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PRELIMINARY WASTEWATER REPORT

FOR

LAKIN – PHASE 1

GOODYEAR, ARIZONA

CITY OF Goodyear

Approved by City of Goodyear

10/27/2020

20-60000021 - LAKIN PARK PHASE 1

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May 2020
Project No. 1981.02

PRELIMINARY WASTEWATER REPORT
FOR
LAKIN – PHASE 1

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1.0 INTRODUCTION

1.1 Project Location

Lakin – Phase 1 (the Project) is a proposed master planned community located along Cotton Lane, south of Maricopa County Route 85 (MC-85) and the Union Pacific Railroad (UPRR) in Goodyear, Arizona. The Project consists of approximately 105 gross acres in a portion of Section 26 of Township 1 North, Range 2 West of the Gila and Salt River Baseline and Meridian. The property is bound by MC-85 and the UPRR to the north, the Buckeye Canal to the south, Cotton Road to the east, and undeveloped agricultural land to the west. Figure 1 in Appendix A provides a vicinity map for the Project.

1.2 General Description

At build-out, the Project will consist of approximately 184 single-family residential units to be developed in one phase. The Project will also contain approximately 89.1 acres of non-residential use, comprised of industrial and commercial and/or public safety (fire station) properties as well as amenities and open space. The focus of this Phase 1 Preliminary Report is Parcel 2, which will consist of two large industrial buildings. Parcels 1 and 3, although included in Phase 1 of the *Master Wastewater Report for CP Lakin Park* (HILGARTWILSON, 2020) are anticipated to be developed at a future time.

The Project is located within the City of Goodyear wastewater service area and is situated within the City's Water Planning Area 2 (WPA2). The site and surrounding area generally slope to the south-southwest at approximately 0.2 percent. The wastewater system infrastructure discussed in this report required for the Project will tie into existing City of Goodyear wastewater system infrastructure and will be owned and operated by the City of Goodyear.

1.3 Purpose of Report

This Preliminary Wastewater Report has been prepared in support of the preliminary plat prepared for Parcel 2 of the Project. All development projects shall be responsible for determining their specific wastewater system needs. Services for proposed developments shall not be provided at the expense of existing customers.

The purpose of this Preliminary Wastewater Report is to identify and evaluate the proposed wastewater system infrastructure for serving the Project in accordance with the design criteria established in the City of Goodyear *2016 Integrated Water Master Plan* (Carollo 2016) and Chapter 6 of the City of Goodyear *Engineering Design Standards and Policies Manual* (Goodyear 2017). This Preliminary Wastewater Report discusses the existing wastewater infrastructure within the Project vicinity and identifies anticipated average daily wastewater flows and peak flows. It also identifies anticipated sewer line sizes and alignments for the Project and presents results from a hydraulic model of the proposed wastewater infrastructure.

In February 2019, HILGARTWILSON prepared the *Master Wastewater Report for CP Lakin Park* (HILGARTWILSON, 2019), which is currently under review by the City of Goodyear. An update to the *Master Wastewater Report for CP Lakin Park*

(HILGARTWILSON, 2020) is currently being submitted alongside this Preliminary Wastewater Report. The Master Wastewater Report discussed general wastewater concepts and identified preliminary sewer line sizing and alignments for the overall Lakin community.

1.4 Existing Conditions

The Project site is currently undeveloped agricultural land that is actively being farmed. The site and surrounding area generally slope to the south-southwest at a rate of 0.2 percent. The site contains an existing Flood Control District of Maricopa County (FCDMC) drainage structure, irrigation canals, a natural gas line, as well as various easements for electrical, drainage, and other utilities throughout the Project. There is also an existing 96-inch regional effluent line parallel to the Buckeye Canal that serves the Palo Verde Nuclear Generating Station.

2.0 PROJECTED WASTEWATER FLOWS

2.1 City of Goodyear Wastewater Flow Criteria

The proposed wastewater collection system for the Project has been prepared consistent with the design criteria provided in the City of Goodyear *2016 Integrated Water Master Plan* (Carollo 2016) and Chapter 6 of the City of Goodyear *Engineering Design Standards and Policies Manual* (Goodyear 2017). A summary of the wastewater flow factors and peaking factors from the design criteria are shown in Table 1 below.

TABLE 1
WASTEWATER FLOW FACTORS[1]

Category		Value	Unit
Average Daily Flow			
	Residential (2-4 DU/ac)	144	gpd/DU
	Residential (4-6 DU/ac)	129	gpd/DU
	Residential (6-10 DU/ac)	128	gpd/DU
	Community Commercial	951	gpad
	Public/Quasi-Public (Fire Station)	1,019	gpad
	General Industrial	1,087	gpad
Peaking Factor			
	Peak Dry Weather Flow	2.89	x Average Daily Flow
Peak Capacity[2]			
	8-inch to 12-inch sewer lines (not less than)	1,000	gpd/DU (flowing full)

Notes:
1. Demand criteria based on the City of Goodyear *2016 Integrated Water Master Plan* (Carollo 2016) and the City of Goodyear *Engineering Design Standards and Policies Manual* (Goodyear 2017).
2. Peak capacity calculations are for 8-inch to 12-inch sewer mains only. Only residential parcels utilize peak capacity calculations. Other land uses including commercial and industrial remain peaked at 2.89 x Average Daily Flow.

2.2 Wastewater Flow Calculations

Anticipated wastewater flows for the Project have been calculated in accordance with the design criteria listed in Table 1. It is anticipated that the wastewater infrastructure for the Project will need to convey wastewater flows generated from future phases of the Lakin community and other offsite developments located east of the Project and north of the Buckeye Canal. The projected wastewater flows for the Project and offsite areas are summarized by parcel in Table 2 below. Table B.1 in Appendix B provides more detailed flow calculations for the Project.

TABLE 2
TOTAL WASTEWATER FLOW SUMMARY

Parcel	Average Daily Flow		Peak Flow		Peak Capacity[1]	
	gpd	gpm	gpd	gpm	gpd	gpm
PHASE 1 - ONSITE						
2	85,330	59.3	246,602	171.3	246,602	171.3
PHASE 1 - OFFSITE						
1	11,522	8.0	33,299	23.1	33,299	23.1
3	22,816	15.8	65,938	45.8	184,000	127.8
OTHER OFFSITE CONTRIBUTING PARCELS						
7	8,261	5.7	23,875	16.6	23,875	16.6
8	71,633	49.7	207,020	143.8	207,020	143.8
Other	188,901	131.2	545,925	379.1	904,677	628.2
TOTAL	**388,464**	**269.8**	**1,122,660**	**779.6**	**1,599,474**	**1,110.7**

Notes:
1. Peak capacity calculations are for 8-inch to 12-inch sewer mains only. Only residential parcels utilize peak capacity calculations. Other land uses including commercial and industrial remain peaked at 2.89 x Average Daily Flow.

3.0 EXISTING SEWER SYSTEM

3.1 Existing Wastewater System Infrastructure

The existing wastewater collection system is located within the Goodyear Water Reclamation Facility (WRF) sewer basin as identified in Figure 4.1 of the City of Goodyear *2016 Integrated Water Master Plan* (Carollo 2016). Existing wastewater infrastructure immediately adjacent to the Project consists of 8-inch and 12-inch gravity sewer mains located north of, and parallel to, the UPRR. These sewer mains collect wastewater flows from the nearby Rubbermaid manufacturing facility located north of the Project and flow east to the existing Rubbermaid Lift Station located north of MC-85 and east of Cotton Lane. The lift station lifts the wastewater flows into a shallower existing 12-inch gravity sewer main, which continues east. Flows are eventually treated at the Goodyear WRF. In preliminary discussions with the City, the

Rubbermaid Lift Station is currently at capacity of its design flow of 220 gpm per Table 4.1 of the City of Goodyear *2016 Integrated Water Master Plan* (Carollo 2016).

In addition to the sewer mains and lift station, there is also an existing 54-inch sewer main located along Elwood Street, north of the Project. This 54-inch sewer main flows east along Elwood Street then south along the 159th Avenue alignment and outfalls to the Goodyear WRF. The existing wastewater collection system near the Project is shown in Figure 2 in Appendix A. Proposed sewer mains and infrastructure anticipated to serve the Project and connect to the City's existing system are discussed in Section 4.2 of this report.

3.2 Wastewater Treatment

As mentioned previously, the Project is located within the Goodyear WRF sewer basin. As such, wastewater flows generated by the Project will be conveyed to the Goodyear WRF located along 157th Avenue just north of the Buckeye Irrigation District Canal. Per the City's *2016 Integrated Water Master Plan* (Carollo 2016), the Goodyear WRF has a current treatment capacity of 4.0 MGD; however, the City is in the process of expanding the treatment capacity to 6.0 MGD.

4.0 SYSTEM IMPROVEMENTS

4.1 City of Goodyear Design Criteria

The wastewater collection system design criteria is presented in Table 3 below and is based on the design criteria provided in the City of Goodyear *2016 Integrated Water Master Plan* (Carollo 2016) and Chapter 6 of the City of Goodyear *Engineering Design Standards and Policies Manual* (Goodyear 2017).

TABLE 3 WASTEWATER SYSTEM DESIGN CRITERIA[1]			
Category		Value	Unit
System Layout			
	Minimum Sewer Depth of Cover – Private	4.0	ft
	Minimum Sewer Depth of Cover – Public	6.0	ft
	Minimum Pipe Diameter	8	inches
	Maximum Manhole Spacing (dia. 8"-15")	400	ft
	Maximum Manhole Spacing (dia. 18" & larger)	500	ft
	Manhole Invert Drop (30-60° direction change)	0.1'	Drop across manhole
	Manhole Invert Drop (> 60° direction change)	0.2'	Drop across manhole
System Performance			
	Manning's Roughness Coefficient (n)	0.013	
	Minimum Full-Flow Velocity – 8" & 10" sewers	2.0	fps
	Minimum Full-Flow Velocity – 12" sewers & larger	2.5	fps
	Maximum Velocity	9.0	fps
	Sewer Capacity Ratio (d/D, max at peak flow)	0.65	
	Peak Capacity – 8" to 12" sewers (not less than)	1,000	gpd/DU (flowing full)
	Force Main Velocity Requirements	4-6	fps
Minimum Pipe Slopes			
	8-inch	0.0033	ft/ft
	10-inch	0.0025	ft/ft
	12-inch	0.0031	ft/ft
	15-inch	0.0023	ft/ft
	18-inch	0.0018	ft/ft

Notes:
1) Design criteria based on the City of Goodyear *2016 Integrated Water Master Plan* (Carollo 2016) and the City of Goodyear *Engineering Design Standards and Policies Manual* (Goodyear 2017).

4.2 Proposed Wastewater System Improvements

The proposed wastewater system for the Project is shown in Figure 2 in Appendix A. The sewer system is comprised of 8-inch to 18-inch gravity sewer mains that generally flow west to the proposed regional Lakin lift station located near the southeast corner of Building A in Parcel 2. From there, a proposed force main will convey wastewater flows to the existing 54-inch sewer main along Elwood Street. Final alignment and sizing of the force main will be determined during final design as the Project develops. It is anticipated that this lift station will be owned and operated by the City of Goodyear and will be designed in accordance with all applicable City and state design criteria. The lift station and force main are currently in design under separate cover.

The system layout is designed using parcel boundaries, proposed and potential residential and collector roadway alignments, existing ground elevation data from an aerial topo, recent survey data, proposed preliminary grade elevations for Parcel 2, and City of Goodyear quarter section maps that identified existing sewer

infrastructure adjacent to the Project area. The system layout is optimized to minimize sewer depths where possible and to facilitate the future development of the overall Lakin community upstream of the Project and east of Cotton Lane. More information about the proposed lift station capacity, preliminary force main sizing, and the overall sewer service area to be served by the Lakin lift station can be found in the *Master Wastewater Report for CP Lakin Park* (HILGARTWILSON 2020).

5.0 SEWER MODEL/CALCULATIONS

5.1 Design Methodology

The proposed wastewater collection system was modeled using Bentley SewerCAD V8i by Bentley Systems, Inc. The wastewater flows shown in Table B.1 in Appendix B were distributed to individual manholes throughout the collection system to provide an appropriate distribution of average daily flow and peak flow within the system. The wastewater loading for a given parcel and/or dwelling unit is generally applied to the next upstream manhole to account for flows that enter the system at multiple points within a pipe segment, thus ensuring the entire pipe segment has sufficient capacity to convey the anticipated flow.

The proposed wastewater collection system shown in Figure 2 in Appendix A was designed to meet the design criteria as specified in Table 4, discussed in Section 4.2, and represents the wastewater collection system's backbone trunk mains. Final sewer line alignments and inverts within individual parcels upstream of the Project will be determined at the time of each parcel's design.

The hydraulic model of the proposed wastewater collection system was optimized using existing topography, preliminary grade elevations, and the proposed land use plan to determine the best sewer alignments while minimizing pipe depths. Pipes were assumed to have a Manning's n value of 0.013 and were designed to have a peak capacity of not less than 1,000 gpd/DU for 8-inch to 12-inch sewer lines (for residential parcels only). For sewer lines larger than 12-inches, the normal depth of flow within the pipe shall not exceed 65 percent of the pipe diameter during peak flow conditions.

5.2 Hydraulic Model Results

Detailed hydraulic model results for the proposed wastewater collection system are included in Appendix C. The hydraulic model results show that the proposed wastewater collection system for the Project will adequately convey the projected peak onsite and offsite flows through the parcels and to the outfall location of the proposed Lakin lift station located in the southeast corner of Parcel 2 near Building A.

In accordance with the City's current design criteria, the sewer mains between 8 and 18 inches in diameter are anticipated to be either DIP, PVC, or VCP, as approved by the City of Goodyear. Final invert and rim elevations will be determined at the time of final design. Pipe slopes shall also be refined during final design, as final grades are known, to increase and optimize pipe velocities where possible.

5.3 Wastewater Collection System Phasing

It is anticipated that the wastewater system infrastructure will be constructed in one phase as required to serve the Project and all offsite flows. Sewer mains will also be set at sufficient depths to facilitate the future phases of the Lakin community and other offsite areas as described in the *Master Wastewater Report for CP Lakin Park* (HILGARTWILSON 2020).

6.0 CONCLUSIONS

The proposed wastewater collection system will adequately serve the Project. This Preliminary Wastewater Report has determined that:

- The projected average daily flow, peak flow, and peak capacity generated by the Project and offsite area is approximately 388,464 gpd (269.8 gpm), 1,122,660 gpd (779.6 gpm), and 1,599,474 gpd (1,110.7 gpm), respectively.
- The proposed onsite wastewater collection system consists of 8-inch gravity mains. The lift station site, being designed under separate cover, will include 8-inch, 12-inch, and 18-inch gravity mains. All sewer mains are designed to meet the criteria outlined in Table 4 of this report.
- Due to the existing topography, the Project and future offsite developments will require a lift station located near the southeast corner of the Project. This lift station is anticipated to be public and will be owned and operated by the City of Goodyear. More information about the proposed lift station capacity, preliminary force main sizing, and the overall sewer service area to be served by the Lakin lift station can be found in the *Master Wastewater Report for CP Lakin Park* (HILGARTWILSON 2020).
- The hydraulic model results in Appendix C show that the onsite sewer mains have sufficient capacity to convey the anticipated wastewater flows from the Project.
- The Project is anticipated to be developed in one phase.

7.0 REFERENCES

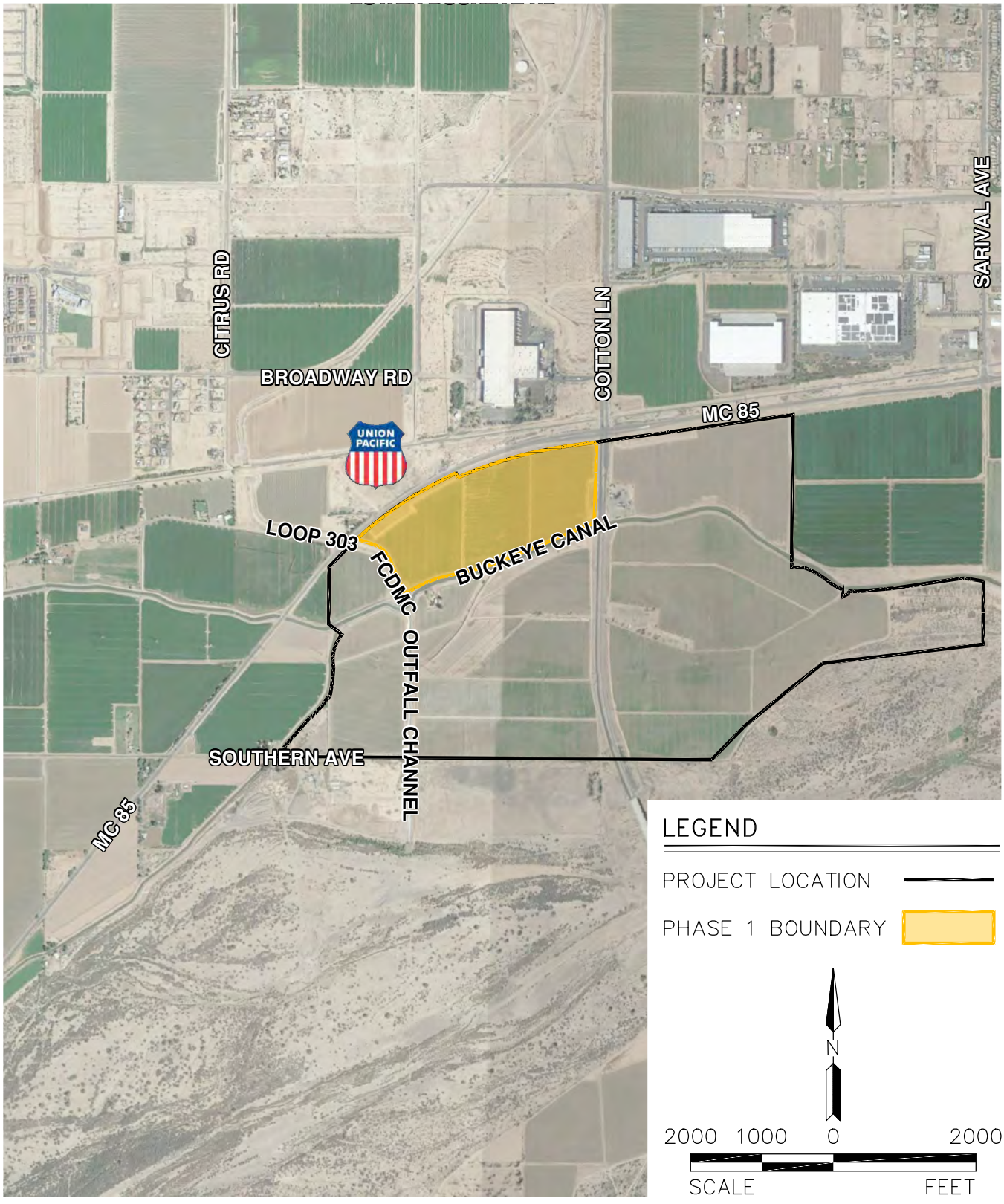
Carollo Engineers (2016). *City of Goodyear 2016 Integrated Water Master Plan*. November 2016, Goodyear, AZ.

City of Goodyear (2017). *City of Goodyear Engineering Design Standards and Policies Manual*. September 2017, Goodyear, AZ.

Black & Veatch (2008). *City of Goodyear 2007 Integrated Water Master Plan*. June 2008, Goodyear, AZ.

HILGARTWILSON, LLC (2019). *Master Wastewater Report for Lakin*. February 2019, Phoenix, AZ.

APPENDIX A
FIGURES



PROJ.NO.:	1981
DATE:	MAY 2020
SCALE:	1" = 2,000'
DRAWN BY:	SL
CHECKED BY:	AT

LAKIN PROPERTY

CITY OF GOODYEAR, ARIZONA

FIG 1: VICINITY MAP

HILGARTWILSON
2141 E. HIGHLAND AVE., STE. 250
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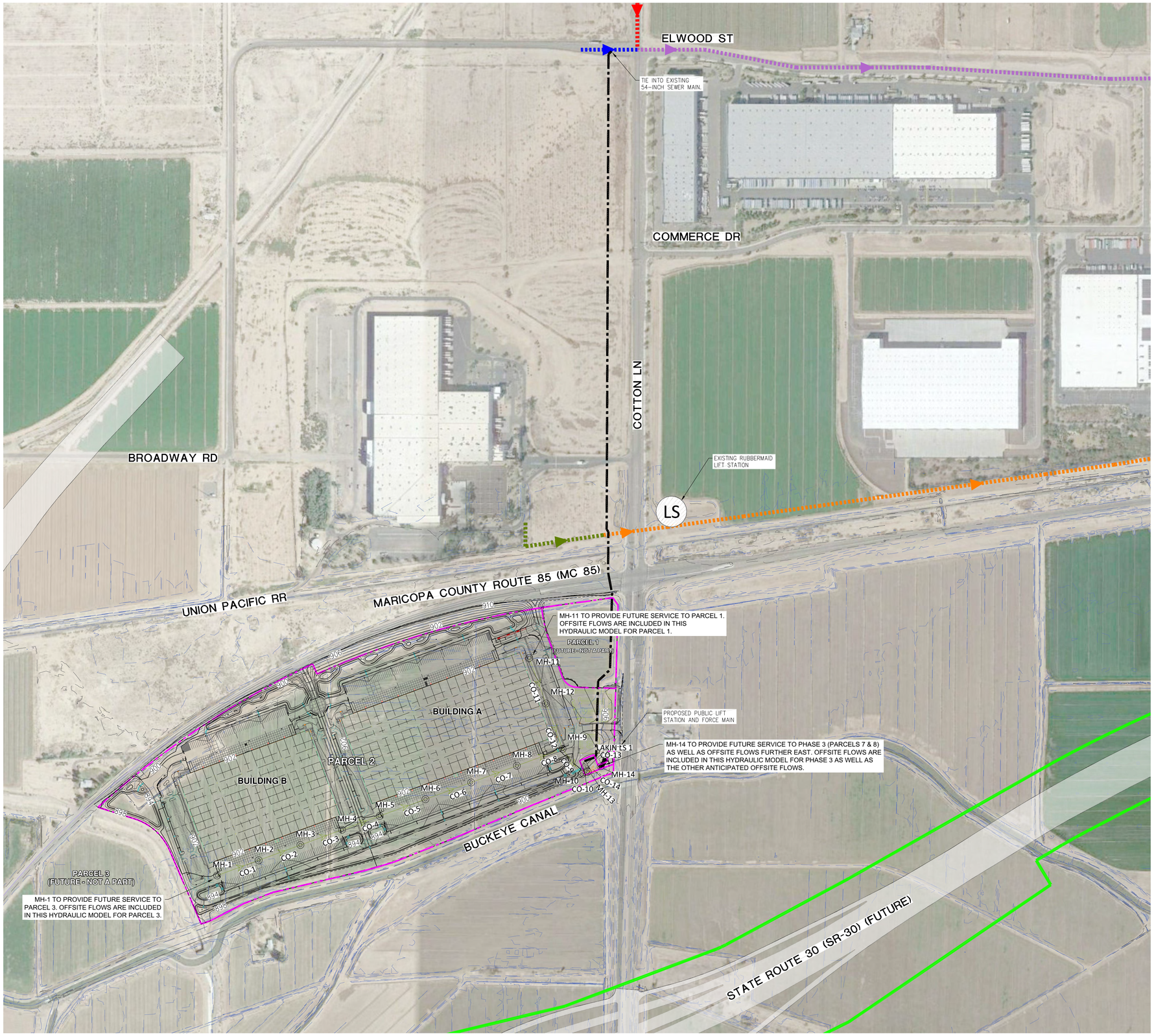

LEGEND

- PROPERTY BOUNDARY
- PROPOSED SEWER MAIN
- EXISTING SEWER MAIN
- PROPOSED FORCE MAIN
- SEWER MANHOLE
- SEWER OUTFALL
- EXISTING LIFT STATION (LS)
- FEMA FLOODWAY

SEWER PIPE SIZES

- 8-INCH
- 10-INCH
- 12-INCH
- 15-INCH
- 18-INCH
- 30-INCH
- 54-INCH

NOTES:

1. ENTIRE PROJECT IS LOCATED WITHIN THE GOODYEAR WRF SEWER BASIN.
2. SEWER MAIN AND FORCE MAIN ALIGNMENTS SHOWN ARE PRELIMINARY AND WILL BE REFINED DURING FINAL DESIGN.

NOT FOR CONSTRUCTION
MAY 2020

N

300 150 0 300 600
SCALE: 1" = 300 FEET

REV.:

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LAKIN - PHASE 1

COTTON LANE & MARICOPA COUNTY ROUTE 85 (MC-85)
GOODYEAR, ARIZONA

FIG 2: WASTEWATER SYSTEM IMPROVEMENTS

HILGARTWILSON
PROJ NO.: 1981.02
DATE: MAY 2020
SCALE: 1"=300'
DRAWN: MAJ
DESIGNED: MAJ
APPROVED: ZS
DWG. NO.
SHT. OF

APPENDIX B
TABLES

Table B.1 - Wastewater Flow Calculations

LAKIN - Phase 1

Goodyear, Arizona

May, 2020

HILGARTWILSON
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Phase	Parcel	Land Use[2]	Area (ac)	Dwelling Units	Density (DU/ac)	Average Daily Flow (gpd)	Average Daily Flow (gpm)	Peak Flow (gpd)	Peak Flow (gpm)	Peak Capacity (gpd)	Peak Capacity (gpm)
PHASE 1 - ONSITE											
1	2	Industrial	78.5	-	-	85,330	59.3	246,602	171.3	246,602	171.3
Phase 1 Onsite Subtotal			***78.5***	***0***	***-***	***85,330***	***59.3***	***246,602***	***171.3***	***246,602***	***171.3***
PHASE 1 - OFFSITE											
1	1	Commercial / Industrial	10.6	-	-	11,522	8.0	33,299	23.1	33,299	23.1
	3	Residential	15.4	184	11.9	22,816	15.8	65,938	45.8	184,000	127.8
Phase 1 Offsite Subtotal			***26.0***	***184***	***-***	***34,338***	***23.8***	***99,237***	***68.9***	***217,299***	***150.9***
Phase 1 Subtotal			***104.5***	***184***	***-***	***119,668***	***83.1***	***345,840***	***240.2***	***463,901***	***322.2***
OFFSITE											
3	7	Commercial / Industrial	7.6	-	-	8,261	5.7	23,875	16.6	23,875	16.6
	8	Industrial	65.9	-	-	71,633	49.7	207,020	143.8	207,020	143.8
Phase 3 Subtotal			***73.5***	***0***	***-***	***79,895***	***55.5***	***230,895***	***160.3***	***230,895***	***160.3***
OTHER OFFSITE[3]	500-84-153	Residential	82.0	328	4.0	42,312	29.4	122,282	84.9	328,000	227.8
	500-84-154	Residential	60.2	241	4.0	31,089	21.6	89,847	62.4	241,000	167.4
	500-84-013A	Residential	0.6	3	4.0	387	0.3	1,118	0.8	3,000	2.1
	500-83-002K	Industrial	104.4	-	-	113,483	78.8	327,965	227.8	327,965	227.8
	500-06-033A	Industrial	1.5	-	-	1,631	1.1	4,712	3.3	4,712	3.3
Other Offsite Subtotal			***248.7***	***572***	***-***	***188,901***	***131.2***	***545,925***	***379.1***	***904,677***	***628.2***
Offsite Subtotal			***322.2***	***572***	***-***	***268,796***	***186.7***	***776,820***	***539.5***	***1,135,573***	***788.6***
GRAND TOTAL			***426.7***	***756***	***-***	***388,464***	***269.8***	***1,122,660***	***779.6***	***1,599,474***	***1,110.7***

Notes:

1. Design criteria based on City of Goodyear's *Engineering Design Standards and Policies Manual - 2017 Edition.*
2. Wastewater flows for flex land use parcels (Parcels 1, 5, 7, and 9) assume the more conservative land use wastewater flow factor of General Industrial.
3. Other offsite parcels are anticipated to include the area generally east of Parcel 8, south of MC-85, north of the Buckeye Canal, and west of the City of Goodyear properties. See the *Master Wastewater Report for CP Lakin Park* (HILGARTWILSON, 2020) for additional information.
4. Peak Capacity calculations only apply to residential parcels. Commerical, Industrial, and all other land uses remain peaked at 2.89 x Average Daily Flow.

Flow Factors:

Residential (2-4 DU/ac):	144	gpd/DU
Residential (4-6 DU/ac):	129	gpd/DU
Residential (10-20 DU/ac):	124	gpd/DU
Community Commercial:	951	gpad
General Industrial:	1,087	gpad

Peaking Factors[4]:

Peak Flow:	2.89	x Average Daily Flow	
Peak Capacity (8 to 12-inch Sewer Lines):	1,000	gpd/DU	*(Not less than when flowing full)*

APPENDIX C
HYDRAULIC MODEL RESULTS

AVERAGE DAILY FLOWS

Label	Diam (in)	Mannin g's n	Length (ft)	Slope (ft/ft)	Start Node	Invert (Start) (ft)	Cover (Start) (ft)	Stop Node	Invert (Stop) (ft)	Cover (Stop) (ft)	Flow (gal/day)	Velocity at Flow (ft/s)	Flow / Capacity (Design) (%)	Capacity (Design) (gal/day)	Depth / Diam (%)	Capacity (Full Flow) (gal/day)
CO-1	8.0	0.013	286.7	0.0040	MH-1	884.00	14.47	MH-2	882.85	15.37	44,148	1.36	11.8	374,157	20.2	494,649
CO-2	8.0	0.013	286.7	0.0040	MH-2	882.85	15.37	MH-3	881.70	16.52	44,148	1.36	11.8	374,157	20.2	494,649
CO-3	8.0	0.013	286.7	0.0038	MH-3	881.70	16.52	MH-4	880.60	17.85	44,148	1.33	12.1	365,933	20.4	483,777
CO-4	8.0	0.013	260.0	0.0040	MH-4	880.60	17.85	MH-5	879.56	18.90	65,481	1.52	17.5	373,614	24.6	493,932
CO-5	8.0	0.013	314.8	0.0040	MH-5	879.56	18.90	MH-6	878.30	19.79	86,813	1.65	23.2	373,726	28.4	494,079
CO-6	8.0	0.013	314.8	0.0040	MH-6	878.30	19.79	MH-7	877.04	21.19	86,813	1.65	23.2	373,726	28.4	494,079
CO-7	8.0	0.013	314.8	0.0040	MH-7	877.04	21.19	MH-8	875.78	22.59	86,813	1.65	23.2	373,726	28.4	494,079
CO-8	8.0	0.013	314.8	0.0040	MH-8	875.78	22.59	MH-9	874.52	24.82	86,813	1.65	23.2	373,726	28.4	494,079
CO-9	8.0	0.013	205.4	0.0040	MH-9	874.32	25.02	MH-10	873.50	27.46	119,668	1.80	32.1	373,239	33.5	493,436
CO-10	8.0	0.013	42.5	0.0040	MH-10	873.30	27.66	MH-13	873.13	28.48	119,668	1.81	32.0	373,831	33.5	494,218
CO-11	8.0	0.013	313.4	0.0040	MH-11	893.94	7.02	MH-12	892.68	8.51	32,855	1.24	8.8	374,582	17.4	495,211
CO-12	8.0	0.013	313.4	0.0579	MH-12	892.68	8.51	MH-9	874.52	24.82	32,855	3.16	2.3	1,422,064	9.2	1,880,022
CO-13	18.0	0.013	44.0	0.0018	MH-13	867.00	33.78	LAKIN LS 1	866.92	33.78	388,463	1.76	17.7	2,188,894	24.7	2,893,799
CO-14	12.0	0.013	90.0	0.0033	MH-14	867.80	34.40	MH-13	867.50	33.78	268,796	2.05	26.7	1,005,564	30.5	1,329,392

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Depth (Structure) (ft)	Flow (Total Out) (gal/day)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
MH-1	899.14	884.00	15.14	44,148	884.13	884.13
MH-2	898.89	882.85	16.04	44,148	882.98	882.98
MH-3	898.89	881.70	17.19	44,148	881.84	881.84
MH-4	899.12	880.60	18.52	65,481	880.76	880.76
MH-5	899.12	879.56	19.56	86,813	879.75	879.75
MH-6	898.75	878.30	20.45	86,813	878.49	878.49
MH-7	898.89	877.04	21.85	86,813	877.23	877.23
MH-8	899.03	875.78	23.25	86,813	875.97	875.97
MH-9	900.01	874.32	25.69	119,668	874.54	874.54
MH-10	901.63	873.30	28.33	119,668	873.52	873.52
MH-11	901.62	893.94	7.68	32,855	894.06	894.06
MH-12	901.85	892.68	9.17	32,855	892.78	892.78
MH-13	902.28	867.00	35.28	388,463	867.36	867.36
MH-14	903.20	867.80	35.40	268,796	868.10	868.10

FlexTable: Outfall Table

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (gal/day)
LAKIN LS 1	902.20	866.92	867.21	388,463

PEAK FLOW
(PEAKING FACTOR = 2.89 x AVERAGE DAILY FLOW)

Label	Diam (in)	Mannin g's n	Length (ft)	Slope (ft/ft)	Start Node	Invert (Start) (ft)	Cover (Start) (ft)	Stop Node	Invert (Stop) (ft)	Cover (Stop) (ft)	Flow (gal/day)	Velocity at Flow (ft/s)	Flow / Capacity (Design) (%)	Capacity (Design) (gal/day)	Depth / Diam (%)	Capacity (Full Flow) (gal/day)
CO-1	8.0	0.013	286.7	0.0040	MH-1	884.00	14.47	MH-2	882.85	15.37	127,589	1.84	34.1	374,157	34.7	494,649
CO-2	8.0	0.013	286.7	0.0040	MH-2	882.85	15.37	MH-3	881.70	16.52	127,589	1.84	34.1	374,157	34.7	494,649
CO-3	8.0	0.013	286.7	0.0038	MH-3	881.70	16.52	MH-4	880.60	17.85	127,589	1.81	34.9	365,933	35.1	483,777
CO-4	8.0	0.013	260.0	0.0040	MH-4	880.60	17.85	MH-5	879.56	18.90	189,239	2.05	50.7	373,614	42.9	493,932
CO-5	8.0	0.013	314.8	0.0040	MH-5	879.56	18.90	MH-6	878.30	19.79	250,890	2.20	67.1	373,726	50.4	494,079
CO-6	8.0	0.013	314.8	0.0040	MH-6	878.30	19.79	MH-7	877.04	21.19	250,890	2.20	67.1	373,726	50.4	494,079
CO-7	8.0	0.013	314.8	0.0040	MH-7	877.04	21.19	MH-8	875.78	22.59	250,890	2.20	67.1	373,726	50.4	494,079
CO-8	8.0	0.013	314.8	0.0040	MH-8	875.78	22.59	MH-9	874.52	24.82	250,890	2.20	67.1	373,726	50.4	494,079
CO-9	8.0	0.013	205.4	0.0040	MH-9	874.32	25.02	MH-10	873.50	27.46	345,840	2.37	92.7	373,239	61.7	493,436
CO-10	8.0	0.013	42.5	0.0040	MH-10	873.30	27.66	MH-13	873.13	28.48	345,840	2.37	92.5	373,831	61.6	494,218
CO-11	8.0	0.013	313.4	0.0040	MH-11	893.94	7.02	MH-12	892.68	8.51	94,950	1.69	25.3	374,582	29.7	495,211
CO-12	8.0	0.013	313.4	0.0579	MH-12	892.68	8.51	MH-9	874.52	24.82	94,950	4.36	6.7	1,422,064	15.3	1,880,022
CO-13	18.0	0.013	44.0	0.0018	MH-13	867.00	33.78	LAKIN LS 1	866.92	33.78	1,122,659	2.37	51.3	2,188,894	43.3	2,893,799
CO-14	12.0	0.013	90.0	0.0033	MH-14	867.80	34.40	MH-13	867.50	33.78	776,820	2.72	77.3	1,005,564	54.9	1,329,392

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Depth (Structure) (ft)	Flow (Total Out) (gal/day)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
MH-1	899.14	884.00	15.14	127,589	884.23	884.23
MH-2	898.89	882.85	16.04	127,589	883.08	883.08
MH-3	898.89	881.70	17.19	127,589	881.93	881.93
MH-4	899.12	880.60	18.52	189,239	880.89	880.89
MH-5	899.12	879.56	19.56	250,890	879.90	879.90
MH-6	898.75	878.30	20.45	250,890	878.64	878.64
MH-7	898.89	877.04	21.85	250,890	877.38	877.38
MH-8	899.03	875.78	23.25	250,890	876.12	876.12
MH-9	900.01	874.32	25.69	345,840	874.73	874.73
MH-10	901.63	873.30	28.33	345,840	873.71	873.71
MH-11	901.62	893.94	7.68	94,950	894.14	894.14
MH-12	901.85	892.68	9.17	94,950	892.86	892.86
MH-13	902.28	867.00	35.28	1,122,659	867.62	867.62
MH-14	903.20	867.80	35.40	776,820	868.35	868.35

FlexTable: Outfall Table

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (gal/day)
LAKIN LS 1	902.20	866.92	867.42	1,122,659

PEAK CAPACITY
(8-INCH TO 12-INCH SEWER MAINS)

Label	Diam (in)	Mannin g's n	Length (ft)	Slope (ft/ft)	Start Node	Invert (Start) (ft)	Cover (Start) (ft)	Stop Node	Invert (Stop) (ft)	Cover (Stop) (ft)	Flow (gal/day)	Velocity at Flow (ft/s)	Flow / Capacity (Design) (%)	Capacity (Design) (gal/day)	Depth / Diam (%)	Capacity (Full Flow) (gal/day)
CO-1	8.0	0.013	286.7	0.0040	MH-1	884.00	14.47	MH-2	882.85	15.37	245,651	2.19	49.7	494,649	49.8	494,649
CO-2	8.0	0.013	286.7	0.0040	MH-2	882.85	15.37	MH-3	881.70	16.52	245,651	2.19	49.7	494,649	49.8	494,649
CO-3	8.0	0.013	286.7	0.0038	MH-3	881.70	16.52	MH-4	880.60	17.85	245,651	2.15	50.8	483,777	50.4	483,777
CO-4	8.0	0.013	260.0	0.0040	MH-4	880.60	17.85	MH-5	879.56	18.90	307,301	2.31	62.2	493,932	57.1	493,932
CO-5	8.0	0.013	314.8	0.0040	MH-5	879.56	18.90	MH-6	878.30	19.79	368,952	2.40	74.7	494,079	64.4	494,079
CO-6	8.0	0.013	314.8	0.0040	MH-6	878.30	19.79	MH-7	877.04	21.19	368,952	2.40	74.7	494,079	64.4	494,079
CO-7	8.0	0.013	314.8	0.0040	MH-7	877.04	21.19	MH-8	875.78	22.59	368,952	2.40	74.7	494,079	64.4	494,079
CO-8	8.0	0.013	314.8	0.0040	MH-8	875.78	22.59	MH-9	874.52	24.82	368,952	2.40	74.7	494,079	64.4	494,079
CO-9	8.0	0.013	205.4	0.0040	MH-9	874.32	25.02	MH-10	873.50	27.46	463,901	2.49	94.0	493,436	77.1	493,436
CO-10	8.0	0.013	42.5	0.0040	MH-10	873.30	27.66	MH-13	873.13	28.48	463,901	2.49	93.9	494,218	76.9	494,218
CO-11	8.0	0.013	313.4	0.0040	MH-11	893.94	7.02	MH-12	892.68	8.51	94,950	1.69	19.2	495,211	29.7	495,211
CO-12	8.0	0.013	313.4	0.0579	MH-12	892.68	8.51	MH-9	874.52	24.82	94,950	4.36	5.1	1,880,022	15.3	1,880,022
CO-14	12.0	0.013	90.0	0.0033	MH-14	867.80	34.40	MH-13	867.50	33.78	1,135,573	2.94	85.4	1,329,392	71.1	1,329,392

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Depth (Structure) (ft)	Flow (Total Out) (gal/day)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
MH-1	899.14	884.00	15.14	245,651	884.33	884.33
MH-2	898.89	882.85	16.04	245,651	883.18	883.18
MH-3	898.89	881.70	17.19	245,651	882.04	882.04
MH-4	899.12	880.60	18.52	307,301	880.98	880.98
MH-5	899.12	879.56	19.56	368,952	879.99	879.99
MH-6	898.75	878.30	20.45	368,952	878.73	878.73
MH-7	898.89	877.04	21.85	368,952	877.47	877.47
MH-8	899.03	875.78	23.25	368,952	876.21	876.21
MH-9	900.01	874.32	25.69	463,901	874.83	874.83
MH-10	901.63	873.30	28.33	463,901	873.80	873.80
MH-11	901.62	893.94	7.68	94,950	894.14	894.14
MH-12	901.85	892.68	9.17	94,950	892.86	892.86
MH-13	902.28	867.00	35.28	1,599,474	867.74	867.74
MH-14	903.20	867.80	35.40	1,135,573	868.50	868.50

FlexTable: Outfall Table

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (gal/day)
LAKIN LS 1	902.20	866.92	867.52	1,599,474