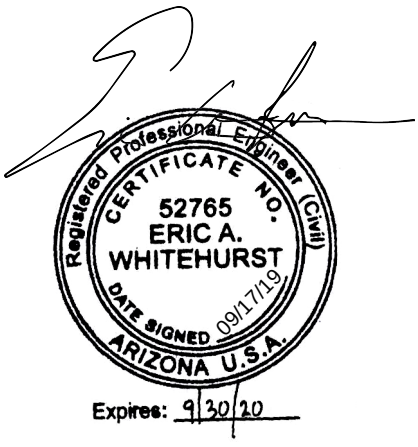
WASTEWATER

BASIS OF DESIGN REPORT

2nd Street & Bishop Lane
Scottsdale, Arizona

Prepared for:

The Morgan Group, Inc.
3001 Brighton Blvd., Suite 445
Denver, CO 80216



Prepared by:

291347001
September 2019

2ND STREET & BISHOP LANE

WASTEWATER BASIS OF DESIGN REPORT

SEPTEMBER 2019

Prepared By:

Kimley»Horn

Contents

Appendices

1.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this Wastewater Basis of Design Report for the proposed luxury apartment development at the southwest corner of 2nd Street and Bishop Lane in Scottsdale, Arizona. This report will demonstrate that the proposed project conforms to the City of Scottsdale design requirements.

2nd Street & Bishop Lane, the "project", encompasses approximately 1.13 ± net acres and contains a 210,857 square foot, eight-story apartment with a 93,372 square foot two-level underground parking garage. The project lies within a portion of the Northeast Quarter of Section 27, Township 2 North, Range 4 East of the Gila and Salt River Baseline and Meridian in Maricopa County, Arizona. More specifically, the project is bounded by East 2nd Street to the north followed by North Bishop Lane to the east followed by Moe Tavassoli Oriental Rugs to the south, and a public alley followed by existing commercial buildings to the west. The site slopes from the northwest to the southeast at approximately 1.0%. See **Appendix A** for the Vicinity Map.

Kimley»Horn

2.0 WASTEWATER COLLECTION SYSTEM

2.1 INTENT AND SCOPE

The intent of this section is to evaluate the proposed and existing sewer infrastructure and wastewater design flows for the development. As a result of this analysis, it will be determined if the proposed and existing sewer infrastructure is capable supporting the proposed development in accordance with the City of Scottsdale Design Standards & Policies Manual (**Reference 1**).

2.2 SEWER INFRASTRUCTURE

There is an existing 6-inch sewer main in the alley west of the site. An 8-inch VCP sewer main also exists in North Bishop Lane to the east of the site.

A proposed 6-inch PVC sewer service with a slope of 1.00% will connect to the existing 8-inch sewer main in North Bishop lane, east of the site. Refer to **Appendix B** for the Preliminary Utility Plan.

2.3 WASTEWATER DESIGN FLOWS

The following calculations are based on information provided in Section 7-1.403 of **Reference 1**:

Table 3: Wastewater Design Flow

Building	Building Area (SF)	# Units	Average Daily Flow[1] (GPD)	Peak Flow[2] (GPD)	Peak Flow (GPM)	Peak Flow[3] w/ Pool Backwash (GPM)
Apartment and Garage	304,229	199	27,860	125,370	87	187

Notes:

1. Wastewater flows are based on 140 gallons per unit per day for high density condominium land use.
2. Design peaking factor for high density condominium is 4.5.
3. 100 GPM maximum design assumption. Backwash pump and pipe sizing will be done by the pool designer under separate permit.

2.4 ANALYSIS

Sanitary sewer lines will be designed to maintain a maximum depth to diameter ratio (d/D) of 0.65 and minimum full flow velocity of 2.5 ft/sec and a maximum full flow velocity of 10.0 ft/sec in the ultimate peak flow condition. To verify the proposed 6-inch sewer on-site has adequate capacity to serve the project, design flows were analyzed with Flow Master using minimum and maximum pipe design slopes. The sewer capacity for a six-inch pipe at the minimum design slope of 1.0% is 252 gpm. Pool backwash shall be connected to the sanitary sewer system and not discharge to the storm drain system. For the purpose of the design we have assumed a pool backwash flow rate of 100 gpm. Actual backwash discharge rate shall not exceed 100 gpm. Backwash pump and pipe sizing will be done by the pool designer under separate permit. Refer to **Appendix C** for the Onsite Sewer Capacity Calculations.

The existing 8-inch sewer main in North Bishop Lane was hydraulically analyzed for capacity to accommodate the proposed development. According to the City's quarter section maps, the

existing line services several adjacent commercial businesses to the east and north of the proposed development. Using the estimated existing building areas and City of Scottsdale DS&PM sewer demand factors, design flows for each building contributing to the 8-inch main are summarized in the table below.

Table 4: Bishop Lane Wastewater Design Flow

Building	APN	Building Area (SF)	Demand (GPD/SF or GPD/Unit)	ADD (GPM)	Peaking Factor	Peak Demand [1] (GPM)	Max Day (GPM)
Restaurant #1	130-12-977	14,580	1.2	12.15	6	72.9	24.3
Restaurant #2	130-13-432	10236.5	1.2	8.53	6	51.2	17.1
Restaurant #3	130-13-432	10236.5	1.2	8.53	6	51.2	17.1
Office #1	130-13-008C	10,341	0.4	2.87	3	8.6	5.7
Commercial/ Retail	130-13-007A	8,699	0.5	3.02	3	9.1	6.0
Proposed Apartments		199 (units)	140	19.35	4.5	187.1	38.7
TOTAL				54.45		380.01	108.90

Notes:

1. 100 GPM maximum design assumption for multifamily pool backwash. Backwash pump and pipe sizing will be done by the pool designer under separate permit.

Refer to **Appendix D** for the Bishop Lane Sewer Exhibit.

To verify the existing 8-inch sewer has adequate capacity to serve the project and adjacent developments, design flows were analyzed with Flow Master using minimum and maximum pipe design slopes. Using survey verified data, the existing 8-inch sewer main in Bishop Lane adjacent to the site has a calculated slope of approx. 1.0%. The sewer capacity for an 8-inch pipe at the minimum design slope of 1.0% is 542 gpm. Considering an estimated peak demand of 380 GPM from Table 4 above, the calculated (d/D) ratio for the 8-inch main is approx. 0.61 which meets the City's criteria of 0.65 max.

Refer to **Appendix E** for the Bishop Lane Sewer Capacity Calculations.

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3.0 CONCLUSION

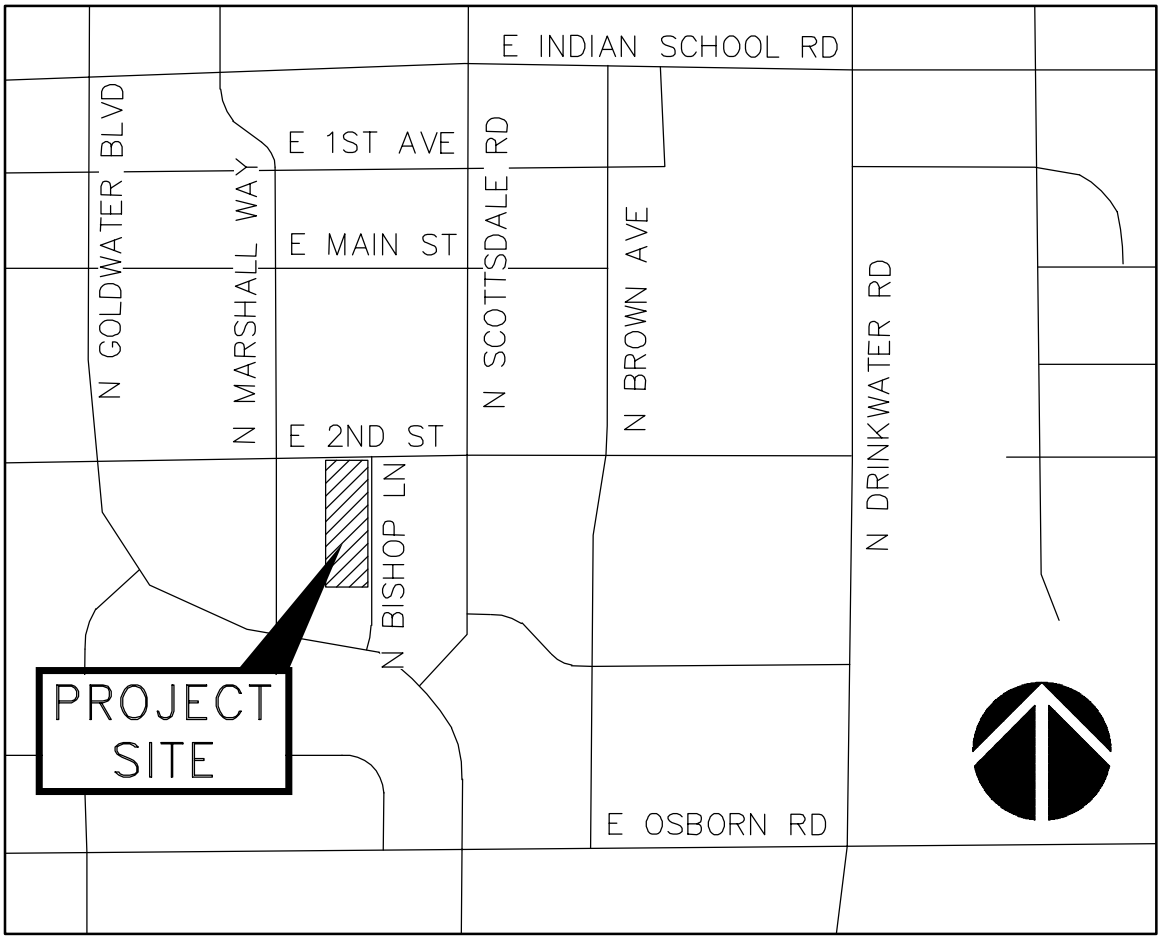
Wastewater

This development proposes to connect the building sewer services to the existing 8-inch sewer main in Bishop Lane. The proposed onsite 6-inch PVC private sanitary sewer service has adequate capacity for the flows generated by the proposed building and its associated uses. The existing 8-inch public sanitary sewer main in Bishop Lane also has capacity available to accommodate the proposed development along with the existing properties it currently serves.

4.0 REFERENCES

1. City of Scottsdale, *Design Standards and Policies Manual*. 2018.

Appendix A – Vicinity Map



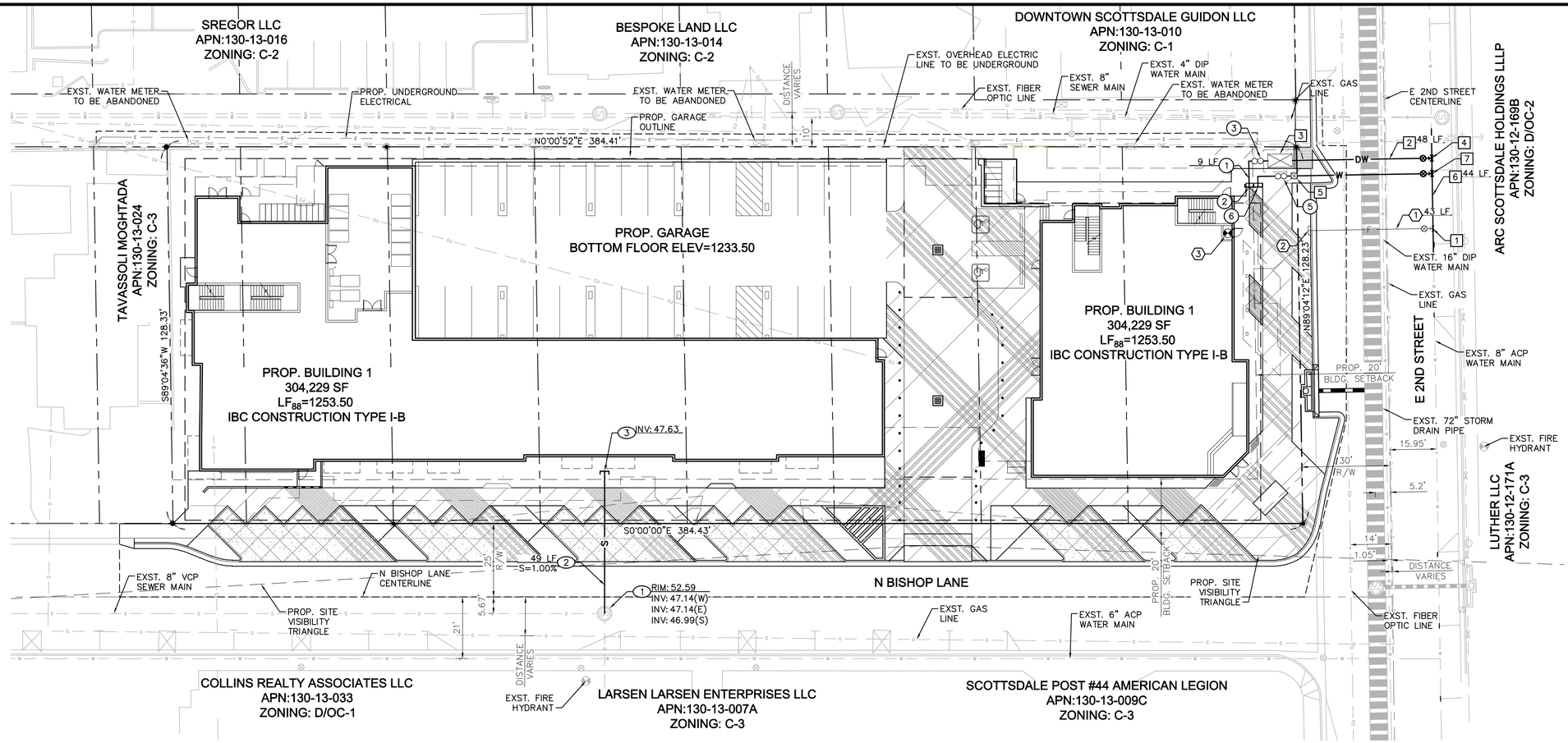
VICINITY MAP

SCOTTSDALE, AZ
N.T.S.

Kimley»Horn

9-ZN-2019
9/23/2019

Appendix B –Utility Plan



DEVELOPER/OWNER
THE MORGAN GROUP
3001 BRIGHTON BLVD, SUITE 445
DENVER, CO 80216
PH: (704) 615-0554
CONTACT: SCOTT MAKEE

CIVIL ENGINEER
KIMLEY-HORN AND ASSOCIATES, INC
7740 N. 16TH STREET, SUITE 300
PHOENIX, ARIZONA 85020
PH: (602) 944-5500
CONTACT: ERIC WHITEHURST, PE

LAND SURVEYOR
SURVEY INNOVATION GROUP, INC
7301 EAST EVANS ROAD
SCOTTSDALE, ARIZONA 85260
PH: (480) 922-0780
CONTACT: JASON SEGNERI, P.L.S.

ARCHITECT
TODD & ASSOCIATES, INC.
4019 N. 44TH STREET
PHOENIX, ARIZONA 85018
PH: (602) 952-8280
CONTACT: RANDALL MARTINEZ

BENCHMARK
FOUND 3" CITY OF SCOTTSDALE BRASS CAP IN HANDHOLE AT THE INTERSECTION OF OSBORN ROAD AND SCOTTSDALE ROAD.

GDACS DATA
NAVD88
ELEVATION = 1246.52'

BASIS OF BEARING
THE CENTERLINE OF 2ND STREET AS IN BOOK 32, PAGE 50, MARICOPA COUNTY RECORDS. SAID LINE BEARS N89°03'00"E.

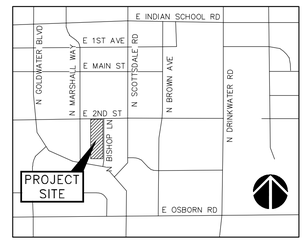
LEGEND
- PROPERTY LINE
- RIGHT OF WAY LINE
- STREET CENTERLINE
- EASEMENT LINE
- EXISTING SEWER MAIN
- EXISTING WATER MAIN
- PROPOSED WATER MAIN
- PROPOSED SEWER MAIN
- PROPOSED STORM DRAIN
- EXSTING STORM DRAIN
- EXISTING SANITARY SEWER MANHOLE
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED SANITARY SEWER CLEANOUT
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- PROPOSED CATCH BASIN

PUBLIC WATER MAIN NOTES
1. INSTALL 8"X8" TEE.
2. INSTALL 3" WATER SERIVCE LINE TYPE K SOFT COPPER PER MAG SPEC. 754.1, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER COS STD DET 2201.
3. INSTALL WATER SERVICE LINE CONNECTION WITH 3" DOMESTIC WATER METER AND VAULT PER COS STD DET 2345-1, METER BOX PER MAG STD DET 320. METER TO BE INSTALLED BY CITY FORCES.
4. INSTALL 8"X3" TAPPING SLEEVE AND VALVE FOR DOMESTIC SERVICE.
5. INSTALL IRRIGATION WATER METER PER COS STD DET 2653, METER BOX PER MAG STD DET 320. METER TO BE INSTALLED BY CITY FORCES.
6. REMOVE AND REPLACE EXISTING 8" ACP WATER MAIN WITH 8" CLASS 350 DIP WATER MAIN POLYWRAPPED, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER COS STD DET 2201.
7. INSTALL 8"X2" TAPPING SLEEVE AND VALVE FOR IRRIGATION SERVICE.

PRIVATE DOMESTIC WATER NOTES
1. INSTALL 3" SCH 40 PVC DOMESTIC WATER SERVICE, LENGTH PER PLAN.
2. BUILDING DOMESTIC WATER CONNECTION, REF MEP PLANS FOR CONTINUATION.
3. INSTALL 3" DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY PER COS STD DET 2351.
5. IRRIGATION WATER DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY PER COS STD DET 2352. REF IRRIGATION PLANS FOR CONTINUATION.
6. IRRIGATION WATER CONNECTION, REF IRRIGATION PLANS FOR CONTINUATION.

PRIVATE FIRELINE NOTES
1. INSTALL 8" CLASS 350 DIP WATER MAIN POLYWRAPPED WITH TRACER WIRE, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER COS STD DET 2201.
2. BUILDING FIRELINE CONNECTION. INSTALL FIRELINE RISER AND BACKFLOW PREVENTOR PER COS STD DET 2369 IN FIRE RISER ROOM. REF FIRE SPRINKLER PLANS FOR CONTINUATION.
3. BUILDING FIRE RISER ROOM WITH INTERNAL BACKFLOW PREVENTOR.

PRIVATE SEWER NOTES
1. CONNECT TO EXISTING SANITARY SEWER MANHOLE, RIM AND INVERT PER PLAN.
2. INSTALL 6" SDR 35 PVC SEWER SERVICE, LENGTH AND SLOPE PER PLAN. BEDDING AND BACKFILL PER COS STD DET 2201.
3. CONNECT TO BUILDING SEWER AT TWO-WAY CLEANOUT, INVERT PER PLAN. REF MEP PLANS FOR CONTINUATION.



VICINITY MAP
PHOENIX, AZ
N.T.S.

GRAPHIC SCALE IN FEET
0 10 20 40

NOTES:
1. ADD 1200' TO ALL ELEVATIONS.
2. ALL ELEVATIONS ARE INVERT ELEVATIONS, UNLESS OTHERWISE NOTED.

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA811
Call 811 or click Arizona811.com

Kimley»Horn

7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

MORGAN

PRELIMINARY UTILITY PLAN
SWC N BISHOP LANE AND E 2ND STREET
SCOTTSDALE, ARIZONA

PROJECT No.	291347001
SCALE (H):	1"=20'
SCALE (V):	NONE
DRAWN BY:	CHS
DESIGN BY:	CHS
CHECK BY:	EAW
DATE:	09/17/19

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
ENGINEER E. WHITEHURST
PE NO. 52765 DATE 09/19

347001Pre-UT.dwg

UT1
1 OF 1 SHEETS

Q.S.: 16-44 COS PROJECT #: 890-PA-2018

REV	DESCRIPTION	BY	DATE	APPR

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XREFS: x347001b x347001lr x347001m x347001rm x347001rd x347001rd_t x347001ls

9-ZN-2019
9/23/2019

Appendix C – Onsite Sewer Capacity Calculations

Worksheet for 6" Service (min design slope)

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Normal Depth	6.0 in
Diameter	6.0 in

Results	
Discharge	251.83 gal/min
Flow Area	0.2 ft²
Wetted Perimeter	1.6 ft
Hydraulic Radius	1.5 in
Top Width	0.00 ft
Critical Depth	4.6 in
Percent Full	100.0 %
Critical Slope	0.012 ft/ft
Velocity	2.86 ft/s
Velocity Head	0.13 ft
Specific Energy	0.63 ft
Froude Number	(N/A)
Maximum Discharge	270.89 gal/min
Discharge Full	251.83 gal/min
Slope Full	0.010 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	64.2 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.0 in
Critical Depth	4.6 in
Channel Slope	0.010 ft/ft
Critical Slope	0.012 ft/ft

Worksheet for 6" Service (max design slope)

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

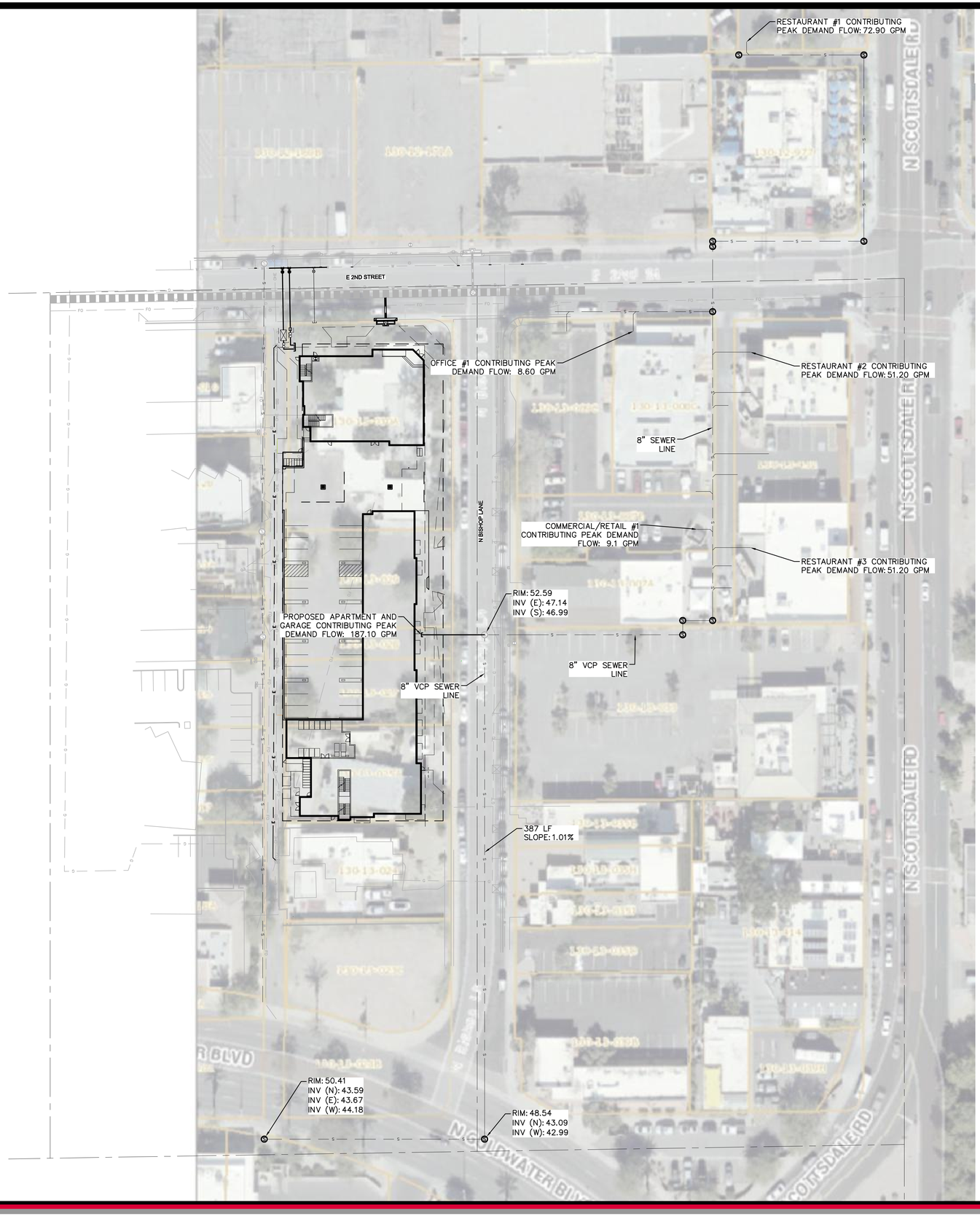
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.080 ft/ft
Normal Depth	6.0 in
Diameter	6.0 in

Results	
Discharge	712.28 gal/min
Flow Area	0.2 ft²
Wetted Perimeter	1.6 ft
Hydraulic Radius	1.5 in
Top Width	0.00 ft
Critical Depth	5.9 in
Percent Full	100.0 %
Critical Slope	0.074 ft/ft
Velocity	8.08 ft/s
Velocity Head	1.02 ft
Specific Energy	1.52 ft
Froude Number	(N/A)
Maximum Discharge	766.20 gal/min
Discharge Full	712.28 gal/min
Slope Full	0.080 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.0 in
Critical Depth	5.9 in
Channel Slope	0.080 ft/ft
Critical Slope	0.074 ft/ft

Appendix D – Bishop Lane Sewer Exhibit



LEGEND

- F — PROPOSED PRIVATE FIRE LINE
- DW — PROPOSED DOMESTIC WATER LINE
- S — PROPOSED SANITARY SEWER MAIN
- S — EXISTING SANITARY SEWER MAIN
- G — EXISTING GAS LINE
- PROPOSED STORM DRAIN PIPES
- PROPOSED VAULTED WATER METER
- PROPOSED BACKFLOW PREVENTER
- EXISTING SANITARY SEWER MANHOLE
- EXISTING FIRE HYDRANT

FOR REFERENCE ONLY.
NOT FOR CONSTRUCTION OR PERMITTING.

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

SEWER CAPACITY EXHIBIT

Kimley»Horn

K:\PHX_Civil\291347001- 2nd St & Bishop\CADD\Exhibits\2019-08-20 - Sewer Exhibit.dwg Sep 17, 2019 Connor.Sperry

9-ZN-2019
9/23/2019

Appendix E – Bishop Lane Sewer Capacity Calculations

Kimley»Horn

Description:
One new 6" on-site PVC private sewer service is proposed to connect to an existing 8" sewer main in Bishop Lane. This sewer main ultimately discharges to the city of Scottsdale sewer main in North Goldwater Boulevard. Sewer demand calculations are based on number of units, existing parcel square footage, and the peaking factors as outlined in the city of Scottsdale DS&PM. See Appendix F (Sewer Exhibit) for building locations.

Design Sewage Flow Calculations

Fc= (CF*P)*PF

Fc = Sewage Design Flow
CF = Sewage Demand Rate per DS&PM
P = Demand Criteria
PF=Peaking Factor

Building	*Use*	*Sewage Demand* *SF or Unit*	*Demand Criteria* *GDP/SF or GPD/Unit*	*Peaking Factor*	*Sewage Peak Design Flow [GPD]*
Proposed Apartment & Garage	High Density Condomenium	199	140	4.5	125370
Restaurant #1	Restaurant	14580	1.2	6	104976
Restaurant #2	Restaurant	10236.5	1.2	6	73702.8
Restaurant #3	Restaurant	10236.5	1.2	6	73702.8
Office #1	Office	10341	0.4	3	12409.2
Commercial/Retail #1	Commercial/Retail	8699	0.5	3	13048.5
Total					**403,209**

Fc = 403,209 GPD
Fc = 380.01 GPM

Capacity Calculation:

Diameter =	**8**	in
Cross-Section Area =	**0.35**	ft^2
Min Design Slope =	**0.0050**	ft/ft
Max Design Slope =	**0.0050**	ft/ft
Manning's "n" =	**0.013**	
Min Full Flow Velocity =	**2.5**	> 2 ft/s
Max Full Flow Velocity =	**2.5**	< 10 ft/s
Full Flow Capacity* =	**542**	gpm > Fw

Meet Criteria?
YES
YES
YES

*Peak Demand Flow includes 100 GPM maximum design assumption for a proposed pool backwash. Backwash pump and pipe sizing will be done by the pool designer under separate permit

Worksheet for 8" VCP Sewer Main (Bishop Ln)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	8.0 in
Discharge	380.00 gpm

Results	
Normal Depth	4.9 in
Flow Area	0.2 ft²
Wetted Perimeter	1.2 ft
Hydraulic Radius	2.3 in
Top Width	0.65 ft
Critical Depth	5.2 in
Percent Full	61.7 %
Critical Slope	0.008 ft/ft
Velocity	3.75 ft/s
Velocity Head	0.22 ft
Specific Energy	0.63 ft
Froude Number	1.118
Maximum Discharge	583.40 gpm
Discharge Full	542.34 gpm
Slope Full	0.005 ft/ft
Flow Type	Supercritical

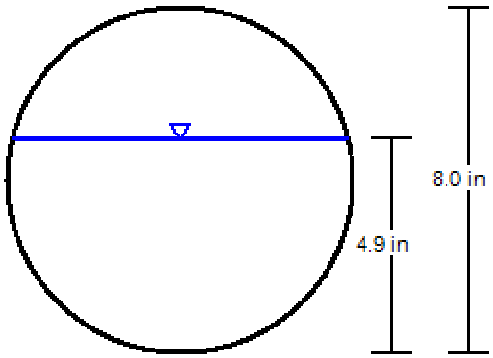
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	61.7 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.9 in
Critical Depth	5.2 in
Channel Slope	0.010 ft/ft
Critical Slope	0.008 ft/ft

Cross Section for 8" VCP Sewer Main (Bishop Ln)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Normal Depth	4.9 in
Diameter	8.0 in
Discharge	380.00 gpm



V: 1
H: 1