by the buildout volume required to obtain the utilized capacity. Its utilized capacity during the 10-year period is approximately 43.5%.

2016 Utilized Capacity = (2016 Max Hour Demand – Max Day Demand) / 4
= (5.521 MGD– 3.334 MGD)/ 4
= 2.190 MGD/ 4
= 0.55 MG
2016 Utilized Capacity = 2016 Required Volume / Available Volume
= 0.55 MG/ 1.0 MG x 100%
= 55%
2026 Utilized Capacity = (2026 Max Hour Demand – Max Day Demand) / 4
2026 Utilized Capacity = (8.209 MGD– 4.742 MGD)/4
= 3.467 / 4
= 0.87 MG
2026 Utilized Capacity = 2026 Required Volume / Available Volume
2026 Utilized Capacity = 0.87 MG / 1.0 MG x 100%
= 87%
Utilized Capacity during Capital Recovery Fee (CRF) Period = 32%

D. CAPITAL IMPROVEMENTS PLAN MAP

The following map illustrates the Capital Improvements required within the 10-year period to support the City's projected growth.



WATER DISTRIBUTION SYSTEM 2016-2026 WATER IMPACT FEE CAPITAL IMPROVEMENT PLAN AND RECOVERY WATERLINE MAP

LEGEND

- PLANNING AREA BOUNDARY
- EXISTING WATER LINE (NO IMPACT FEE)
- EXISTING WATER LINE (IMPACT FEE)
- PROPOSED WATER LINE (IMPACT FEE)
- CITY PARTICIPATED IN OVERSIZE COST (IMPACT FEE)
- CITY PURCHASED FROM PECAN ORCHARD (IMPACT FEE)
- EXISTING NTMWD SUPPLY LINE
- EXISTING PUMP STATION
- PROPOSED PUMP STATION
- EXISTING ELEVATED STORAGE TANK
- EXISTING PRESSURE REDUCING VALVE
- PROPOSED PRESSURE REDUCING VALVE

N

0 1500 3000 4500

HORIZONTAL SCALE IN FEET

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NOVEMBER, 2016

REVISED: 12/7/16 – AMATA H:\Projects\H2ONET\Parker\2016133 Water Impact Fee\Maps\2016-2026 Water CIP Map.dwg PLOT SCALE: 1:2 PLOT STYLE: ---- PLOTTED BY: AMATA ON 12/8/2016

E. CAPITAL IMPROVEMENTS PLAN COSTS

The following table lists the Capital Improvements and this total projects costs.

CITY OF PARKER, TEXAS
2016 IMPACT FEE
WATER DISTRIBUTION SYSTEM
10-YEAR CAPITAL IMPROVEMENT PLAN

PROPOSED WATER LINES

Project No. (3)	Project	Size	Opinion of Project Cost (1)	Debt Service (2)	Total Project Cost
1	Dillehay Drive 18-Inch Water Line	18"	$ 577,500	$ 197,657	$ 775,157
2	Chaparral Elevated Storage Tank 16-Inch Water Line	16"	$ 46,200	$ 24,255	$ 70,455
3	Bois-D-Arc Lane 8-Inch Water Line	8"	$ 167,000	$ 87,675	$ 254,675
	Subtotal: Proposed Water Lines		**$ 790,700**	**$ 309,587**	**$ 1,100,287**

SUPPLY, PUMPING, STORAGE FACILITIES AND FACILITY IMPROVEMENTS

Project No. (4)	Project	Capacity	Opinion of Project Cost (1)	Debt Service (2)	Total Project Cost
4	Central Pump Station - 1.75 MGD P.S.	1.75 MGD	$ 3,150,000	$ 1,653,750	$ 4,803,750
5	Central Pump Station - 0.75 MG G.S.R.	0.75 MG	$ 990,000	$ 49,500	$ 1,039,500
6	NTMWD Delivery Point No. 2	5 MGD	$ 1,320,000	$ 693,000	$ 2,013,000
7	Bois-D-Arc Lane 8-Inch Pressure Reducing Valve	-----	$ 240,000	$ 126,000	$ 366,000
	Subtotal, Supply, Pumping and Storage Facilities:		**$ 5,700,000**	**$ 2,522,250**	**$ 8,222,250**

PLANNING EXPENSES

Project No.	Project	Opinion of Cost (1)(b)	Debt Service (2)	Total Project Cost
	Water System Master Plan	$ 32,000	$ -	$ 32,000
	Water Impact Fee	$ 20,000	$ -	$ 20,000
	Subtotal, Planning Expenses:	**$ 52,000**	**$ -**	**$ 52,000**
	Water Distribution System CIP Grand Total:	**$ 6,542,700**	**$ 2,831,837**	**$ 9,374,537**

Notes:

(1) Opinion of Project Cost includes:
  a) Engineer's Opinion of Construction Cost
  b) Professional Services Fees (Survey, Engineering, Testing, Legal)
  c) Cost of Easement or Land Acquisitions

(2) Debt Service based on 20-year simple interest bonds at 5%

(3) * - Developer Initiated Construction of 8-inch Waterline, City Participation in Oversize Cost

F. CAPITAL IMPROVEMENT PLAN SCHEDULE

The following table No. 8 illustrates the projected Capital Improvement Plan schedule. This schedule correlated to the projected growth in the Land Use Assumptions report. The City will need to evaluate the yearly growth projections to determine if the schedule below needs to be revised accordingly to development growth.

TABLE NO. 8

CAPITAL IMPROVEMENTS PLAN SCHEDULE

Facility	Start Design	Start Construction	In Service
Central Pump Station	Mid 2017	Mid 2018	2020
Water Supply and Distribution Lines	Early 2017	Mid 2018	2020
Central 0.75 MG Ground Storage No. 1	Mid 2017	Mid 2018	2020
NTMWD Metered Station	Mid 2017	Mid 2028	2020

G. **INDEX**

Parker Demand Rates

LAND USE	Residential		Non-Residential		
	Max Day Per Capita g.p.c.d.	Max Hour Per Capita g.p.c.d.	Max Day Per Acre g.p.a.d.	Max Hour Per Acre g.p.a.d.	Peaking Factor
Single Family Residential (1.0 AC.)	571	1,090			1.91
Single Family Residential (1.5 AC.)	571	1,090			1.91
Single Family Residential (2.0 AC.)	571	1,090			1.91
Single Family Residential (>2.0 AC.)	1,500	1,500			1.00
Manufactured Housing					
Commercial		0	1,500	1,950	
Public/Special Activities		0	1,500	1,950	
ROW					

Min Hour GDF 0.3

City of Parker - Existing 2016 Demands

LAND USE	Residential			Non-Residential			Total Demand	
	Population	Max Day Demand (MGD)	Max Hour Demand (MGD)	Area (Ac)	Max Day Demand (MGD)	Max Hour Demand (MGD)	Max Day Demand (MGD)	Max Hour Demand (MGD)
Single Family Residential (1.0 AC.)	2,130	1.216	2.322				1.216	2.322
Single Family Residential (1.5 AC.)	699	0.399	0.762				0.399	0.762
Single Family Residential (2.0 AC.)	1,200	0.685	1.308				0.685	1.308
Single Family Residential (>2.0 AC.)	474	0.711	0.711				0.711	0.711
Manufactured Housing				0.00	0.000	0.000	0.000	0.000
Commercial				13.53	0.020	0.026	0.020	0.026
Public/Special Activities				201.16	0.302	0.392	0.302	0.392
ROW								
Totals	**4,503**	**3.01**	**5.10**	**214.69**	**0.32**	**0.42**	**3.334**	**5.521**

Parker Demand Rates

LAND USE	Residential		Non-Residential		
	Max Day Per Capita g.p.c.d.	Max Hour Per Capita g.p.c.d.	Max Day Per Acre g.p.a.d.	Max Hour Per Acre g.p.a.d.	Peaking Factor
Single Family Residential (1.0 AC.)	571	1,090			1.91
Single Family Residential (1.5 AC.)	571	1,090			1.91
Single Family Residential (2.0 AC.)	571	1,090			1.91
Single Family Residential (>2.0 AC.)	1,500	1,500			1.00
Manufactured Housing					
Commercial		0	1,500	1,950	
Public/Special Activities		0	1,500	1,950	
ROW					

Min Hour GDF 0.3

City of Parker - 2026 Demands

LAND USE	Residential			Non-Residential			Total Demand	
	Population	Max Day Demand (MGD)	Max Hour Demand (MGD)	Area (Ac)	Max Day Demand (MGD)	Max Hour Demand (MGD)	Max Day Demand (MGD)	Max Hour Demand (MGD)
Single Family Residential (1.0 AC.)	4,596	2.624	5.010				2.624	5.010
Single Family Residential (1.5 AC.)	699	0.399	0.762				0.399	0.762
Single Family Residential (2.0 AC.)	1,200	0.685	1.308				0.685	1.308
Single Family Residential (>2.0 AC.)	474	0.711	0.711				0.711	0.711
Manufactured Housing				0.00	0.000	0.000	0.000	0.000
Commercial				13.53	0.020	0.026	0.020	0.026
Public/Special Activities				201.16	0.302	0.392	0.302	0.392
ROW								
Totals	**6,969**	**4.42**	**7.79**	**214.69**	**0.32**	**0.42**	**4.742**	**8.209**

Parker Demand Rates

LAND USE	Residential		Non-Residential		
	Max Day Per Capita g.p.c.d.	Max Hour Per Capita g.p.c.d.	Max Day Per Acre g.p.a.d.	Max Hour Per Acre g.p.a.d.	Peaking Factor
Single Family Residential (1.0 AC.)	571	1,090			1.91
Single Family Residential (1.5 AC.)	571	1,090			1.91
Single Family Residential (2.0 AC.)	571	1,090			1.91
Single Family Residential (>2.0 AC.)	1,500	1,500			1.00
Manufactured Housing					
Commercial		0	1,500	1,950	
Public/Special Activities		0	1,500	1,950	
ROW					

Min Hour GDF 0.3

City of Parker - Buildout Demands

LAND USE	Residential			Non-Residential			Total Demand	
	Population	Max Day Demand (MGD)	Max Hour Demand (MGD)	Area (Ac)	Max Day Demand (MGD)	Max Hour Demand (MGD)	Max Day Demand (MGD)	Max Hour Demand (MGD)
Single Family Residential (1.0 AC.)	7,254	4.142	7.907				4.142	7.907
Single Family Residential (1.5 AC.)	1,626	0.928	1.772				0.928	1.772
Single Family Residential (2.0 AC.)	2,631	1.502	2.868				1.502	2.868
Single Family Residential (>2.0 AC.)	492	0.738	0.738				0.738	0.738
Manufactured Housing				0.00	0.000	0.000	0.000	0.000
Commercial				21.53	0.032	0.042	0.032	0.042
Public/Special Activities				201.16	0.302	0.392	0.302	0.392
ROW								
Totals	**12,003**	**7.31**	**13.28**	**222.69**	**0.33**	**0.43**	**7.645**	**13.719**

Capital Improvements Plan for 2016-2026 Water Impact Fee

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