CITY OF SCOTTSDALE

Drainage Reports

Abbreviated Water and Sewer Needs

Water Study

Wastewater Study

Stormwater Waiver Application

WASTEWATER COLLECTION SYSTEM
BASIS OF DESIGN REPORT
FOR
HONOR HEALTH
MEDICAL OFFICE BUIILDING

April 17, 2019
WP# 194976

Prepared For:

Devenney Group Ltd., Architects
Mr. Dudley Campbell
201 West Indian School Road
Suite 102
Phoenix, Arizona 85013
Phone: (602) 943-7645

Submitted To:

City of Scottsdale
Mr. Levi Dillion, P.E.
Water Resources Administration
9379 East San Salvador Drive
Scottsdale, Arizona 85258
Phone: (480)-312-5319

Prepared By:

Wood, Patel & Associates, Inc.
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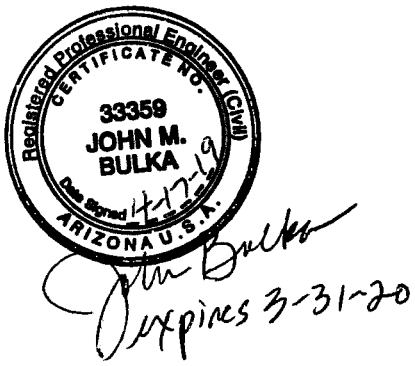

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April 17, 2019

Mr. Levi Dillion, P.E.
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

Phone: (480)-312-5319
Email: ldillion@scottsdaleaz.gov

Re: **Honor Health Medical Office Building**
Wastewater Collection System, Basis of Design Report
Scottsdale, Arizona
WP# 194976

Dear Mr. Dillion:

The proposed Honor Health Medical Office Building development is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian. Refer to the attached *Vicinity Map* for the project location. The proposed 4-story office building will be 92,000 square feet (sf), with an option to add a 25,000-sf fifth floor. The proposed building is located at southeast corner of the site, with proposed parking lots on the north and west sides of the proposed building. At-grade parking will also be located under the south side of the building. The development will include associated hardscape and landscaping.

Wastewater flowing from the proposed Honor Health Medical Office Building will discharge to a 6-inch private sewer line on the west side of the proposed building. The 6-inch private sewer line discharges into the City of Scottsdale's existing public 8-inch VCP sewer line in Brown Avenue.

The design criteria used to estimate wastewater flows and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the requirements listed in the City of Scottsdale's *Design Standards and Policies Manual,* 2018. The following is a summary of the primary design criteria utilized:

• Average Day Wastewater flows, Office:	0.4 gpd/sq. ft.
• Peaking Factor, Office:	3
• Minimum Mean Full Flow Velocity:	2.50 fps
• Minimum Peak Full Flow Velocity:	10.0 fps
• Minimum Peak Flow d/D Ratio (12" dia. Or less sewers):	d/D = 0.65

Abbreviations: gpd = gallons per day; fps = feet per second

Based on the above design criteria, the projected average day flow for the proposed 117,000-sf Honor Health Medical Office Building project is approximately 44,800 gallons per day (gpd), or 33 gallons per minute (gpm). The peak flow is projected to be 140,400 gpd. The proposed sewer slopes, projected flow velocities, and pipe flow capacities are summarized on the attached spreadsheets.

It is assumed the infiltration and inflow from wet weather has been accounted for in the published design flow rates for the development and the maximum d/D. Therefore, those flows have not been added into the calculations. The proposed sanitary sewer collection system is designed to have adequate capacity to serve the proposed development.

Thank you for your review of the Wastewater Collection System Basis of Design Report provided for the Honor Health Medical Office Building development. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc.

John M. Bulka, P.E.
Project Manager

JMB/km

Y:\WP\Reports\Commercial\194976 Honor Health Medical Office Building Wastewater Basis of Design Report.docx

WASTEWATER DESIGN FLOWS & FLOWMASTER RESULTS

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TABLE 1 - WASTEWATER DESIGN FLOWS

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Manager: John Bulka, P.E.
Date: 4/17/2019

UPSTREAM NODE	DOWNSTREAM NODE	APPLICABLE UNIT	NUMBER OF UNITS	ADF/ APPLICABLE UNIT (GPD)[1]	TOTAL ADF (GPD)	PEAKING FACTOR[2]	PEAK FLOW (GPD)	TOTAL ADF (GPM)	PEAK FLOW (GPM)
Building Connection 1	Privite Sewer Connection	SF	117,000	0.4	46,800	3.00	140,400	33	98
Total					**46,800**		**140,400**	**33**	**98**

1. Average Daily Flow Demand based upon office building square footage per City of Scottsdale Design Standards and Policies Manual (2018)
2. Peaking Factor per City of Scottsdale Design Standards and Policies Manual (2018)

Proposed 6" Sewer Line (2.0%)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02000	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

Results

Normal Depth	1.87	in
Flow Area	0.05	ft²
Wetted Perimeter	0.59	ft
Hydraulic Radius	1.06	in
Top Width	0.46	ft
Critical Depth	0.23	ft
Percent Full	31.2	%
Critical Slope	0.00445	ft/ft
Velocity	4.16	ft/s
Velocity Head	0.27	ft
Specific Energy	0.42	ft
Froude Number	2.18	
Maximum Discharge	1.11	ft³/s
Discharge Full	1.03	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	31.19	%
Downstream Velocity	Infinity	ft/s

Proposed 6" Sewer Line (2.0%)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.87	in
Critical Depth	0.23	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.00445	ft/ft

Proposed 6" Sewer Line (2.5%)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02500	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

Results

Normal Depth	1.77	in
Flow Area	0.05	ft²
Wetted Perimeter	0.57	ft
Hydraulic Radius	1.01	in
Top Width	0.46	ft
Critical Depth	0.23	ft
Percent Full	29.4	%
Critical Slope	0.00446	ft/ft
Velocity	4.50	ft/s
Velocity Head	0.31	ft
Specific Energy	0.46	ft
Froude Number	2.44	
Maximum Discharge	1.24	ft³/s
Discharge Full	1.15	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

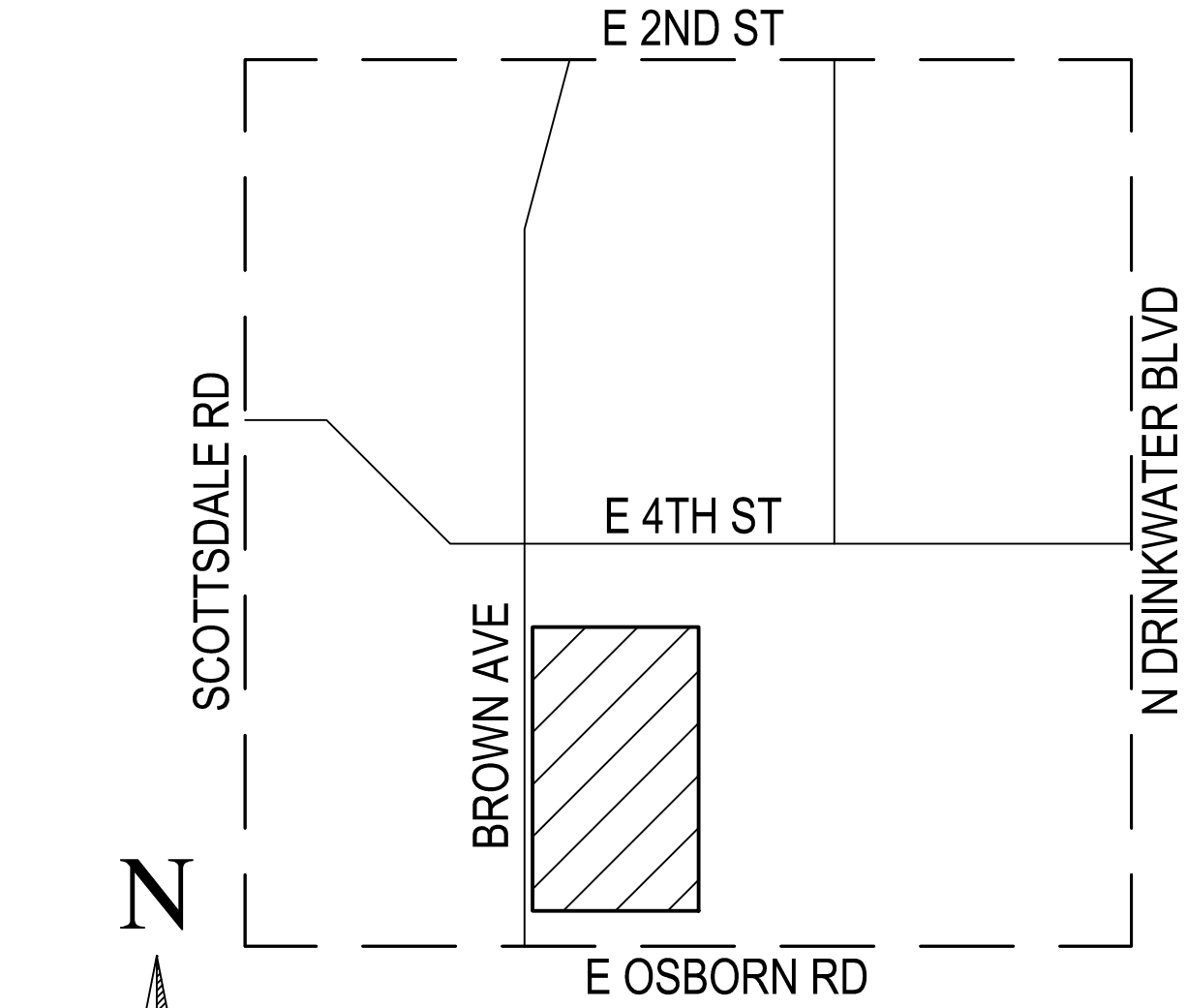
Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	29.45	%
Downstream Velocity	Infinity	ft/s

Proposed 6" Sewer Line (2.5%)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.77	in
Critical Depth	0.23	ft
Channel Slope	0.02500	ft/ft
Critical Slope	0.00446	ft/ft

VICINITY MAP



VICINITY MAP

N.T.S.

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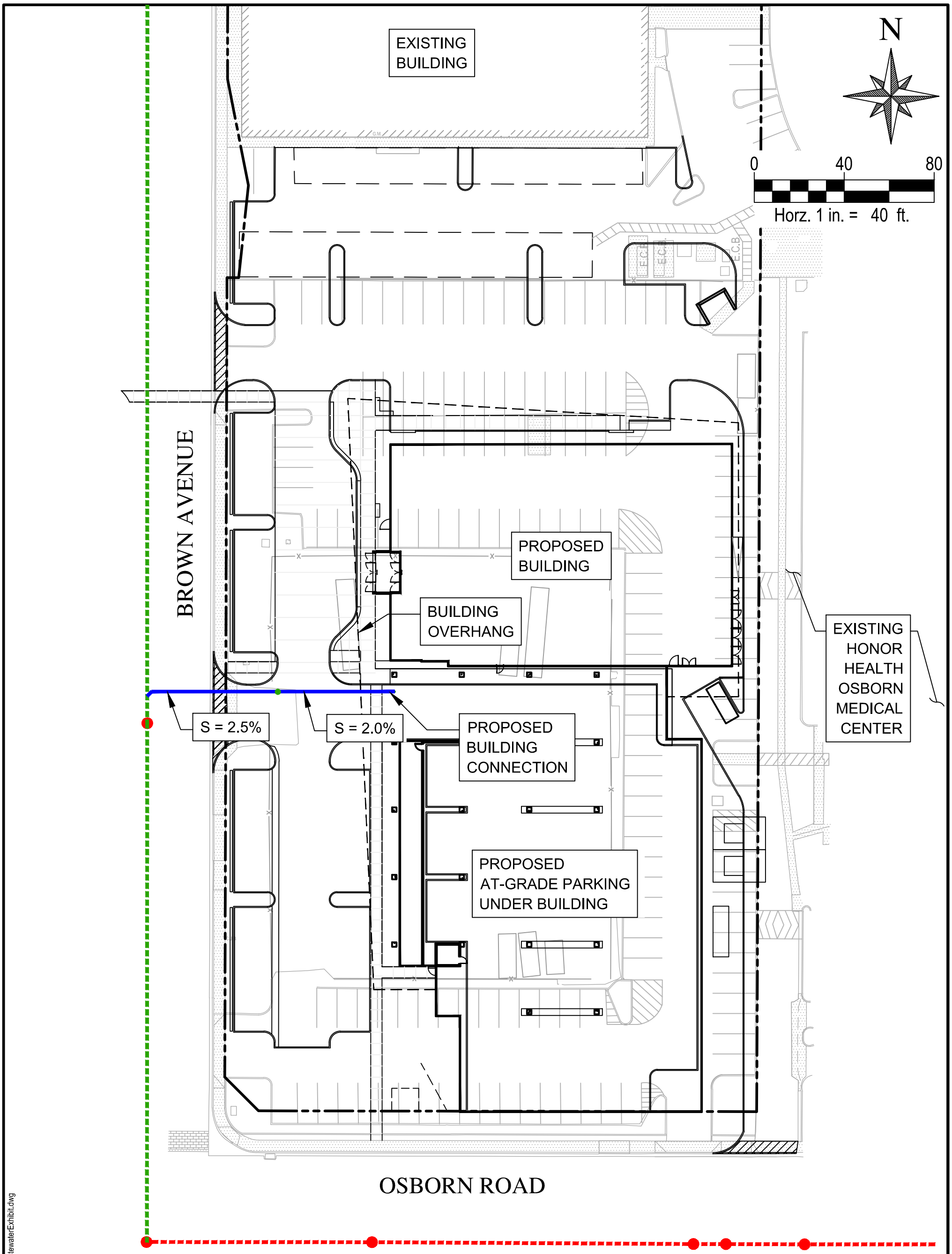
HONOR HEALTH MEDICAL OFFICE BUILDING

VICINITY MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

WASTEWATER EXHIBIT



PIPE DIAMETER	EXISTING	PLANNED
6-INCHES		
8-INCHES		
12-INCHES		
MANHOLE		
CLEANOUT		

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HONOR HEALTH MEDICAL OFFICE BUILDING

Wastewater Exhibit

DATE:	SCALE:	SHEET
04-17-2019	1" = 40'	01 of 01
JOB NO.:	DESIGN: JB	
194976	DRAWN: AF	

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E01

PRODUCT: EIFS
MANUFACTURER: DRYVIT
FINISH: #200 GIBRALTAR TERRANEO

M01

PRODUCT: METAL PANEL
MANUFACTURER: PURE + FREEFORM
FINISH: #MK-019

M02

PRODUCT: METAL PANEL
MANUFACTURER: MORIN
FINISH: BONE WHITE

HONORHEALTH OSBORN
7400 E. OSBORN RD., SCOTTSDALE, AZ 85251
04.19.19

NEUROSCIENCE INSTITUTE

HONORHEALTH

Devenney GROUP

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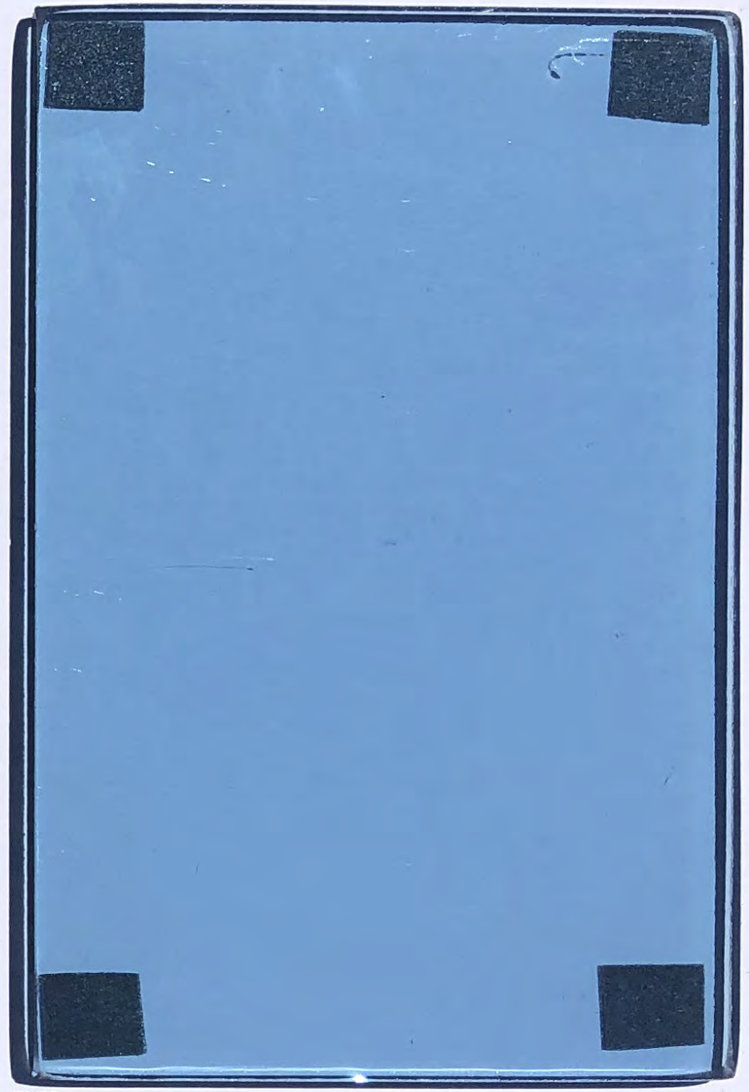
GL01

PRODUCT: GLASS
MANUFACTURER: VIRACON
FINISH: VE3-2M, 1" INSULATING
REFLECTIVITY: 6% EXTERIOR, 9% INTERIOR, 12% SOLAR

GL01S

PRODUCT: SPANDREL GLASS
MANUFACTURER: VIRACON
FINISH:VE3-2M, 1" INSULATING WITH V175 HIGH OPACITY WHITE CERAMIC FRIT ON #4 SURFACE



GL02

PRODUCT: GLASS
MANUFACTURER: VIRACON
FINISH: VUE 1-40
REFLECTIVITY: 15% EXTERIOR & INTERIOR, 27% SOLAR

HONORHEALTH OSBORN
7400 E. OSBORN RD., SCOTTSDALE, AZ 85251
04.19.19

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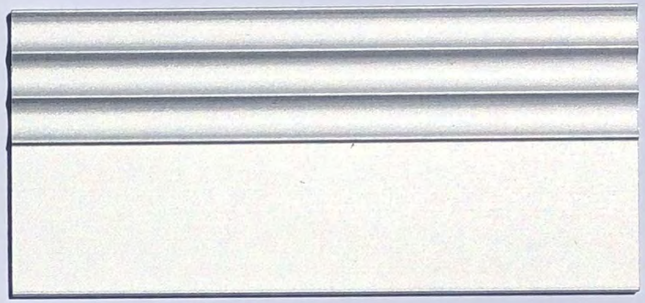
NORTHWEST VIEW

EXTERIOR ELEVATION - WEST

EXTERIOR MULLION
MANUFACTURER: ARCADIA
FINISH: AB-7 STD. DARK BRONZE



EXTERIOR MULLION
MANUFACTURER: ARCADIA
FINISH: #11/CLEAR AC-2

PT01
PRODUCT: PAINT
MANUFACTURER: SHERWIN WILLIAMS
FINISH: SW 7069 IRON ORE

GL02S
PRODUCT: GLASS SPANDREL
MANUFACTURER: VIRACON
FINISH: VUE1-40, 1" INSULATING, WITH V933 WARM GRAY #4

HONORHEALTH OSBORN
7400 E. OSBORN RD., SCOTTSDALE, AZ 85251
04.19.19

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WATER DISTRIBUTION SYSTEM
BASIS OF DESIGN REPORT
FOR
HONOR HEALTH
MEDICAL OFFICE BUIILDING

April 17, 2019
WP# 194976

Prepared For:

Devenney Group Ltd., Architects
Mr. Dudley Campbell
201 West Indian School Road
Suite 102
Phoenix, Arizona 85013
Phone: (602) 943-7645

Submitted To:

City of Scottsdale
Mr. Levi Dillion, P.E.
Water Resources Administration
9379 East San Salvador Drive
Scottsdale, Arizona 85258
Phone: (480)-312-5319

Prepared By:

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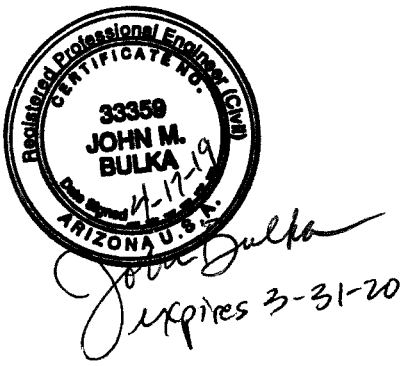

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April 17, 2019

Mr. Levi Dillion, P.E.
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

Phone: (480)-312-5319
Email: ldillion@scottsdaleaz.gov

Re: **Honor Health Medical Office Building**
Water Distribution System, Basis of Design Report
Scottsdale, Arizona
WP# 194976

Dear Mr. Dillion:

The proposed Honor Health Medical Office Building development is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian. Refer to the attached *Vicinity Map* for the project location. The proposed 4-story office building will be 92,000 square feet (sf), with an option to add a 25,000-sf fifth floor. The proposed building is located at the southeast corner of the site, with proposed parking lots on the north and west sides of the proposed building. At-grade parking will also be located under the south side of the building. The development will include associated hardscape and landscaping.

The project site has public waterline infrastructure on three (3) sides of the site. There is one (1) 12-inch DIP and one (1) 8-inch ACP water main in Osborn Road. There is one (1) 8-inch CIP water main in Brown Avenue. There is one (1) 6-inch CIP water main in 4th Street. The Honor Health Medical Office Building site proposes two (2) private water connections that utilize the City's public waterline for domestic water and fire protection that connect to the existing public 8-inch waterline in Osborn Road. The existing irrigation meter will be reused. Refer to the attached *Water Exhibit* for a depiction of the existing water infrastructure surrounding the project.

The design criteria used to estimate potable water demands and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the requirements listed in the *City of Scottsdale Design Standards and Policies Manual*, 2018. The following is a summary of the primary design criteria utilized:

- Average Day Water Demand, Office: 8.34E-04 gpm/sq. ft.*
- Fire Flow Requirements: min 1,500 gpm**
- Maximum Day Demand: 2.0 x ADD
- Peak Hour Demand: 3.5 x ADD
- Minimum Residual Pressure, Peak Hour: 50 psi
- Minimum Residual Pressure, Maximum Day + Fire Flow: 30 psi

• Maximum System Pressure:	120 psi
• Maximum Pipe Head Loss, Maximum Day Demand:	8 ft / 1000 ft
• Maximum Pipe Head Loss, Peak Hour Demand:	10 ft / 1000 ft
• Minimum Pipe Diameter, Public Water Line:	8 inches

Abbreviations: gpd = gallons per day; sf = square feet; ADD = average day demand; psi = pounds per square inch

* Includes both inside and outside use per Figure 6-1.2, *COS Design Standards and Policies Manual*

** Fire flow is based on 10% reduction to account for flow measurement inaccuracy (refer to attached calculations in the appendices)

Domestic water service will be provided by a proposed 3-inch private waterline and a 3-inch domestic meter. Fire protection for the proposed building will be provided by one (1) proposed 6-inch fire line for an automatic fire-sprinkler service. Irrigation water service will be provided by a suspected existing 1-inch irrigation line.

The average day water demand for the proposed 117,000-sf Honor Health Medical Office Building is projected to be approximately 97.6 gallons per minute (gpm). Maximum day demands and peak hour demands are projected to be 195.2 gpm and 341.6 gpm, respectively (refer to the attached calculations).

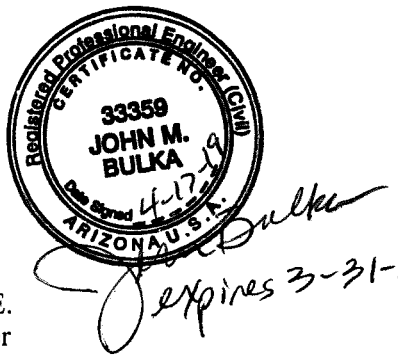
WaterCAD V8i, by Haestad Methods, was utilized to analyze the existing water distribution system and proposed improvements. Results from a fire hydrant flow test, conducted on April 12, 2019 by Arizona Flow Testing LLC, was utilized to simulate the City of Scottsdale's water supply for the project (refer to attached modeling results).

The hydraulic modeling results indicate the proposed system is capable of delivering peak hour demands, totaling 342 gpm, to the proposed Honor Health Medical Office Building project, with pressures ranging from 71 to 72 pounds per square inch (psi). Fire flow results indicate residual pressures exceed 30 psi within the project site, with 2,500-gpm fire hydrant flows during maximum day demand. A 50-percent reduction was applied to the fire flow requirements due to the proposed sprinkler system. Hydraulic modeling results, calculations, and exhibits involved in the water system analysis are attached.

Thank you for your review of the Water Distribution System Basis of Design Report provided for the Honor Health Medical Office Building project. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc



John Bulka, P.E.
Project Manager

JMB/km

CALCULATIONS AND HYDRAULIC MODELING RESULTS

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TABLE 1 - WATER DEMAND DESIGN FLOWS

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Engineer: John Bulka, P.E.
Date: 4/17/2019

LAND USE AND DWELLING UNIT BREAKDOWN BY JUNCTION

HYDRAULIC MODEL NODE	ELEVATION (ft)	PRESSURE ZONE	LAND USE	DWELLING UNITS	DEMAND VALUE	UNITS	AVERAGE DAILY DEMAND			MAXIMUM DAY DEMAND				PEAK HOUR DEMAND			
							(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)
J-BLDG	1,245.00	-	Commercial (Office)	117,000	0.000834	gpm/sf	140,544.00	97.6	97.6	2.0	281,088.00	195.2	195.2	3.5	491,904.00	341.6	341.6
Total				**117,000**			**140,544**	**97.6**	**97.6**		**281,088**	**195.2**	**195.2**		**491,904**	**341.6**	**341.6**

Notes:
1. Per the City of Scottsdale Design Standards and Policies Manuel, dwelling units for an office building are measured in square feet.
2. The proposed building water demand was estimated assuming 5th floor addition.

FIRE HYDRANT FLOW TEST

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	Honor Health MOB
Project Address:	7242 East Osborn Road, Scottsdale, Arizona, 85251
Client Project No.:	194976
Arizona Flow Testing Project No.:	19131
Flow Test Permit No.:	C57857
Date and time flow test conducted:	April 12, 2019 at 8:00 AM
Data is current and reliable until:	October 12, 2019
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Ray Padilla –City of Scottsdale-Inspector (602-541-0586)

Raw Test Data

Static Pressure: **85.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **75.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **23.0 PSI**

(Measured in pounds per square inch)

Diffuser Orifice Diameter: One 4-inch Hose Monster
(Measured in inches)

Coefficient of Diffuser: .7875

Flowing GPM: **1,803 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **4,955 GPM**

Data with 13 PSI Safety Factor

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **62.0 PSI**
(Measured in pounds per square inch)

Distance between hydrants: Approx.: 290 feet

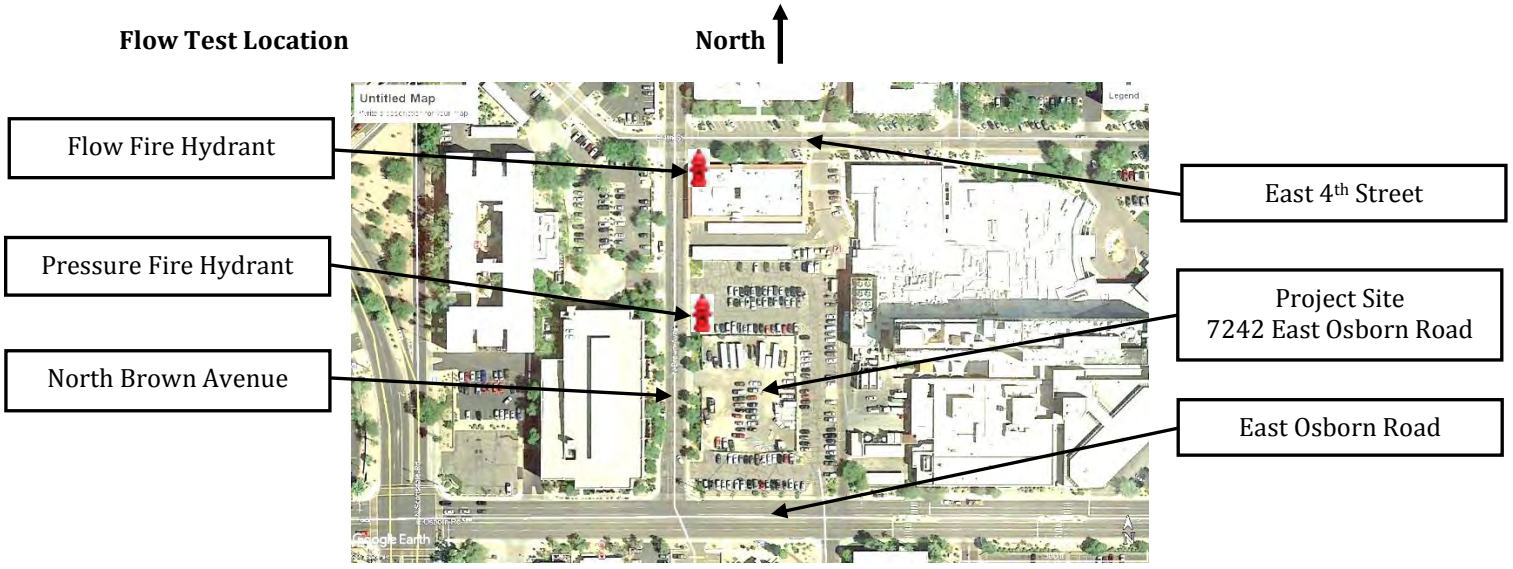
Main size: Not Provided

Flowing GPM: **1,803 GPM**

GPM @ 20 PSI**:** **4,392 GPM**

Scottsdale requires a maximum Static Pressure of 72 PSI for AFES Design.

Flow Test Location **North**



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EXISTING WATER SYSTEM PRESSURES

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona

Project Number: 194976
Project Engineer: John Bulka, P.E.

Flow Test Location: 7242 E Osborn Road, Scottsdale AZ
Date of Flow Test: April 12, 2019

Pressure Hydrant		**Flow Hydrant**	
Static Pressure (psi)	72.0		
Residual Pressure (psi)	62.0	Flow (gpm)	1803
Calculated Flow at 20 psi	4392 gpm	Calculated Flow at	20 psi

Discharge (gpm)	Pressure (psi)	Head (ft)
0	72.0	166.2
1803	62.0	143.2
4392	20	46.2

Notes:
1. Values provided from a flow test by the Arizona Flow Testing LLC

FlexTable: Pipe Table

Active Scenario: Calibration-Static

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	0	0.00
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	0	0.00
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibration-Static

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.70	73
EX J-2	1,244.50	0	1,412.70	73
EX FH-1	1,245.00	0	1,412.70	73
EX FH-FLOW	1,247.50	0	1,412.70	71
EX J-3	1,248.00	0	1,412.70	71
EX FH-TEST	1,246.50	0	1,412.70	72
EX J-BLDG	1,248.00	0	1,412.70	71
EX J-4	1,247.00	0	1,412.70	72
J-BLDG	1,245.00	0	1,412.70	73

FlexTable: Pipe Table

Active Scenario: Calibraion-Flow

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	1,803	11.51
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	1,803	0.32
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	1,803	0.32
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibraion-Flow

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,389.70	63
EX J-2	1,244.50	0	1,389.70	63
EX FH-1	1,245.00	0	1,389.70	63
EX FH-FLOW	1,247.50	1,803	1,375.86	56
EX J-3	1,248.00	0	1,375.86	55
EX FH-TEST	1,246.50	0	1,389.70	62
EX J-BLDG	1,248.00	0	1,375.86	55
EX J-4	1,247.00	0	1,375.86	56
J-BLDG	1,245.00	0	1,389.70	63

FlexTable: Pipe Table

Active Scenario: Calibraion-Max

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	4,392	28.03
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	4,392	0.78
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	4,392	0.78
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibraion-Max

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,292.70	21
EX J-2	1,244.50	0	1,292.70	21
EX FH-1	1,245.00	0	1,292.70	21
EX FH-FLOW	1,247.50	4,392	1,220.72	-12
EX J-3	1,248.00	0	1,220.72	-12
EX FH-TEST	1,246.50	0	1,292.70	20
EX J-BLDG	1,248.00	0	1,220.72	-12
EX J-4	1,247.00	0	1,220.72	-11
J-BLDG	1,245.00	0	1,292.70	21

FlexTable: Pipe Table

Active Scenario: Average Day Demand

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	98	0.62
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	98	0.02
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	98	0.02
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-98	0.62

FlexTable: Junction Table

Active Scenario: Average Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.50	73
EX J-2	1,244.50	0	1,412.50	73
EX FH-1	1,245.00	0	1,412.52	72
EX FH-FLOW	1,247.50	0	1,412.60	71
EX J-3	1,248.00	0	1,412.60	71
EX FH-TEST	1,246.50	0	1,412.60	72
EX J-BLDG	1,248.00	0	1,412.60	71
EX J-4	1,247.00	0	1,412.60	72
J-BLDG	1,245.00	98	1,412.50	72

FlexTable: Pipe Table

Active Scenario: Max Day

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	195	1.25
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	195	0.03
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	195	0.03
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-195	1.25

FlexTable: Junction Table

Active Scenario: Max Day

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,411.99	73
EX J-2	1,244.50	0	1,411.99	72
EX FH-1	1,245.00	0	1,412.03	72
EX FH-FLOW	1,247.50	0	1,412.33	71
EX J-3	1,248.00	0	1,412.33	71
EX FH-TEST	1,246.50	0	1,412.33	72
EX J-BLDG	1,248.00	0	1,412.33	71
EX J-4	1,247.00	0	1,412.33	72
J-BLDG	1,245.00	195	1,411.99	72

FlexTable: Pipe Table

Active Scenario: Peak Hour

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	342	2.18
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	342	0.06
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	342	0.06
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-342	2.18

FlexTable: Junction Table

Active Scenario: Peak Hour

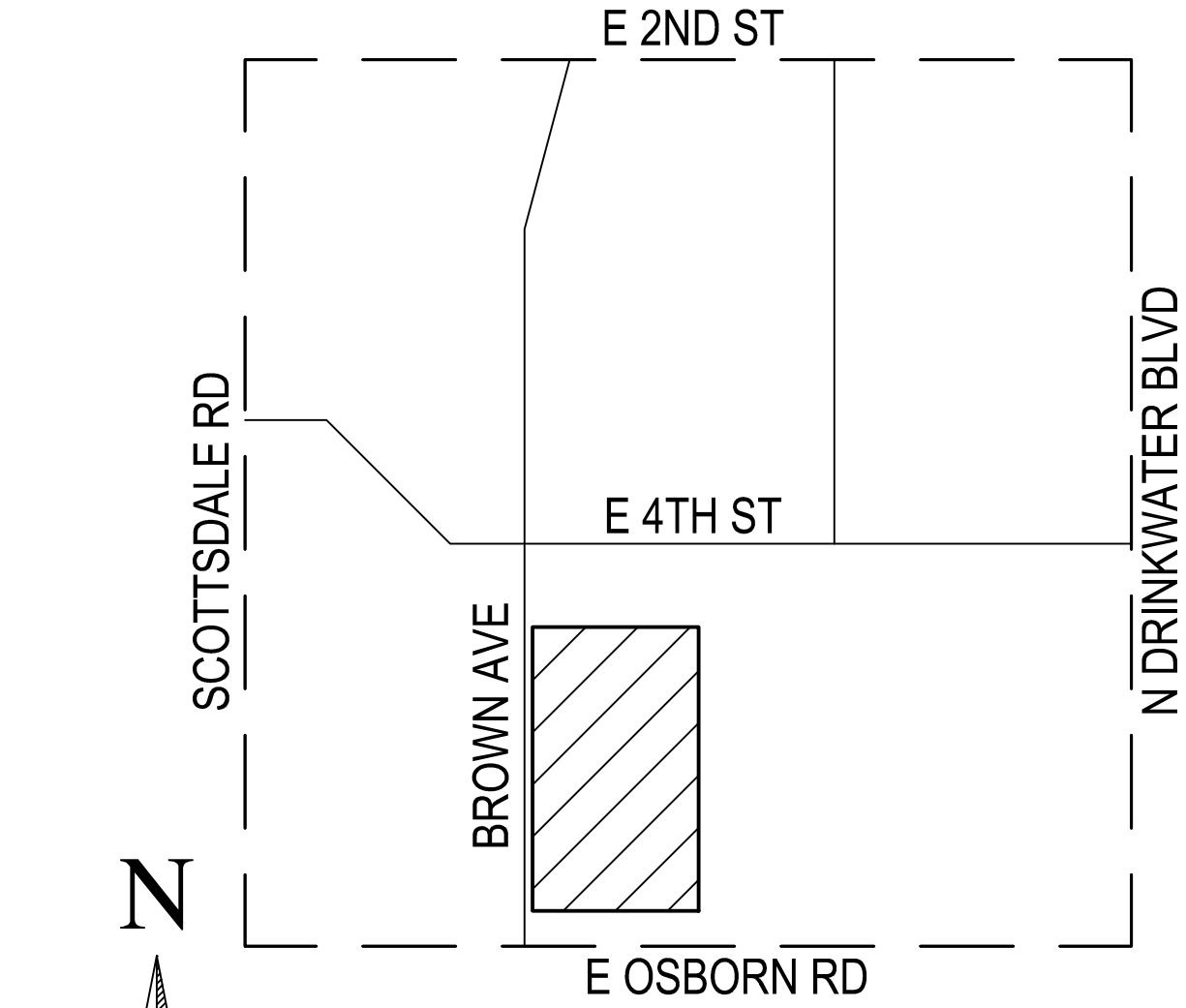
Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,410.71	72
EX J-2	1,244.50	0	1,410.71	72
EX FH-1	1,245.00	0	1,410.82	72
EX FH-FLOW	1,247.50	0	1,411.65	71
EX J-3	1,248.00	0	1,411.65	71
EX FH-TEST	1,246.50	0	1,411.65	71
EX J-BLDG	1,248.00	0	1,411.65	71
EX J-4	1,247.00	0	1,411.65	71
J-BLDG	1,245.00	342	1,410.71	72

Fire Flow Node FlexTable: Fire Flow Report

Active Scenario: Max Day + Fire Flow

Label	Elevation (ft)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Calculated Residual) (psi)	Junction w/ Minimum Pressure (System)	Hydraulic Grade (ft)
EX J-1	1,244.00	2,500	2,330	30	EX J-2	1,411.99
EX J-2	1,244.50	2,500	2,406	30	EX J-1	1,411.99
EX FH-1	1,245.00	2,500	2,690	30	J-BLDG	1,412.03
EX FH-FLOW	1,247.50	2,500	2,888	30	EX J-BLDG	1,412.33
EX J-3	1,248.00	2,500	2,792	30	EX J-BLDG	1,412.33
EX FH-TEST	1,246.50	2,500	3,685	31	EX J-BLDG	1,412.33
EX J-BLDG	1,248.00	2,500	2,276	30	EX J-4	1,412.33
EX J-4	1,247.00	2,500	1,718	30	EX J-BLDG	1,412.33
J-BLDG	1,245.00	2,695	2,799	30	EX J-2	1,411.99

VICINITY MAP



VICINITY MAP

N.T.S.

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HONOR HEALTH MEDICAL OFFICE BUILDING

VICINITY MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

WATER EXHIBIT

EX J-3
EX P-7
EX J-BLDG
EX P-8
EX J-4
EX P-6
EX FH-FLOW
4TH STREET
N
0
50
100
Horz. 1 in. = 50 ft.
EX. BUILDING
FF=1248.51±
EX P-5
BROWN AVENUE
EX FH-TEST
PMP-1
RES-1
BUILDING OVERHANG
PROPOSED BUILDING
IRRIGATION CONNECTION
EXISTING HONOR HEALTH OSBORN MEDICAL CENTER
P-RES
P-PMP
PROPOSED AT-GRADE PARKING UNDER BUILDING
EX P-4
FIRE CONNECTION
J-BLDG (DOMESTIC)
EX J-2
EX J-1
EX FH-1
EX P-3
EX P-2
EX P-1
OSBORN ROAD

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PIPE DIAMETER	EXISTING	PLANNED
6-INCHES		
8-INCHES		
12-INCHES		

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HONOR HEALTH MEDICAL OFFICE BUILDING

Water Exhibit

DATE: 04-17-2019	SCALE: 1" = 50'	SHEET 01 of 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

PRELIMINARY
DRAINAGE REPORT
FOR
HONOR HEALTH
MEDICAL OFFICE BUIILDING

April 17, 2019
WP# 194976

Prepared For:

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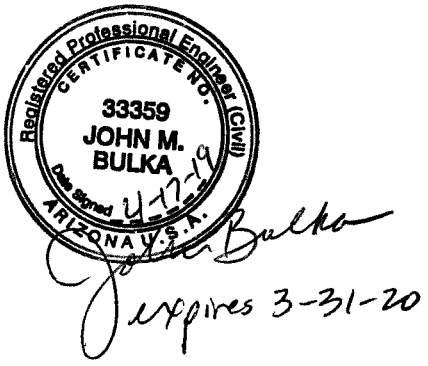

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APPENDICES

EXHIBITS

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Y:\WP\Reports\Commercial\194976 Honor Health Medical Office Building Preliminary Drainage Report.docx

1.0 INTRODUCTION

The proposed Honor Health Medical Office Building development is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Osborn Medical Center. More specifically, the site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian. Refer to Exhibit 1 – *Vicinity Map* at the back of this report for the project location. The proposed 4-story office building will be 92,000 square feet with an option to add a 25,000-sf fifth floor. The proposed building is located at the southeast corner of the site, with proposed parking lots on the north and west sides of the proposed building. At-grade parking will also be located under the south side of the building. The development will also include associated hardscape and landscaping.

The purpose of this report is to document the drainage design criteria utilized for the Honor Health Medical Office Building development, and is intended to support the Design Review Board (DRB) submittal for the project. This Preliminary Drainage Report has been prepared in accordance with Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the City of Scottsdale's technical requirements for drainage (Ref. 1), as applicable for the site.

2.0 EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

2.1 Existing Conditions

The Honor Health Medical Office Building site is currently an asphalt parking lot with an existing building on the north side of the site (refer to Exhibit 2 – *Existing Drainage Map*). There is also an enclosed fenced area in the middle of the site, with a gravel surface that is currently being used for parking and storage containers. Aerial photography indicates a building was previously located at this location and was demolished around 2008. There are currently no storm water retention facilities on the site. There are currently two (2) drywells in the interior of the site. One (1) drywell appears to accept some runoff, but the second drywell is higher than the adjacent grades. In general, most of the site where development will occur drains overland to the southwest, into Osborn Road. The north side of the site, including the portion of the existing building, drains to the north. There is an existing catch basin on the north side of the building that connects to an existing public 18-inch storm drain in 4th Street. An existing scupper at the northeast portion of the site also drains storm water away from the existing building. A smaller portion of the site drains overland to Brown Avenue. Brown Avenue and Osborn Road both have existing storm drain. There are several existing catch basins on the east side of Brown Avenue that connect to a 48-inch main line. There are also several existing catch basins on the north side of Osborn Road that connect to a 54-inch main line. It is our understanding both of these storm drain main lines run to the east to Hayden Wash.

2.2 FEMA Floodplain

The Federal Emergency Management Agency (FEMA) has published a 100-year floodplain, per Flood Insurance Rate Map (FIRM). The City of Scottsdale FEMA Firm panel number is 04013C2235L, effective date October 16, 2013, and indicates the site falls within Zone "X" (refer to Exhibit 3 – *FEMA FIRM Map*).

Zone "X" is defined by FEMA as follows:

> "*0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flow with average depth less than one foot or with drainage areas of less than one square mile"*

3.0 PROPOSED DRAINAGE PLAN

3.1 Proposed Conditions

The proposed grading for the site is designed to direct storm water runoff away from the proposed building and into the proposed on-site storm water facilities. Proposed catch basins and storm drains will collect the site runoff and store the first flush volume in an 8-foot-diameter underground storm water retention pipe (refer to Exhibit 6 – *Preliminary Grading and Drainage Plan*). The retention pipe will dewater by two (2) methods. The lower part of the pipe will drain to a proposed drywell at the southwest corner of the site. The upper part of the retention pipe will drain by a bleed-off pipe to the City of Scottsdale's storm drain in Osborn Road. We do not believe the entire underground retention system can be drained solely by a bleed-off pipe, due to the number of utility crossings in Osborn Road. 8-foot-diameter storage pipe was selected because the upper portion of the pipe can still be drained by gravity, and the upstream on-site storm water drain will not conflict with the on-site sanitary sewer. It should be noted the catch basin connection inverts in Osborn Road still need to be verified.

If the on-site catch basins become clogged, or if the on-site storm water storage system is exceeded, overland overflow routes have been incorporated into the grading and drainage design. The ultimate outfall for the project will be at the southwest corner of the site and will drain into Osborn Road.

3.2 Retention and Dissipation

It is our understanding a storm water retention waiver exists for the Honor Health campus, per City of Scottsdale Plan Check No. 3182-02. We have not seen the retention waiver, and it is unclear if this portion of the site is included in the waiver. Therefore, using a historical aerial map, the pre-development runoff coefficient was compared to the post-development runoff coefficient (refer to Exhibit 4 – *Aerial Map from November 2005*). The historical runoff coefficient of 0.93 is higher than the post-development runoff coefficient of 0.91. Because there is no increase in runoff, the City of Scottsdale's *Design Standards and Policies Manual* states the site must provide storm water retention for the first flush storm event. In accordance with the current City of Scottsdale's *Design Standards and Policies Manual*, the following required retention volume equation was used for this project, with the current precipitation depth of 0.5 inches:

$Vol_{req} = {}^{P}/_{12}$ x A x C

P = Precipitation Depth: 0.5 inches

A = Total Area (sq. ft.)

C = Post-Development Runoff Coefficient: 0.95

The required retention volume will be provided by proposed 8-foot-diameter underground C.M.P. storage pipes. The storm water retention volumes have been designed to accommodate the first flush event within the underground storage pipe. The retention volume required for the site is 4,445 cubic feet (cf). The proposed storm water retention system consists of one (1) 8-foot-diameter pipe, having a length of 90 linear feet of pipe (refer to Appendix A – *Preliminary Hydrologic and Hydraulic Calculations*). The underground storage system primarily utilizes a drywell to dissipate the retained volume within 36 hours. An estimate of the required number of drywells was calculated by utilizing a design drain rate of 0.10 cfs per drywell. Based on this design drywell drain rate, one (1) drywell each is required to dissipate the retention pipe. When the drywell is installed, percolation testing will be performed to determine the actual percolation rate of the drywell. The underground storage system also utilizes a bleed-off pipe to dissipate the retained volume within 36 hours. This bleed-off pipe will connect to the catch basin in Osborn Road and drain into the 54-inch storm drain.

The design of the storm water retention pipe will be finalized with the final plan set. We anticipate using proposed 8-foot-diameter C.M.P. underground storage pipe. The pipe manufacturer and Geotechnical Engineer will provide specifications for the H20/HS20 and H25/HS25 live loads and estimated design life that exceeds the City of Scottsdale's minimum design criteria of a 50-year design life for underground retention pipes.

3.3 Lowest Floor Elevation

The Preliminary Grading and Drainage Plan is designed to comply with the City of Scottsdale's floodplain ordinance in a Zone "X" floodplain. The proposed building has a finished floor elevation of 1247.50, which is 2.20 feet above the ultimate outfall elevation of 1245.30, located on the southwest corner of the site. If the outlet pipe for the retention basins becomes clogged, storm water can overflow over land (refer to Exhibit 5 – *Preliminary Drainage Map* for a graphical representation).

3.4 Operation and Maintenance

The property owner shall be solely responsible for the operation and maintenance of the storm water drainage system. In accordance with the City of Scottsdale's *Design Specifications and Policies Manual*, the owner will dedicate a public drainage easement for the storm water retention facilities. Operation and maintenance reference material will be provided in the Final Drainage Report.

4.0 SPECIAL CONDITIONS

Currently, there are no washes with 100-year flows greater than 50 cfs that traverse the project site. Also, there are no designated Section 404 washes within the site; therefore, no Section 404 permit is required.

5.0 DATA ANALYSIS

5.1 Hydrologic Analysis

The drainage improvements will be developed consistent with Chapter 4 of the City of Scottsdale's *Design Standards and Policies Manual*, 2018. The Rational Method will be used to quantify peak discharge values for on-site concentration points for the full buildout scenario during the first flush storm event. Weighted "C" coefficients will be referenced from Chapter 4 of the City of Scottsdale's *Design Standards and Policies Manual*, 2018. Refer to Appendix A for rational calculation printouts, and Exhibit 4 for drainage basin tributary areas and concentration point locations.

5.2 Hydraulic Analysis

For this preliminary report, storm drain rim and invert information is provided on Exhibit 5. Hydraulic analysis of the proposed storm drain will be forthcoming once the City approves the conceptual storm water retention scenario. The on-site storm drain system will be designed to accommodate the 10-year storm event. Bentley StormCAD Version 5.6 will be utilized to analyze the proposed storm sewer system. StormCAD printouts and storm drain profiles will be available.

6.0 CONCLUSIONS

Based on our analysis of the site, the following conclusions can be made:

1. The proposed drainage infrastructure will be designed in accordance with the City of Scottsdale's *Design Standards and Policies Manual*, 2018.

2. The proposed site lies within a FEMA-designated "Other Flood Areas" Zone "X" shaded. Per the FEMA map (Panel 1760L), the FIRM information is as follows:

   "*0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flow with average depth less than one foot or with drainage areas of less than one square mile*."

3. No off-site flows appear to impact the site.

4. The Rational Method was used to estimate peak discharges for all on-site drainage areas in this report.

5. In accordance with the City of Scottsdale's design guidelines, storm water retention will be provided for the first flush storm event (0.5 inches of rainfall).

6. Storm water retention will be provided in a retention basin. The volume required for the site is 4,445 cubic feet. The volume proposed is 4,524 cubic feet.

7. The proposed building has a finished floor elevation of 1247.50, which is 2.20 feet above the ultimate outfall elevation of 1245.30, located on the southwest corner of the site.

8. The property owner will maintain the on-site storm water retention system, and dedicate a public drainage easement for the storm water retention facilities.

7.0 REFERENCES

1. *Design Standards and Policies Manual, Chapter 4: Grading and Drainage*, City of Scottsdale, January 2018.

APPENDIX A

PRELIMINARY HYDROLOGIC AND HYDRAULIC CALCULATIONS

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Site I-D-F Curve

Description: Rational Method IDF Curve
Location: Honor Health Medical Office Building
City of Scottsdale, Arizona

NOAA ATLAS 14 RAINFALL DEPTHS, INCHES

Duration	Average Recurrence Interval (years)					
	2	5	10	25	50	100
5-min	0.24	0.326	0.392	0.481	0.55	0.62
10-min	0.365	0.496	0.596	0.733	0.838	0.944
15-min	0.452	0.614	0.739	0.908	1.04	1.17
30-min	0.609	0.827	0.995	1.22	1.4	1.58
60-min	0.754	1.02	1.23	1.51	1.73	1.95
2-hr	0.864	1.16	1.38	1.69	1.92	2.16
3-hr	0.931	1.22	1.46	1.78	2.04	2.31
6-hr	1.11	1.42	1.67	2.01	2.28	2.56
12-hr	1.24	1.57	1.83	2.18	2.44	2.72
24-hr	1.48	1.92	2.27	2.75	3.13	3.53

RAINFALL INTENSITY, INCHES/HOUR

Duration minutes	Frequency, years					
	2	5	10	25	50	100
5	2.88	3.91	4.70	5.77	6.60	7.44
10	2.19	2.98	3.58	4.40	5.03	5.66
15	1.81	2.46	2.96	3.63	4.16	4.68
30	1.22	1.65	1.99	2.44	2.80	3.16
60	0.75	1.02	1.23	1.51	1.73	1.95
120	0.43	0.58	0.69	0.85	0.96	1.08
180	0.31	0.41	0.49	0.59	0.68	0.77
360	0.19	0.24	0.28	0.34	0.38	0.43
720	0.10	0.13	0.15	0.18	0.20	0.23
1440	0.06	0.08	0.09	0.11	0.13	0.15

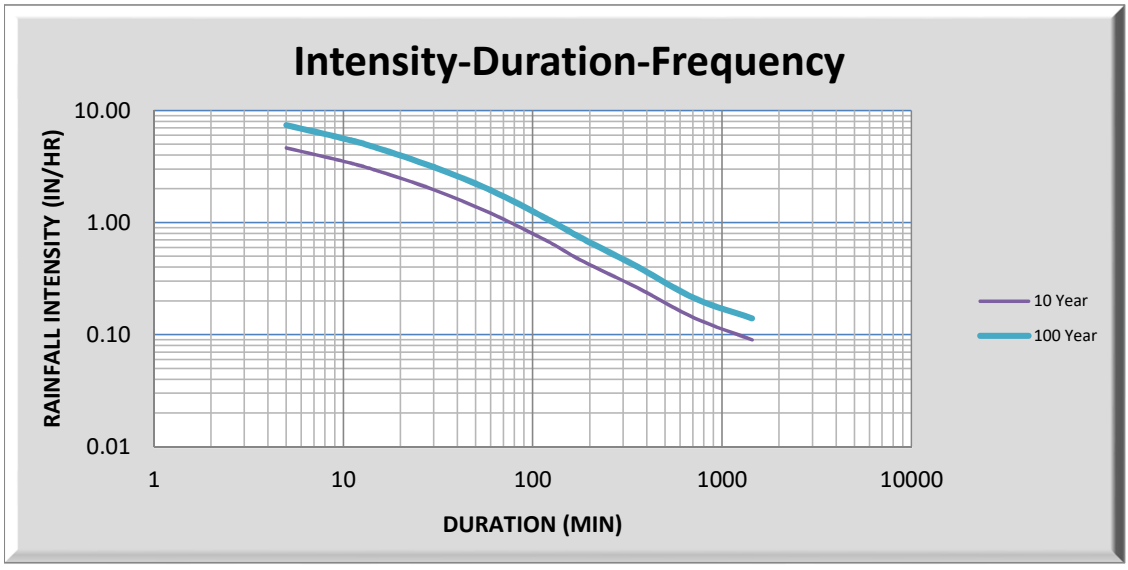


Table 1: 'C' Value Calculation

Location: Honor Health Medical Office Building
Reference: *City of Scottsdale Engineering Design Criteria (2018)*

Known Values: Design storm: 100-yr, 2-hr
Rainfall, D: 2.16

Calc. Values: $V_{Required} = \Delta C A \frac{D}{12}$

Where: V = Retention Volume Required
C = Runoff Coefficient
D = Depth of Rainfall
A = Area of Watershed Contributing

Historical

Contributing Sub-Area	Area (ft)	Land Use	Weighted Runoff Coefficient
1	112,734.00	Pavement, Asphalt, Roof	0.95
2	4,492.00	Landscaping	0.45
Total	**117,226.00**		**0.93**

Proposed

Contributing Sub-Area	Area (ft)	Land Use	Weighted Runoff Coefficient
1	109,014.00	Pavement, Asphalt, Roof	0.95
2	8,212.00	Landscaping	0.45
Total	**117,226.00**		**0.91**

Table 2 - Retention Volume Required & Provided

Description: Calculation of Retention Volume Required & Provided
Date: 04/17/19
Location: Honor Health Medical Office Building
City of Scottsdale, Arizona
Reference: *City of Scottsdale Engineering Design Criteria (2018)*

Known Values: Design storm: First Flush
Rainfall, D: 0.50

Calc. Values: $V_r = C \times (D/12) \times A$
Where: V_r = Retention Volume Required
C = Runoff Coefficient
D = Depth of Rainfall
A = Area of Watershed Contributing

$V_p = \pi \times (D/2)^2 \times L$
(For Underground Retention)
Where: V_p = Retention Volume Provided
D = Diameter of Pipe
L = Length of Pipe

$V_p = 0.5 \times$ (Top Contour Area + Bottom Contour Area) x (Top Contour Elevation - Bottom Contour Elevation)
(For Basin)
Where: V_p = Retention Volume Provided

Basin ID	Area (sf)	Land Use	100-Year Runoff Coefficient	100-Year, 2-Hour Volume Required (cu.ft)	100-Year, 2-Hour Volume Required (ac.ft)	Diameter of Pipe (ft)	Length of Pipe (ft)	Top Contour Area (sf)	Bottom Contour Area (sf)	Top Contour Elevation	Bottom Contour Elevation	100-Year, 2-Hour Volume Provided (cu.ft)
Underground A	117,226	Commercial/ Landscape	0.91	4,445	0.10	8	90	-	-	-	-	4,524
Total	***117,226***	-	-	*4,445*	***0.10***	-	-	-	-	-	-	*4,524*

Table 3 - Required Drywells

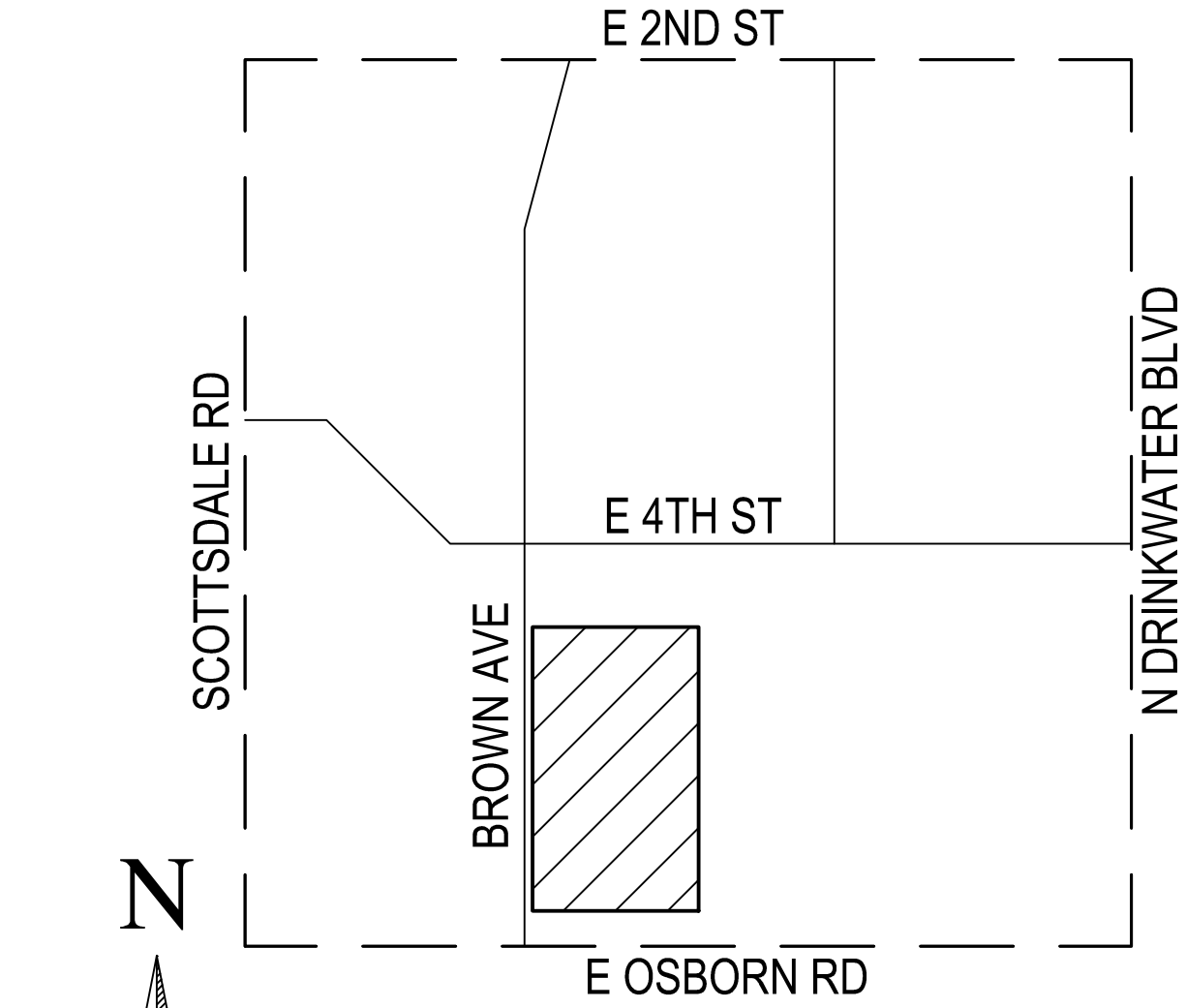
Description: Drywell Calculations
Date: 04/17/19
Location: Honor Health Medical Office Building
City of Scottsdale, Arizona
References: *City of Scottsdale Engineering Design Criteria (2018)*

Basin ID	Volume Required (CF)	Design Percolation Rate (CFS)	Maximum Drain Time (Hours)	Number of Drywells Required/Provided	Drain Time (hours)
Underground A	4,445	0.10	36	**1**	12.3

EXHIBIT 1

VICINITY MAP

\



VICINITY MAP

N.T.S.

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HONOR HEALTH MEDICAL OFFICE BUILDING

EXHIBIT 1
VICINITY MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

EXHIBIT 2

EXISTING DRAINAGE MAP

\

EXHIBIT 2

HONOR HEALTH

MEDICAL OFFICE BUILDING

EXISITING DRAINGE MAP

EXHIBIT 3

FEMA FIRM MAP

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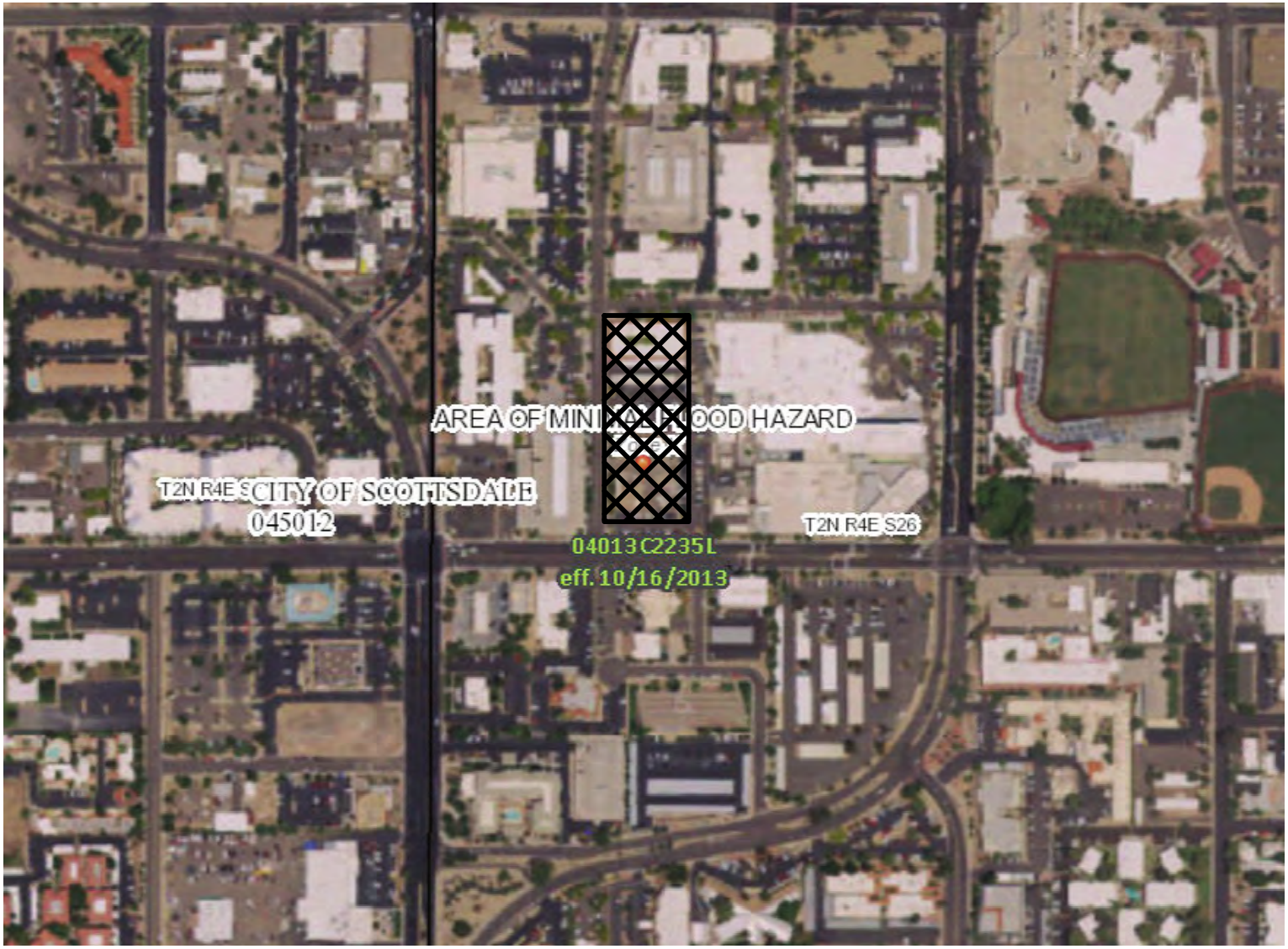

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/5/2019 at 11:03:02 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

PROJECT AREA

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HONOR HEALTH MEDICAL OFFICE BUILDING

EXHIBIT 3
FEMA FIRM MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

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EXHIBIT 4

AERIAL MAP FROM NOVEMBER 2005

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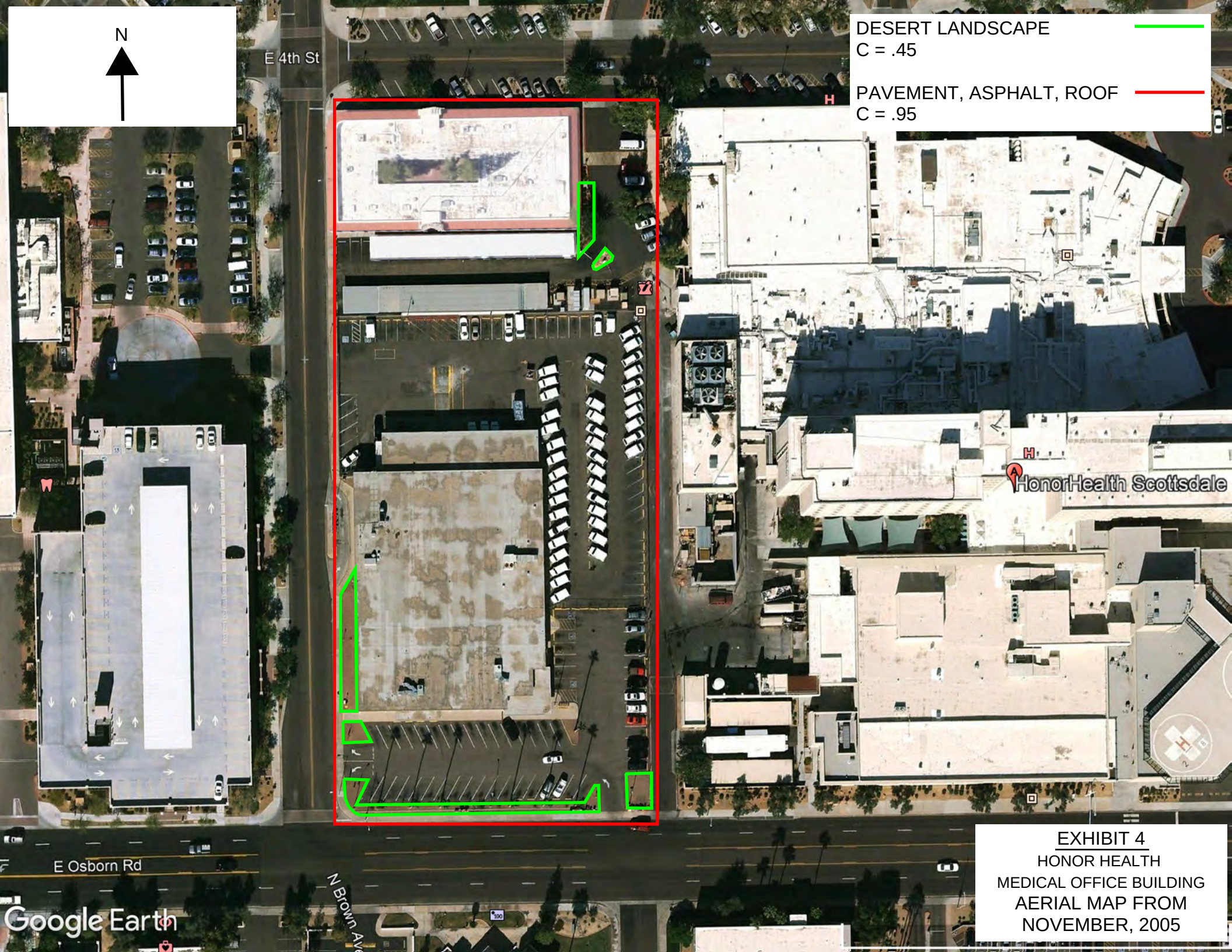

EXHIBIT 4

HONOR HEALTH

MEDICAL OFFICE BUILDING

AERIAL MAP FROM

NOVEMBER, 2005

EXHIBIT 5

PRELIMINARY DRAINAGE MAP

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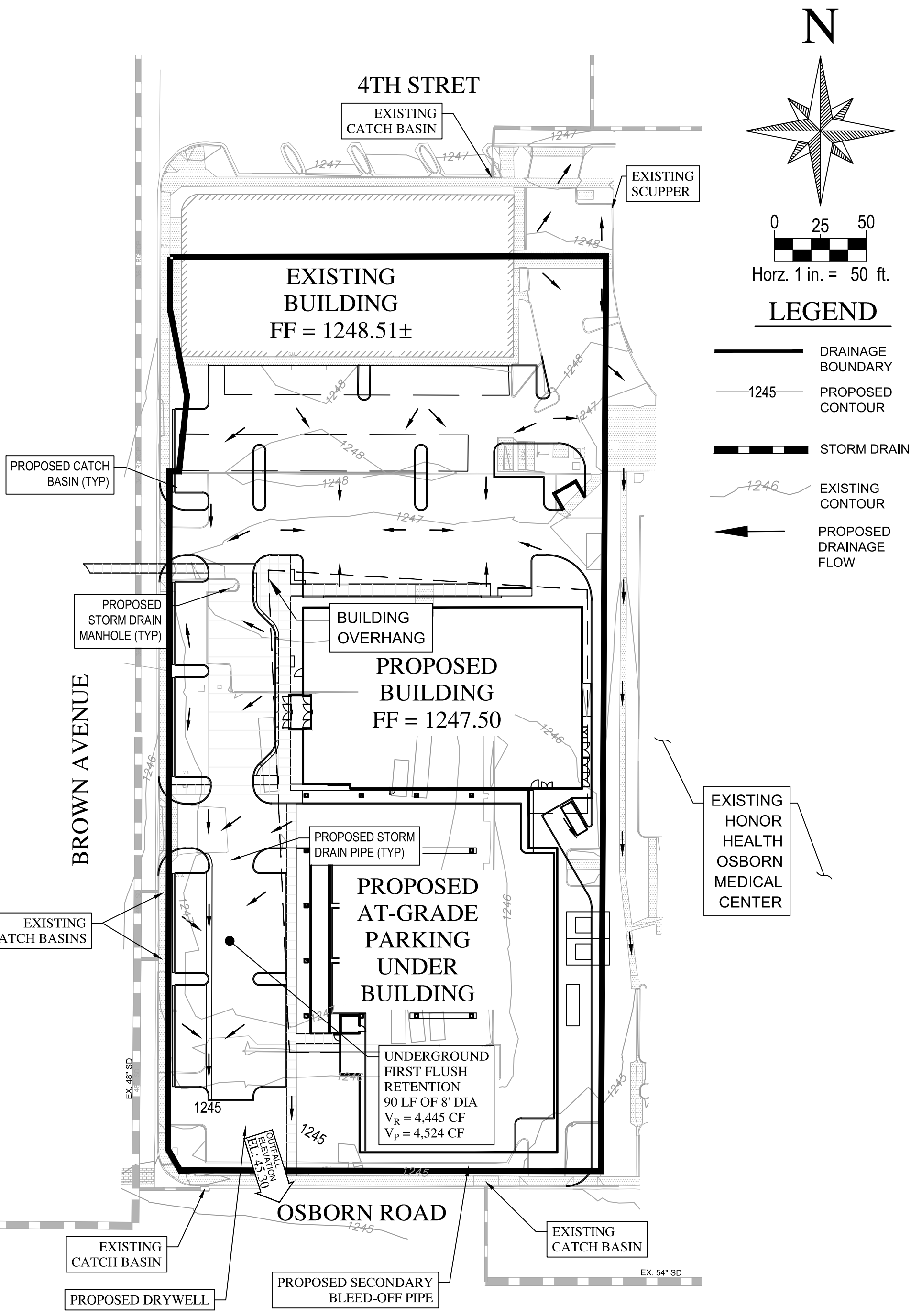

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HONOR HEALTH MEDICAL OFFICE BUILDING

EXHIBIT 5
PRELIMINARY DRAINAGE MAP

DATE: 04-17-2019	SCALE: 1" = 50'	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

EXHIBIT 6

PRELIMINARY GRADING AND DRAINAGE PLAN

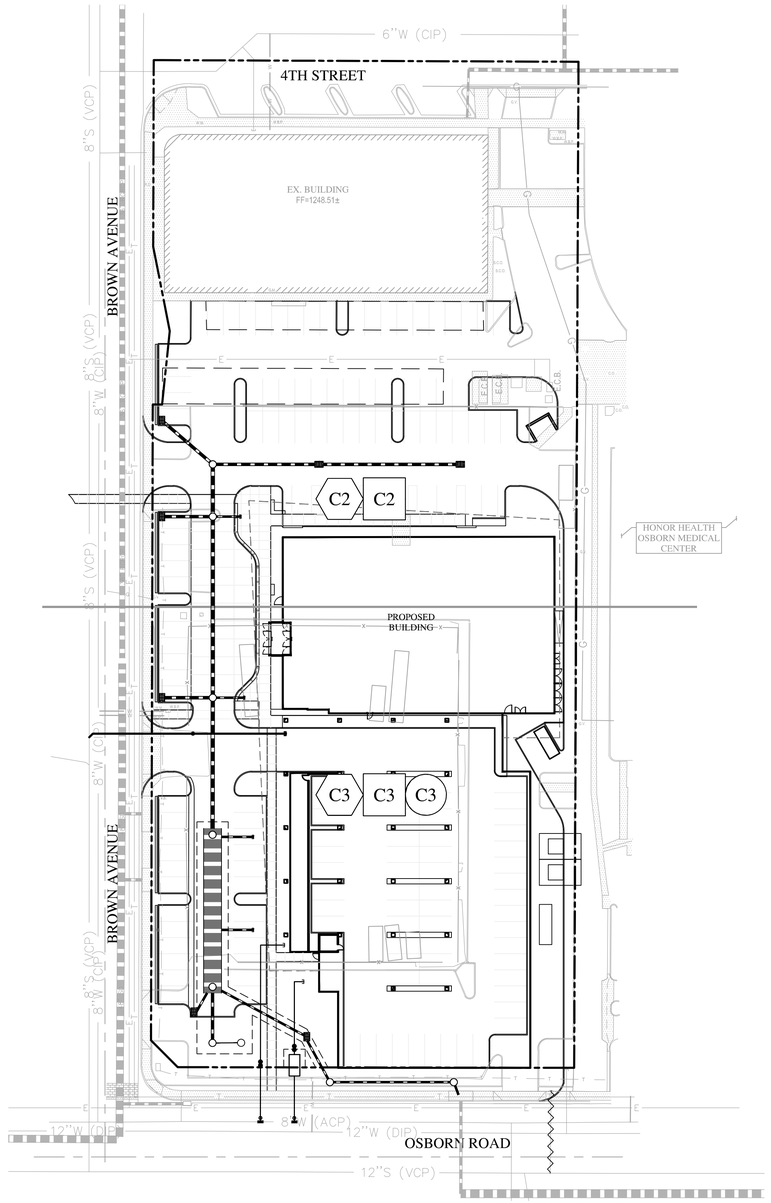
\

HONORHEALTH OSBORN

PRELIMINARY IMPROVEMENT PLAN

7400 E. OSBORN RD, SCOTTSDALE, AZ 85251

A PORTION OF THE SOUTHEAST 1/4 OF SECTION 26, TOWNSHIP 2 NORTH, RANGE 4 EAST
OF THE GILA AND SALT RIVER MERIDIAN, MARICOPA COUNTY, ARIZONA



N

0 40 80

Horz. 1 in. = 40 ft.

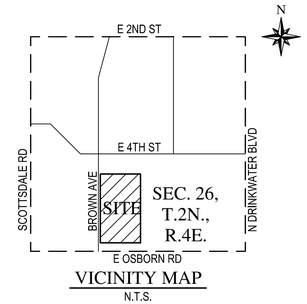
LEGEND

CX — PAVING, GRADING & DRAINAGE PLAN

CX — STORM DRAIN PLAN

CX — WATER PLAN AND SEWER

PROPERTY LINE



VICINITY MAP
N.T.S.

OWNER / DEVELOPER

SCOTTSDALE HEALTHCARE HOSPITALS
7400 E. OSBORN RD,
SCOTTSDALE ARIZONA 85251
CONTACT:
PHONE: 602-
E-MAIL: WWW..COM

ENGINEER

WOOD, PATEL & ASSOCIATES, INC.
1630 SOUTH STAPLEY DRIVE, SUITE 219
MESA, ARIZONA 85204
CONTACT: JOHN BULKA, P.E.
PHONE: (480) 834-3300
E-MAIL: JBULKA@WOOPATEL.COM

ARCHITECT

NORRIS DESIGN
901 EAST MADISON STREET
TEMPE, AZ 85281
CONTACT:
PHONE: (602)-254-9600
EMAIL: WWW.NORRIS-DESING.COM

PROJECT SITE DATA

ASSESSOR PARCEL NUMBER(S):
130-22-128
PROJECT SITE ADDRESS:
7400 E. OSBORN RD,
SCOTTSDALE AZ, 85251
PROJECT SITE AREA(S):
NET AREA = 7.49 AC
ZONING:
D/M-2

SHEET INDEX

LEGEND/ABBREVIATIONS

EXISTING SURVEY	
	SECTION LINE
	RIGHT OF WAY
	PROPERTY LINE
	ROAD CENTERLINE
	EASEMENT
	SURVEY MARKER
E	ELECTRIC
T	TELEPHONE
G	GAS LINE
S	SEWER LINE
W	WATER LINE
	STORM DRAIN PIPE
S	SEWER MANHOLE
D	STORM DRAIN MANHOLE
P 0.00	PAVEMENT ELEVATION
NG 0.00	NATURAL GROUND ELEVATION
C 0.00	CONCRETE ELEVATION
TC 0.00	TOP OF CURB ELEVATION
	JUNCTION BOX/RISER
	FIRE HYDRANT
	WATER VALVE
	STREET/PARKING LIGHT

PROPOSED GRADING, DRAINAGE & PAVING	
	SLOPE ARROW
	WALL
PROPOSED WATER & SEWER	
S	SEWER LNE
12"W	WATER LINE
	PLUG
	SEWER CLEANOUT
	AREA DRAIN
CB	CATCH BASIN
	STORM DRAIN MANHOLE
	STORM DRAIN PIPE
	DRYWELL

A.L.	AREA LIGHT
C	CONCRETE ELEVATION
C.B.	CATCH BASIN
DE	DRAINAGE EASEMENT
D.W.	DRYWELL
E.O.L.	EDGE OF LANDSCAPE
J.B.	JUNCTION BOX
FH	FIRE HYDRANT
E.C.B.	ELECTRICAL CABINET BOX
HW	HEAD WALL
INV	INVERT ELEVATION
FF	FINISHED FLOOR ELEVATION
WE	WATER EASEMENT
LF 88=	LOWEST FINISH FLOOR ELEVATION
TC 0.00	TOP OF CURB
FG 0.00	FINISH GRADE ELEVATION
C 0.00	CONCRETE ELEVATION
C.A	CROSS ACCESS
E.S.A	EMERGENCY SERVICE ACCESS
P.U.E	PUBLIC UTILITY EASEMENT
U.E	UTILITY EASEMENT
P.A.E	PUBLIC ACCESS EASEMENT
S.S.T	SITE SAFETY TRIANGLE
S.V.T	SITE VISIBILITY TRIANGLE
TW	TOP OF WALL

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CITY OF SCOTTSDALE

AUTHORITY HAVING JURISDICTION'S PROJECT NO:

FACILITY NUMBER:

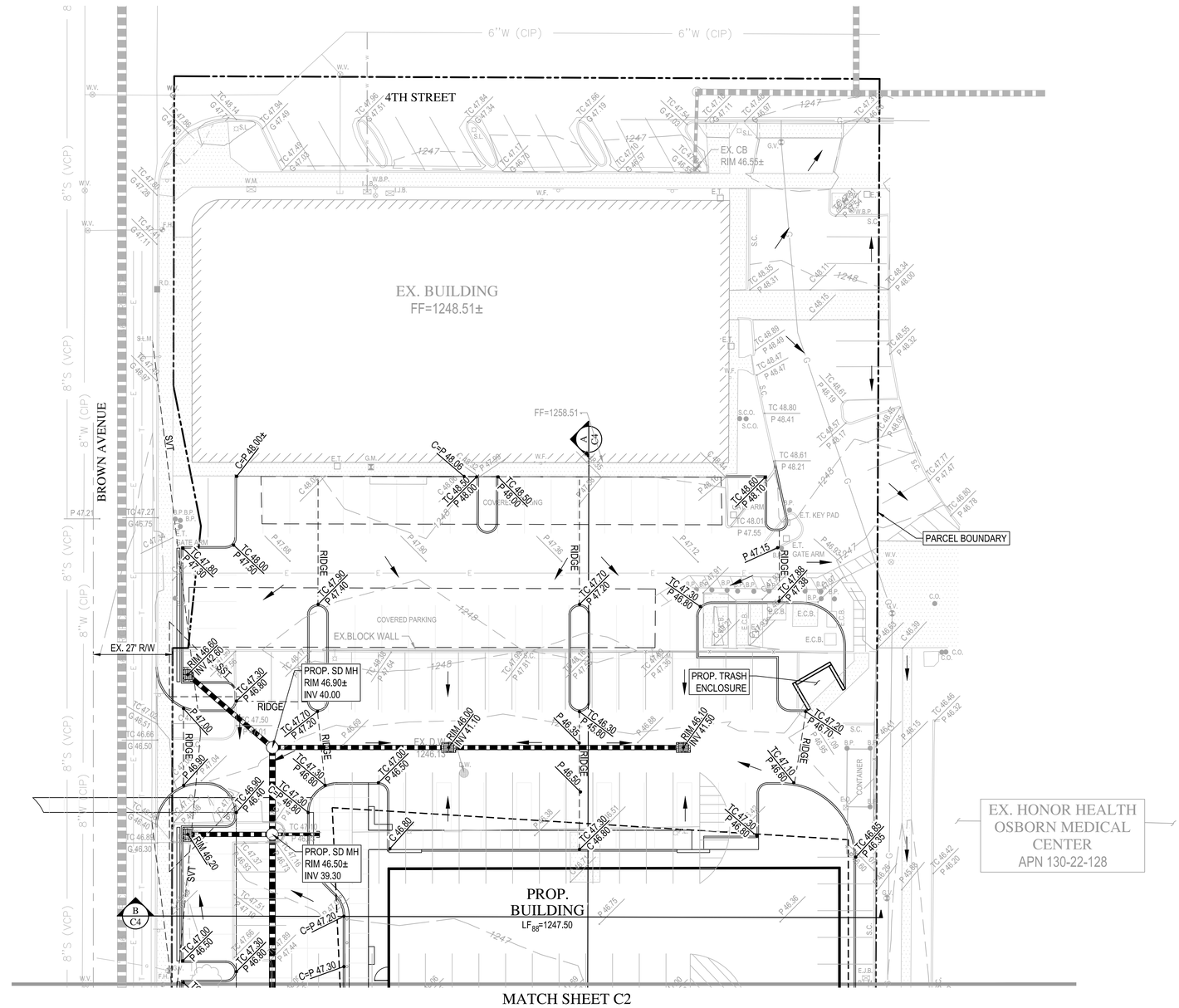
AGENCY APPROVALS:

REVISIONS		
REV #	DESCRIPTION	DATE

DATE:	04/1719
SCALE:	AS NOTED
DRAWN:	JO
REVIEWED:	JB
JOB NUMBER:	194976

COVER SHEET/
SHEET INDEX

C1 _ 4



N

0 20 40

Horz. 1 in. = 20 ft.

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REV #	DESCRIPTION	DATE

DATE:	04/1719
SCALE:	AS NOTED
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REVIEWED:	JB
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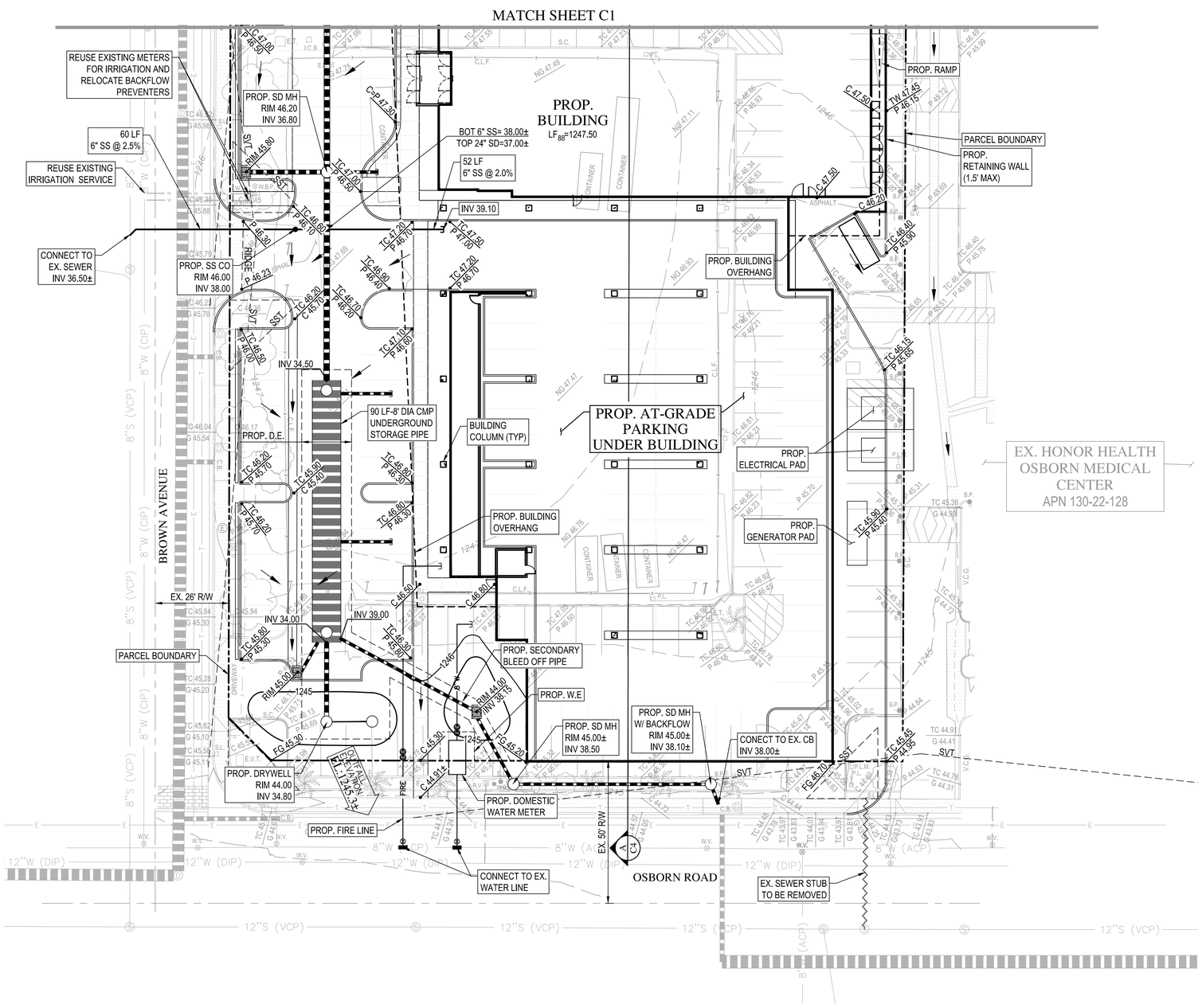
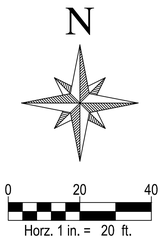
PRELIMINARY
IMPROVEMENT PLAN

C2 _ 4





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FACILITY NUMBER:

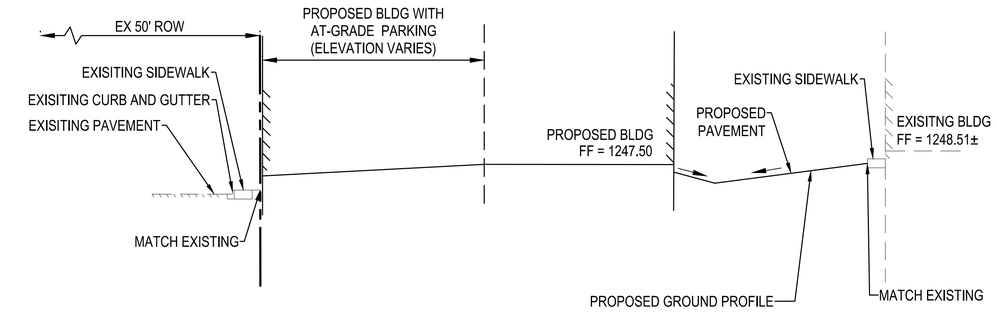
AGENCY APPROVALS:

REVISIONS		
REV #	DESCRIPTION	DATE

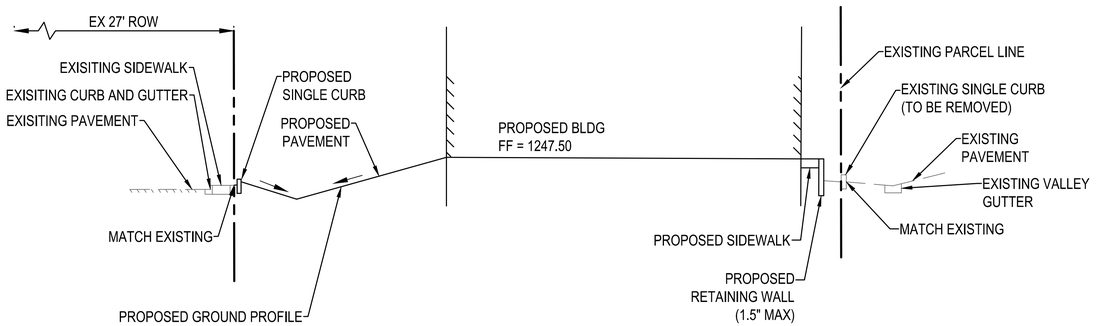
DATE:	04/1719
SCALE:	AS NOTED
DRAWN:	JO
REVIEWED:	JB
JOB NUMBER:	194976

PRELIMINARY
IMPROVEMENT PLAN

C3 _ 4



SECTION- A
N.T.S.



SECTION- B
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AGENCY APPROVALS:

REVISIONS		
REV #	DESCRIPTION	DATE

DATE:	04/1719
SCALE:	AS NOTED
DRAWN:	JO
REVIEWED:	JB
JOB NUMBER:	194976

PRELIMINARY
IMPROVEMENT PLAN

C4 _ 4

WASTEWATER COLLECTION SYSTEM
BASIS OF DESIGN REPORT
FOR
HONOR HEALTH
MEDICAL OFFICE BUIILDING

April 17, 2019
WP# 194976

Prepared For:

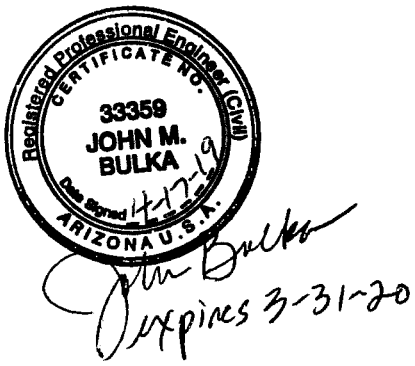
Devenney Group Ltd., Architects
Mr. Dudley Campbell
201 West Indian School Road
Suite 102
Phoenix, Arizona 85013
Phone: (602) 943-7645

Submitted To:

City of Scottsdale
Mr. Levi Dillion, P.E.
Water Resources Administration
9379 East San Salvador Drive
Scottsdale, Arizona 85258
Phone: (480)-312-5319

Prepared By:

Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8500
Website: www.woodpatel.com



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CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS • CONSTRUCTION MANAGERS

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S., CFM
Michael T. Young, P.E., LEED AP
James S. Campbell, P.E., LEED GA
Thomas R. Gettings, R.L.S.
Darin L. Moore, P.E., LEED GA
Jeffrey R. Minch, P.E., CFM
Robert D. Gofonia, P.E., R.L.S.

April 17, 2019

Mr. Levi Dillion, P.E.
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

Phone: (480)-312-5319
Email: ldillion@scottsdaleaz.gov

Re: **Honor Health Medical Office Building**
Wastewater Collection System, Basis of Design Report
Scottsdale, Arizona
WP# 194976

Dear Mr. Dillion:

The proposed Honor Health Medical Office Building development is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian. Refer to the attached *Vicinity Map* for the project location. The proposed 4-story office building will be 92,000 square feet (sf), with an option to add a 25,000-sf fifth floor. The proposed building is located at southeast corner of the site, with proposed parking lots on the north and west sides of the proposed building. At-grade parking will also be located under the south side of the building. The development will include associated hardscape and landscaping.

Wastewater flowing from the proposed Honor Health Medical Office Building will discharge to a 6-inch private sewer line on the west side of the proposed building. The 6-inch private sewer line discharges into the City of Scottsdale's existing public 8-inch VCP sewer line in Brown Avenue.

The design criteria used to estimate wastewater flows and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the requirements listed in the City of Scottsdale's *Design Standards and Policies Manual,* 2018. The following is a summary of the primary design criteria utilized:

• Average Day Wastewater flows, Office:	0.4 gpd/sq. ft.
• Peaking Factor, Office:	3
• Minimum Mean Full Flow Velocity:	2.50 fps
• Minimum Peak Full Flow Velocity:	10.0 fps
• Minimum Peak Flow d/D Ratio (12" dia. Or less sewers):	d/D = 0.65

Abbreviations: gpd = gallons per day; fps = feet per second

Based on the above design criteria, the projected average day flow for the proposed 117,000-sf Honor Health Medical Office Building project is approximately 44,800 gallons per day (gpd), or 33 gallons per minute (gpm). The peak flow is projected to be 140,400 gpd. The proposed sewer slopes, projected flow velocities, and pipe flow capacities are summarized on the attached spreadsheets.

It is assumed the infiltration and inflow from wet weather has been accounted for in the published design flow rates for the development and the maximum d/D. Therefore, those flows have not been added into the calculations. The proposed sanitary sewer collection system is designed to have adequate capacity to serve the proposed development.

Thank you for your review of the Wastewater Collection System Basis of Design Report provided for the Honor Health Medical Office Building development. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc.

John M. Bulka, P.E.
Project Manager

JMB/km

Y:\WP\Reports\Commercial\194976 Honor Health Medical Office Building Wastewater Basis of Design Report.docx

WASTEWATER DESIGN FLOWS & FLOWMASTER RESULTS

WOOD/PATEL
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CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

TABLE 1 - WASTEWATER DESIGN FLOWS

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Manager: John Bulka, P.E.
Date: 4/17/2019

UPSTREAM NODE	DOWNSTREAM NODE	APPLICABLE UNIT	NUMBER OF UNITS	ADF/ APPLICABLE UNIT (GPD)[1]	TOTAL ADF (GPD)	PEAKING FACTOR[2]	PEAK FLOW (GPD)	TOTAL ADF (GPM)	PEAK FLOW (GPM)
Building Connection 1	Privite Sewer Connection	SF	117,000	0.4	46,800	3.00	140,400	33	98
Total					**46,800**		**140,400**	**33**	**98**

1. Average Daily Flow Demand based upon office building square footage per City of Scottsdale Design Standards and Policies Manual (2018)
2. Peaking Factor per City of Scottsdale Design Standards and Policies Manual (2018)

Proposed 6" Sewer Line (2.0%)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02000	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

Results

Normal Depth	1.87	in
Flow Area	0.05	ft²
Wetted Perimeter	0.59	ft
Hydraulic Radius	1.06	in
Top Width	0.46	ft
Critical Depth	0.23	ft
Percent Full	31.2	%
Critical Slope	0.00445	ft/ft
Velocity	4.16	ft/s
Velocity Head	0.27	ft
Specific Energy	0.42	ft
Froude Number	2.18	
Maximum Discharge	1.11	ft³/s
Discharge Full	1.03	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	31.19	%
Downstream Velocity	Infinity	ft/s

Proposed 6" Sewer Line (2.0%)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.87	in
Critical Depth	0.23	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.00445	ft/ft

Proposed 6" Sewer Line (2.5%)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02500	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

Results

Normal Depth	1.77	in
Flow Area	0.05	ft²
Wetted Perimeter	0.57	ft
Hydraulic Radius	1.01	in
Top Width	0.46	ft
Critical Depth	0.23	ft
Percent Full	29.4	%
Critical Slope	0.00446	ft/ft
Velocity	4.50	ft/s
Velocity Head	0.31	ft
Specific Energy	0.46	ft
Froude Number	2.44	
Maximum Discharge	1.24	ft³/s
Discharge Full	1.15	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

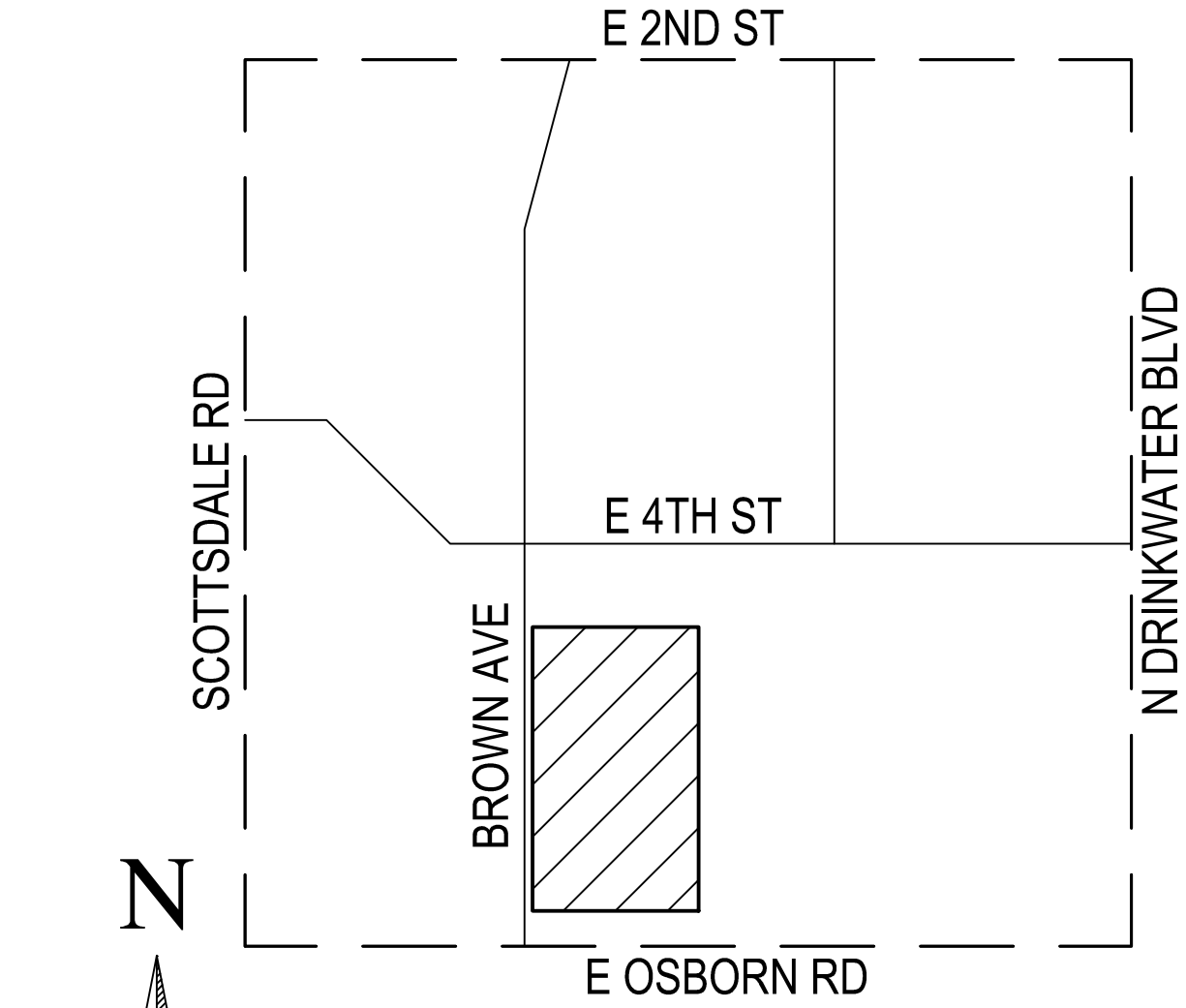
Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	29.45	%
Downstream Velocity	Infinity	ft/s

Proposed 6" Sewer Line (2.5%)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.77	in
Critical Depth	0.23	ft
Channel Slope	0.02500	ft/ft
Critical Slope	0.00446	ft/ft

VICINITY MAP



VICINITY MAP

N.T.S.

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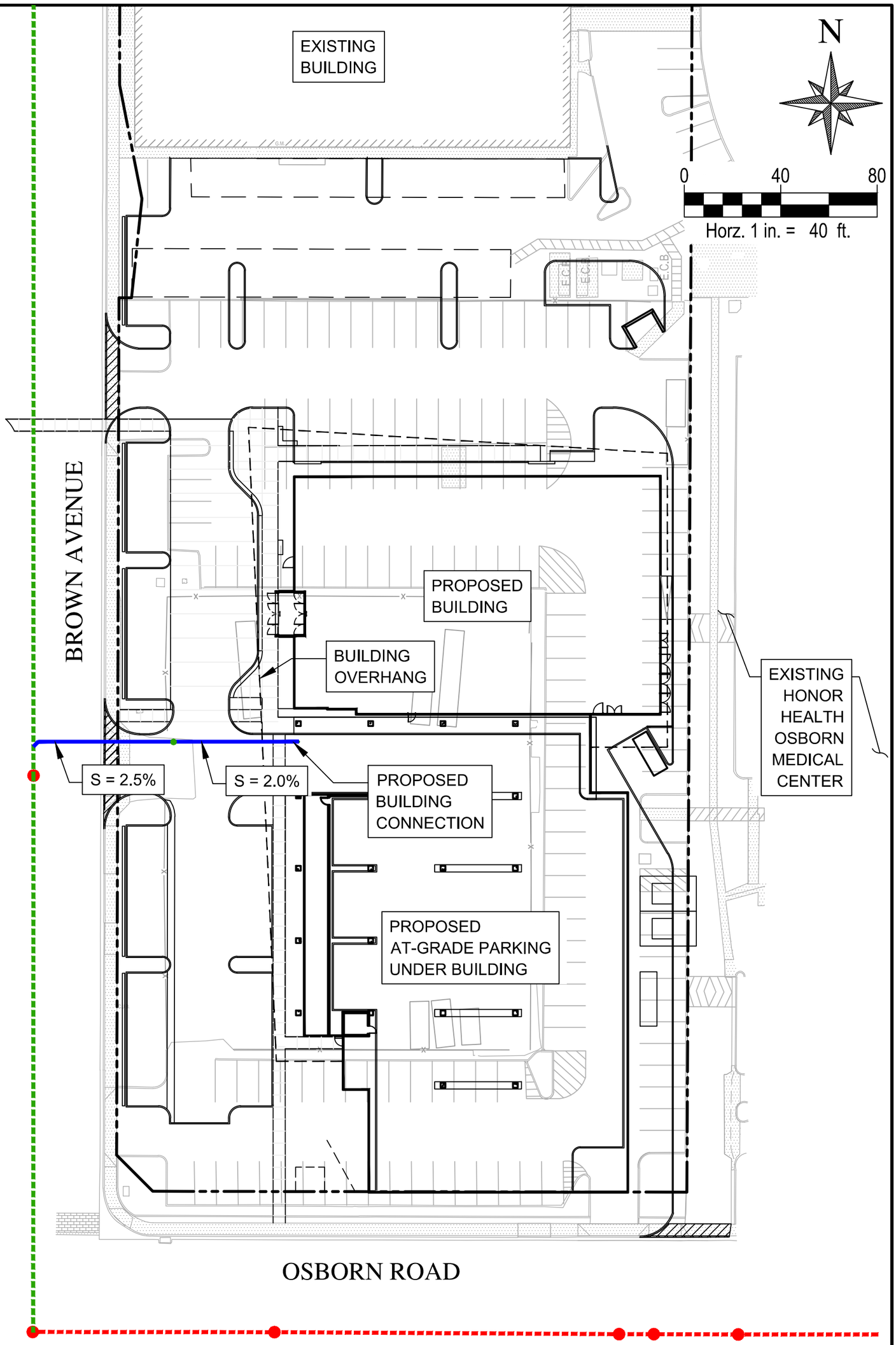
HONOR HEALTH MEDICAL OFFICE BUILDING

VICINITY MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

WASTEWATER EXHIBIT



PIPE DIAMETER	EXISTING	PLANNED
6-INCHES		
8-INCHES		
12-INCHES		
MANHOLE		
CLEANOUT		

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HONOR HEALTH MEDICAL OFFICE BUILDING

Wastewater Exhibit

DATE:	SCALE:	SHEET
04-17-2019	1" = 40'	01 of 01
JOB NO.:	DESIGN: JB	
194976	DRAWN: AF	

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WATER DISTRIBUTION SYSTEM
BASIS OF DESIGN REPORT
FOR
HONOR HEALTH
MEDICAL OFFICE BUIILDING

April 17, 2019
WP# 194976

Prepared For:

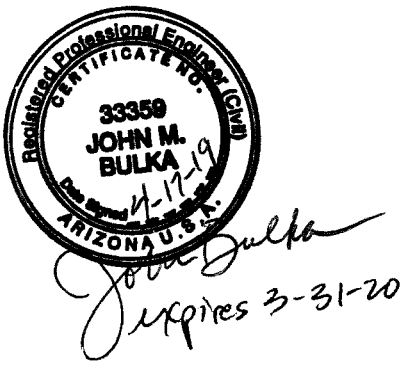
Devenney Group Ltd., Architects
Mr. Dudley Campbell
201 West Indian School Road
Suite 102
Phoenix, Arizona 85013
Phone: (602) 943-7645

Submitted To:

City of Scottsdale
Mr. Levi Dillion, P.E.
Water Resources Administration
9379 East San Salvador Drive
Scottsdale, Arizona 85258
Phone: (480)-312-5319

Prepared By:

Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8500
Website: www.woodpatel.com



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CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS • CONSTRUCTION MANAGERS

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Michael T. Young, P.E., LEED AP
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April 17, 2019

Mr. Levi Dillion, P.E.
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

Phone: (480)-312-5319
Email: ldillion@scottsdaleaz.gov

Re: **Honor Health Medical Office Building**
Water Distribution System, Basis of Design Report
Scottsdale, Arizona
WP# 194976

Dear Mr. Dillion:

The proposed Honor Health Medical Office Building development is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian. Refer to the attached *Vicinity Map* for the project location. The proposed 4-story office building will be 92,000 square feet (sf), with an option to add a 25,000-sf fifth floor. The proposed building is located at the southeast corner of the site, with proposed parking lots on the north and west sides of the proposed building. At-grade parking will also be located under the south side of the building. The development will include associated hardscape and landscaping.

The project site has public waterline infrastructure on three (3) sides of the site. There is one (1) 12-inch DIP and one (1) 8-inch ACP water main in Osborn Road. There is one (1) 8-inch CIP water main in Brown Avenue. There is one (1) 6-inch CIP water main in 4th Street. The Honor Health Medical Office Building site proposes two (2) private water connections that utilize the City's public waterline for domestic water and fire protection that connect to the existing public 8-inch waterline in Osborn Road. The existing irrigation meter will be reused. Refer to the attached *Water Exhibit* for a depiction of the existing water infrastructure surrounding the project.

The design criteria used to estimate potable water demands and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the requirements listed in the *City of Scottsdale Design Standards and Policies Manual*, 2018. The following is a summary of the primary design criteria utilized:

- Average Day Water Demand, Office: 8.34E-04 gpm/sq. ft.*
- Fire Flow Requirements: min 1,500 gpm**
- Maximum Day Demand: 2.0 x ADD
- Peak Hour Demand: 3.5 x ADD
- Minimum Residual Pressure, Peak Hour: 50 psi
- Minimum Residual Pressure, Maximum Day + Fire Flow: 30 psi

• Maximum System Pressure:	120 psi
• Maximum Pipe Head Loss, Maximum Day Demand:	8 ft / 1000 ft
• Maximum Pipe Head Loss, Peak Hour Demand:	10 ft / 1000 ft
• Minimum Pipe Diameter, Public Water Line:	8 inches

Abbreviations: gpd = gallons per day; sf = square feet; ADD = average day demand; psi = pounds per square inch

* Includes both inside and outside use per Figure 6-1.2, *COS Design Standards and Policies Manual*

** Fire flow is based on 10% reduction to account for flow measurement inaccuracy (refer to attached calculations in the appendices)

Domestic water service will be provided by a proposed 3-inch private waterline and a 3-inch domestic meter. Fire protection for the proposed building will be provided by one (1) proposed 6-inch fire line for an automatic fire-sprinkler service. Irrigation water service will be provided by a suspected existing 1-inch irrigation line.

The average day water demand for the proposed 117,000-sf Honor Health Medical Office Building is projected to be approximately 97.6 gallons per minute (gpm). Maximum day demands and peak hour demands are projected to be 195.2 gpm and 341.6 gpm, respectively (refer to the attached calculations).

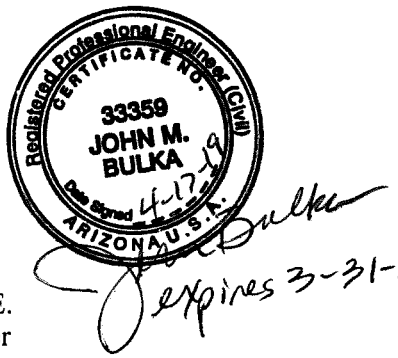
WaterCAD V8i, by Haestad Methods, was utilized to analyze the existing water distribution system and proposed improvements. Results from a fire hydrant flow test, conducted on April 12, 2019 by Arizona Flow Testing LLC, was utilized to simulate the City of Scottsdale's water supply for the project (refer to attached modeling results).

The hydraulic modeling results indicate the proposed system is capable of delivering peak hour demands, totaling 342 gpm, to the proposed Honor Health Medical Office Building project, with pressures ranging from 71 to 72 pounds per square inch (psi). Fire flow results indicate residual pressures exceed 30 psi within the project site, with 2,500-gpm fire hydrant flows during maximum day demand. A 50-percent reduction was applied to the fire flow requirements due to the proposed sprinkler system. Hydraulic modeling results, calculations, and exhibits involved in the water system analysis are attached.

Thank you for your review of the Water Distribution System Basis of Design Report provided for the Honor Health Medical Office Building project. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc



John Bulka, P.E.
Project Manager

JMB/km

CALCULATIONS AND HYDRAULIC MODELING RESULTS

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TABLE 1 - WATER DEMAND DESIGN FLOWS

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Engineer: John Bulka, P.E.
Date: 4/17/2019

LAND USE AND DWELLING UNIT BREAKDOWN BY JUNCTION

HYDRAULIC MODEL NODE	ELEVATION (ft)	PRESSURE ZONE	LAND USE	DWELLING UNITS	DEMAND VALUE	UNITS	AVERAGE DAILY DEMAND			MAXIMUM DAY DEMAND				PEAK HOUR DEMAND			
							(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)
J-BLDG	1,245.00	-	Commercial (Office)	117,000	0.000834	gpm/sf	140,544.00	97.6	97.6	2.0	281,088.00	195.2	195.2	3.5	491,904.00	341.6	341.6
Total				**117,000**			**140,544**	**97.6**	**97.6**		**281,088**	**195.2**	**195.2**		**491,904**	**341.6**	**341.6**

Notes:
1. Per the City of Scottsdale Design Standards and Policies Manuel, dwelling units for an office building are measured in square feet.
2. The proposed building water demand was estimated assuming 5th floor addition.

FIRE HYDRANT FLOW TEST

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	Honor Health MOB
Project Address:	7242 East Osborn Road, Scottsdale, Arizona, 85251
Client Project No.:	194976
Arizona Flow Testing Project No.:	19131
Flow Test Permit No.:	C57857
Date and time flow test conducted:	April 12, 2019 at 8:00 AM
Data is current and reliable until:	October 12, 2019
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Ray Padilla –City of Scottsdale-Inspector (602-541-0586)

Raw Test Data

Static Pressure: **85.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **75.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **23.0 PSI**

(Measured in pounds per square inch)

Diffuser Orifice Diameter: One 4-inch Hose Monster
(Measured in inches)

Coefficient of Diffuser: .7875

Flowing GPM: **1,803 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **4,955 GPM**

Data with 13 PSI Safety Factor

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **62.0 PSI**
(Measured in pounds per square inch)

Distance between hydrants: Approx.: 290 feet

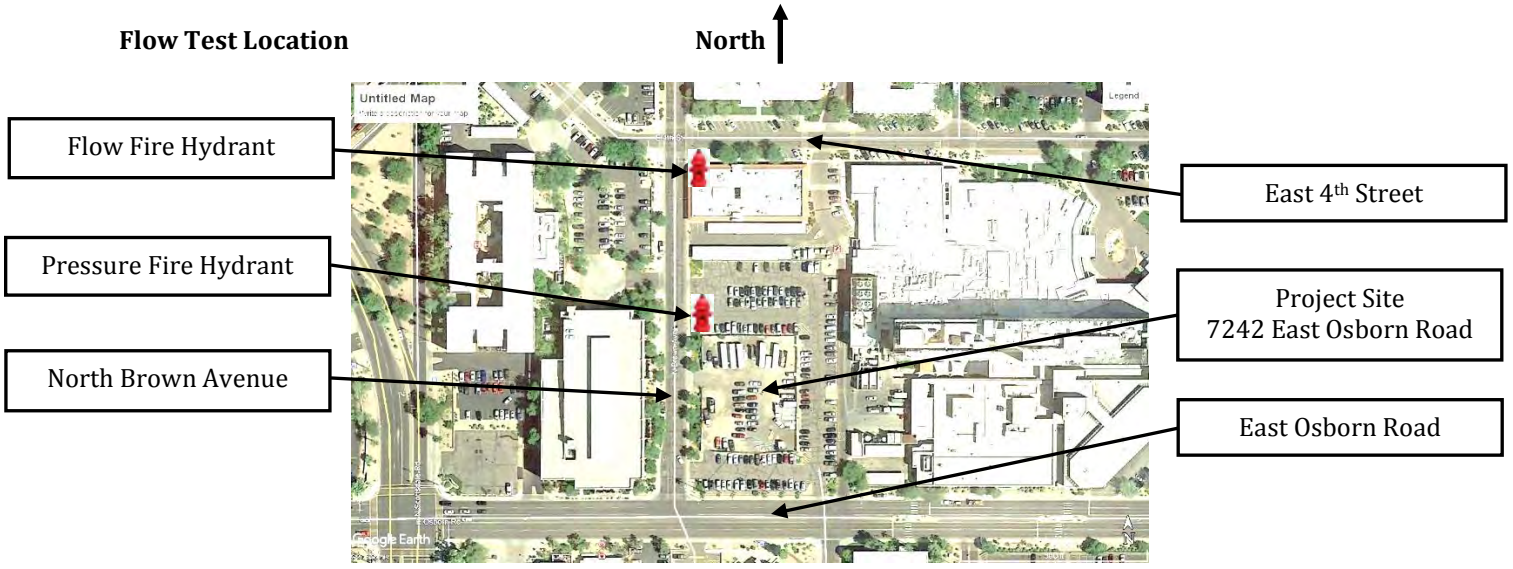
Main size: Not Provided

Flowing GPM: **1,803 GPM**

GPM @ 20 PSI**:** **4,392 GPM**

Scottsdale requires a maximum Static Pressure of 72 PSI for AFES Design.

Flow Test Location **North**



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EXISTING WATER SYSTEM PRESSURES

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona

Project Number: 194976
Project Engineer: John Bulka, P.E.

Flow Test Location: 7242 E Osborn Road, Scottsdale AZ
Date of Flow Test: April 12, 2019

Pressure Hydrant		**Flow Hydrant**	
Static Pressure (psi)	72.0		
Residual Pressure (psi)	62.0	Flow (gpm)	1803
Calculated Flow at 20 psi	4392 gpm	Calculated Flow at	20 psi

Discharge (gpm)	Pressure (psi)	Head (ft)
0	72.0	166.2
1803	62.0	143.2
4392	20	46.2

Notes:
1. Values provided from a flow test by the Arizona Flow Testing LLC

FlexTable: Pipe Table

Active Scenario: Calibration-Static

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	0	0.00
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	0	0.00
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibration-Static

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.70	73
EX J-2	1,244.50	0	1,412.70	73
EX FH-1	1,245.00	0	1,412.70	73
EX FH-FLOW	1,247.50	0	1,412.70	71
EX J-3	1,248.00	0	1,412.70	71
EX FH-TEST	1,246.50	0	1,412.70	72
EX J-BLDG	1,248.00	0	1,412.70	71
EX J-4	1,247.00	0	1,412.70	72
J-BLDG	1,245.00	0	1,412.70	73

FlexTable: Pipe Table

Active Scenario: Calibraion-Flow

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	1,803	11.51
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	1,803	0.32
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	1,803	0.32
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibraion-Flow

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,389.70	63
EX J-2	1,244.50	0	1,389.70	63
EX FH-1	1,245.00	0	1,389.70	63
EX FH-FLOW	1,247.50	1,803	1,375.86	56
EX J-3	1,248.00	0	1,375.86	55
EX FH-TEST	1,246.50	0	1,389.70	62
EX J-BLDG	1,248.00	0	1,375.86	55
EX J-4	1,247.00	0	1,375.86	56
J-BLDG	1,245.00	0	1,389.70	63

FlexTable: Pipe Table

Active Scenario: Calibraion-Max

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	4,392	28.03
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	4,392	0.78
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	4,392	0.78
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibraion-Max

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,292.70	21
EX J-2	1,244.50	0	1,292.70	21
EX FH-1	1,245.00	0	1,292.70	21
EX FH-FLOW	1,247.50	4,392	1,220.72	-12
EX J-3	1,248.00	0	1,220.72	-12
EX FH-TEST	1,246.50	0	1,292.70	20
EX J-BLDG	1,248.00	0	1,220.72	-12
EX J-4	1,247.00	0	1,220.72	-11
J-BLDG	1,245.00	0	1,292.70	21

FlexTable: Pipe Table

Active Scenario: Average Day Demand

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	98	0.62
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	98	0.02
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	98	0.02
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-98	0.62

FlexTable: Junction Table

Active Scenario: Average Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.50	73
EX J-2	1,244.50	0	1,412.50	73
EX FH-1	1,245.00	0	1,412.52	72
EX FH-FLOW	1,247.50	0	1,412.60	71
EX J-3	1,248.00	0	1,412.60	71
EX FH-TEST	1,246.50	0	1,412.60	72
EX J-BLDG	1,248.00	0	1,412.60	71
EX J-4	1,247.00	0	1,412.60	72
J-BLDG	1,245.00	98	1,412.50	72

FlexTable: Pipe Table

Active Scenario: Max Day

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	195	1.25
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	195	0.03
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	195	0.03
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-195	1.25

FlexTable: Junction Table

Active Scenario: Max Day

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,411.99	73
EX J-2	1,244.50	0	1,411.99	72
EX FH-1	1,245.00	0	1,412.03	72
EX FH-FLOW	1,247.50	0	1,412.33	71
EX J-3	1,248.00	0	1,412.33	71
EX FH-TEST	1,246.50	0	1,412.33	72
EX J-BLDG	1,248.00	0	1,412.33	71
EX J-4	1,247.00	0	1,412.33	72
J-BLDG	1,245.00	195	1,411.99	72

FlexTable: Pipe Table

Active Scenario: Peak Hour

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	342	2.18
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	342	0.06
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	342	0.06
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-342	2.18

FlexTable: Junction Table

Active Scenario: Peak Hour

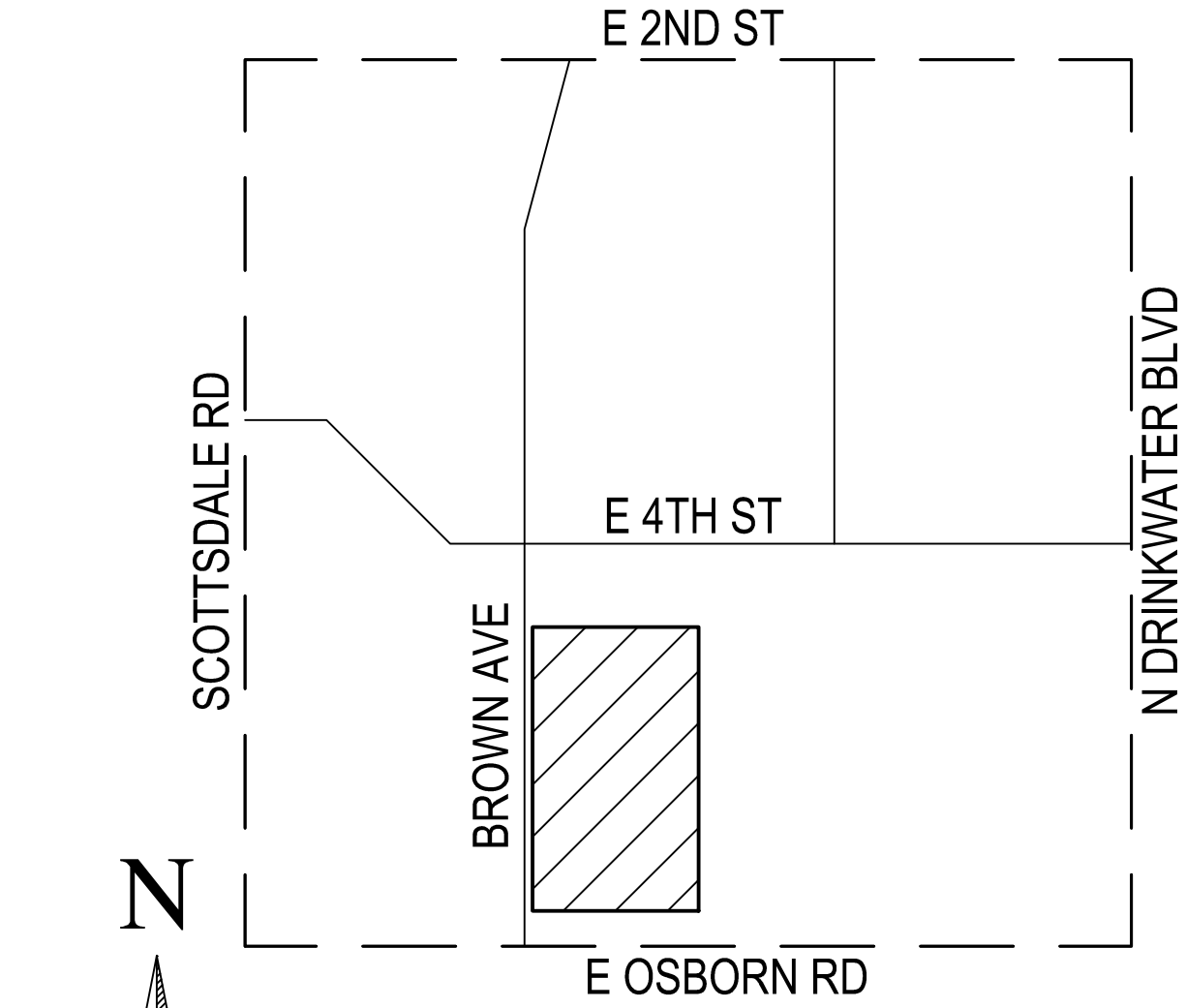
Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,410.71	72
EX J-2	1,244.50	0	1,410.71	72
EX FH-1	1,245.00	0	1,410.82	72
EX FH-FLOW	1,247.50	0	1,411.65	71
EX J-3	1,248.00	0	1,411.65	71
EX FH-TEST	1,246.50	0	1,411.65	71
EX J-BLDG	1,248.00	0	1,411.65	71
EX J-4	1,247.00	0	1,411.65	71
J-BLDG	1,245.00	342	1,410.71	72

Fire Flow Node FlexTable: Fire Flow Report

Active Scenario: Max Day + Fire Flow

Label	Elevation (ft)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Calculated Residual) (psi)	Junction w/ Minimum Pressure (System)	Hydraulic Grade (ft)
EX J-1	1,244.00	2,500	2,330	30	EX J-2	1,411.99
EX J-2	1,244.50	2,500	2,406	30	EX J-1	1,411.99
EX FH-1	1,245.00	2,500	2,690	30	J-BLDG	1,412.03
EX FH-FLOW	1,247.50	2,500	2,888	30	EX J-BLDG	1,412.33
EX J-3	1,248.00	2,500	2,792	30	EX J-BLDG	1,412.33
EX FH-TEST	1,246.50	2,500	3,685	31	EX J-BLDG	1,412.33
EX J-BLDG	1,248.00	2,500	2,276	30	EX J-4	1,412.33
EX J-4	1,247.00	2,500	1,718	30	EX J-BLDG	1,412.33
J-BLDG	1,245.00	2,695	2,799	30	EX J-2	1,411.99

VICINITY MAP



VICINITY MAP

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HONOR HEALTH MEDICAL OFFICE BUILDING

VICINITY MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

WATER EXHIBIT

EX J-3
EX P-7
EX J-BLDG
EX P-8
EX J-4
EX P-6
EX FH-FLOW
4TH STREET
N
0
50
100
Horz. 1 in. = 50 ft.
EX. BUILDING
FF=1248.51±
EX P-5
BROWN AVENUE
EX FH-TEST
PMP-1
RES-1
BUILDING OVERHANG
PROPOSED BUILDING
IRRIGATION CONNECTION
EXISTING HONOR HEALTH OSBORN MEDICAL CENTER
P-RES
P-PMP
PROPOSED AT-GRADE PARKING UNDER BUILDING
EX P-4
FIRE CONNECTION
J-BLDG (DOMESTIC)
EX J-2
EX J-1
EX FH-1
EX P-3
EX P-2
EX P-1
OSBORN ROAD

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PIPE DIAMETER	EXISTING	PLANNED
6-INCHES		
8-INCHES		
12-INCHES		

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HONOR HEALTH MEDICAL OFFICE BUILDING

Water Exhibit

DATE: 04-17-2019	SCALE: 1" = 50'	SHEET 01 of 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

PRELIMINARY
DRAINAGE REPORT
FOR
HONOR HEALTH
MEDICAL OFFICE BUIILDING

April 17, 2019
WP# 194976

Prepared For:

Devenney Group Ltd., Architects
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Submitted To:

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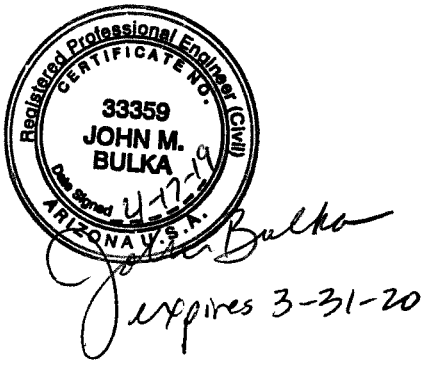

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APPENDICES

EXHIBITS

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Y:\WP\Reports\Commercial\194976 Honor Health Medical Office Building Preliminary Drainage Report.docx

1.0 INTRODUCTION

The proposed Honor Health Medical Office Building development is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Osborn Medical Center. More specifically, the site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian. Refer to Exhibit 1 – *Vicinity Map* at the back of this report for the project location. The proposed 4-story office building will be 92,000 square feet with an option to add a 25,000-sf fifth floor. The proposed building is located at the southeast corner of the site, with proposed parking lots on the north and west sides of the proposed building. At-grade parking will also be located under the south side of the building. The development will also include associated hardscape and landscaping.

The purpose of this report is to document the drainage design criteria utilized for the Honor Health Medical Office Building development, and is intended to support the Design Review Board (DRB) submittal for the project. This Preliminary Drainage Report has been prepared in accordance with Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the City of Scottsdale's technical requirements for drainage (Ref. 1), as applicable for the site.

2.0 EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

2.1 Existing Conditions

The Honor Health Medical Office Building site is currently an asphalt parking lot with an existing building on the north side of the site (refer to Exhibit 2 – *Existing Drainage Map*). There is also an enclosed fenced area in the middle of the site, with a gravel surface that is currently being used for parking and storage containers. Aerial photography indicates a building was previously located at this location and was demolished around 2008. There are currently no storm water retention facilities on the site. There are currently two (2) drywells in the interior of the site. One (1) drywell appears to accept some runoff, but the second drywell is higher than the adjacent grades. In general, most of the site where development will occur drains overland to the southwest, into Osborn Road. The north side of the site, including the portion of the existing building, drains to the north. There is an existing catch basin on the north side of the building that connects to an existing public 18-inch storm drain in 4th Street. An existing scupper at the northeast portion of the site also drains storm water away from the existing building. A smaller portion of the site drains overland to Brown Avenue. Brown Avenue and Osborn Road both have existing storm drain. There are several existing catch basins on the east side of Brown Avenue that connect to a 48-inch main line. There are also several existing catch basins on the north side of Osborn Road that connect to a 54-inch main line. It is our understanding both of these storm drain main lines run to the east to Hayden Wash.

2.2 FEMA Floodplain

The Federal Emergency Management Agency (FEMA) has published a 100-year floodplain, per Flood Insurance Rate Map (FIRM). The City of Scottsdale FEMA Firm panel number is 04013C2235L, effective date October 16, 2013, and indicates the site falls within Zone "X" (refer to Exhibit 3 – *FEMA FIRM Map*).

Zone "X" is defined by FEMA as follows:

> "*0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flow with average depth less than one foot or with drainage areas of less than one square mile"*

3.0 PROPOSED DRAINAGE PLAN

3.1 Proposed Conditions

The proposed grading for the site is designed to direct storm water runoff away from the proposed building and into the proposed on-site storm water facilities. Proposed catch basins and storm drains will collect the site runoff and store the first flush volume in an 8-foot-diameter underground storm water retention pipe (refer to Exhibit 6 – *Preliminary Grading and Drainage Plan*). The retention pipe will dewater by two (2) methods. The lower part of the pipe will drain to a proposed drywell at the southwest corner of the site. The upper part of the retention pipe will drain by a bleed-off pipe to the City of Scottsdale's storm drain in Osborn Road. We do not believe the entire underground retention system can be drained solely by a bleed-off pipe, due to the number of utility crossings in Osborn Road. 8-foot-diameter storage pipe was selected because the upper portion of the pipe can still be drained by gravity, and the upstream on-site storm water drain will not conflict with the on-site sanitary sewer. It should be noted the catch basin connection inverts in Osborn Road still need to be verified.

If the on-site catch basins become clogged, or if the on-site storm water storage system is exceeded, overland overflow routes have been incorporated into the grading and drainage design. The ultimate outfall for the project will be at the southwest corner of the site and will drain into Osborn Road.

3.2 Retention and Dissipation

It is our understanding a storm water retention waiver exists for the Honor Health campus, per City of Scottsdale Plan Check No. 3182-02. We have not seen the retention waiver, and it is unclear if this portion of the site is included in the waiver. Therefore, using a historical aerial map, the pre-development runoff coefficient was compared to the post-development runoff coefficient (refer to Exhibit 4 – *Aerial Map from November 2005*). The historical runoff coefficient of 0.93 is higher than the post-development runoff coefficient of 0.91. Because there is no increase in runoff, the City of Scottsdale's *Design Standards and Policies Manual* states the site must provide storm water retention for the first flush storm event. In accordance with the current City of Scottsdale's *Design Standards and Policies Manual*, the following required retention volume equation was used for this project, with the current precipitation depth of 0.5 inches:

$Vol_{req} = {}^{P}/_{12}$ x A x C

P = Precipitation Depth: 0.5 inches

A = Total Area (sq. ft.)

C = Post-Development Runoff Coefficient: 0.95

The required retention volume will be provided by proposed 8-foot-diameter underground C.M.P. storage pipes. The storm water retention volumes have been designed to accommodate the first flush event within the underground storage pipe. The retention volume required for the site is 4,445 cubic feet (cf). The proposed storm water retention system consists of one (1) 8-foot-diameter pipe, having a length of 90 linear feet of pipe (refer to Appendix A – *Preliminary Hydrologic and Hydraulic Calculations*). The underground storage system primarily utilizes a drywell to dissipate the retained volume within 36 hours. An estimate of the required number of drywells was calculated by utilizing a design drain rate of 0.10 cfs per drywell. Based on this design drywell drain rate, one (1) drywell each is required to dissipate the retention pipe. When the drywell is installed, percolation testing will be performed to determine the actual percolation rate of the drywell. The underground storage system also utilizes a bleed-off pipe to dissipate the retained volume within 36 hours. This bleed-off pipe will connect to the catch basin in Osborn Road and drain into the 54-inch storm drain.

The design of the storm water retention pipe will be finalized with the final plan set. We anticipate using proposed 8-foot-diameter C.M.P. underground storage pipe. The pipe manufacturer and Geotechnical Engineer will provide specifications for the H20/HS20 and H25/HS25 live loads and estimated design life that exceeds the City of Scottsdale's minimum design criteria of a 50-year design life for underground retention pipes.

3.3 Lowest Floor Elevation

The Preliminary Grading and Drainage Plan is designed to comply with the City of Scottsdale's floodplain ordinance in a Zone "X" floodplain. The proposed building has a finished floor elevation of 1247.50, which is 2.20 feet above the ultimate outfall elevation of 1245.30, located on the southwest corner of the site. If the outlet pipe for the retention basins becomes clogged, storm water can overflow over land (refer to Exhibit 5 – *Preliminary Drainage Map* for a graphical representation).

3.4 Operation and Maintenance

The property owner shall be solely responsible for the operation and maintenance of the storm water drainage system. In accordance with the City of Scottsdale's *Design Specifications and Policies Manual*, the owner will dedicate a public drainage easement for the storm water retention facilities. Operation and maintenance reference material will be provided in the Final Drainage Report.

4.0 SPECIAL CONDITIONS

Currently, there are no washes with 100-year flows greater than 50 cfs that traverse the project site. Also, there are no designated Section 404 washes within the site; therefore, no Section 404 permit is required.

5.0 DATA ANALYSIS

5.1 Hydrologic Analysis

The drainage improvements will be developed consistent with Chapter 4 of the City of Scottsdale's *Design Standards and Policies Manual*, 2018. The Rational Method will be used to quantify peak discharge values for on-site concentration points for the full buildout scenario during the first flush storm event. Weighted "C" coefficients will be referenced from Chapter 4 of the City of Scottsdale's *Design Standards and Policies Manual*, 2018. Refer to Appendix A for rational calculation printouts, and Exhibit 4 for drainage basin tributary areas and concentration point locations.

5.2 Hydraulic Analysis

For this preliminary report, storm drain rim and invert information is provided on Exhibit 5. Hydraulic analysis of the proposed storm drain will be forthcoming once the City approves the conceptual storm water retention scenario. The on-site storm drain system will be designed to accommodate the 10-year storm event. Bentley StormCAD Version 5.6 will be utilized to analyze the proposed storm sewer system. StormCAD printouts and storm drain profiles will be available.

6.0 CONCLUSIONS

Based on our analysis of the site, the following conclusions can be made:

1. The proposed drainage infrastructure will be designed in accordance with the City of Scottsdale's *Design Standards and Policies Manual*, 2018.

2. The proposed site lies within a FEMA-designated "Other Flood Areas" Zone "X" shaded. Per the FEMA map (Panel 1760L), the FIRM information is as follows:

   "*0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flow with average depth less than one foot or with drainage areas of less than one square mile*."

3. No off-site flows appear to impact the site.

4. The Rational Method was used to estimate peak discharges for all on-site drainage areas in this report.

5. In accordance with the City of Scottsdale's design guidelines, storm water retention will be provided for the first flush storm event (0.5 inches of rainfall).

6. Storm water retention will be provided in a retention basin. The volume required for the site is 4,445 cubic feet. The volume proposed is 4,524 cubic feet.

7. The proposed building has a finished floor elevation of 1247.50, which is 2.20 feet above the ultimate outfall elevation of 1245.30, located on the southwest corner of the site.

8. The property owner will maintain the on-site storm water retention system, and dedicate a public drainage easement for the storm water retention facilities.

7.0 REFERENCES

1. *Design Standards and Policies Manual, Chapter 4: Grading and Drainage*, City of Scottsdale, January 2018.

APPENDIX A

PRELIMINARY HYDROLOGIC AND HYDRAULIC CALCULATIONS

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Site I-D-F Curve

Description: Rational Method IDF Curve
Location: Honor Health Medical Office Building
City of Scottsdale, Arizona

NOAA ATLAS 14 RAINFALL DEPTHS, INCHES

Duration	Average Recurrence Interval (years)					
	2	5	10	25	50	100
5-min	0.24	0.326	0.392	0.481	0.55	0.62
10-min	0.365	0.496	0.596	0.733	0.838	0.944
15-min	0.452	0.614	0.739	0.908	1.04	1.17
30-min	0.609	0.827	0.995	1.22	1.4	1.58
60-min	0.754	1.02	1.23	1.51	1.73	1.95
2-hr	0.864	1.16	1.38	1.69	1.92	2.16
3-hr	0.931	1.22	1.46	1.78	2.04	2.31
6-hr	1.11	1.42	1.67	2.01	2.28	2.56
12-hr	1.24	1.57	1.83	2.18	2.44	2.72
24-hr	1.48	1.92	2.27	2.75	3.13	3.53

RAINFALL INTENSITY, INCHES/HOUR

Duration minutes	Frequency, years					
	2	5	10	25	50	100
5	2.88	3.91	4.70	5.77	6.60	7.44
10	2.19	2.98	3.58	4.40	5.03	5.66
15	1.81	2.46	2.96	3.63	4.16	4.68
30	1.22	1.65	1.99	2.44	2.80	3.16
60	0.75	1.02	1.23	1.51	1.73	1.95
120	0.43	0.58	0.69	0.85	0.96	1.08
180	0.31	0.41	0.49	0.59	0.68	0.77
360	0.19	0.24	0.28	0.34	0.38	0.43
720	0.10	0.13	0.15	0.18	0.20	0.23
1440	0.06	0.08	0.09	0.11	0.13	0.15

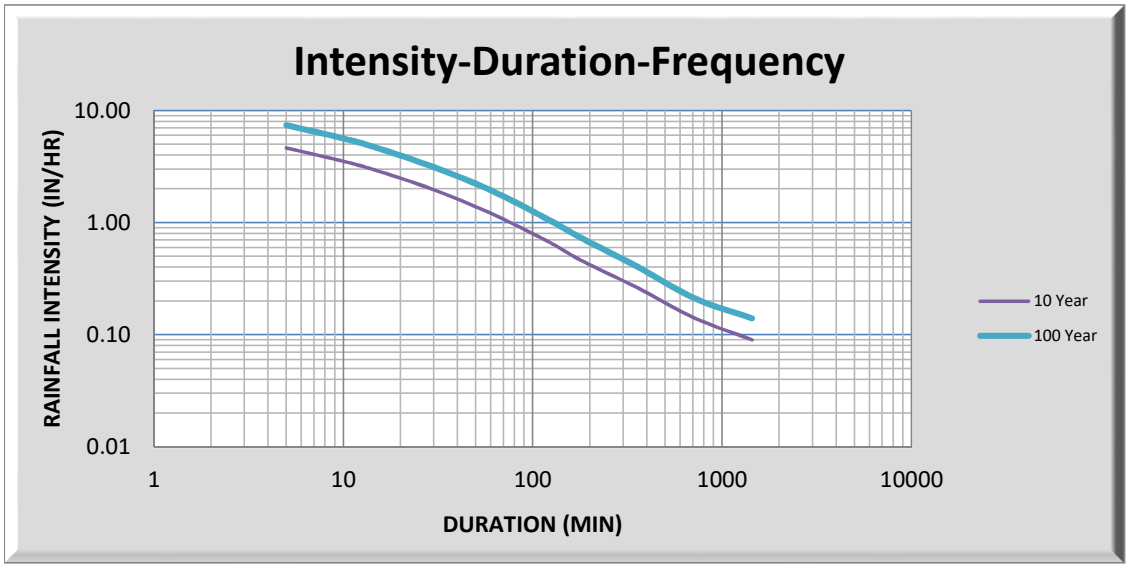

Table 1: 'C' Value Calculation

Location: Honor Health Medical Office Building
Reference: *City of Scottsdale Engineering Design Criteria (2018)*

Known Values: Design storm: 100-yr, 2-hr
Rainfall, D: 2.16

Calc. Values: $V_{Required} = \Delta C A \frac{D}{12}$

Where: V = Retention Volume Required
C = Runoff Coefficient
D = Depth of Rainfall
A = Area of Watershed Contributing

Historical

Contributing Sub-Area	Area (ft)	Land Use	Weighted Runoff Coefficient
1	112,734.00	Pavement, Asphalt, Roof	0.95
2	4,492.00	Landscaping	0.45
Total	**117,226.00**		**0.93**

Proposed

Contributing Sub-Area	Area (ft)	Land Use	Weighted Runoff Coefficient
1	109,014.00	Pavement, Asphalt, Roof	0.95
2	8,212.00	Landscaping	0.45
Total	**117,226.00**		**0.91**

Table 2 - Retention Volume Required & Provided

Description: Calculation of Retention Volume Required & Provided
Date: 04/17/19
Location: Honor Health Medical Office Building
City of Scottsdale, Arizona
Reference: *City of Scottsdale Engineering Design Criteria (2018)*

Known Values: Design storm: First Flush
Rainfall, D: 0.50

Calc. Values: $V_r = C \times (D/12) \times A$
Where: V_r = Retention Volume Required
C = Runoff Coefficient
D = Depth of Rainfall
A = Area of Watershed Contributing

$V_p = \pi \times (D/2)^2 \times L$
(For Underground Retention)
Where: V_p = Retention Volume Provided
D = Diameter of Pipe
L = Length of Pipe

$V_p = 0.5 \times$ (Top Contour Area + Bottom Contour Area) x (Top Contour Elevation - Bottom Contour Elevation)
(For Basin)
Where: V_p = Retention Volume Provided

Basin ID	Area (sf)	Land Use	100-Year Runoff Coefficient	100-Year, 2-Hour Volume Required (cu.ft)	100-Year, 2-Hour Volume Required (ac.ft)	Diameter of Pipe (ft)	Length of Pipe (ft)	Top Contour Area (sf)	Bottom Contour Area (sf)	Top Contour Elevation	Bottom Contour Elevation	100-Year, 2-Hour Volume Provided (cu.ft)
Underground A	117,226	Commercial/ Landscape	0.91	4,445	0.10	8	90	-	-	-	-	4,524
Total	***117,226***	-	-	*4,445*	***0.10***	-	-	-	-	-	-	*4,524*

Table 3 - Required Drywells

Description: Drywell Calculations
Date: 04/17/19
Location: Honor Health Medical Office Building
City of Scottsdale, Arizona
References: *City of Scottsdale Engineering Design Criteria (2018)*

Basin ID	Volume Required (CF)	Design Percolation Rate (CFS)	Maximum Drain Time (Hours)	Number of Drywells Required/Provided	Drain Time (hours)
Underground A	4,445	0.10	36	**1**	12.3

EXHIBIT 1

VICINITY MAP

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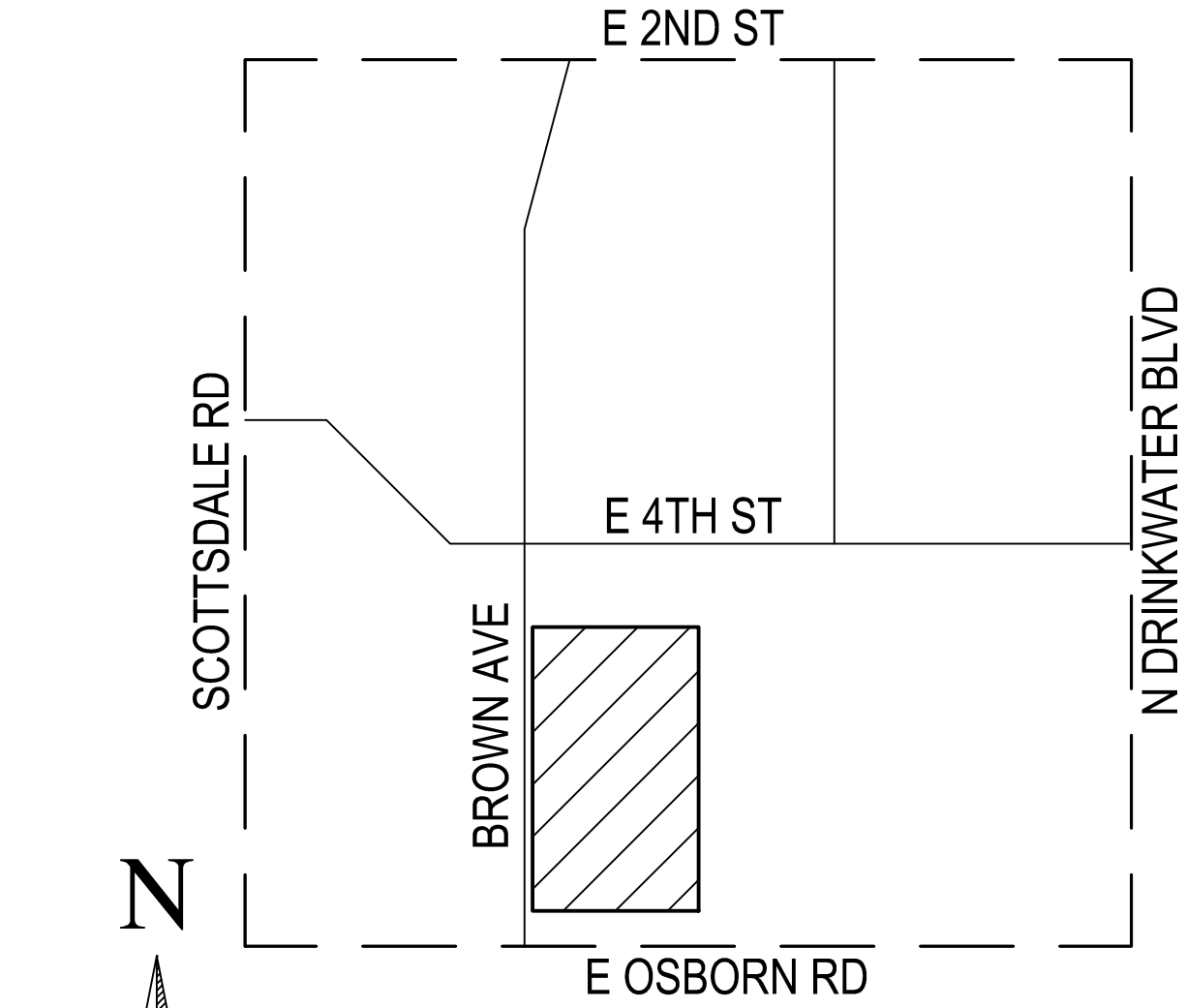

VICINITY MAP

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EXHIBIT 1
VICINITY MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

EXHIBIT 2

EXISTING DRAINAGE MAP

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EXHIBIT 2

HONOR HEALTH

MEDICAL OFFICE BUILDING

EXISITING DRAINGE MAP

EXHIBIT 3

FEMA FIRM MAP

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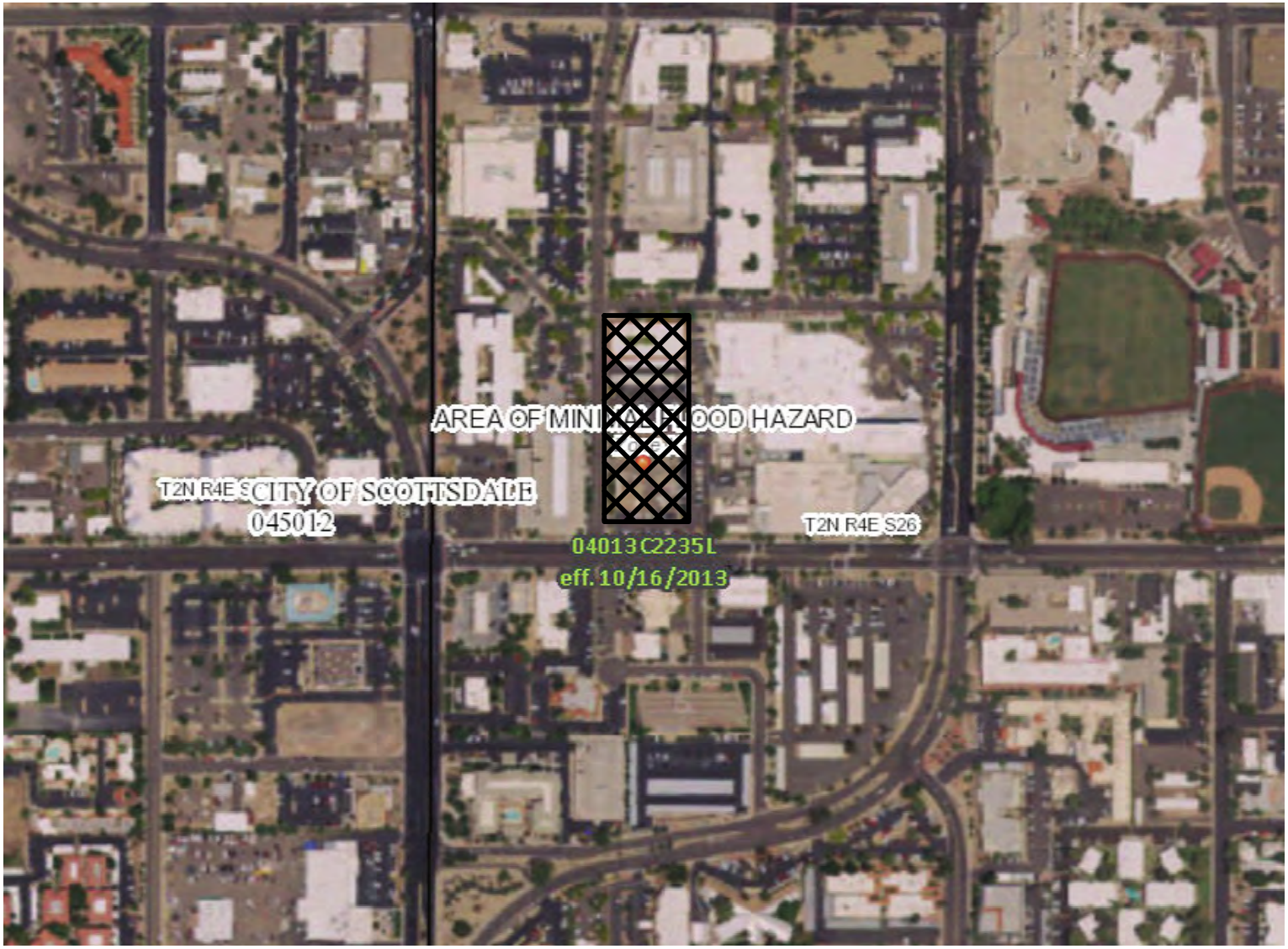

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/5/2019 at 11:03:02 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

PROJECT AREA

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HONOR HEALTH MEDICAL OFFICE BUILDING

EXHIBIT 3
FEMA FIRM MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

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EXHIBIT 4

AERIAL MAP FROM NOVEMBER 2005

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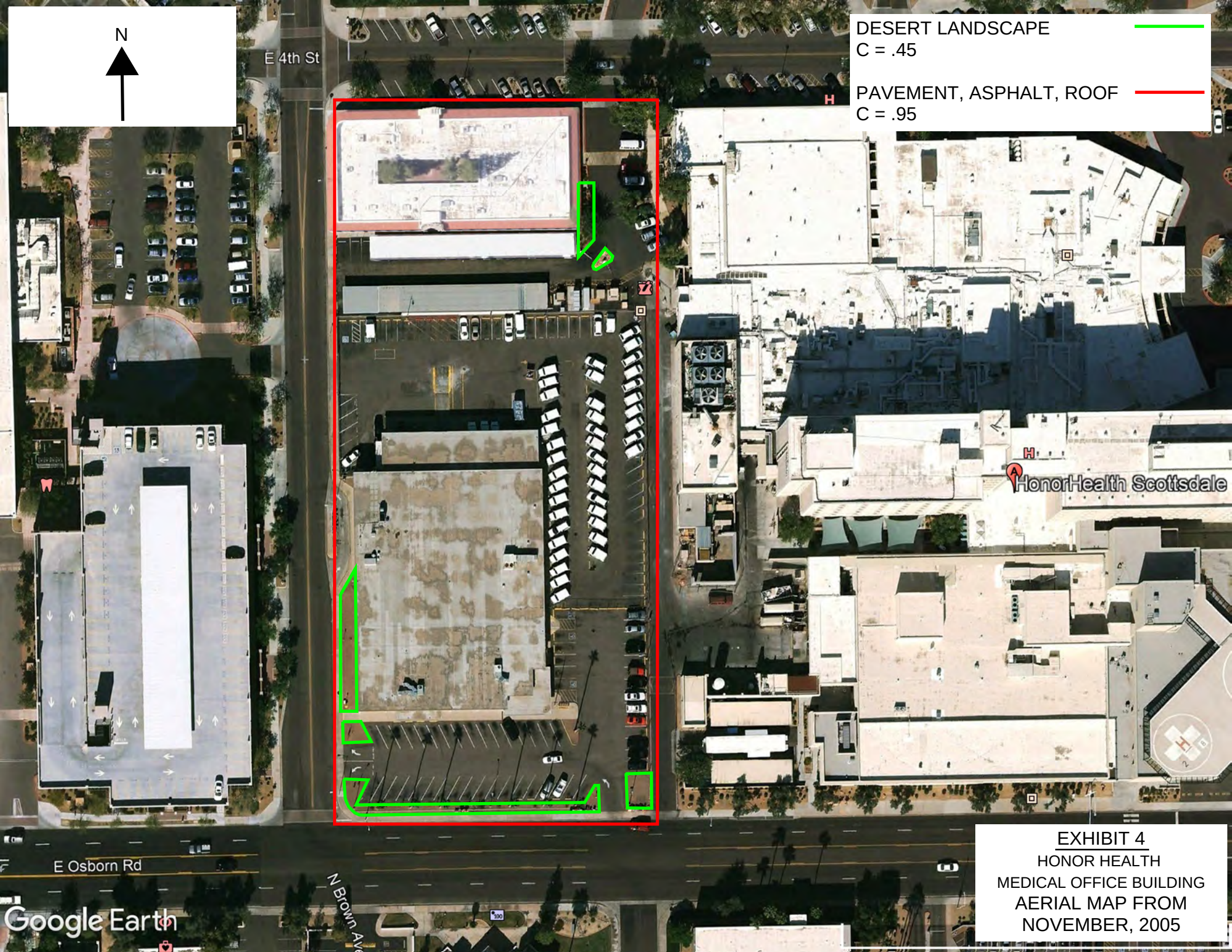

EXHIBIT 4

HONOR HEALTH

MEDICAL OFFICE BUILDING

AERIAL MAP FROM

NOVEMBER, 2005

EXHIBIT 5

PRELIMINARY DRAINAGE MAP

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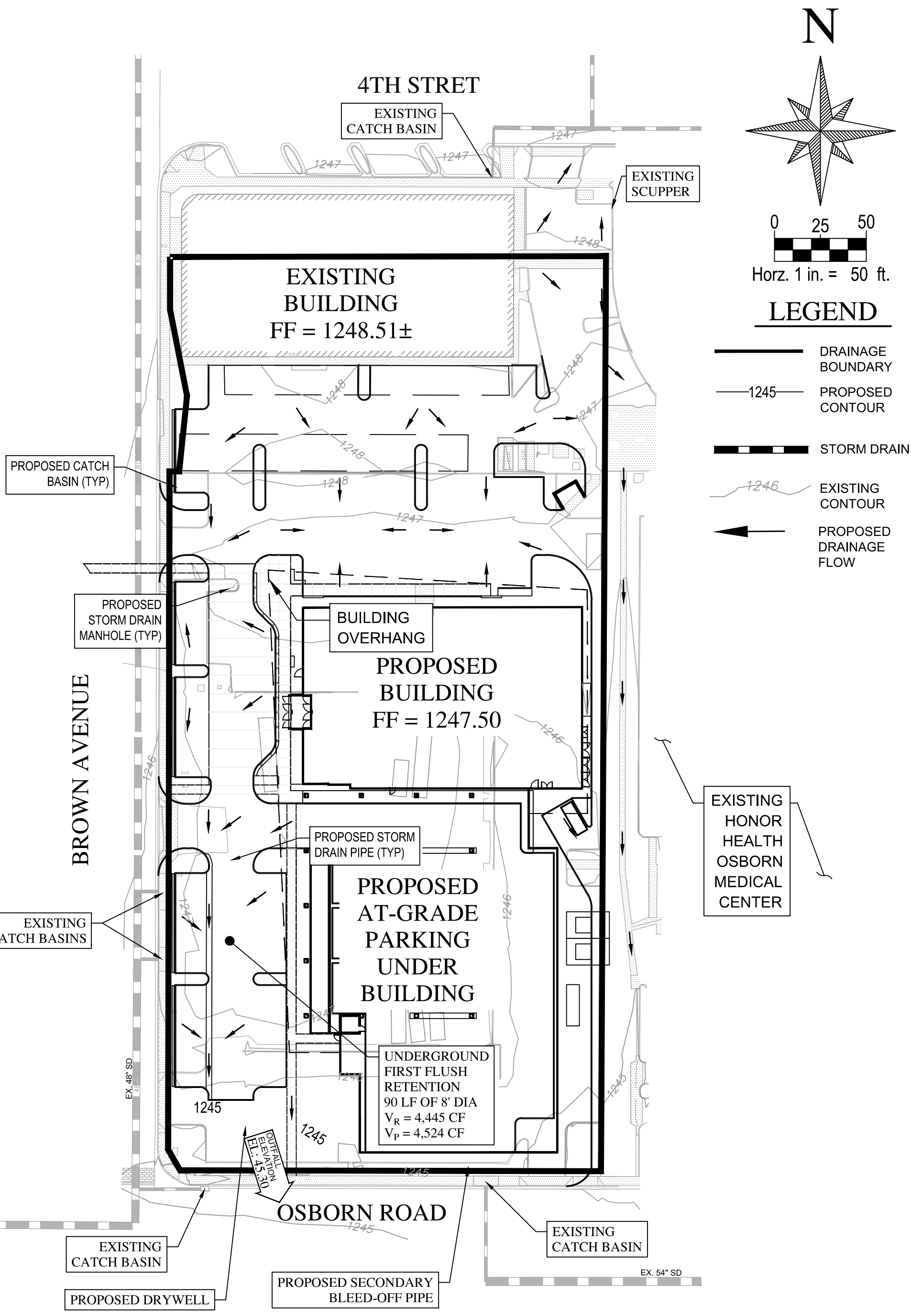

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HONOR HEALTH MEDICAL OFFICE BUILDING

EXHIBIT 5
PRELIMINARY DRAINAGE MAP

DATE: 04-17-2019	SCALE: 1" = 50'	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

EXHIBIT 6

PRELIMINARY GRADING AND DRAINAGE PLAN

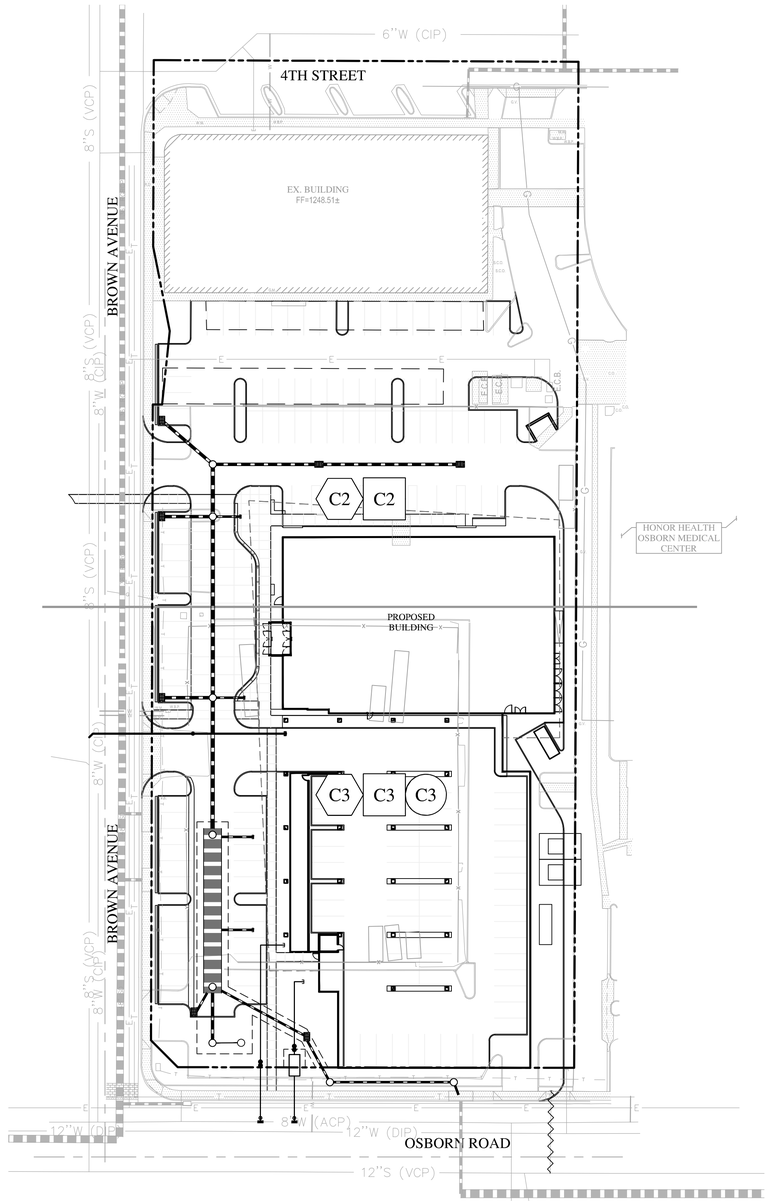
\

HONORHEALTH OSBORN

PRELIMINARY IMPROVEMENT PLAN

7400 E. OSBORN RD, SCOTTSDALE, AZ 85251

A PORTION OF THE SOUTHEAST 1/4 OF SECTION 26, TOWNSHIP 2 NORTH, RANGE 4 EAST
OF THE GILA AND SALT RIVER MERIDIAN, MARICOPA COUNTY, ARIZONA



N

0 40 80

Horz. 1 in. = 40 ft.

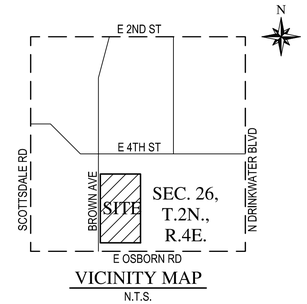
LEGEND

CX — PAVING, GRADING & DRAINAGE PLAN

CX — STORM DRAIN PLAN

CX — WATER PLAN AND SEWER

PROPERTY LINE



VICINITY MAP
N.T.S.

OWNER / DEVELOPER

SCOTTSDALE HEALTHCARE HOSPITALS
7400 E. OSBORN RD,
SCOTTSDALE ARIZONA 85251
CONTACT:
PHONE: 602-
E-MAIL: WWW..COM

ENGINEER

WOOD, PATEL & ASSOCIATES, INC.
1630 SOUTH STAPLEY DRIVE, SUITE 219
MESA, ARIZONA 85204
CONTACT: JOHN BULKA, P.E.
PHONE: (480) 834-3300
E-MAIL: JBULKA@WOOPATEL.COM

ARCHITECT

NORRIS DESIGN
901 EAST MADISON STREET
TEMPE, AZ 85281
CONTACT:
PHONE: (602)-254-9600
EMAIL: WWW.NORRIS-DESING.COM

PROJECT SITE DATA

ASSESSOR PARCEL NUMBER(S):
130-22-128
PROJECT SITE ADDRESS:
7400 E. OSBORN RD,
SCOTTSDALE AZ, 85251
PROJECT SITE AREA(S):
NET AREA = 7.49 AC
ZONING:
D/M-2

SHEET INDEX

LEGEND/ABBREVIATIONS

EXISTING SURVEY	
	SECTION LINE
	RIGHT OF WAY
	PROPERTY LINE
	ROAD CENTERLINE
	EASEMENT
	SURVEY MARKER
E	ELECTRIC
T	TELEPHONE
G	GAS LINE
S	SEWER LINE
W	WATER LINE
	STORM DRAIN PIPE
S	SEWER MANHOLE
D	STORM DRAIN MANHOLE
P 0.00	PAVEMENT ELEVATION
NG 0.00	NATURAL GROUND ELEVATION
C 0.00	CONCRETE ELEVATION
TC 0.00	TOP OF CURB ELEVATION
	JUNCTION BOX/RISER
	FIRE HYDRANT
	WATER VALVE
	STREET/PARKING LIGHT

PROPOSED GRADING, DRAINAGE & PAVING	
	SLOPE ARROW
	WALL
PROPOSED WATER & SEWER	
S	SEWER LNE
12"W	WATER LINE
	PLUG
	SEWER CLEANOUT
	AREA DRAIN
CB	CATCH BASIN
	STORM DRAIN MANHOLE
	STORM DRAIN PIPE
	DRYWELL

A.L.	AREA LIGHT
C	CONCRETE ELEVATION
C.B.	CATCH BASIN
DE	DRAINAGE EASEMENT
D.W.	DRYWELL
E.O.L.	EDGE OF LANDSCAPE
J.B.	JUNCTION BOX
FH	FIRE HYDRANT
E.C.B.	ELECTRICAL CABINET BOX
HW	HEAD WALL
INV	INVERT ELEVATION
FF	FINISHED FLOOR ELEVATION
WE	WATER EASEMENT
LF 88=	LOWEST FINISH FLOOR ELEVATION
TC 0.00	TOP OF CURB
FG 0.00	FINISH GRADE ELEVATION
C 0.00	CONCRETE ELEVATION
C.A	CROSS ACCESS
E.S.A	EMERGENCY SERVICE ACCESS
P.U.E	PUBLIC UTILITY EASEMENT
U.E	UTILITY EASEMENT
P.A.E	PUBLIC ACCESS EASEMENT
S.S.T	SITE SAFETY TRIANGLE
S.V.T	SITE VISIBILITY TRIANGLE
TW	TOP OF WALL

Call at least two full working days before you begin excavation.
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201 W. Indian School Road
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F: 602.943.7645

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INSTITUTE

HONORHEALTH

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SCOTTSDALE, AZ 85251

AUTHORITY HAVING JURISDICTION:
CITY OF SCOTTSDALE

AUTHORITY HAVING JURISDICTION'S PROJECT NO:

FACILITY NUMBER:

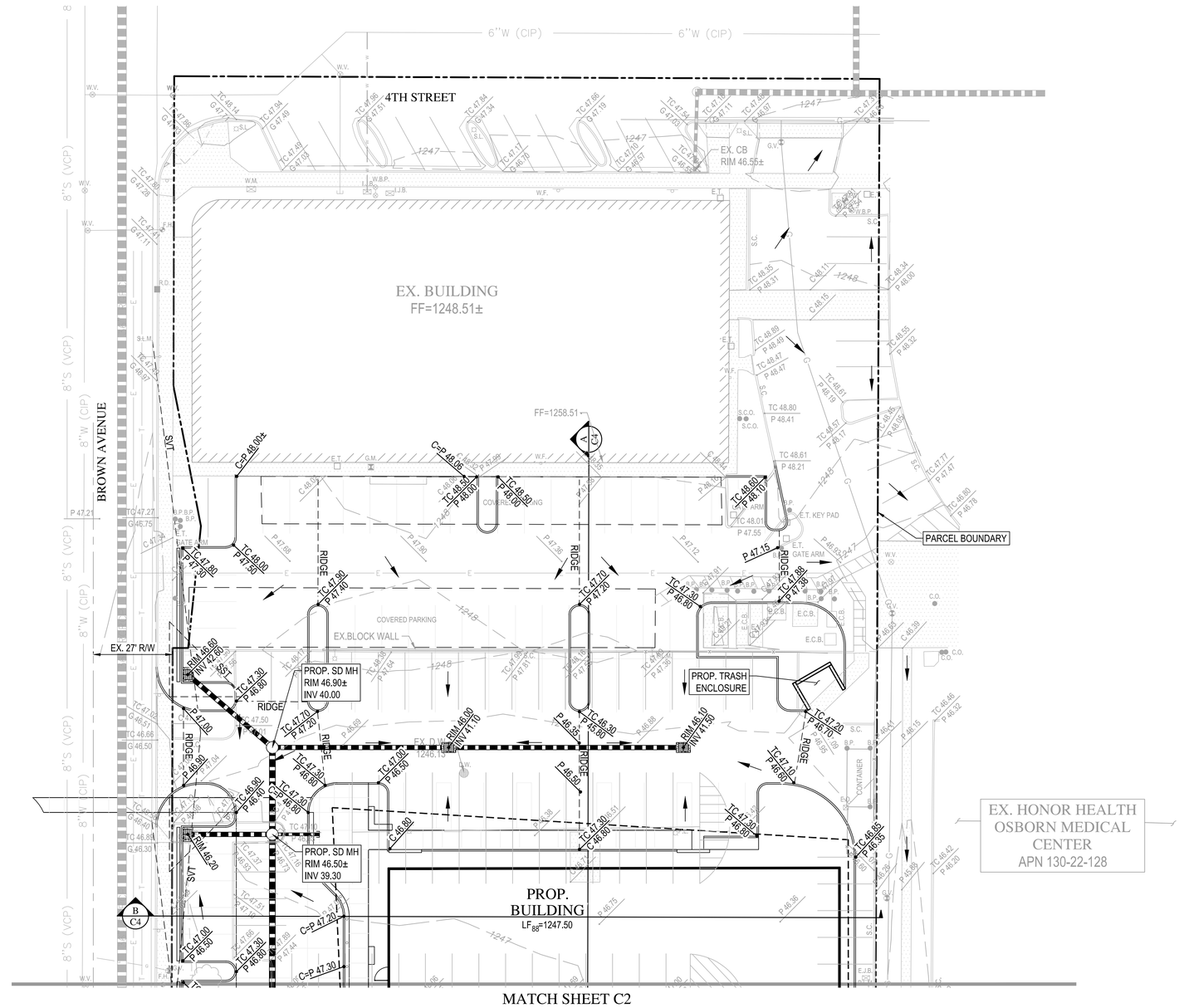
AGENCY APPROVALS:

REVISIONS		
REV #	DESCRIPTION	DATE

DATE:	04/1719
SCALE:	AS NOTED
DRAWN:	JO
REVIEWED:	JB
JOB NUMBER:	194976

COVER SHEET/
SHEET INDEX

C1 _ 4



N

0 20 40

Horz. 1 in. = 20 ft.

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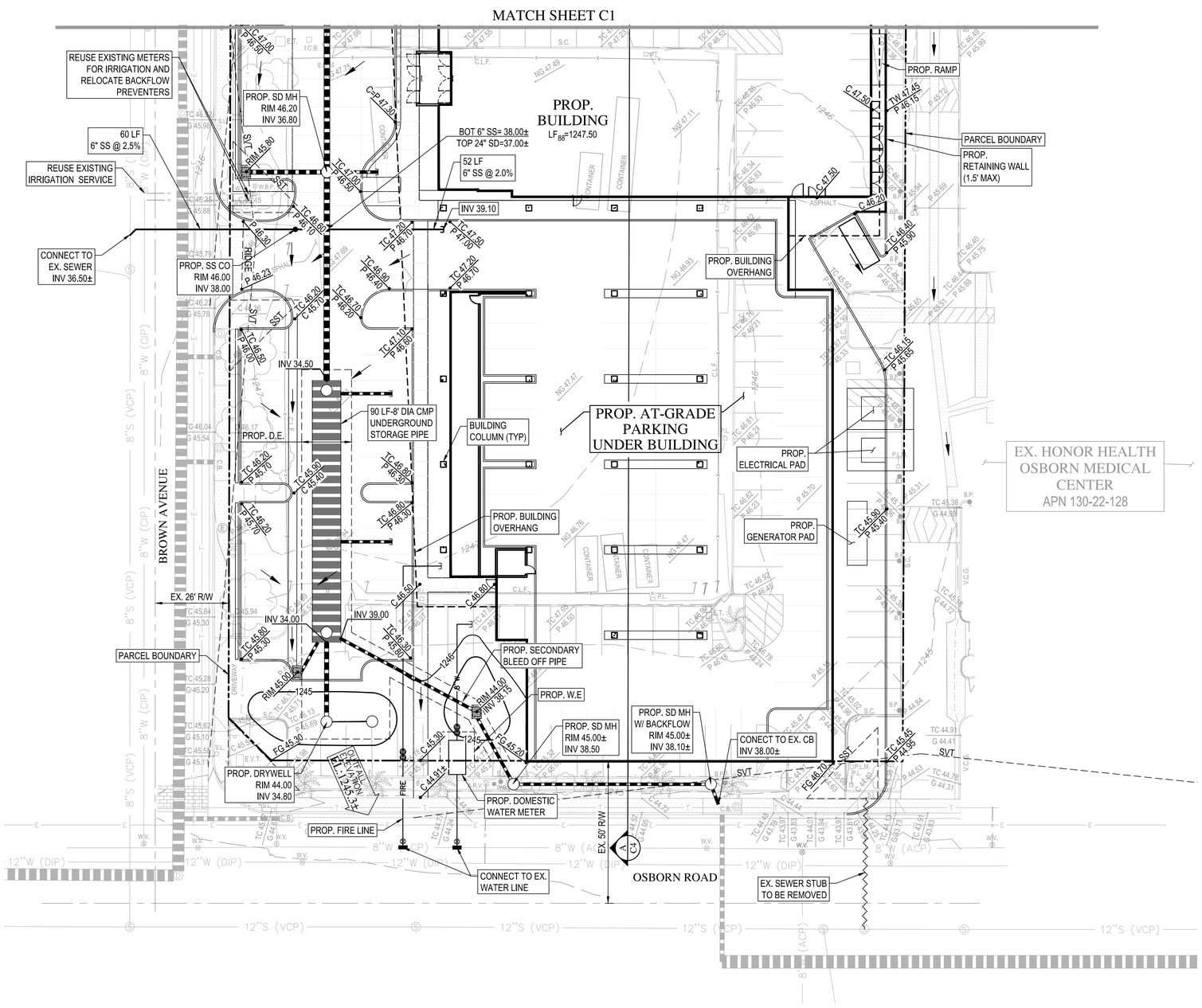
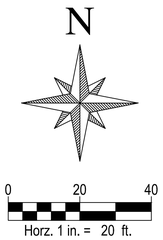
REVISIONS		
REV #	DESCRIPTION	DATE

DATE:	04/1719
SCALE:	AS NOTED
DRAWN:	JO
REVIEWED:	JB
JOB NUMBER:	194976

PRELIMINARY
IMPROVEMENT PLAN

C2 _ 4





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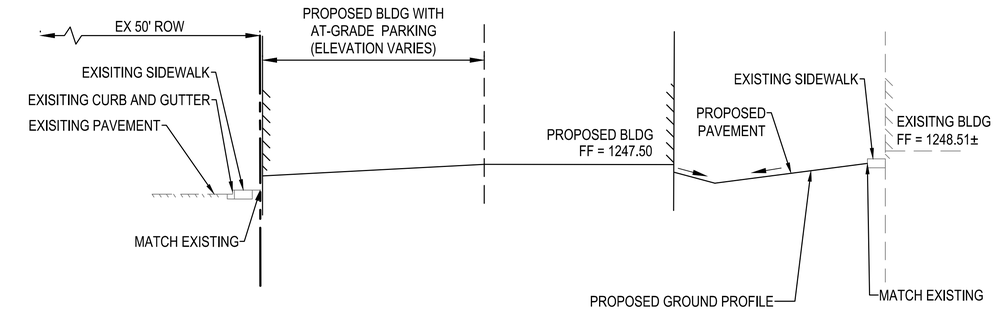
AGENCY APPROVALS:

REVISIONS		
REV #	DESCRIPTION	DATE

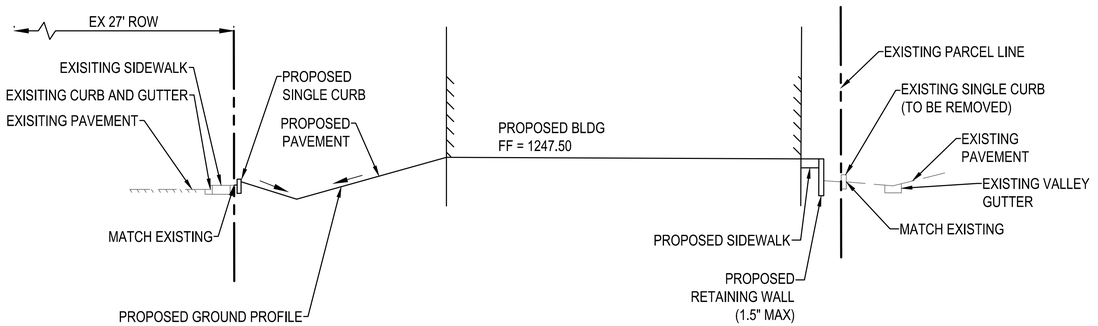
DATE:	04/1719
SCALE:	AS NOTED
DRAWN:	JO
REVIEWED:	JB
JOB NUMBER:	194976

PRELIMINARY
IMPROVEMENT PLAN

C3 _ 4



SECTION- A
N.T.S.



SECTION- B
N.T.S.

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SCOTTSDALE, AZ 85251

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CITY OF SCOTTSDALE

AUTHORITY HAVING JURISDICTION'S PROJECT NO:

FACILITY NUMBER:

AGENCY APPROVALS:

REVISIONS		
REV #	DESCRIPTION	DATE

DATE:	04/1719
SCALE:	AS NOTED
DRAWN:	JO
REVIEWED:	JB
JOB NUMBER:	194976

PRELIMINARY
IMPROVEMENT PLAN

C4 _ 4

Add "FINAL"

WASTEWATER COLLECTION SYSTEM
BASIS OF DESIGN REPORT
FOR
HONOR HEALTH
MEDICAL OFFICE BUIILDING

April 17, 2019
WP# 194976

FINAL Basis of Design Report
☐ APPROVED
☐ APPROVED AS NOTED
☑ REVISE AND RESUBMIT

CITY OF SCOTTSDALE
SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If approved; the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY ldillon DATE 7/3/2019

Address and resubmit:
1) Sewer capacity on Osborn will not be available when already approved and allocated projects ahead of this project are complete. The City is in a study phase of a parallel sewer on Osborn Rd. An in-lieu of construction payment to the City to off-set the cost of this new sewer will be required so that capacity will be available for this development. This payment will be proportional to the capacity impact and length of sewer impacted to Miller Rd. Coordinate with the Water Resources department on the determination of this payment prior to re-submittal. The details of this determination should be included in the re-submittal.
2) If sewer stub in southeast corner is not to be used it should be removed back to the main to make room for new parallel sewer in Osborn i.e. discharge onto Brown is likely preferred. Indicate stub removal on utility plan.
3) Address any applicable comments in email correspondence herein.

Prepared For:
Devenney Group Ltd., Architects
Mr. Dudley Campbell
201 West Indian School Road
Suite 102
Phoenix, Arizona 85013
Phone: (602) 943-7645

Submitted To:
City of Scottsdale
Mr. Levi Dillion, P.E.
Water Resources Administration
9379 East San Salvador Drive
Scottsdale, Arizona 85258
Phone: (480)-312-5319

Prepared By:
Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8500
Website: www.woodpatel.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 33359 JOHN M. BULKA Date Signed 4-17-19 ARIZONA U.S.A.
Expires 3-31-20

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Dillon, Levi

From: John Bulka <jbulka@WoodPatel.com>
Sent: Wednesday, June 12, 2019 11:10 AM
To: Dillon, Levi
Cc: Cluff, Bryan; Hayes, Eliana; John "Gordy" Ritchie; Darin Moore
Subject: RE: water and sewer questions on 20-DR-2019, Neuroscience Institute

Hi Dillion,
As discussed in our phone conversation, we've reviewed your comments and offer the following responses. Please call if you have any questions.
Thanks,

John Bulka
Project Manager

D: 602.336.7924
M: 602.695.5579
jbulka@woodpatel.com
www.woodpatel.com

From: Dillon, Levi [mailto:LDillon@Scottsdaleaz.gov]
Sent: Monday, June 10, 2019 6:17 PM
To: John Bulka
Cc: Cluff, Bryan; Hayes, Eliana
Subject: water and sewer questions on 20-DR-2019, Neuroscience Institute

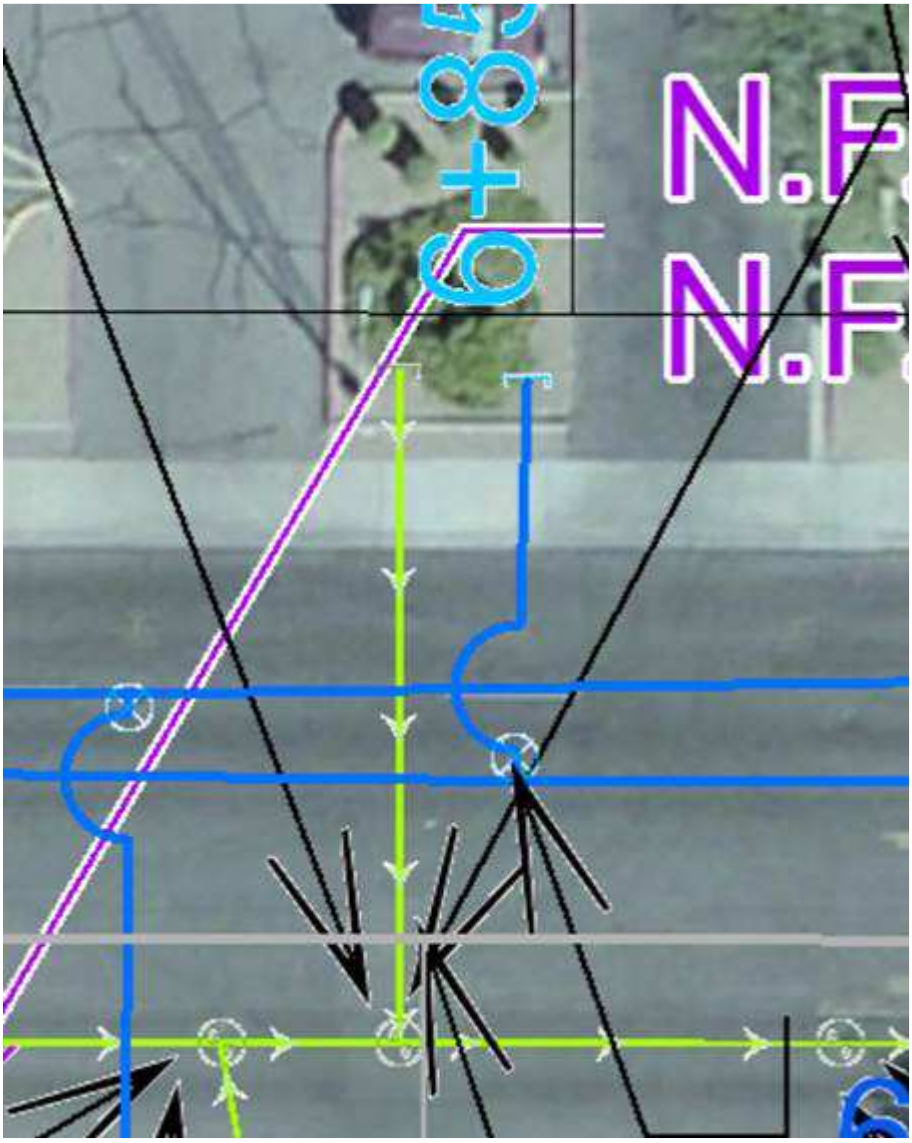
Hi John,

Before I made any basis of design comments formal I wanted to run these by you:

1. Please note a future parallel sewer on Osborn is already in the planning stages by the City so sewer capacity will not be an issue for this facility. The tentative plan is to have all hospital flows routed to this new sewer. However, this parallel sewer will not start construction until approximately summer 2020.
    a. How does this schedule align with the schedule for this facility? ***Construction is scheduled to start later this year. We are planning on submitting CDs at the end of July.***
    b. Given this we are interested in obtaining the most accurate projection of sewer demands for this facility possible. See items 2 below . ***It's our understanding the building will just be an out-patient facility with offices.***
2. There is no reference in the BODs to the type of medical facility and water/sewer demand characteristics (the floor plan area nomenclature, i.e. infusion, ASC, SGA, etc, is not readily discernable)
    a. Is this an in-patient or out-patient facility? (include in BODs) ***Out-patient only.***
    b. number of beds? ***No Beds.***
    c. Is there a cafeteria? ***No Cafeteria.***
    d. Is there a laundry? ***We believe they are using an offsite service, but will verify with the Architect.***

e. Are there rehabilitation or exercise pools or spas? ***No pools or spas.***
f. Is the future ambulatory facility included in this approval? ***No Ambulatory***. Should it be considering the need for accurate water/sewer planning?

3. Why is the sewer being sent to Brown 8“ sewer but the water supply is coming from Osborn 8”? ***It’s a shorter pipe run to route the sewer line in Brown Street. Plus there will be proposed electrical equipment in that area and we wanted to avoid conflicts. The site plan has changed since our submittal, so we will review again and see if it makes sense to use the existing sewer stub.*** See question 4 below for follow-up question on this.
4. Water and sewer stub-outs appear to exist in the southeast corner of the parcel. Why are these not being used? ***The fire riser room is located on the west side of the building, so it just made sense to go to connect to the waterline further west in Osborn. We will review again and see if it makes sense to use the existing water stub.*** A Water Resources’ consultant recently had a flow meter placed in the manhole where the stub out is shown below and there was no flow reported coming from the stub-out. Instead it was coming into the manhole to the east. Both the sewer and water stub outs show as 8” in City GIS. The water stub-out’s source is the 12” Osborn main. The 12” Osborn main supplies the 8” on Osborn through a connection at Osborn and Drinkwater Blvd.

a. 

Thanks,

Levi C. Dillon, P.E. | *Sr. Water Resources Engineer*

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CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS • CONSTRUCTION MANAGERS

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S., CFM
Michael T. Young, P.E., LEED AP
James S. Campbell, P.E., LEED GA
Thomas R. Gettings, R.L.S.
Darin L. Moore, P.E., LEED GA
Jeffrey R. Minch, P.E., CFM
Robert D. Gofonia, P.E., R.L.S.

April 17, 2019

Mr. Levi Dillion, P.E.
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

Phone: (480)-312-5319
Email: ldillion@scottsdaleaz.gov

Re: **Honor Health Medical Office Building**
Wastewater Collection System, Basis of Design Report
Scottsdale, Arizona
WP# 194976

Dear Mr. Dillion:

The proposed Honor Health Medical Office Building development is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian. Refer to the attached *Vicinity Map* for the project location. The proposed 4-story office building will be 92,000 square feet (sf), with an option to add a 25,000-sf fifth floor. The proposed building is located at southeast corner of the site, with proposed parking lots on the north and west sides of the proposed building. At-grade parking will also be located under the south side of the building. The development will include associated hardscape and landscaping.

Wastewater flowing from the proposed Honor Health Medical Office Building will discharge to a 6-inch private sewer line on the west side of the proposed building. The 6-inch private sewer line discharges into the City of Scottsdale's existing public 8-inch VCP sewer line in Brown Avenue.

The design criteria used to estimate wastewater flows and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the requirements listed in the City of Scottsdale's *Design Standards and Policies Manual,* 2018. The following is a summary of the primary design criteria utilized:

• Average Day Wastewater flows, Office:	0.4 gpd/sq. ft.
• Peaking Factor, Office:	3
• Minimum Mean Full Flow Velocity:	2.50 fps
• Minimum Peak Full Flow Velocity:	10.0 fps
• Minimum Peak Flow d/D Ratio (12" dia. Or less sewers):	d/D = 0.65

Abbreviations: gpd = gallons per day; fps = feet per second

Based on the above design criteria, the projected average day flow for the proposed 117,000-sf Honor Health Medical Office Building project is approximately 44,800 gallons per day (gpd), or 33 gallons per minute (gpm). The peak flow is projected to be 140,400 gpd. The proposed sewer slopes, projected flow velocities, and pipe flow capacities are summarized on the attached spreadsheets.

It is assumed the infiltration and inflow from wet weather has been accounted for in the published design flow rates for the development and the maximum d/D. Therefore, those flows have not been added into the calculations. The proposed sanitary sewer collection system is designed to have adequate capacity to serve the proposed development.

Thank you for your review of the Wastewater Collection System Basis of Design Report provided for the Honor Health Medical Office Building development. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc.

John M. Bulka, P.E.
Project Manager

JMB/km

Y:\WP\Reports\Commercial\194976 Honor Health Medical Office Building Wastewater Basis of Design Report.docx

WASTEWATER DESIGN FLOWS & FLOWMASTER RESULTS

WOOD/PATEL
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CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

TABLE 1 - WASTEWATER DESIGN FLOWS

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Manager: John Bulka, P.E.
Date: 4/17/2019

UPSTREAM NODE	DOWNSTREAM NODE	APPLICABLE UNIT	NUMBER OF UNITS	ADF/ APPLICABLE UNIT (GPD)[1]	TOTAL ADF (GPD)	PEAKING FACTOR[2]	PEAK FLOW (GPD)	TOTAL ADF (GPM)	PEAK FLOW (GPM)
Building Connection 1	Privite Sewer Connection	SF	117,000	0.4	46,800	3.00	140,400	33	98
Total					**46,800**		**140,400**	**33**	**98**

1. Average Daily Flow Demand based upon office building square footage per City of Scottsdale Design Standards and Policies Manual (2018)
2. Peaking Factor per City of Scottsdale Design Standards and Policies Manual (2018)

Proposed 6" Sewer Line (2.0%)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02000	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

Results

Normal Depth	1.87	in
Flow Area	0.05	ft²
Wetted Perimeter	0.59	ft
Hydraulic Radius	1.06	in
Top Width	0.46	ft
Critical Depth	0.23	ft
Percent Full	31.2	%
Critical Slope	0.00445	ft/ft
Velocity	4.16	ft/s
Velocity Head	0.27	ft
Specific Energy	0.42	ft
Froude Number	2.18	
Maximum Discharge	1.11	ft³/s
Discharge Full	1.03	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	31.19	%
Downstream Velocity	Infinity	ft/s

Proposed 6" Sewer Line (2.0%)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.87	in
Critical Depth	0.23	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.00445	ft/ft

Proposed 6" Sewer Line (2.5%)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02500	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

Results

Normal Depth	1.77	in
Flow Area	0.05	ft²
Wetted Perimeter	0.57	ft
Hydraulic Radius	1.01	in
Top Width	0.46	ft
Critical Depth	0.23	ft
Percent Full	29.4	%
Critical Slope	0.00446	ft/ft
Velocity	4.50	ft/s
Velocity Head	0.31	ft
Specific Energy	0.46	ft
Froude Number	2.44	
Maximum Discharge	1.24	ft³/s
Discharge Full	1.15	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

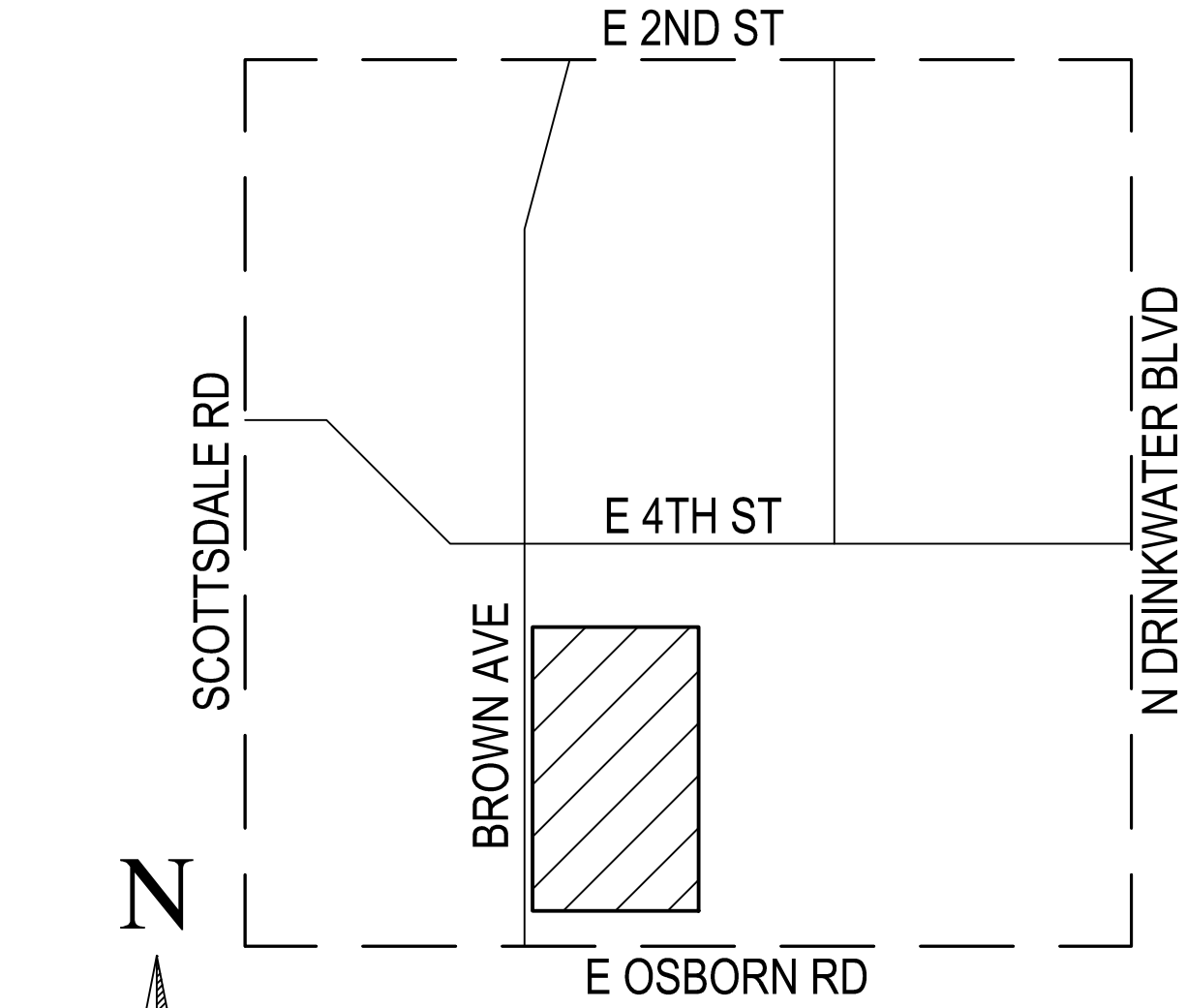
Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	29.45	%
Downstream Velocity	Infinity	ft/s

Proposed 6" Sewer Line (2.5%)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.77	in
Critical Depth	0.23	ft
Channel Slope	0.02500	ft/ft
Critical Slope	0.00446	ft/ft

VICINITY MAP



VICINITY MAP

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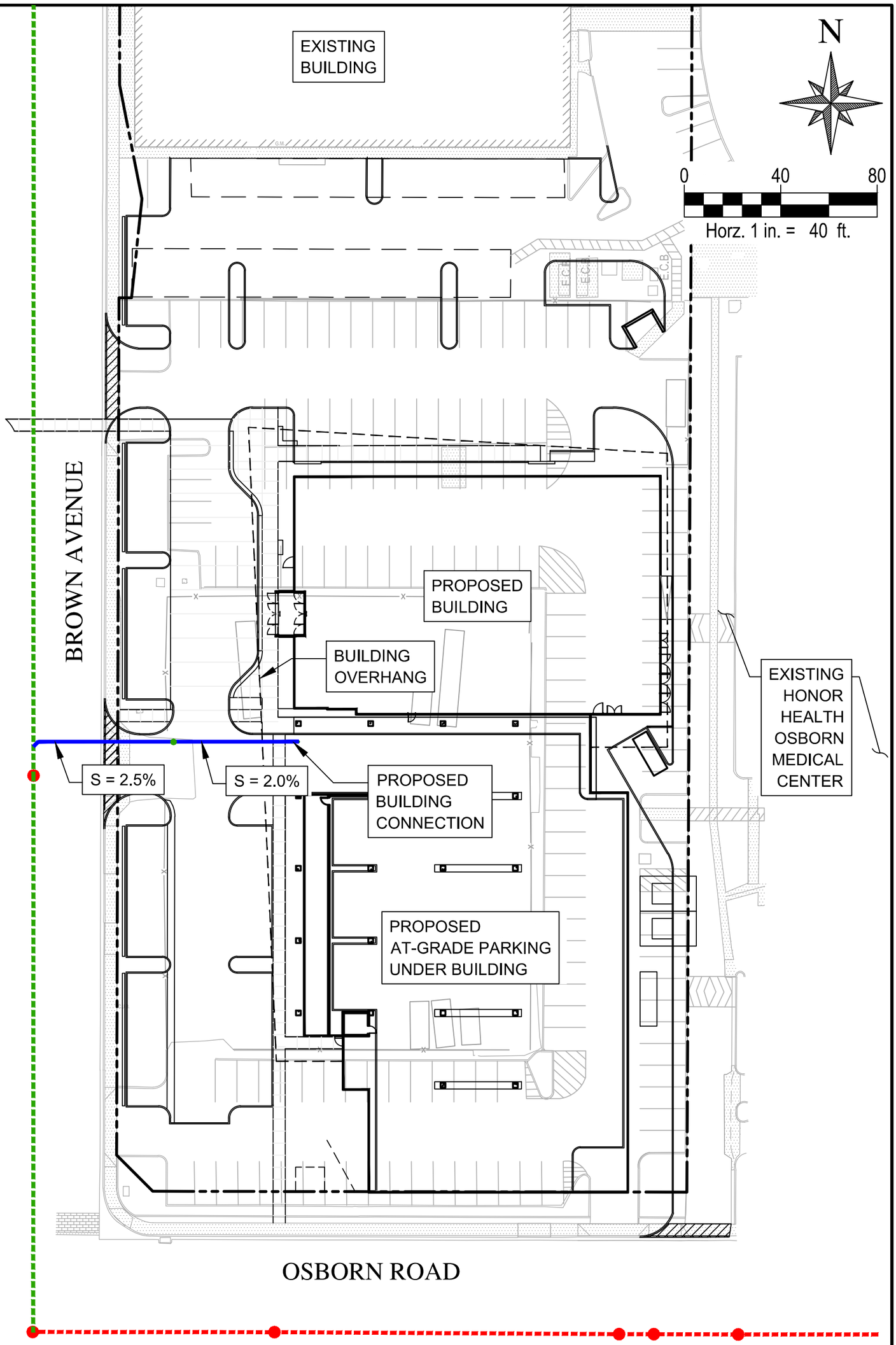
HONOR HEALTH MEDICAL OFFICE BUILDING

VICINITY MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

WASTEWATER EXHIBIT



PIPE DIAMETER	EXISTING	PLANNED
6-INCHES		
8-INCHES		
12-INCHES		
MANHOLE		
CLEANOUT		

NOT
FOR CONSTRUCTION OR RECORDING

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(602) 335-8500
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HONOR HEALTH MEDICAL OFFICE BUILDING

Wastewater Exhibit

DATE:	SCALE:	SHEET
04-17-2019	1" = 40'	01 of 01
JOB NO.:	DESIGN: JB	
194976	DRAWN: AF	

Z:\2019\194976\Project Support\Reports\Sewer BOD\Exhibits\4976-WastewaterExhibit.dwg

Add "FINAL"

WATER DISTRIBUTION SYSTEM
BASIS OF DESIGN REPORT
FOR
HONOR HEALTH
MEDICAL OFFICE BUIILDING

April 17, 2019
WP# 194976

FINAL Basis of Design Report
☐ APPROVED
☐ APPROVED AS NOTED
☑ REVISE AND RESUBMIT

CITY OF SCOTTSDALE
SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If approved; the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY ldillon DATE 7/3/2019

Address and resubmit:
1) Evaluate using 8" water stub out located in southeast corner. This connects to a 12" main on Osborn. If not to be used (and not currently in use) remove stub back to main. Indicate on utility plan.
2) In final BOD show utility plan with meter and BFP. Provide meter and service line sizing per DS&PM and verify if meter vault is required.
3) Complete hydraulic analysis up to highest finished floor of building and show 15psi min concurrent with fire flow (associated with meter and service/supply line sizing)
4) Clarify required fire flow, both 1,250 and 1,500 are shown.
5) Address any applicable comments in the email correspondence herein.

Prepared For:
Devenney Group Ltd., Architects
Mr. Dudley Campbell
201 West Indian School Road
Suite 102
Phoenix, Arizona 85013
Phone: (602) 943-7645

Submitted To:
City of Scottsdale
Mr. Levi Dillion, P.E.
Water Resources Administration
9379 East San Salvador Drive
Scottsdale, Arizona 85258
Phone: (480)-312-5319

Prepared By:
Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8500
Website: www.woodpatel.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 33359 JOHN M. BULKA Date Signed 4-17-19 ARIZONA U.S.A.
Expires 3-31-20

WOOD/PATEL
MISSION: CLIENT SERVICE®

Dillon, Levi

From: John Bulka <jbulka@WoodPatel.com>
Sent: Wednesday, June 12, 2019 11:10 AM
To: Dillon, Levi
Cc: Cluff, Bryan; Hayes, Eliana; John "Gordy" Ritchie; Darin Moore
Subject: RE: water and sewer questions on 20-DR-2019, Neuroscience Institute

Hi Dillion,
As discussed in our phone conversation, we've reviewed your comments and offer the following responses. Please call if you have any questions.
Thanks,

John Bulka
Project Manager

D: 602.336.7924
M: 602.695.5579
jbulka@woodpatel.com
www.woodpatel.com

From: Dillon, Levi [mailto:LDillon@Scottsdaleaz.gov]
Sent: Monday, June 10, 2019 6:17 PM
To: John Bulka
Cc: Cluff, Bryan; Hayes, Eliana
Subject: water and sewer questions on 20-DR-2019, Neuroscience Institute

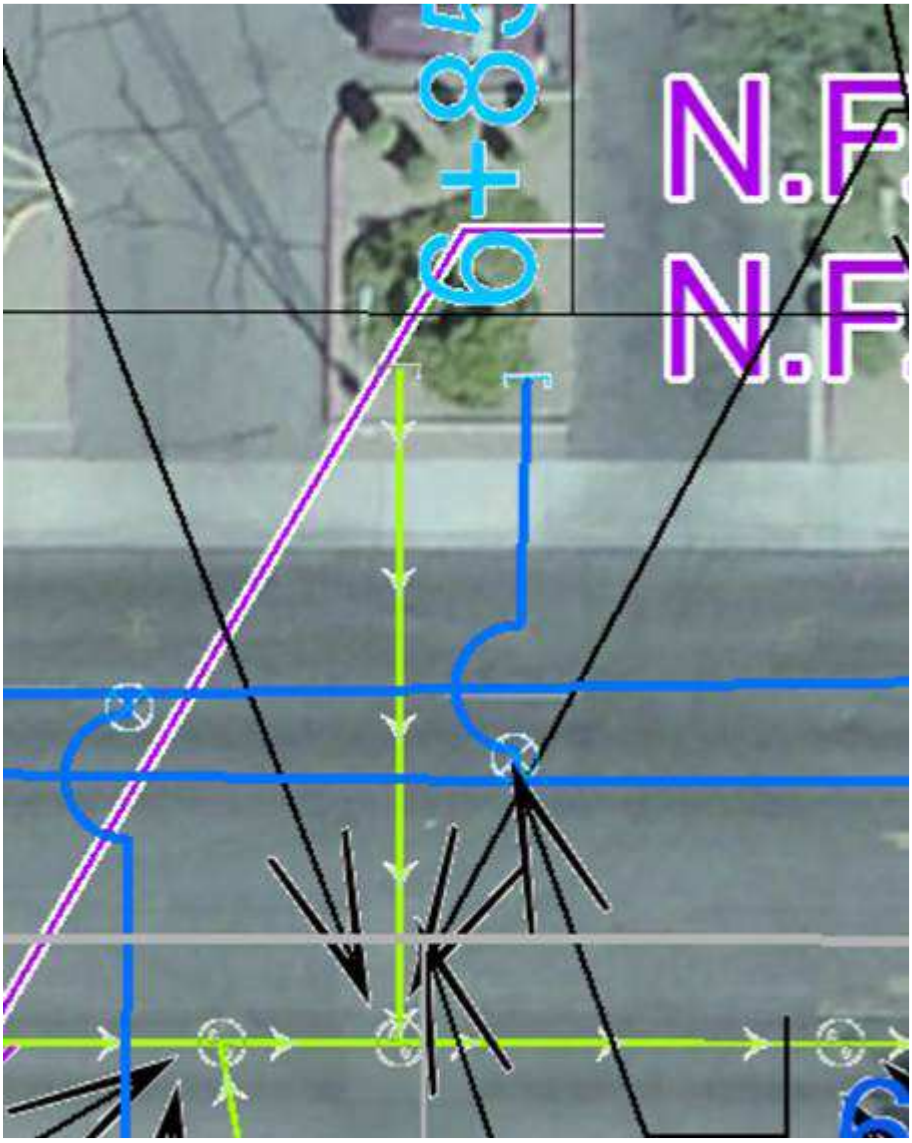
Hi John,

Before I made any basis of design comments formal I wanted to run these by you:

1. Please note a future parallel sewer on Osborn is already in the planning stages by the City so sewer capacity will not be an issue for this facility. The tentative plan is to have all hospital flows routed to this new sewer. However, this parallel sewer will not start construction until approximately summer 2020.
    a. How does this schedule align with the schedule for this facility? ***Construction is scheduled to start later this year. We are planning on submitting CDs at the end of July.***
    b. Given this we are interested in obtaining the most accurate projection of sewer demands for this facility possible. See items 2 below . ***It's our understanding the building will just be an out-patient facility with offices.***
2. There is no reference in the BODs to the type of medical facility and water/sewer demand characteristics (the floor plan area nomenclature, i.e. infusion, ASC, SGA, etc, is not readily discernable)
    a. Is this an in-patient or out-patient facility? (include in BODs) ***Out-patient only.***
    b. number of beds? ***No Beds.***
    c. Is there a cafeteria? ***No Cafeteria.***
    d. Is there a laundry? ***We believe they are using an offsite service, but will verify with the Architect.***

e. Are there rehabilitation or exercise pools or spas? ***No pools or spas.***
f. Is the future ambulatory facility included in this approval? ***No Ambulatory***. Should it be considering the need for accurate water/sewer planning?

3. Why is the sewer being sent to Brown 8“ sewer but the water supply is coming from Osborn 8”? ***It’s a shorter pipe run to route the sewer line in Brown Street. Plus there will be proposed electrical equipment in that area and we wanted to avoid conflicts. The site plan has changed since our submittal, so we will review again and see if it makes sense to use the existing sewer stub.*** See question 4 below for follow-up question on this.
4. Water and sewer stub-outs appear to exist in the southeast corner of the parcel. Why are these not being used? ***The fire riser room is located on the west side of the building, so it just made sense to go to connect to the waterline further west in Osborn. We will review again and see if it makes sense to use the existing water stub.*** A Water Resources’ consultant recently had a flow meter placed in the manhole where the stub out is shown below and there was no flow reported coming from the stub-out. Instead it was coming into the manhole to the east. Both the sewer and water stub outs show as 8” in City GIS. The water stub-out’s source is the 12” Osborn main. The 12” Osborn main supplies the 8” on Osborn through a connection at Osborn and Drinkwater Blvd.

a. 

Thanks,

Levi C. Dillon, P.E. | *Sr. Water Resources Engineer*

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CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS • CONSTRUCTION MANAGERS

Darrel E. Wood, P.E., R.LS.
Ashok C. Patel, P.E., R.L.S., CFM
Michael T. Young, P.E., LEED AP
James S. Campbell, P.E., LEED GA
Thomas R. Gettings, R.L.S.
Darin L. Moore, P.E., LEED GA
Jeffrey R. Minch, P.E., CFM
Robert D. Gofonia, P.E., R.L.S.

April 17, 2019

Mr. Levi Dillion, P.E.
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

Phone: (480)-312-5319
Email: ldillion@scottsdaleaz.gov

Re: **Honor Health Medical Office Building**
Water Distribution System, Basis of Design Report
Scottsdale, Arizona
WP# 194976

Dear Mr. Dillion:

The proposed Honor Health Medical Office Building development is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian. Refer to the attached *Vicinity Map* for the project location. The proposed 4-story office building will be 92,000 square feet (sf), with an option to add a 25,000-sf fifth floor. The proposed building is located at the southeast corner of the site, with proposed parking lots on the north and west sides of the proposed building. At-grade parking will also be located under the south side of the building. The development will include associated hardscape and landscaping.

The project site has public waterline infrastructure on three (3) sides of the site. There is one (1) 12-inch DIP and one (1) 8-inch ACP water main in Osborn Road. There is one (1) 8-inch CIP water main in Brown Avenue. There is one (1) 6-inch CIP water main in 4th Street. The Honor Health Medical Office Building site proposes two (2) private water connections that utilize the City's public waterline for domestic water and fire protection that connect to the existing public 8-inch waterline in Osborn Road. The existing irrigation meter will be reused. Refer to the attached *Water Exhibit* for a depiction of the existing water infrastructure surrounding the project.

The design criteria used to estimate potable water demands and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the requirements listed in the *City of Scottsdale Design Standards and Policies Manual*, 2018. The following is a summary of the primary design criteria utilized:

- Average Day Water Demand, Office: 8.34E-04 gpm/sq. ft.*
- Fire Flow Requirements: min 1,500 gpm**
- Maximum Day Demand: 2.0 x ADD
- Peak Hour Demand: 3.5 x ADD
- Minimum Residual Pressure, Peak Hour: 50 psi
- Minimum Residual Pressure, Maximum Day + Fire Flow: 30 psi

Not clear, 1,250 versus 1,500, which is it?

• Maximum System Pressure:	120 psi
• Maximum Pipe Head Loss, Maximum Day Demand:	8 ft / 1000 ft
• Maximum Pipe Head Loss, Peak Hour Demand:	10 ft / 1000 ft
• Minimum Pipe Diameter, Public Water Line:	8 inches

Abbreviations: gpd = gallons per day; sf = square feet; ADD = average day demand; psi = pounds per square inch

* Includes both inside and outside use per Figure 6-1.2, *COS Design Standards and Policies Manual*

** Fire flow is based on 10% reduction to account for flow measurement inaccuracy (refer to attached calculations in the appendices)

Domestic water service will be provided by a proposed 3-inch private waterline and a 3-inch domestic meter. Fire protection for the proposed building will be provided by one (1) proposed 6-inch fire line for an automatic fire-sprinkler service. Irrigation water service will be provided by a suspected existing 1-inch irrigation line.

The average day water demand for the proposed 117,000-sf Honor Health Medical Office Building is projected to be approximately 97.6 gallons per minute (gpm). Maximum day demands and peak hour demands are projected to be 195.2 gpm and 341.6 gpm, respectively (refer to the attached calculations).

WaterCAD V8i, by Haestad Methods, was utilized to analyze the existing water distribution system and proposed improvements. Results from a fire hydrant flow test, conducted on April 12, 2019 by Arizona Flow Testing LLC, was utilized to simulate the City of Scottsdale's water supply for the project (refer to attached modeling results).

The hydraulic modeling results indicate the proposed system is capable of delivering peak hour demands, totaling 342 gpm, to the proposed Honor Health Medical Office Building project, with pressures ranging from 71 to 72 pounds per square inch (psi). Fire flow results indicate residual pressures exceed 30 psi within the project site, with 2,500-gpm fire hydrant flows during maximum day demand. A 50-percent reduction was applied to the fire flow requirements due to the proposed sprinkler system. Hydraulic modeling results, calculations, and exhibits involved in the water system analysis are attached.

Thank you for your review of the Water Distribution System Basis of Design Report provided for the Honor Health Medical Office Building project. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc

John Bulka, P.E.
Project Manager

JMB/km

CALCULATIONS AND HYDRAULIC MODELING RESULTS

WOOD/PATEL
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CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

TABLE 1 - WATER DEMAND DESIGN FLOWS

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Engineer: John Bulka, P.E.
Date: 4/17/2019

LAND USE AND DWELLING UNIT BREAKDOWN BY JUNCTION

HYDRAULIC MODEL NODE	ELEVATION (ft)	PRESSURE ZONE	LAND USE	DWELLING UNITS	DEMAND VALUE	UNITS	AVERAGE DAILY DEMAND			MAXIMUM DAY DEMAND				PEAK HOUR DEMAND			
							(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)
J-BLDG	1,245.00	-	Commercial (Office)	117,000	0.000834	gpm/sf	140,544.00	97.6	97.6	2.0	281,088.00	195.2	195.2	3.5	491,904.00	341.6	341.6
Total				**117,000**			**140,544**	**97.6**	**97.6**		**281,088**	**195.2**	**195.2**		**491,904**	**341.6**	**341.6**

Notes:
1. Per the City of Scottsdale Design Standards and Policies Manuel, dwelling units for an office building are measured in square feet.
2. The proposed building water demand was estimated assuming 5th floor addition.

FIRE HYDRANT FLOW TEST

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	Honor Health MOB
Project Address:	7242 East Osborn Road, Scottsdale, Arizona, 85251
Client Project No.:	194976
Arizona Flow Testing Project No.:	19131
Flow Test Permit No.:	C57857
Date and time flow test conducted:	April 12, 2019 at 8:00 AM
Data is current and reliable until:	October 12, 2019
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Ray Padilla –City of Scottsdale-Inspector (602-541-0586)

Raw Test Data

Static Pressure: **85.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **75.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **23.0 PSI**

(Measured in pounds per square inch)

Diffuser Orifice Diameter: One 4-inch Hose Monster
(Measured in inches)

Coefficient of Diffuser: .7875

Flowing GPM: **1,803 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **4,955 GPM**

Data with 13 PSI Safety Factor

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **62.0 PSI**
(Measured in pounds per square inch)

Distance between hydrants: Approx.: 290 feet

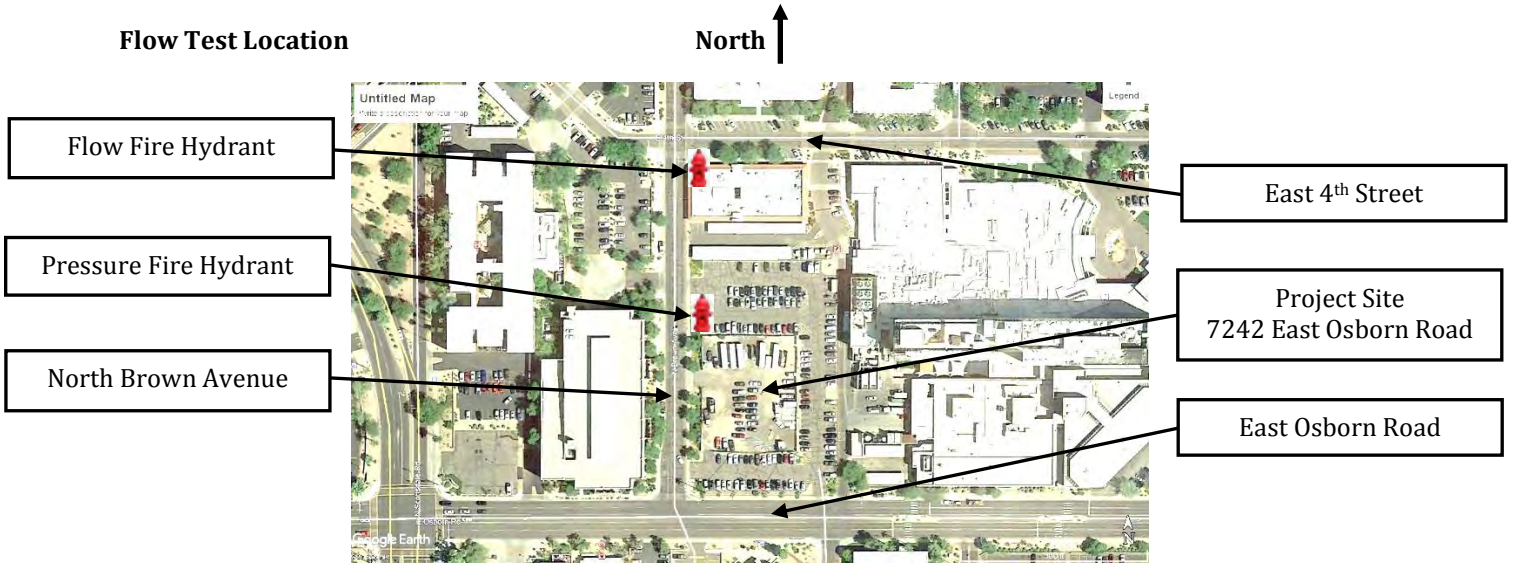
Main size: Not Provided

Flowing GPM: **1,803 GPM**

GPM @ 20 PSI**:** **4,392 GPM**

Scottsdale requires a maximum Static Pressure of 72 PSI for AFES Design.

Flow Test Location **North**



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EXISTING WATER SYSTEM PRESSURES

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona

Project Number: 194976
Project Engineer: John Bulka, P.E.

Flow Test Location: 7242 E Osborn Road, Scottsdale AZ
Date of Flow Test: April 12, 2019

Pressure Hydrant		**Flow Hydrant**	
Static Pressure (psi)	72.0		
Residual Pressure (psi)	62.0	Flow (gpm)	1803
Calculated Flow at 20 psi	4392 gpm	Calculated Flow at	20 psi

Discharge (gpm)	Pressure (psi)	Head (ft)
0	72.0	166.2
1803	62.0	143.2
4392	20	46.2

Notes:
1. Values provided from a flow test by the Arizona Flow Testing LLC

FlexTable: Pipe Table

Active Scenario: Calibration-Static

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	0	0.00
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	0	0.00
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibration-Static

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.70	73
EX J-2	1,244.50	0	1,412.70	73
EX FH-1	1,245.00	0	1,412.70	73
EX FH-FLOW	1,247.50	0	1,412.70	71
EX J-3	1,248.00	0	1,412.70	71
EX FH-TEST	1,246.50	0	1,412.70	72
EX J-BLDG	1,248.00	0	1,412.70	71
EX J-4	1,247.00	0	1,412.70	72
J-BLDG	1,245.00	0	1,412.70	73

FlexTable: Pipe Table

Active Scenario: Calibraion-Flow

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	1,803	11.51
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	1,803	0.32
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	1,803	0.32
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibraion-Flow

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,389.70	63
EX J-2	1,244.50	0	1,389.70	63
EX FH-1	1,245.00	0	1,389.70	63
EX FH-FLOW	1,247.50	1,803	1,375.86	56
EX J-3	1,248.00	0	1,375.86	55
EX FH-TEST	1,246.50	0	1,389.70	62
EX J-BLDG	1,248.00	0	1,375.86	55
EX J-4	1,247.00	0	1,375.86	56
J-BLDG	1,245.00	0	1,389.70	63

FlexTable: Pipe Table

Active Scenario: Calibraion-Max

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	4,392	28.03
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	4,392	0.78
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	4,392	0.78
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibraion-Max

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,292.70	21
EX J-2	1,244.50	0	1,292.70	21
EX FH-1	1,245.00	0	1,292.70	21
EX FH-FLOW	1,247.50	4,392	1,220.72	-12
EX J-3	1,248.00	0	1,220.72	-12
EX FH-TEST	1,246.50	0	1,292.70	20
EX J-BLDG	1,248.00	0	1,220.72	-12
EX J-4	1,247.00	0	1,220.72	-11
J-BLDG	1,245.00	0	1,292.70	21

FlexTable: Pipe Table

Active Scenario: Average Day Demand

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	98	0.62
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	98	0.02
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	98	0.02
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-98	0.62

FlexTable: Junction Table

Active Scenario: Average Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.50	73
EX J-2	1,244.50	0	1,412.50	73
EX FH-1	1,245.00	0	1,412.52	72
EX FH-FLOW	1,247.50	0	1,412.60	71
EX J-3	1,248.00	0	1,412.60	71
EX FH-TEST	1,246.50	0	1,412.60	72
EX J-BLDG	1,248.00	0	1,412.60	71
EX J-4	1,247.00	0	1,412.60	72
J-BLDG	1,245.00	98	1,412.50	72

FlexTable: Pipe Table

Active Scenario: Max Day

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	195	1.25
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	195	0.03
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	195	0.03
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-195	1.25

FlexTable: Junction Table

Active Scenario: Max Day

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,411.99	73
EX J-2	1,244.50	0	1,411.99	72
EX FH-1	1,245.00	0	1,412.03	72
EX FH-FLOW	1,247.50	0	1,412.33	71
EX J-3	1,248.00	0	1,412.33	71
EX FH-TEST	1,246.50	0	1,412.33	72
EX J-BLDG	1,248.00	0	1,412.33	71
EX J-4	1,247.00	0	1,412.33	72
J-BLDG	1,245.00	195	1,411.99	72

FlexTable: Pipe Table

Active Scenario: Peak Hour

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	342	2.18
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	342	0.06
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	342	0.06
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-342	2.18

FlexTable: Junction Table

Active Scenario: Peak Hour

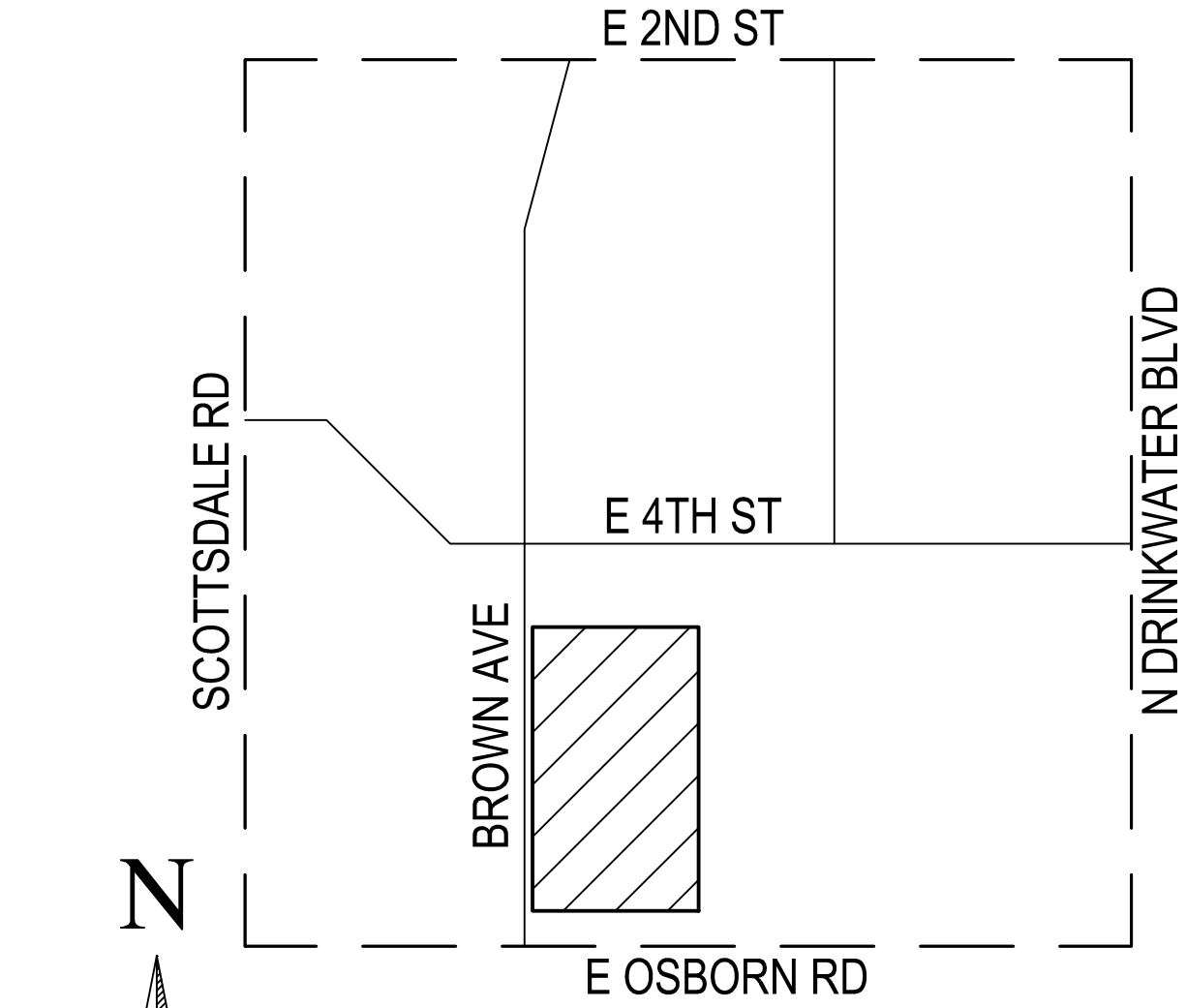
Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,410.71	72
EX J-2	1,244.50	0	1,410.71	72
EX FH-1	1,245.00	0	1,410.82	72
EX FH-FLOW	1,247.50	0	1,411.65	71
EX J-3	1,248.00	0	1,411.65	71
EX FH-TEST	1,246.50	0	1,411.65	71
EX J-BLDG	1,248.00	0	1,411.65	71
EX J-4	1,247.00	0	1,411.65	71
J-BLDG	1,245.00	342	1,410.71	72

Fire Flow Node FlexTable: Fire Flow Report

Active Scenario: Max Day + Fire Flow

Label	Elevation (ft)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Calculated Residual) (psi)	Junction w/ Minimum Pressure (System)	Hydraulic Grade (ft)
EX J-1	1,244.00	2,500	2,330	30	EX J-2	1,411.99
EX J-2	1,244.50	2,500	2,406	30	EX J-1	1,411.99
EX FH-1	1,245.00	2,500	2,690	30	J-BLDG	1,412.03
EX FH-FLOW	1,247.50	2,500	2,888	30	EX J-BLDG	1,412.33
EX J-3	1,248.00	2,500	2,792	30	EX J-BLDG	1,412.33
EX FH-TEST	1,246.50	2,500	3,685	31	EX J-BLDG	1,412.33
EX J-BLDG	1,248.00	2,500	2,276	30	EX J-4	1,412.33
EX J-4	1,247.00	2,500	1,718	30	EX J-BLDG	1,412.33
J-BLDG	1,245.00	2,695	2,799	30	EX J-2	1,411.99

VICINITY MAP



VICINITY MAP

N.T.S.

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HONOR HEALTH MEDICAL OFFICE BUILDING

VICINITY MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

WATER EXHIBIT

EX J-3
EX P-7
EX J-BLDG
EX P-8
EX J-4
EX P-6
EX FH-FLOW
4TH STREET
N
0
50
100
Horz. 1 in. = 50 ft.
EX. BUILDING
FF=1248.51±
EX P-5
BROWN AVENUE
EX FH-TEST
PMP-1
RES-1
BUILDING OVERHANG
PROPOSED BUILDING
IRRIGATION CONNECTION
EXISTING HONOR HEALTH OSBORN MEDICAL CENTER
P-RES
P-PMP
PROPOSED AT-GRADE PARKING UNDER BUILDING
EX P-4
FIRE CONNECTION
J-BLDG (DOMESTIC)
EX J-2
EX J-1
EX FH-1
EX P-3
EX P-2
EX P-1
OSBORN ROAD

Z:\2019\194976\Project Support\Reports\Water BOD\Exhibits\4976-WaterExhibit.dwg

PIPE DIAMETER	EXISTING	PLANNED
6-INCHES		
8-INCHES		
12-INCHES		

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FOR CONSTRUCTION OR RECORDING

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WWW.WOODPATEL.COM

HONOR HEALTH MEDICAL OFFICE BUILDING

Water Exhibit

DATE: 04-17-2019	SCALE: 1" = 50'	SHEET 01 of 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

Add "FINAL"

WASTEWATER COLLECTION SYSTEM
BASIS OF DESIGN REPORT
FOR
HONOR HEALTH
MEDICAL OFFICE BUIILDING

April 17, 2019
WP# 194976

FINAL Basis of Design Report
☐ APPROVED
☐ APPROVED AS NOTED
☑ REVISE AND RESUBMIT

CITY OF SCOTTSDALE
SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If approved; the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY ldillon DATE 7/3/2019

Address and resubmit:
1) Sewer capacity on Osborn will not be available when already approved and allocated projects ahead of this project are complete. The City is in a study phase of a parallel sewer on Osborn Rd. An in-lieu of construction payment to the City to off-set the cost of this new sewer will be required so that capacity will be available for this development. This payment will be proportional to the capacity impact and length of sewer impacted to Miller Rd. Coordinate with the Water Resources department on the determination of this payment prior to re-submittal. The details of this determination should be included in the re-submittal.
2) If sewer stub in southeast corner is not to be used it should be removed back to the main to make room for new parallel sewer in Osborn i.e. discharge onto Brown is likely preferred. Indicate stub removal on utility plan.
3) Address any applicable comments in email correspondence herein.

Prepared For:
Devenney Group Ltd., Architects
Mr. Dudley Campbell
201 West Indian School Road
Suite 102
Phoenix, Arizona 85013
Phone: (602) 943-7645

Submitted To:
City of Scottsdale
Mr. Levi Dillion, P.E.
Water Resources Administration
9379 East San Salvador Drive
Scottsdale, Arizona 85258
Phone: (480)-312-5319

Prepared By:
Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8500
Website: www.woodpatel.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 33359 JOHN M. BULKA Date Signed 4-17-19 ARIZONA U.S.A.
Expires 3-31-20

WOOD/PATEL
MISSION: CLIENT S

20-DR-2019
8/21/2019

Dillon, Levi

From: John Bulka <jbulka@WoodPatel.com>
Sent: Wednesday, June 12, 2019 11:10 AM
To: Dillon, Levi
Cc: Cluff, Bryan; Hayes, Eliana; John "Gordy" Ritchie; Darin Moore
Subject: RE: water and sewer questions on 20-DR-2019, Neuroscience Institute

Hi Dillion,
As discussed in our phone conversation, we've reviewed your comments and offer the following responses. Please call if you have any questions.
Thanks,

John Bulka
Project Manager

D: 602.336.7924
M: 602.695.5579
jbulka@woodpatel.com
www.woodpatel.com

From: Dillon, Levi [mailto:LDillon@Scottsdaleaz.gov]
Sent: Monday, June 10, 2019 6:17 PM
To: John Bulka
Cc: Cluff, Bryan; Hayes, Eliana
Subject: water and sewer questions on 20-DR-2019, Neuroscience Institute

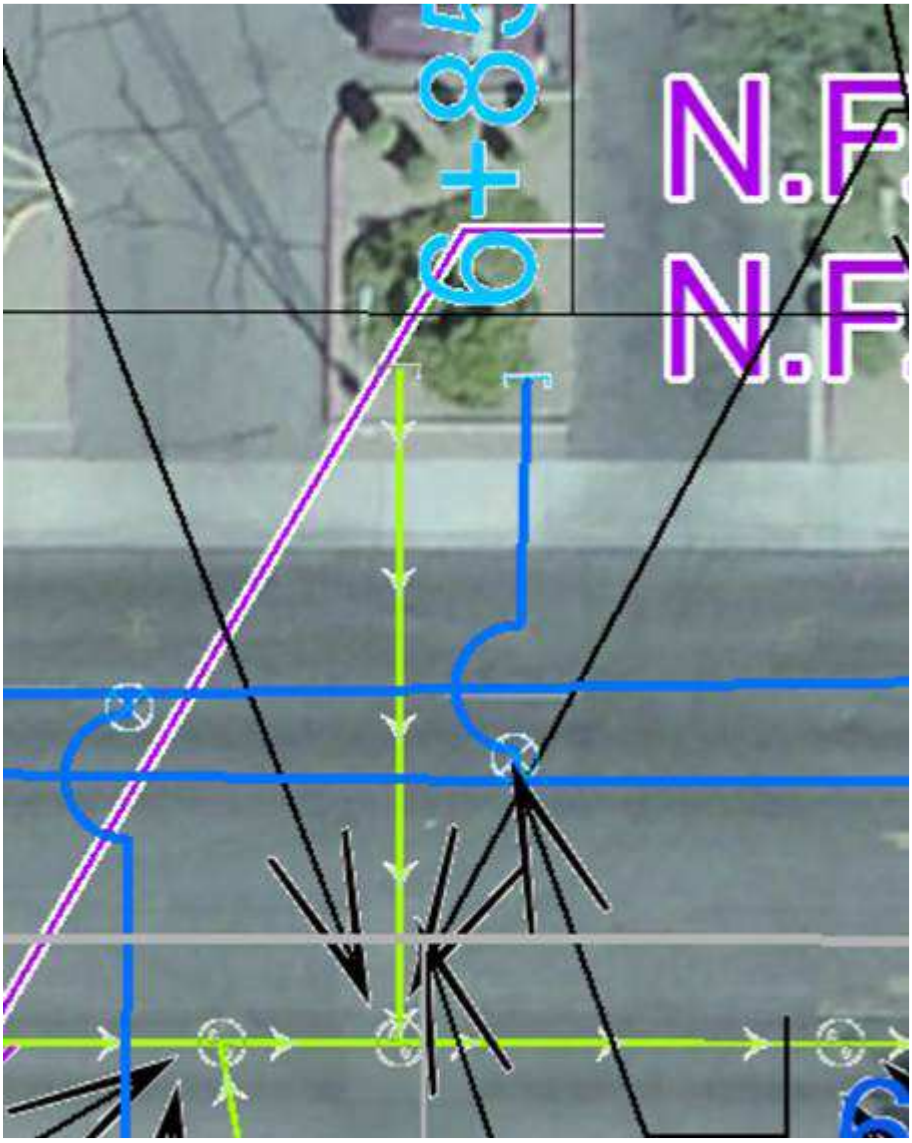
Hi John,

Before I made any basis of design comments formal I wanted to run these by you:

1. Please note a future parallel sewer on Osborn is already in the planning stages by the City so sewer capacity will not be an issue for this facility. The tentative plan is to have all hospital flows routed to this new sewer. However, this parallel sewer will not start construction until approximately summer 2020.
    a. How does this schedule align with the schedule for this facility? ***Construction is scheduled to start later this year. We are planning on submitting CDs at the end of July.***
    b. Given this we are interested in obtaining the most accurate projection of sewer demands for this facility possible. See items 2 below . ***It's our understanding the building will just be an out-patient facility with offices.***
2. There is no reference in the BODs to the type of medical facility and water/sewer demand characteristics (the floor plan area nomenclature, i.e. infusion, ASC, SGA, etc, is not readily discernable)
    a. Is this an in-patient or out-patient facility? (include in BODs) ***Out-patient only.***
    b. number of beds? ***No Beds.***
    c. Is there a cafeteria? ***No Cafeteria.***
    d. Is there a laundry? ***We believe they are using an offsite service, but will verify with the Architect.***

e. Are there rehabilitation or exercise pools or spas? ***No pools or spas.***
f. Is the future ambulatory facility included in this approval? ***No Ambulatory***. Should it be considering the need for accurate water/sewer planning?

3. Why is the sewer being sent to Brown 8“ sewer but the water supply is coming from Osborn 8”? ***It’s a shorter pipe run to route the sewer line in Brown Street. Plus there will be proposed electrical equipment in that area and we wanted to avoid conflicts. The site plan has changed since our submittal, so we will review again and see if it makes sense to use the existing sewer stub.*** See question 4 below for follow-up question on this.
4. Water and sewer stub-outs appear to exist in the southeast corner of the parcel. Why are these not being used? ***The fire riser room is located on the west side of the building, so it just made sense to go to connect to the waterline further west in Osborn. We will review again and see if it makes sense to use the existing water stub.*** A Water Resources’ consultant recently had a flow meter placed in the manhole where the stub out is shown below and there was no flow reported coming from the stub-out. Instead it was coming into the manhole to the east. Both the sewer and water stub outs show as 8” in City GIS. The water stub-out’s source is the 12” Osborn main. The 12” Osborn main supplies the 8” on Osborn through a connection at Osborn and Drinkwater Blvd.

a. 

Thanks,

Levi C. Dillon, P.E. | *Sr. Water Resources Engineer*

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CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS • CONSTRUCTION MANAGERS

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S., CFM
Michael T. Young, P.E., LEED AP
James S. Campbell, P.E., LEED GA
Thomas R. Gettings, R.L.S.
Darin L. Moore, P.E., LEED GA
Jeffrey R. Minch, P.E., CFM
Robert D. Gofonia, P.E., R.L.S.

April 17, 2019

Mr. Levi Dillion, P.E.
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

Phone: (480)-312-5319
Email: ldillion@scottsdaleaz.gov

Re: **Honor Health Medical Office Building**
Wastewater Collection System, Basis of Design Report
Scottsdale, Arizona
WP# 194976

Dear Mr. Dillion:

The proposed Honor Health Medical Office Building development is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian. Refer to the attached *Vicinity Map* for the project location. The proposed 4-story office building will be 92,000 square feet (sf), with an option to add a 25,000-sf fifth floor. The proposed building is located at southeast corner of the site, with proposed parking lots on the north and west sides of the proposed building. At-grade parking will also be located under the south side of the building. The development will include associated hardscape and landscaping.

Wastewater flowing from the proposed Honor Health Medical Office Building will discharge to a 6-inch private sewer line on the west side of the proposed building. The 6-inch private sewer line discharges into the City of Scottsdale's existing public 8-inch VCP sewer line in Brown Avenue.

The design criteria used to estimate wastewater flows and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the requirements listed in the City of Scottsdale's *Design Standards and Policies Manual,* 2018. The following is a summary of the primary design criteria utilized:

• Average Day Wastewater flows, Office:	0.4 gpd/sq. ft.
• Peaking Factor, Office:	3
• Minimum Mean Full Flow Velocity:	2.50 fps
• Minimum Peak Full Flow Velocity:	10.0 fps
• Minimum Peak Flow d/D Ratio (12" dia. Or less sewers):	d/D = 0.65

Abbreviations: gpd = gallons per day; fps = feet per second

Based on the above design criteria, the projected average day flow for the proposed 117,000-sf Honor Health Medical Office Building project is approximately 44,800 gallons per day (gpd), or 33 gallons per minute (gpm). The peak flow is projected to be 140,400 gpd. The proposed sewer slopes, projected flow velocities, and pipe flow capacities are summarized on the attached spreadsheets.

It is assumed the infiltration and inflow from wet weather has been accounted for in the published design flow rates for the development and the maximum d/D. Therefore, those flows have not been added into the calculations. The proposed sanitary sewer collection system is designed to have adequate capacity to serve the proposed development.

Thank you for your review of the Wastewater Collection System Basis of Design Report provided for the Honor Health Medical Office Building development. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc.

John M. Bulka, P.E.
Project Manager

JMB/km

Y:\WP\Reports\Commercial\194976 Honor Health Medical Office Building Wastewater Basis of Design Report.docx

WASTEWATER DESIGN FLOWS & FLOWMASTER RESULTS

WOOD/PATEL
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TABLE 1 - WASTEWATER DESIGN FLOWS

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Manager: John Bulka, P.E.
Date: 4/17/2019

UPSTREAM NODE	DOWNSTREAM NODE	APPLICABLE UNIT	NUMBER OF UNITS	ADF/ APPLICABLE UNIT (GPD)[1]	TOTAL ADF (GPD)	PEAKING FACTOR[2]	PEAK FLOW (GPD)	TOTAL ADF (GPM)	PEAK FLOW (GPM)
Building Connection 1	Privite Sewer Connection	SF	117,000	0.4	46,800	3.00	140,400	33	98
Total					**46,800**		**140,400**	**33**	**98**

1. Average Daily Flow Demand based upon office building square footage per City of Scottsdale Design Standards and Policies Manual (2018)
2. Peaking Factor per City of Scottsdale Design Standards and Policies Manual (2018)

Proposed 6" Sewer Line (2.0%)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02000	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

Results

Normal Depth	1.87	in
Flow Area	0.05	ft²
Wetted Perimeter	0.59	ft
Hydraulic Radius	1.06	in
Top Width	0.46	ft
Critical Depth	0.23	ft
Percent Full	31.2	%
Critical Slope	0.00445	ft/ft
Velocity	4.16	ft/s
Velocity Head	0.27	ft
Specific Energy	0.42	ft
Froude Number	2.18	
Maximum Discharge	1.11	ft³/s
Discharge Full	1.03	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	31.19	%
Downstream Velocity	Infinity	ft/s

20-DR-2019
8/21/2019

Proposed 6" Sewer Line (2.0%)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.87	in
Critical Depth	0.23	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.00445	ft/ft

Proposed 6" Sewer Line (2.5%)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02500	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

Results

Normal Depth	1.77	in
Flow Area	0.05	ft²
Wetted Perimeter	0.57	ft
Hydraulic Radius	1.01	in
Top Width	0.46	ft
Critical Depth	0.23	ft
Percent Full	29.4	%
Critical Slope	0.00446	ft/ft
Velocity	4.50	ft/s
Velocity Head	0.31	ft
Specific Energy	0.46	ft
Froude Number	2.44	
Maximum Discharge	1.24	ft³/s
Discharge Full	1.15	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	29.45	%
Downstream Velocity	Infinity	ft/s

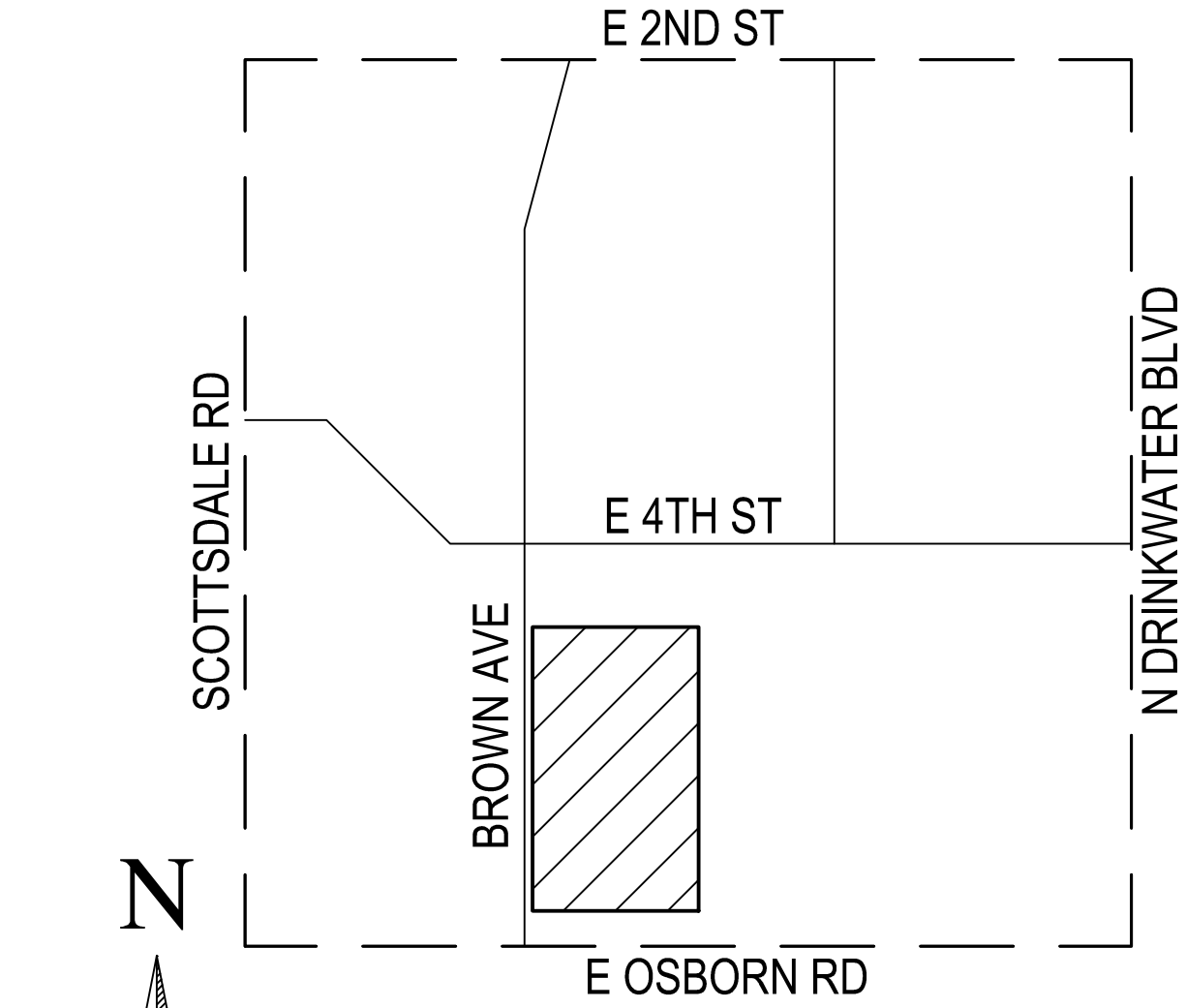
20-DR-2019
8/21/2019

Proposed 6" Sewer Line (2.5%)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.77	in
Critical Depth	0.23	ft
Channel Slope	0.02500	ft/ft
Critical Slope	0.00446	ft/ft

VICINITY MAP



VICINITY MAP

N.T.S.

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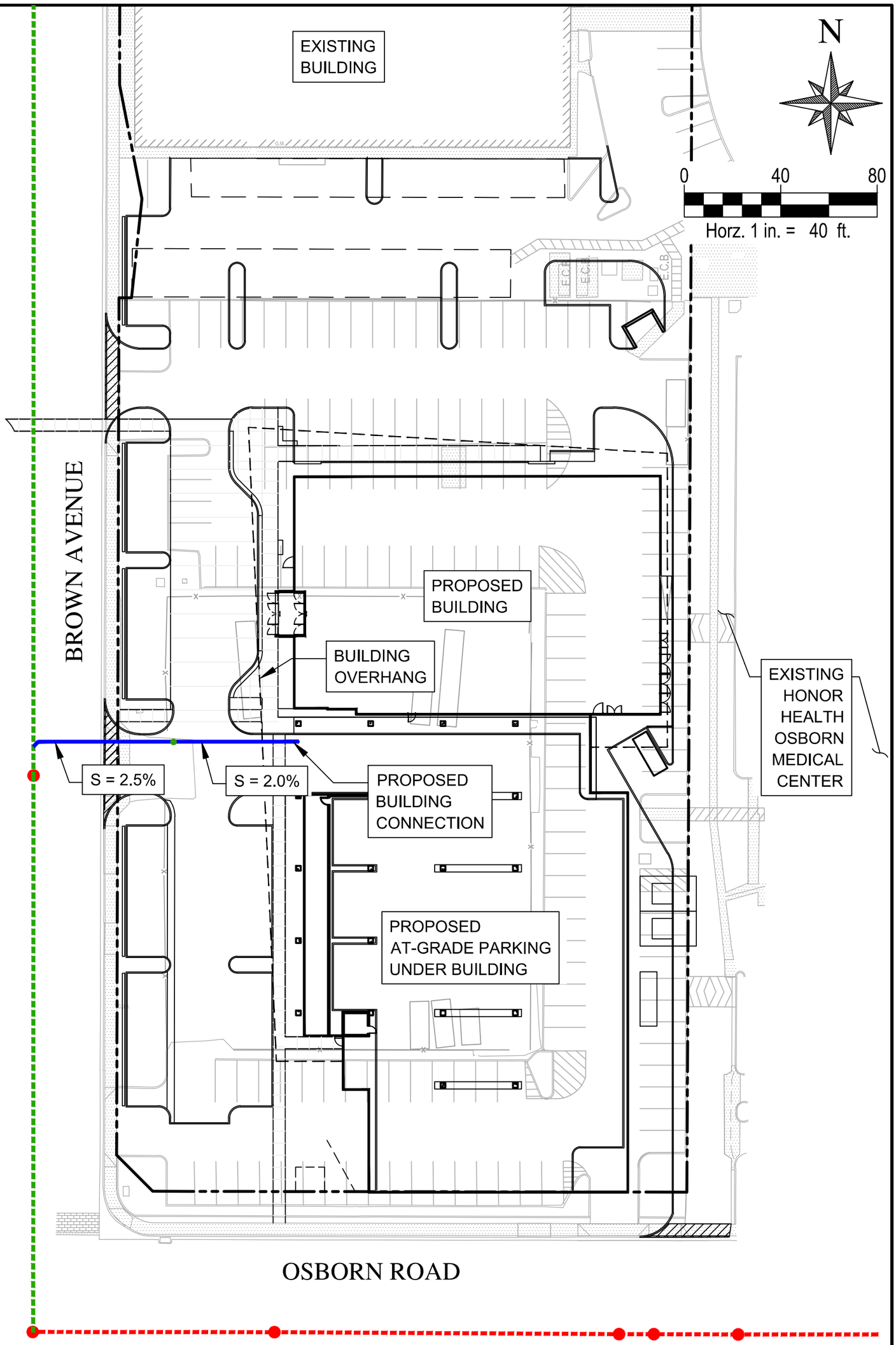
HONOR HEALTH MEDICAL OFFICE BUILDING

VICINITY MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

20-DR-2019
8/21/2019

WASTEWATER EXHIBIT



PIPE DIAMETER	EXISTING	PLANNED
6-INCHES		
8-INCHES		
12-INCHES		
MANHOLE		
CLEANOUT		

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HONOR HEALTH MEDICAL OFFICE BUILDING

Wastewater Exhibit

DATE:	SCALE:	SHEET
04-17-2019	1" = 40'	01 of 01
JOB NO.:	DESIGN: JB	
194976	DRAWN: AF	

20-DR-2019
8/21/2019

Add "FINAL"

WATER DISTRIBUTION SYSTEM
BASIS OF DESIGN REPORT
FOR
HONOR HEALTH
MEDICAL OFFICE BUIILDING

April 17, 2019
WP# 194976

FINAL Basis of Design Report
☐ APPROVED
☐ APPROVED AS NOTED
☑ REVISE AND RESUBMIT

CITY OF SCOTTSDALE
SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

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For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY ldillon DATE 7/3/2019

Address and resubmit:
1) Evaluate using 8" water stub out located in southeast corner. This connects to a 12" main on Osborn. If not to be used (and not currently in use) remove stub back to main. Indicate on utility plan.
2) In final BOD show utility plan with meter and BFP. Provide meter and service line sizing per DS&PM and verify if meter vault is required.
3) Complete hydraulic analysis up to highest finished floor of building and show 15psi min concurrent with fire flow (associated with meter and service/supply line sizing)
4) Clarify required fire flow, both 1,250 and 1,500 are shown.
5) Address any applicable comments in the email correspondence herein.

Prepared For:
Devenney Group Ltd., Architects
Mr. Dudley Campbell
201 West Indian School Road
Suite 102
Phoenix, Arizona 85013
Phone: (602) 943-7645

Submitted To:
City of Scottsdale
Mr. Levi Dillion, P.E.
Water Resources Administration
9379 East San Salvador Drive
Scottsdale, Arizona 85258
Phone: (480)-312-5319

Prepared By:
Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8500
Website: www.woodpatel.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 33359 JOHN M. BULKA Date Signed 4-17-19 ARIZONA U.S.A.
Expires 3-31-20

WOOD/PATEL
MISSION: CLIENT S

20-DR-2019
8/21/2019

Dillon, Levi

From: John Bulka <jbulka@WoodPatel.com>
Sent: Wednesday, June 12, 2019 11:10 AM
To: Dillon, Levi
Cc: Cluff, Bryan; Hayes, Eliana; John "Gordy" Ritchie; Darin Moore
Subject: RE: water and sewer questions on 20-DR-2019, Neuroscience Institute

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Thanks,

John Bulka
Project Manager

D: 602.336.7924
M: 602.695.5579
jbulka@woodpatel.com
www.woodpatel.com

From: Dillon, Levi [mailto:LDillon@Scottsdaleaz.gov]
Sent: Monday, June 10, 2019 6:17 PM
To: John Bulka
Cc: Cluff, Bryan; Hayes, Eliana
Subject: water and sewer questions on 20-DR-2019, Neuroscience Institute

Hi John,

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1. Please note a future parallel sewer on Osborn is already in the planning stages by the City so sewer capacity will not be an issue for this facility. The tentative plan is to have all hospital flows routed to this new sewer. However, this parallel sewer will not start construction until approximately summer 2020.
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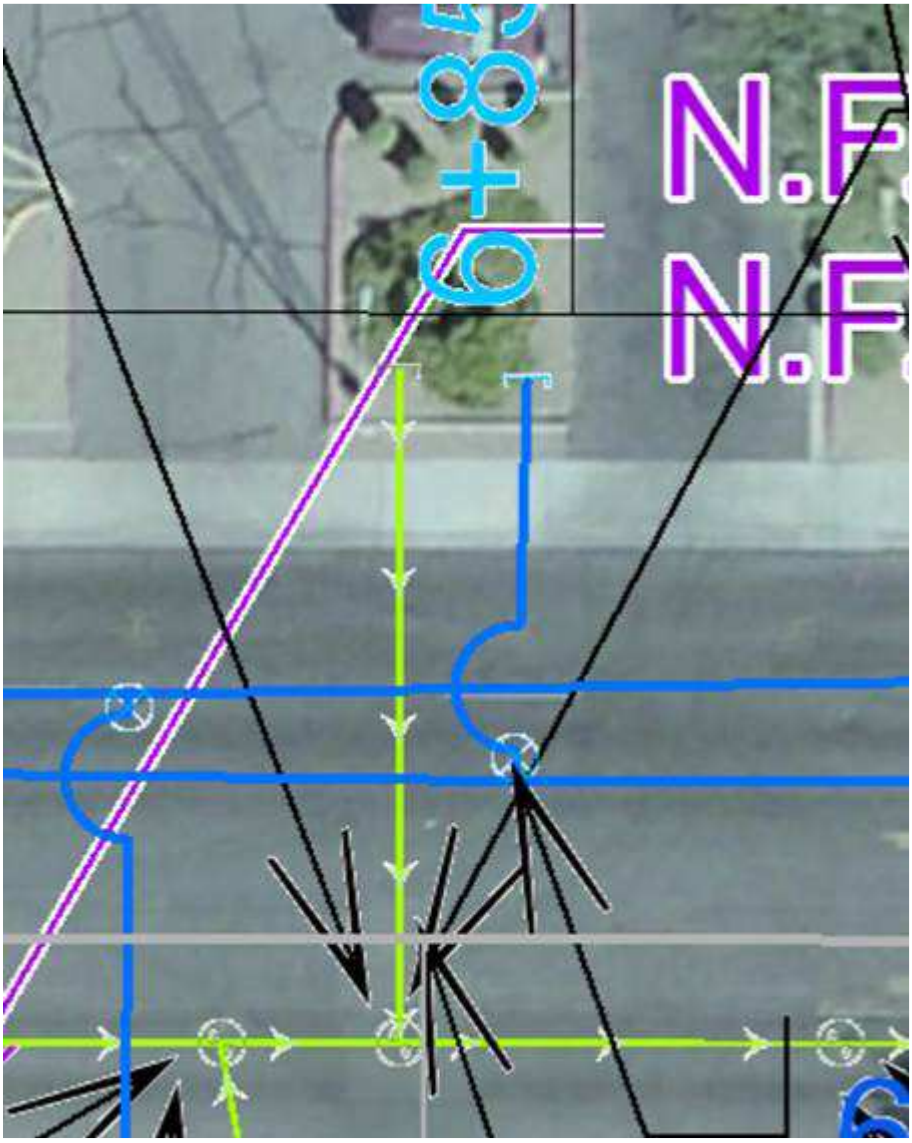
3. Why is the sewer being sent to Brown 8“ sewer but the water supply is coming from Osborn 8”? ***It’s a shorter pipe run to route the sewer line in Brown Street. Plus there will be proposed electrical equipment in that area and we wanted to avoid conflicts. The site plan has changed since our submittal, so we will review again and see if it makes sense to use the existing sewer stub.*** See question 4 below for follow-up question on this.
4. Water and sewer stub-outs appear to exist in the southeast corner of the parcel. Why are these not being used? ***The fire riser room is located on the west side of the building, so it just made sense to go to connect to the waterline further west in Osborn. We will review again and see if it makes sense to use the existing water stub.*** A Water Resources’ consultant recently had a flow meter placed in the manhole where the stub out is shown below and there was no flow reported coming from the stub-out. Instead it was coming into the manhole to the east. Both the sewer and water stub outs show as 8” in City GIS. The water stub-out’s source is the 12” Osborn main. The 12” Osborn main supplies the 8” on Osborn through a connection at Osborn and Drinkwater Blvd.

a. 

Thanks,

Levi C. Dillon, P.E. | *Sr. Water Resources Engineer*

WOOD/PATEL
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CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS • CONSTRUCTION MANAGERS

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S., CFM
Michael T. Young, P.E., LEED AP
James S. Campbell, P.E., LEED GA
Thomas R. Gettings, R.L.S.
Darin L. Moore, P.E., LEED GA
Jeffrey R. Minch, P.E., CFM
Robert D. Gofonia, P.E., R.L.S.

April 17, 2019

Mr. Levi Dillion, P.E.
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

Phone: (480)-312-5319
Email: ldillion@scottsdaleaz.gov

Re: **Honor Health Medical Office Building**
Water Distribution System, Basis of Design Report
Scottsdale, Arizona
WP# 194976

Dear Mr. Dillion:

The proposed Honor Health Medical Office Building development is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian. Refer to the attached *Vicinity Map* for the project location. The proposed 4-story office building will be 92,000 square feet (sf), with an option to add a 25,000-sf fifth floor. The proposed building is located at the southeast corner of the site, with proposed parking lots on the north and west sides of the proposed building. At-grade parking will also be located under the south side of the building. The development will include associated hardscape and landscaping.

The project site has public waterline infrastructure on three (3) sides of the site. There is one (1) 12-inch DIP and one (1) 8-inch ACP water main in Osborn Road. There is one (1) 8-inch CIP water main in Brown Avenue. There is one (1) 6-inch CIP water main in 4th Street. The Honor Health Medical Office Building site proposes two (2) private water connections that utilize the City's public waterline for domestic water and fire protection that connect to the existing public 8-inch waterline in Osborn Road. The existing irrigation meter will be reused. Refer to the attached *Water Exhibit* for a depiction of the existing water infrastructure surrounding the project.

The design criteria used to estimate potable water demands and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the requirements listed in the *City of Scottsdale Design Standards and Policies Manual*, 2018. The following is a summary of the primary design criteria utilized:

- Average Day Water Demand, Office: 8.34E-04 gpm/sq. ft.*
- Fire Flow Requirements: min 1,500 gpm**
- Maximum Day Demand: 2.0 x ADD
- Peak Hour Demand: 3.5 x ADD
- Minimum Residual Pressure, Peak Hour: 50 psi
- Minimum Residual Pressure, Maximum Day + Fire Flow: 30 psi

Not clear, 1,250 versus 1,500, which is it?

• Maximum System Pressure:	120 psi
• Maximum Pipe Head Loss, Maximum Day Demand:	8 ft / 1000 ft
• Maximum Pipe Head Loss, Peak Hour Demand:	10 ft / 1000 ft
• Minimum Pipe Diameter, Public Water Line:	8 inches

Abbreviations: gpd = gallons per day; sf = square feet; ADD = average day demand; psi = pounds per square inch

* Includes both inside and outside use per Figure 6-1.2, *COS Design Standards and Policies Manual*

** Fire flow is based on 10% reduction to account for flow measurement inaccuracy (refer to attached calculations in the appendices)

Domestic water service will be provided by a proposed 3-inch private waterline and a 3-inch domestic meter. Fire protection for the proposed building will be provided by one (1) proposed 6-inch fire line for an automatic fire-sprinkler service. Irrigation water service will be provided by a suspected existing 1-inch irrigation line.

The average day water demand for the proposed 117,000-sf Honor Health Medical Office Building is projected to be approximately 97.6 gallons per minute (gpm). Maximum day demands and peak hour demands are projected to be 195.2 gpm and 341.6 gpm, respectively (refer to the attached calculations).

WaterCAD V8i, by Haestad Methods, was utilized to analyze the existing water distribution system and proposed improvements. Results from a fire hydrant flow test, conducted on April 12, 2019 by Arizona Flow Testing LLC, was utilized to simulate the City of Scottsdale's water supply for the project (refer to attached modeling results).

The hydraulic modeling results indicate the proposed system is capable of delivering peak hour demands, totaling 342 gpm, to the proposed Honor Health Medical Office Building project, with pressures ranging from 71 to 72 pounds per square inch (psi). Fire flow results indicate residual pressures exceed 30 psi within the project site, with 2,500-gpm fire hydrant flows during maximum day demand. A 50-percent reduction was applied to the fire flow requirements due to the proposed sprinkler system. Hydraulic modeling results, calculations, and exhibits involved in the water system analysis are attached.

Thank you for your review of the Water Distribution System Basis of Design Report provided for the Honor Health Medical Office Building project. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc

John Bulka, P.E.
Project Manager

JMB/km

Y:\WP\Reports\Commercial\194976 Honor Health Medical Office Building Water Basis of Design Report.docx

20-DR-2019
8/21/2019

CALCULATIONS AND HYDRAULIC MODELING RESULTS

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TABLE 1 - WATER DEMAND DESIGN FLOWS

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Engineer: John Bulka, P.E.
Date: 4/17/2019

LAND USE AND DWELLING UNIT BREAKDOWN BY JUNCTION

HYDRAULIC MODEL NODE	ELEVATION (ft)	PRESSURE ZONE	LAND USE	DWELLING UNITS	DEMAND VALUE	UNITS	AVERAGE DAILY DEMAND			MAXIMUM DAY DEMAND				PEAK HOUR DEMAND			
							(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)
J-BLDG	1,245.00	-	Commercial (Office)	117,000	0.000834	gpm/sf	140,544.00	97.6	97.6	2.0	281,088.00	195.2	195.2	3.5	491,904.00	341.6	341.6
Total				**117,000**			**140,544**	**97.6**	**97.6**		**281,088**	**195.2**	**195.2**		**491,904**	**341.6**	**341.6**

Notes:
1. Per the City of Scottsdale Design Standards and Policies Manuel, dwelling units for an office building are measured in square feet.
2. The proposed building water demand was estimated assuming 5th floor addition.

FIRE HYDRANT FLOW TEST

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	Honor Health MOB
Project Address:	7242 East Osborn Road, Scottsdale, Arizona, 85251
Client Project No.:	194976
Arizona Flow Testing Project No.:	19131
Flow Test Permit No.:	C57857
Date and time flow test conducted:	April 12, 2019 at 8:00 AM
Data is current and reliable until:	October 12, 2019
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Ray Padilla –City of Scottsdale-Inspector (602-541-0586)

Raw Test Data

Static Pressure: **85.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **75.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **23.0 PSI**

(Measured in pounds per square inch)

Diffuser Orifice Diameter: One 4-inch Hose Monster
(Measured in inches)

Coefficient of Diffuser: .7875

Flowing GPM: **1,803 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **4,955 GPM**

Data with 13 PSI Safety Factor

Scottsdale requires a maximum Static Pressure of 72 PSI for AFES Design.

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **62.0 PSI**
(Measured in pounds per square inch)

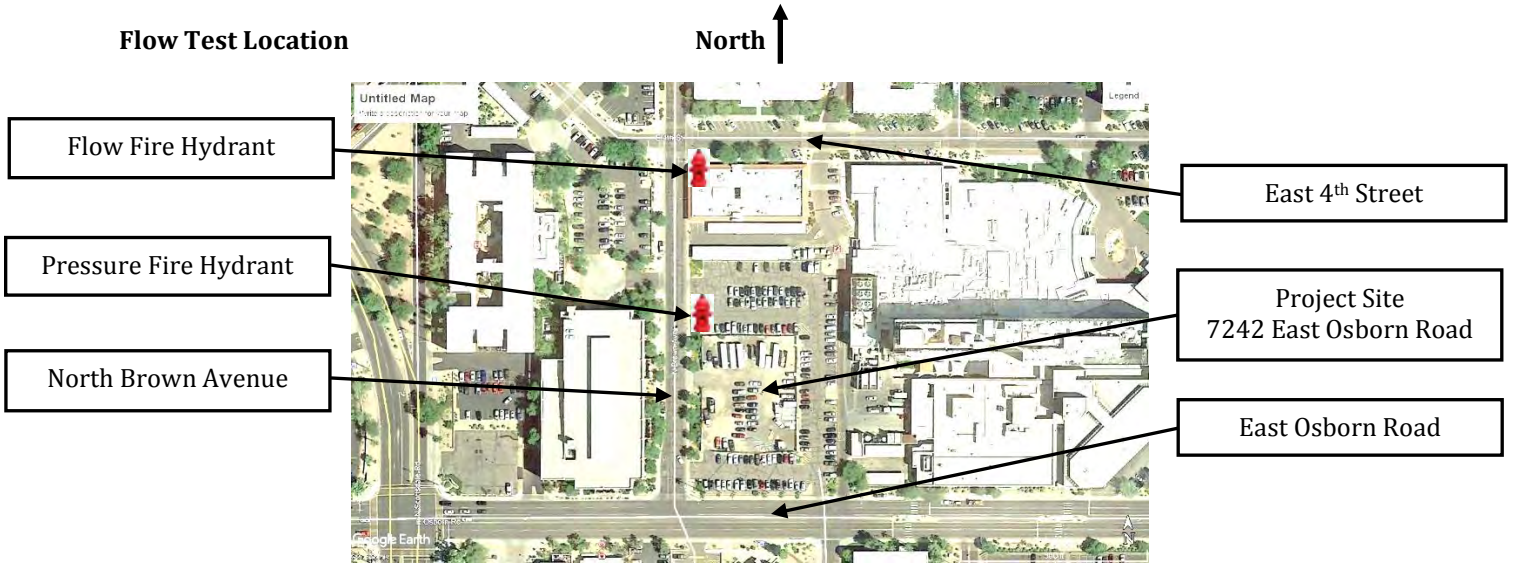
Distance between hydrants: Approx.: 290 feet

Main size: Not Provided

Flowing GPM: **1,803 GPM**

GPM @ 20 PSI**:** **4,392 GPM**

Flow Test Location **North**



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EXISTING WATER SYSTEM PRESSURES

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona

Project Number: 194976
Project Engineer: John Bulka, P.E.

Flow Test Location: 7242 E Osborn Road, Scottsdale AZ
Date of Flow Test: April 12, 2019

Pressure Hydrant		**Flow Hydrant**	
Static Pressure (psi)	72.0		
Residual Pressure (psi)	62.0	Flow (gpm)	1803
Calculated Flow at 20 psi	4392 gpm	Calculated Flow at	20 psi

Discharge (gpm)	Pressure (psi)	Head (ft)
0	72.0	166.2
1803	62.0	143.2
4392	20	46.2

Notes:
1. Values provided from a flow test by the Arizona Flow Testing LLC

FlexTable: Pipe Table

Active Scenario: Calibration-Static

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	0	0.00
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	0	0.00
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibration-Static

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.70	73
EX J-2	1,244.50	0	1,412.70	73
EX FH-1	1,245.00	0	1,412.70	73
EX FH-FLOW	1,247.50	0	1,412.70	71
EX J-3	1,248.00	0	1,412.70	71
EX FH-TEST	1,246.50	0	1,412.70	72
EX J-BLDG	1,248.00	0	1,412.70	71
EX J-4	1,247.00	0	1,412.70	72
J-BLDG	1,245.00	0	1,412.70	73

FlexTable: Pipe Table

Active Scenario: Calibraion-Flow

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	1,803	11.51
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	1,803	0.32
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	1,803	0.32
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibraion-Flow

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,389.70	63
EX J-2	1,244.50	0	1,389.70	63
EX FH-1	1,245.00	0	1,389.70	63
EX FH-FLOW	1,247.50	1,803	1,375.86	56
EX J-3	1,248.00	0	1,375.86	55
EX FH-TEST	1,246.50	0	1,389.70	62
EX J-BLDG	1,248.00	0	1,375.86	55
EX J-4	1,247.00	0	1,375.86	56
J-BLDG	1,245.00	0	1,389.70	63

FlexTable: Pipe Table

Active Scenario: Calibraion-Max

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	0	0.00
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	4,392	28.03
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	4,392	0.78
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	4,392	0.78
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	0	0.00

FlexTable: Junction Table

Active Scenario: Calibraion-Max

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,292.70	21
EX J-2	1,244.50	0	1,292.70	21
EX FH-1	1,245.00	0	1,292.70	21
EX FH-FLOW	1,247.50	4,392	1,220.72	-12
EX J-3	1,248.00	0	1,220.72	-12
EX FH-TEST	1,246.50	0	1,292.70	20
EX J-BLDG	1,248.00	0	1,220.72	-12
EX J-4	1,247.00	0	1,220.72	-11
J-BLDG	1,245.00	0	1,292.70	21

FlexTable: Pipe Table

Active Scenario: Average Day Demand

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	98	0.62
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	98	0.02
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	98	0.02
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-98	0.62

FlexTable: Junction Table

Active Scenario: Average Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.50	73
EX J-2	1,244.50	0	1,412.50	73
EX FH-1	1,245.00	0	1,412.52	72
EX FH-FLOW	1,247.50	0	1,412.60	71
EX J-3	1,248.00	0	1,412.60	71
EX FH-TEST	1,246.50	0	1,412.60	72
EX J-BLDG	1,248.00	0	1,412.60	71
EX J-4	1,247.00	0	1,412.60	72
J-BLDG	1,245.00	98	1,412.50	72

FlexTable: Pipe Table

Active Scenario: Max Day

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	195	1.25
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	195	0.03
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	195	0.03
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-195	1.25

FlexTable: Junction Table

Active Scenario: Max Day

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,411.99	73
EX J-2	1,244.50	0	1,411.99	72
EX FH-1	1,245.00	0	1,412.03	72
EX FH-FLOW	1,247.50	0	1,412.33	71
EX J-3	1,248.00	0	1,412.33	71
EX FH-TEST	1,246.50	0	1,412.33	72
EX J-BLDG	1,248.00	0	1,412.33	71
EX J-4	1,247.00	0	1,412.33	72
J-BLDG	1,245.00	195	1,411.99	72

FlexTable: Pipe Table

Active Scenario: Peak Hour

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	342	2.18
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	342	0.06
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	342	0.06
EX P-2	8.0	EX J-2	J-BLDG	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-BLDG	EX FH-1	Ductile Iron	130.0	-342	2.18

FlexTable: Junction Table

Active Scenario: Peak Hour

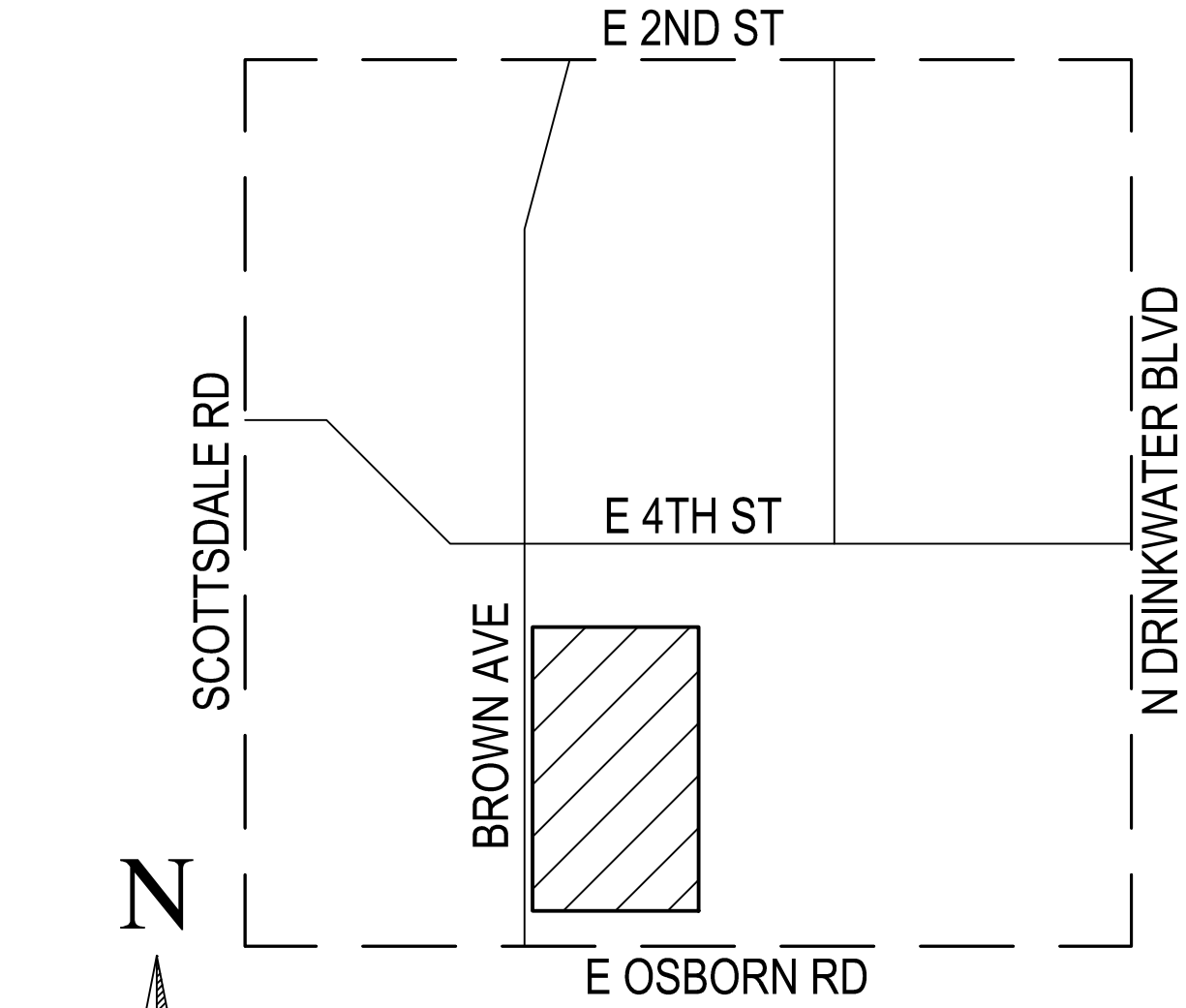
Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,410.71	72
EX J-2	1,244.50	0	1,410.71	72
EX FH-1	1,245.00	0	1,410.82	72
EX FH-FLOW	1,247.50	0	1,411.65	71
EX J-3	1,248.00	0	1,411.65	71
EX FH-TEST	1,246.50	0	1,411.65	71
EX J-BLDG	1,248.00	0	1,411.65	71
EX J-4	1,247.00	0	1,411.65	71
J-BLDG	1,245.00	342	1,410.71	72

Fire Flow Node FlexTable: Fire Flow Report

Active Scenario: Max Day + Fire Flow

Label	Elevation (ft)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Calculated Residual) (psi)	Junction w/ Minimum Pressure (System)	Hydraulic Grade (ft)
EX J-1	1,244.00	2,500	2,330	30	EX J-2	1,411.99
EX J-2	1,244.50	2,500	2,406	30	EX J-1	1,411.99
EX FH-1	1,245.00	2,500	2,690	30	J-BLDG	1,412.03
EX FH-FLOW	1,247.50	2,500	2,888	30	EX J-BLDG	1,412.33
EX J-3	1,248.00	2,500	2,792	30	EX J-BLDG	1,412.33
EX FH-TEST	1,246.50	2,500	3,685	31	EX J-BLDG	1,412.33
EX J-BLDG	1,248.00	2,500	2,276	30	EX J-4	1,412.33
EX J-4	1,247.00	2,500	1,718	30	EX J-BLDG	1,412.33
J-BLDG	1,245.00	2,695	2,799	30	EX J-2	1,411.99

VICINITY MAP



VICINITY MAP

N.T.S.

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NOT
FOR CONSTRUCTION OR RECORDING

WOOD/PATEL
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WWW.WOODPATEL.COM

HONOR HEALTH MEDICAL OFFICE BUILDING

VICINITY MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

20-DR-2019
8/21/2019

WATER EXHIBIT

EX J-3
EX P-7
EX J-BLDG
EX P-8
EX J-4
EX P-6
EX FH-FLOW
4TH STREET
N
0
50
100
Horz. 1 in. = 50 ft.
EX. BUILDING
FF=1248.51±
EX P-5
BROWN AVENUE
EX FH-TEST
PMP-1
RES-1
BUILDING OVERHANG
PROPOSED BUILDING
IRRIGATION CONNECTION
EXISTING HONOR HEALTH OSBORN MEDICAL CENTER
P-RES
P-PMP
PROPOSED AT-GRADE PARKING UNDER BUILDING
EX P-4
FIRE CONNECTION
J-BLDG (DOMESTIC)
EX J-2
EX J-1
EX FH-1
EX P-3
EX P-2
EX P-1
OSBORN ROAD

PIPE DIAMETER	EXISTING	PLANNED
6-INCHES		
8-INCHES		
12-INCHES		

NOT
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HONOR HEALTH MEDICAL OFFICE BUILDING

Water Exhibit

DATE:	SCALE:	SHEET
04-17-2019	1" = 50'	01 of 01
JOB NO.:	DESIGN: JB	
194976	DRAWN: AF	

20-DR-2019
8/21/2019

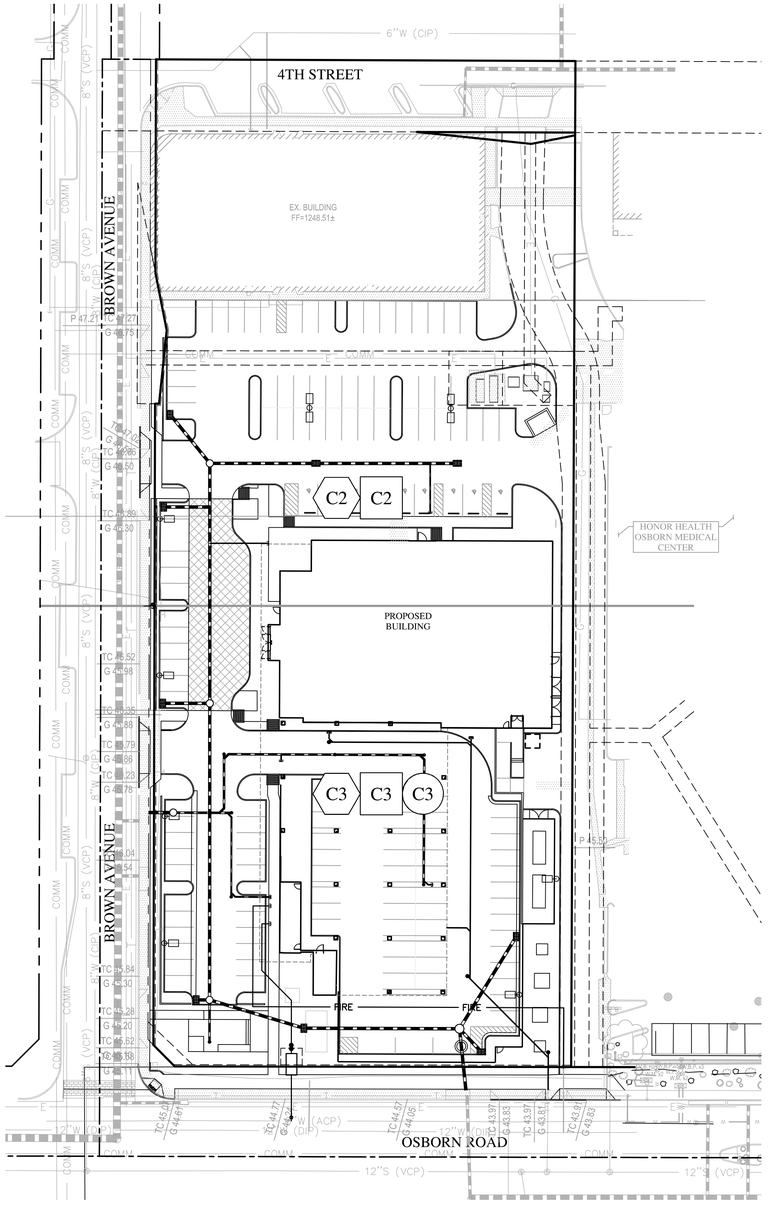
Z:\2019\194976\Project Support\Reports\Water BOD\Exhibits\4976-WaterExhibit.dwg

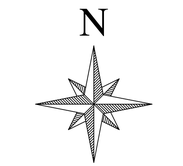
HONORHEALTH NEUROSCIENCE INSTITUTE

PRELIMINARY IMPROVEMENT PLAN

7400 E. OSBORN RD, SCOTTSDALE, AZ 85251

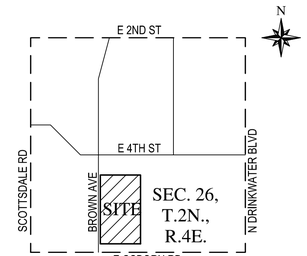
A PORTION OF THE SOUTHEAST 1/4 OF SECTION 26, TOWNSHIP 2 NORTH, RANGE 4 EAST
OF THE GILA AND SALT RIVER MERIDIAN, MARICOPA COUNTY, ARIZONA





LEGEND

- CX — PAVING, GRADING & DRAINAGE PLAN
- CX — STORM DRAIN PLAN
- CX — WATER PLAN AND SEWER
- PROPERTY LINE



VICINITY MAP
N.T.S.

OWNER / DEVELOPER

HONOR HEALTH
2500 WEST UTOPIA ROAD
PHOENIX, AZ 85027
CONTACT: PRESTON ALLRED
PHONE: (480) 587-5085

ENGINEER

WOOD, PATEL & ASSOCIATES, INC.
1630 SOUTH STAPLEY DRIVE, SUITE 219
MESA, ARIZONA 85204
CONTACT: JOHN RITCHIE, P.E.
PHONE: (602) 335-8500

ARCHITECT

NORRIS DESIGN
901 EAST MADISON STREET
TEMPE, AZ 85281
CONTACT: JOEL THOMAS
PHONE: (602)-254-9600

PROJECT SITE DATA

ASSESSOR PARCEL NUMBER(S):
130-22-128
PROJECT SITE ADDRESS:
7400 E. OSBORN RD,
SCOTTSDALE AZ, 85251
PROJECT SITE AREA(S):
NET AREA = 7.49 AC
ZONING:
D/M-2

SHEET INDEX

LEGEND/ABBREVIATIONS

EXISTING SURVEY	
SECTION LINE	
RIGHT OF WAY	
PROPERTY LINE	
ROAD CENTERLINE	
EASEMENT	
SURVEY MARKER	
E — ELECTRIC	
T — TELEPHONE	
G — GAS LINE	
S — SEWER LINE	
W — WATER LINE	
STORM DRAIN PIPE	
Ⓢ SEWER MANHOLE	
Ⓓ STORM DRAIN MANHOLE	
P 0.00	PAVEMENT ELEVATION
NG 0.00	NATURAL GROUND ELEVATION
C 0.00	CONCRETE ELEVATION
TC 0.00	TOP OF CURB ELEVATION
JUNCTION BOX/RISER	
FIRE HYDRANT	
WATER VALVE	
STREET/PARKING LIGHT	

PROPOSED GRADING, DRAINAGE & PAVING	
SLOPE ARROW	
WALL	
PROPOSED WATER & SEWER	
S SEWER LNE	
12"W WATER LINE	
PLUG	
SEWER CLEANOUT	
AREA DRAIN	
CB CATCH BASIN	
STORM DRAIN MANHOLE	
STORM DRAIN PIPE	
DRYWELL	
A.L.	AREA LIGHT
C	CONCRETE ELEVATION
C.B.	CATCH BASIN
DE	DRAINAGE EASEMENT
D.W.	DRYWELL
E.O.L.	EDGE OF LANDSCAPE
J.B.	JUNCTION BOX
FH	FIRE HYDRANT
E.C.B.	ELECTRICAL CABINET BOX
HW	HEAD WALL
INV	INVERT ELEVATION
FF	FINISHED FLOOR ELEVATION
WE	WATER EASEMENT
LF 88=	LOWEST FINISH FLOOR ELEVATION
TC 0.00	TOP OF CURB
FG 0.00	FINISH GRADE ELEVATION
C 0.00	CONCRETE ELEVATION
C.A	CROSS ACCESS
E.S.A	EMERGENCY SERVICE ACCESS
P.U.E	PUBLIC UTILITY EASEMENT
U.E	UTILITY EASEMENT
P.A.E	PUBLIC ACCESS EASEMENT
S.S.T	SITE SAFETY TRIANGLE
S.V.T	SITE VISIBILITY TRIANGLE
TW	TOP OF WALL

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Devenney Group Ltd., Architects
201 W. Indian School Road
Phoenix, Arizona 85013
T: 602.943.8950
F: 602.943.7645
www.devenneygroup.com

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PRELIMINARY DESIGN
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NEUROSCIENCE
INSTITUTE

HONORHEALTH

7400 E OSBORN RD,
SCOTTSDALE, AZ 85251

AUTHORITY HAVING JURISDICTION:
CITY OF SCOTTSDALE

AUTHORITY HAVING JURISDICTION'S PROJECT NO:

FACILITY NUMBER:

AGENCY APPROVALS:

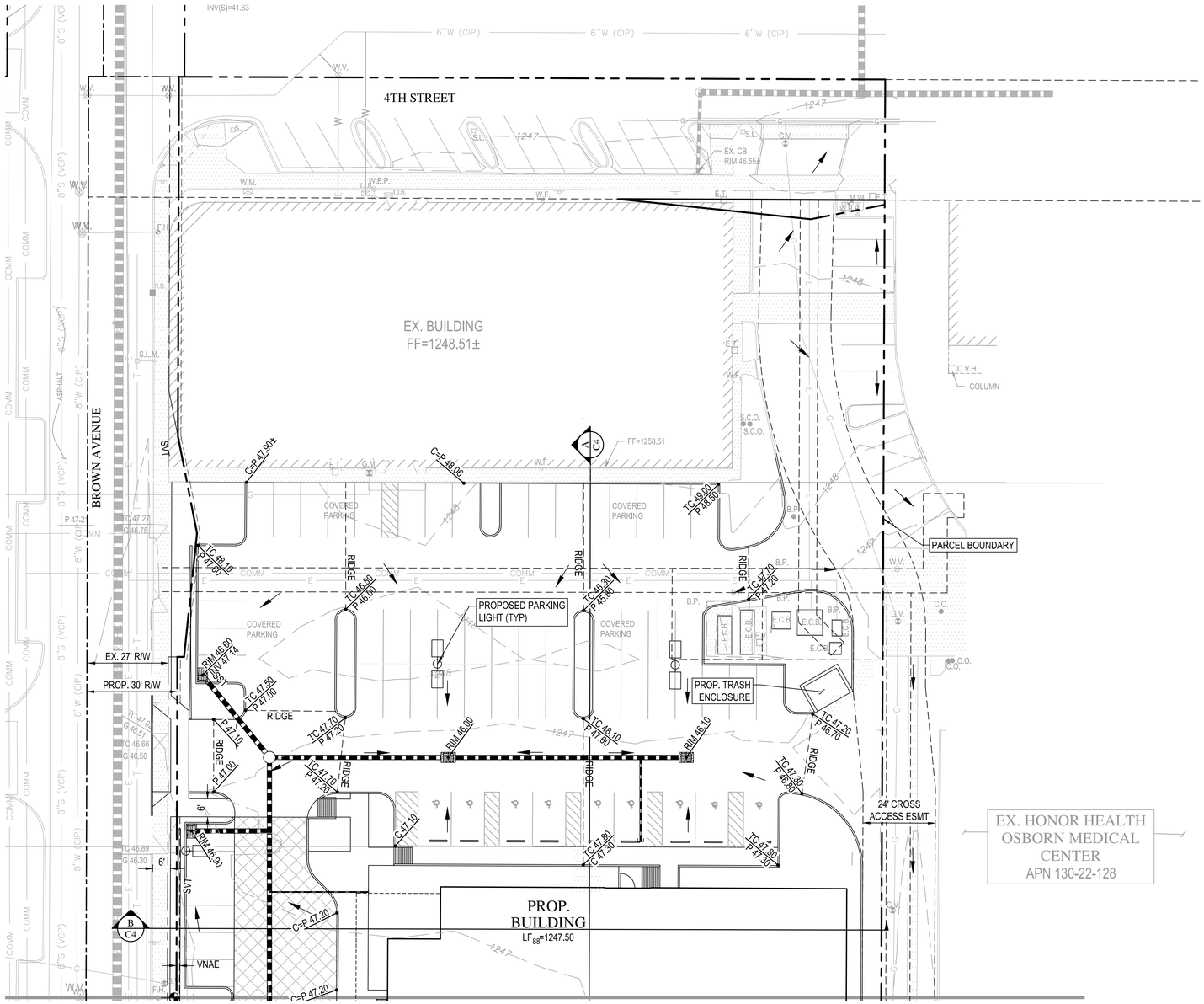
REVISIONS		
REV #	DESCRIPTION	DATE

DATE:	08/19/19
SCALE:	AS NOTED
DRAWN:	AF,JO
REVIEWED:	JB
JOB NUMBER:	194976

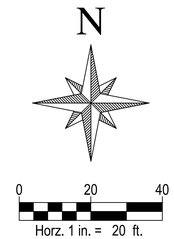
COVER SHEET/
SHEET INDEX

C1 _ 4

20-DR-2019
8/21/2019



MATCH SHEET C2



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FACILITY NUMBER:

AGENCY APPROVALS:

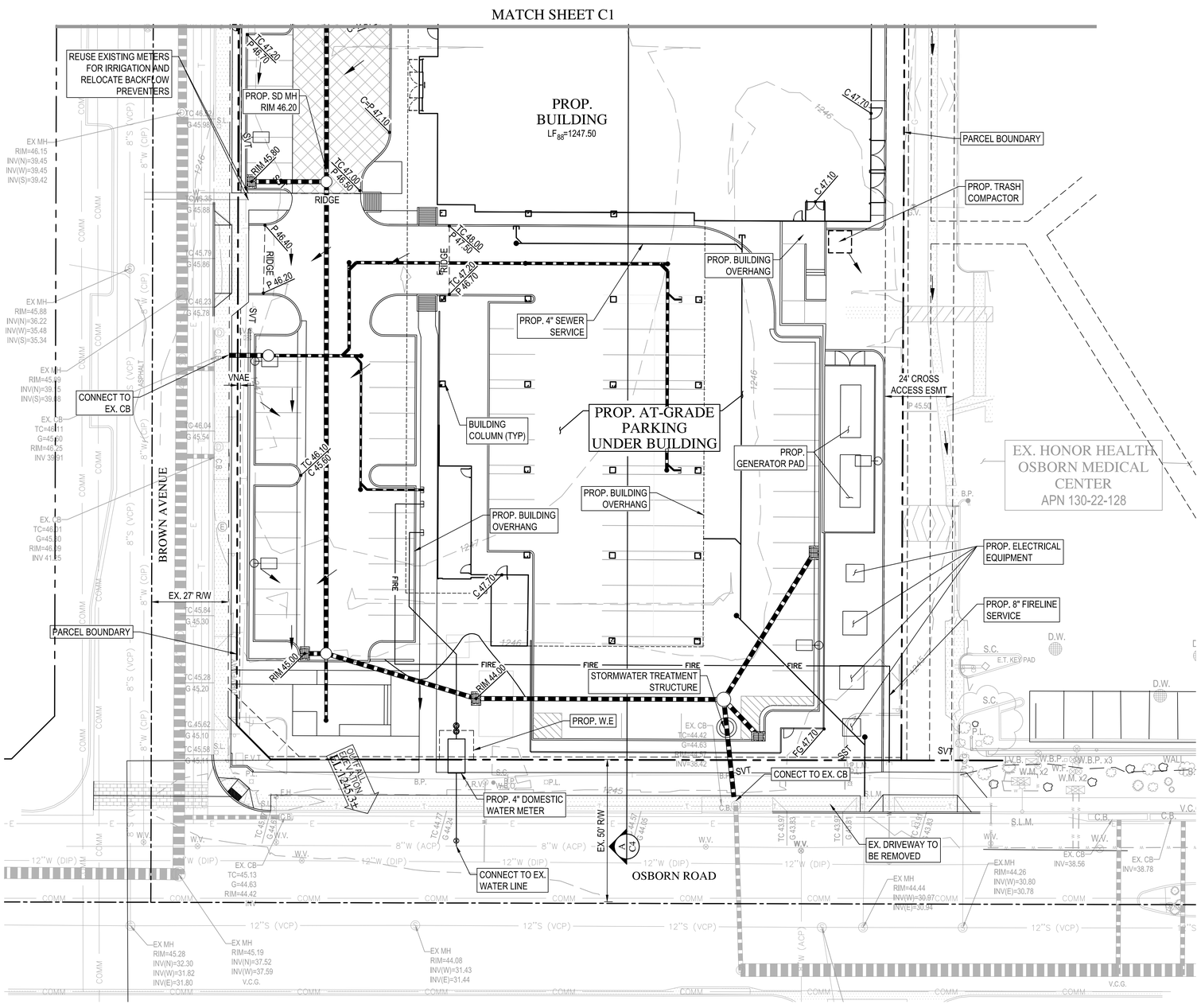
REVISIONS		
REV #	DESCRIPTION	DATE

DATE:	08/19/19
SCALE:	AS NOTED
DRAWN:	AF,JO
REVIEWED:	JB
JOB NUMBER:	194976

PRELIMINARY
IMPROVEMENT PLAN

C2 _ 4

20-DR-2019
8/21/2019



N

0 20 40

Horz. 1 in. = 20 ft.

Devenney GROUP

Devenney Group Ltd., Architects

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Phoenix, Arizona 85013

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F: 602.943.7645

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NEUROSCIENCE INSTITUTE

HONORHEALTH

7400 E OSBORN RD,
SCOTTSDALE, AZ 85251

AUTHORITY HAVING JURISDICTION:
CITY OF SCOTTSDALE

AUTHORITY HAVING JURISDICTION'S PROJECT NO:

FACILITY NUMBER:

AGENCY APPROVALS:

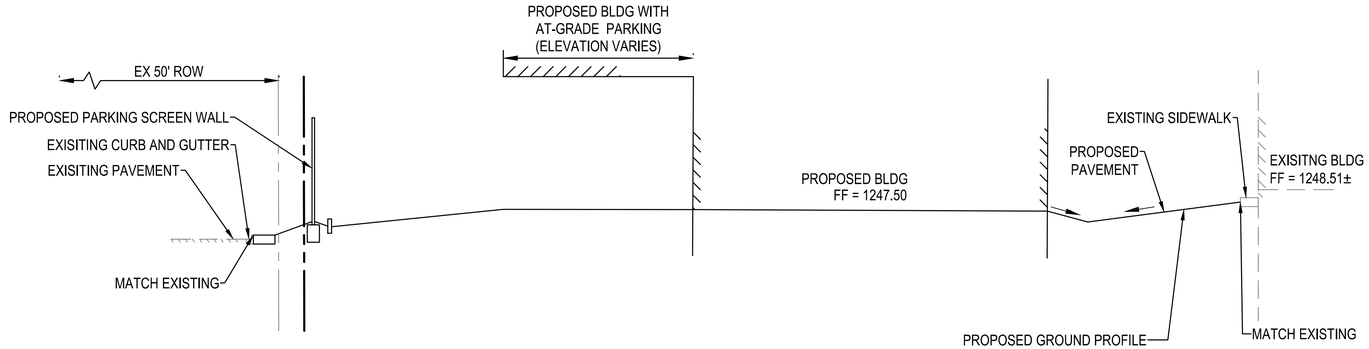
REVISIONS		
REV #	DESCRIPTION	DATE

DATE:	08/19/19
SCALE:	AS NOTED
DRAWN:	AF,JO
REVIEWED:	JB
JOB NUMBER:	194976

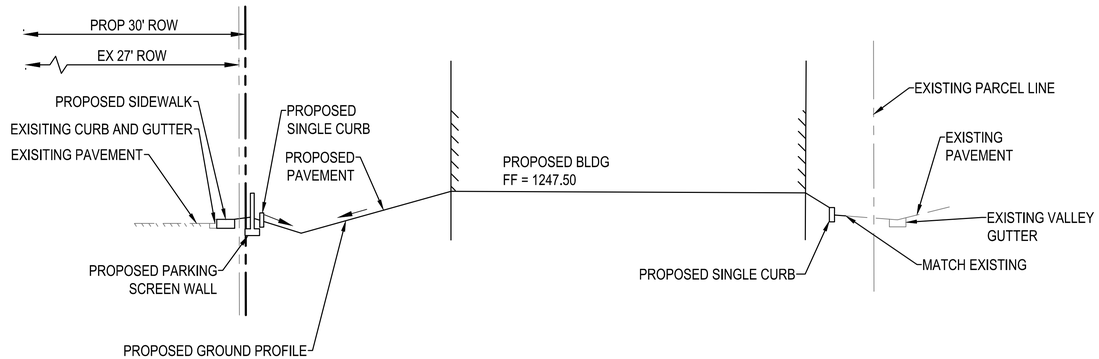
PRELIMINARY IMPROVEMENT PLAN

C3 _ 4

20-DR-2019
8/21/2019



SECTION- A
N.T.S.



SECTION- B
N.T.S.

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INSTITUTE

HONORHEALTH

7400 E OSBORN RD,
SCOTTSDALE, AZ 85251

AUTHORITY HAVING JURISDICTION:
CITY OF SCOTTSDALE

AUTHORITY HAVING JURISDICTION'S PROJECT NO:

FACILITY NUMBER:

AGENCY APPROVALS:

REVISIONS		
REV #	DESCRIPTION	DATE

DATE:	08/19/19
SCALE:	AS NOTED
DRAWN:	AF,JO
REVIEWED:	JB
JOB NUMBER:	194976

PRELIMINARY
IMPROVEMENT PLAN

C4 _ 4

20-DR-2019
8/21/2019

FINAL WASTEWATER COLLECTION SYSTEM BASIS OF DESIGN REPORT FOR HONOR HEALTH NEUROSCIENCE INSTITUTE

August 19, 2019
WP# 194976

WOOD PATEL

2051 W Northern Ave #100
Phoenix AZ 85021
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www.woodpatel.com

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James S. Campbell, PE, LEED GA
Thomas R. Gettings, RLS
Darin L. Moore, PE, LEED GA
Jeffrey R. Minch, PE, CFM
Robert D. Gofonia, PE, RLS

August 19, 2019

Mr. Levi Dillion, PE
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

480.312.5319
ldillion@scottsdaleaz.gov

Re: **Honor Health Neuroscience Institute**
Final Wastewater Collection System Basis of Design Report
WP# 194976

Dear Mr. Dillion:

This Final Wastewater Collection System Basis of Design Report is prepared for Devenney Group Ltd., Architects and submitted to the City of Scottsdale. The proposed Honor Health Neuroscience Institute development (Site) is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the Site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian (refer to the attached *Vicinity Map)*. The proposed 5-story office building is 117,000 square-feet and is anticipated to be outpatient only. Proposed improvements will include associated hardscape, parking, and landscaping.

Wastewater flowing from the Site will discharge to an 8-inch private sewer line on the south side of the proposed building. The 8-inch private sewer line will connect to an existing 8-inch stub south of the property and discharge into existing sewer main within Osborn. Per coordination with the City of Scottsdale, the existing sewer main will not have sufficient capacity at the time of project completion. An in-lieu-of construction payment to the City will be required proportional to the capacity impact and length of sewer impacted to Miller Road. Refer to the attached email from the Levi Dillion for a rough cost estimate. Final costs are to be determined by the Water Resources Department at a later date.

The design criteria used to estimate wastewater flows and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (WOODPATEL) understanding of the requirements listed in the City of Scottsdale's *Design Standards and Policies Manual,* 2018. The following is a summary of the primary design criteria utilized:

- Average Day Wastewater Demand, Office: ..... 0.4 gpd / sq. ft
- Peak Factor, Office: 3
- Minimum Mean Full Flow Velocity: ..... 2.50 fps
- Minimum Peak Full Flow Velocity: ..... 10.0 fps
- Minimum Peak Flow d/D Ratio (12" dia. Or less sewers): ..... d/D = 0.65

Abbreviations: gpd = gallons per day; fps = feet per second

Based on the above design criteria, the projected average day flow for the proposed 117,000 square-foot Site is approximately 44,800 gallons per day (gpd), or 33 gallons per minute (gpm). The peak flow is projected to be 140,400 gpd. The proposed sewer slopes, projected flow velocities, and pipe flow capacities are summarized on the attached spreadsheets.

It is assumed the infiltration and inflow from wet weather has been accounted for in the published design flow rates for the development and the maximum d/D. Therefore, those flows have not been added into the calculations. The proposed sanitary sewer collection system is designed to have adequate capacity to serve the proposed development.

Thank you for your review of the Final Wastewater Collection System Basis of Design Report provided for the Honor Health Neuroscience Institute development. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc.

John “Gordy” Ritchie, PE
Project Manager

JGR/se

se
Y:\WP\Reports\Commercial\194976 Honor Health Neuroscience Institute Final Wastewater BOD.docx

WASTEWATER DESIGN FLOWS & FLOWMASTER RESULTS

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CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

TABLE 1 - WASTEWATER DESIGN FLOWS

Project: Honor Health Neuroscience Institute
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Manager: John Ritchie, P.E.
Date: 4/19/2019

UPSTREAM NODE	DOWNSTREAM NODE	APPLICABLE UNIT	NUMBER OF UNITS	ADF/ APPLICABLE UNIT (GPD)[1]	TOTAL ADF (GPD)	PEAKING FACTOR[2]	PEAK FLOW (GPD)	TOTAL ADF (GPM)	PEAK FLOW (GPM)
Building Connection 1	Privite Sewer Connection	SF	117,000	0.4	46,800	3.00	140,400	33	98
Total					**46,800**		**140,400**	**33**	**98**

1. Average Daily Flow Demand based upon office building square footage per City of Scottsdale Design Standards and Policies Manual (2018)
2. Peaking Factor per City of Scottsdale Design Standards and Policies Manual (2018)

8" Sewer Line

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.05200	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

Results

Normal Depth	1.47	in
Flow Area	0.04	ft²
Wetted Perimeter	0.52	ft
Hydraulic Radius	0.86	in
Top Width	0.43	ft
Critical Depth	0.23	ft
Percent Full	24.4	%
Critical Slope	0.00446	ft/ft
Velocity	5.84	ft/s
Velocity Head	0.53	ft
Specific Energy	0.65	ft
Froude Number	3.50	
Maximum Discharge	1.79	ft³/s
Discharge Full	1.66	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	24.45	%
Downstream Velocity	Infinity	ft/s

20-DR-2019
8/21/2019

8" Sewer Line

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.47	in
Critical Depth	0.23	ft
Channel Slope	0.05200	ft/ft
Critical Slope	0.00446	ft/ft

From: John "Gordy" Ritchie
Sent: Wednesday, August 7, 2019 3:07 PM
To: Aaron Fabian
Subject: FW: Honor Health NSI MOB - Sewer Construction Fees

Follow Up Flag: Follow up
Flag Status: Flagged

FYI for the Sewer BOD Report

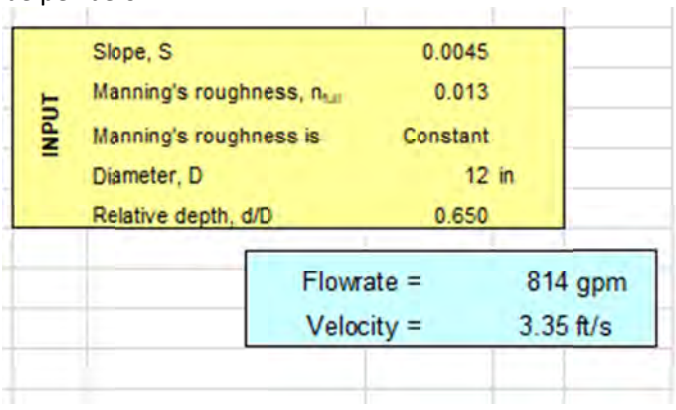
John "Gordy" Ritchie, PE
Project Manager

D: 602.336.7908
M: 520.907.7783
jritchie@woodpatel.com
www.woodpatel.com

From: Dillon, Levi [mailto:LDillon@Scottsdaleaz.gov]
Sent: Thursday, July 25, 2019 7:19 PM
To: John "Gordy" Ritchie
Cc: Irene Clark (iclark@devenneygroup.com); Mars, Scott; Hayes, Eliana
Subject: RE: Honor Health NSI MOB - Sewer Construction Fees

Hello Mr. Ritchie,

Based on preliminary profile information the hydraulic design capacity of the new 12" Osborn sewer will be per below:



As a draft example only:

- New Osborn 12” parallel sewer cost: 3,000ft X $400/ft= $1.2M (note that a large portion of the sewer is 16 feet deep and there are many existing utilities, so the unit cost is only a placeholder as shown here).
- Length of new sewer impacted by this project: 2,220ft (2200/3000=74%)
- Portion of new 12” sewer peak capacity contributed by this development: 98gpm/ 814gpm = 12%
- **Example of In-lieu capital cost attributable to the development: $1.2M X 12% X 74%= $107,000**

Please note that the in-lieu cost portion will not be firmly set until the final cost basis of the project is set by Water Resources and the in-lieu amount is included in the respective agreement.

For the purposes of your basis of design report you can simply include this email as documentation within the report and clearly refer to it in the report text.

Hope this helps for now.

Levi C. Dillon, P.E. | *Sr. Water Resources Engineer*

SCOTTSDALE WATER

"Water Sustainability through Stewardship, Innovation and People"

Contact Info
Direct: (480) 312-5319
Main office: (480) 312-5685
Fax: (480) 312-5615
Mailing/Office Address
Water Resources Administration
9379 E. San Salvador Dr.
Scottsdale, AZ. 85258

Sending me an attachment over 5MB? Please use the link below:
https://securemail.scottsdaleaz.gov/dropbox/ldillon@scottsdaleaz.gov

---

From: John "Gordy" Ritchie <JRitchie@WoodPatel.com>
Sent: Tuesday, July 23, 2019 10:37 AM
To: Dillon, Levi <LDillon@Scottsdaleaz.gov>
Cc: Irene Clark (iclark@devenneygroup.com) <iclark@devenneygroup.com>
Subject: Honor Health NSI MOB - Sewer Construction Fees

Levi,

As requested, I wanted to follow up on our conversation this morning regarding the “in-lieu” construction fees as mentioned in your comments to our Wastwater BOD report. Per our discussion, I have the parameters for a rough estimate I can provide to the owner. However, we

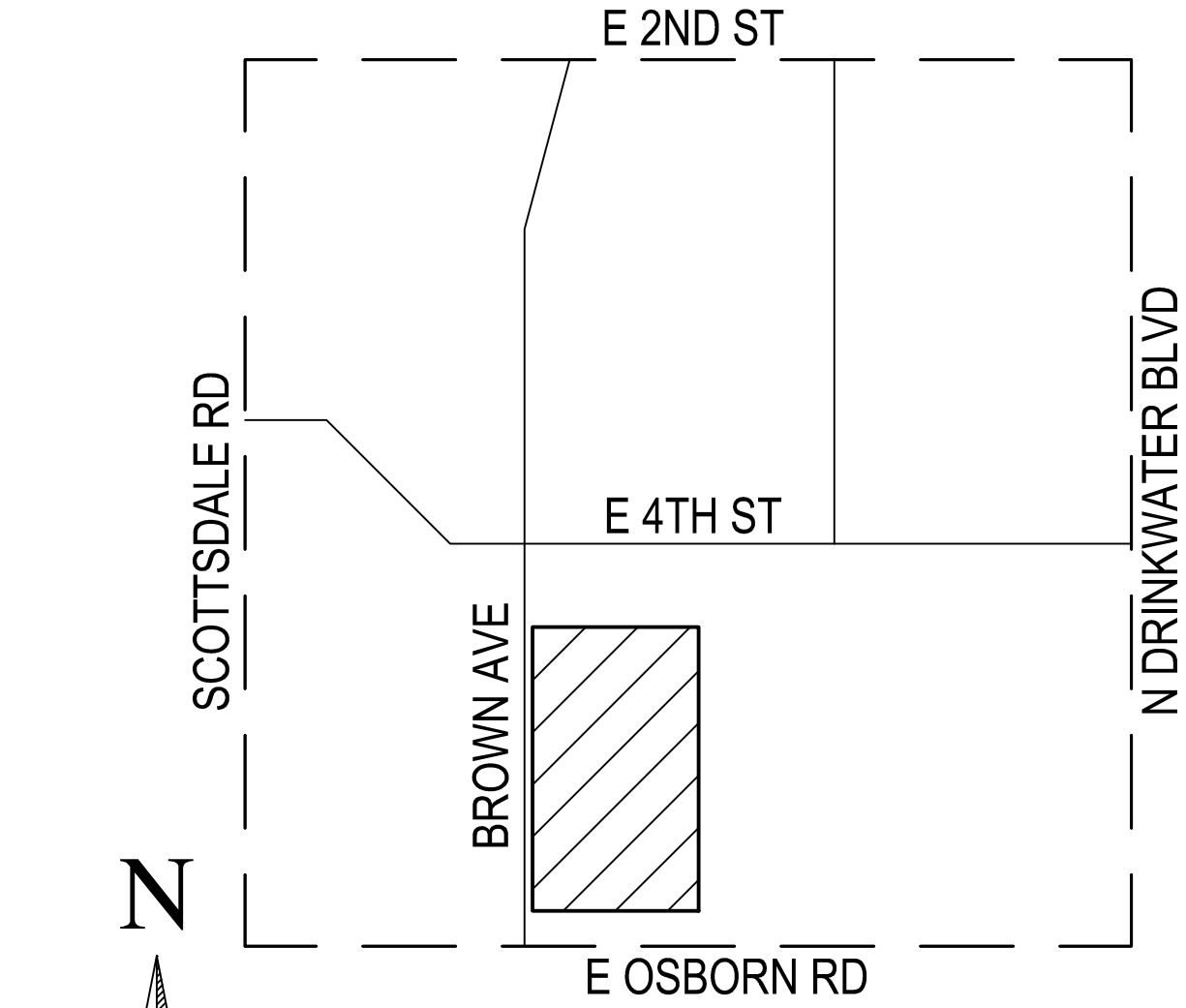
would like to be able to get some more finalized fee parameters prior to our DRB resubmittal. Please let me know when you have some more firm numbers so we can provide an accurate calculation.

Thanks.

John "Gordy" Ritchie, PE
Project Manager

D: 602.336.7908
M: 520.907.7783
jritchie@woodpatel.com
www.woodpatel.com

VICINITY MAP



VICINITY MAP

N.T.S.

Z:\2019\194976\Project Support\Reports\Drainage\Exhibits\4976-EXH1-VM.dwg

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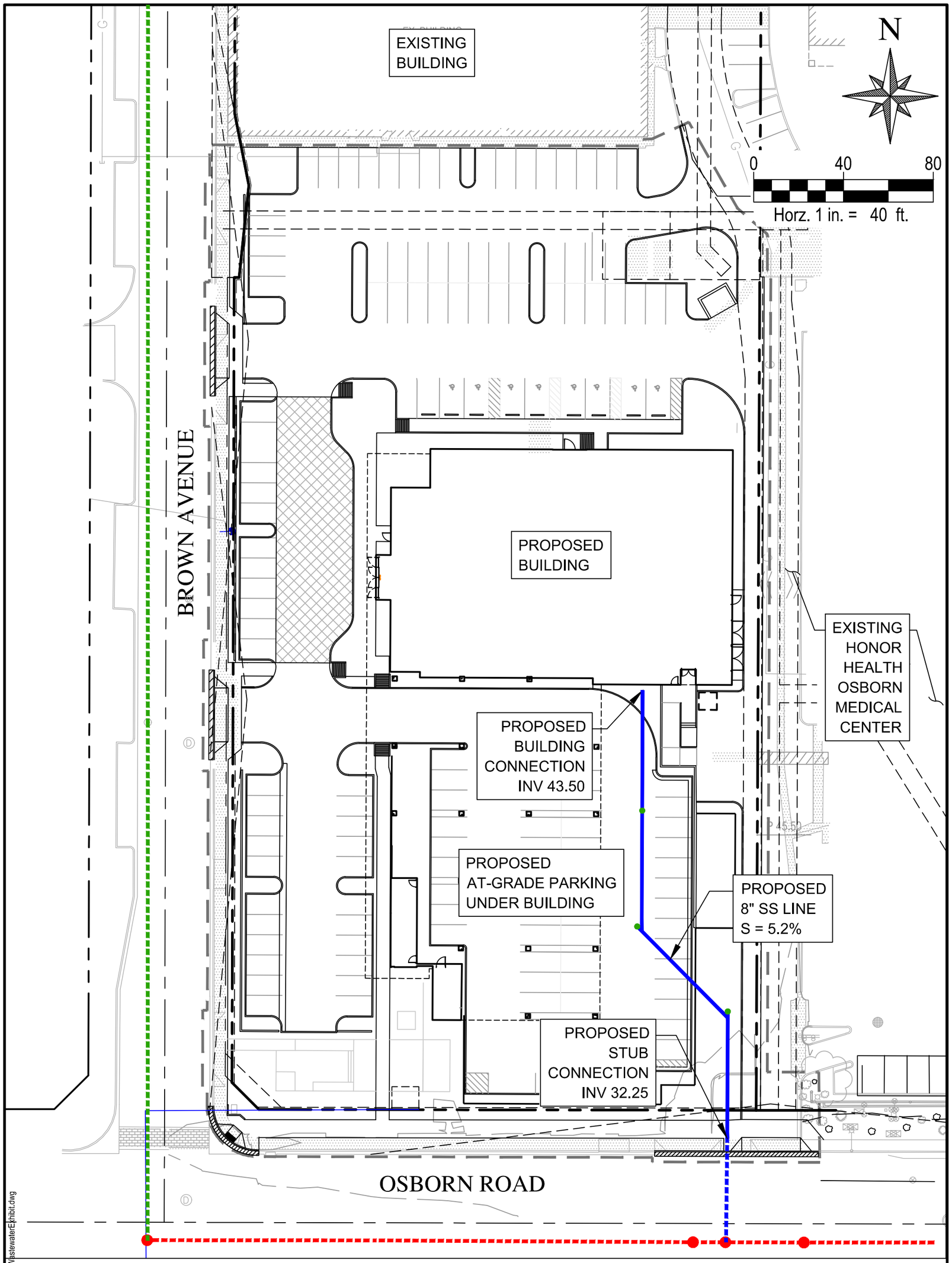
HONOR HEALTH NEUROSCIENCE INSTITUTE

VICINITY MAP

DATE: 08-19-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

20-DR-2019
8/21/2019

WASTEWATER EXHIBIT



PIPE DIAMETER	EXISTING	PLANNED
6-INCHES		
8-INCHES		
12-INCHES		
MANHOLE		
CLEANOUT		

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FOR CONSTRUCTION OR RECORDING

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HONOR HEALTH NEUROSCIENCE INSTITUTE

WASTEWATER EXHIBIT

DATE:	SCALE:	SHEET
08-19-2019	1" = 40'	01 of 01
JOB NO.:	DESIGN: JB	
194976	DRAWN: AF	

20-DR-2019
8/21/2019

WOOD PATEL

FINAL WATER DISTRIBUTION SYSTEM
BASIS OF DESIGN REPORT
FOR
HONOR HEALTH NEUROSCIENCE INSTITUTE

August 19, 2019
WP# 194976

WOOD PATEL

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Phoenix AZ 85021
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Thomas R. Gettings, RLS
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Jeffrey R. Minch, PE, CFM
Robert D. Gofonia, PE, RLS

August 19, 2019

Mr. Levi Dillion, PE
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

480.312.5319
ldillion@scottsdaleaz.gov

Re: **Honor Health Neuroscience Institute**
Final Water Distribution System Basis of Design Report
WP# 194976

Dear Mr. Dillion:

This Final Water Distribution System Basis of Design Report is prepared for Devenney Group Ltd., Architects and submitted to the City of Scottsdale. The proposed Honor Health Neuroscience Institute development (Site) is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the Site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian (refer to the attached *Vicinity Map)*. The proposed 5-story office building is 117,000 square-feet and is anticipated to be outpatient only. Proposed improvements will include associated hardscape, parking, and landscaping.

The Site has public waterline infrastructure on three (3) sides. There is one (1) 12-inch DIP and one (1) 8-inch ACP water main in Osborn Road. There is one (1) 8-inch CIP water main in Brown Avenue and one (1) 6-inch CIP water main in 4th Street. The Site proposes two (2) private water connections that utilize City of Scottsdale public waterline for domestic water to the existing public 8-inch waterline and fire protection that connect to the existing public 12-inch waterline in Osborn Road. The existing irrigation meter will be reused. Refer to the attached *Water Exhibit* for a depiction of the existing water infrastructure surrounding the Site.

The design criteria used to estimate potable water demands and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (WOODPATEL) understanding of the requirements listed in the *City of Scottsdale Design Standards and Policies Manual*, 2018. The following is a summary of the primary design criteria utilized:

- Average Day Water Demand, Office:.....6 gpd*
- Maximum Day Demand: .....2.0 x ADD
- Peak Hour Demand: .....3.5 x ADD
- Minimum Residual Pressure, Peak Hour: .....50 psi
- Minimum Residual Pressure, Maximum Day + Fire Flow:.....30 psi

- Maximum System Pressure ..... 120 psi
- Maximum Pipe Head Loss, Maximum day Demand ..... 8 ft / 1000 ft
- Maximum Pipe Head Loss, Peak Hour Demand ..... 10 ft / 1000 ft
- Minimum Pipe Diameter, Public Water Line ..... 8 inches

Abbreviations: gpd = gallons per day; sf = square feet; ADD = average day demand; psi = pounds per square inch
*Includes both inside and outside use per Figure 6-1.2, COS Design Standards & Policies Manual

Domestic water service will be provided by a proposed 4-inch private waterline and a 4-inch domestic meter. Fire protection for the proposed building will be provided by one (1) proposed 8-inch fire line for an automatic fire-sprinkler service. Irrigation water service is anticipated to be provided by an existing 1-inch irrigation line.

The average day water demand for the proposed 117,000 square-foot Site is projected to be approximately 97.6 gallons per minute (gpm). Maximum day demands and peak hour demands are projected to be 195.2 gpm and 341.6 gpm, respectively (refer to the attached *Calculations*).

WaterCAD V8i, by Haestad Methods, was utilized to analyze the existing water distribution system and proposed improvements. Results from a fire hydrant flow test, conducted on April 12, 2019 by Arizona Flow Testing LLC, were utilized to simulate the City of Scottsdale's water supply for the Site (refer to attached *Modeling Results*).

The hydraulic modeling results indicate the proposed system is capable of delivering peak hour demands, totaling 342 gpm, to the proposed Site with pressures ranging from 71 to 72 pounds per square inch (psi). Fire flow results indicate residual pressures exceed 30 psi within the Site, with 2,500-gpm fire hydrant flows during maximum day demand. Hydraulic modeling results, calculations, and exhibits involved in the water system analysis are attached.

At the request of the City of Scottsdale, WOODPATEL ran an additional scenario to model the pressures at the highest finished floor in the Fire Flow Scenario. Utilizing the headloss assumptions as included in the Design Standards and Policies Manual, we were unable to indicate that sufficient pressures at the highest finished floor were maintained in the fire flow condition. Additional investigation by the Fire Sprinkler designer will be required to confirm if a booster pump is needed.

Thank you for your review of the Final Water Distribution System Basis of Design Report provided for the Honor Health Neuroscience Institute project. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc.

John "Gordy" Ritchie, PE
Project Manager

JGR/se

se
Y:\WP\Reports\Commercial\194976 Honor Health Neuroscience Institute Final Water BOD.docx

CALCULATIONS AND HYDRAULIC MODELING RESULTS

WOOD/PATEL
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CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

TABLE 1 - WATER DEMAND DESIGN FLOWS

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Engineer: John Ritchie, P.E.
Date: 4/19/2019

LAND USE AND DWELLING UNIT BREAKDOWN BY JUNCTION

HYDRAULIC MODEL NODE	ELEVATION (ft)	PRESSURE ZONE	LAND USE	DWELLING UNITS	DEMAND VALUE	UNITS	AVERAGE DAILY DEMAND			MAXIMUM DAY DEMAND				PEAK HOUR DEMAND			
							(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)
J-1	1,245.00	-	Commercial (Office)	117,000	0.000834	gpm/sf	140,544.00	97.6	97.6	2.0	281,088.00	195.2	195.2	3.5	491,904.00	341.6	341.6
Total				**117,000**			**140,544**	**97.6**	**97.6**		**281,088**	**195.2**	**195.2**		**491,904**	**341.6**	**341.6**

Notes:
1. Per the City of Scottsdale Design Standards and Policies Manuel, dwelling units for an office building are measured in square feet.
2. The proposed building water demand was estimated assuming 5th floor addition.

FIRE HYDRANT FLOW TEST

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	Honor Health MOB
Project Address:	7242 East Osborn Road, Scottsdale, Arizona, 85251
Client Project No.:	194976
Arizona Flow Testing Project No.:	19131
Flow Test Permit No.:	C57857
Date and time flow test conducted:	April 12, 2019 at 8:00 AM
Data is current and reliable until:	October 12, 2019
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Ray Padilla –City of Scottsdale-Inspector (602-541-0586)

Raw Test Data

Static Pressure: **85.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **75.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **23.0 PSI**

(Measured in pounds per square inch)

Diffuser Orifice Diameter: One 4-inch Hose Monster
(Measured in inches)

Coefficient of Diffuser: .7875

Flowing GPM: **1,803 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **4,955 GPM**

Data with 13 PSI Safety Factor

Scottsdale requires a maximum Static Pressure of 72 PSI for AFES Design.

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **62.0 PSI**
(Measured in pounds per square inch)

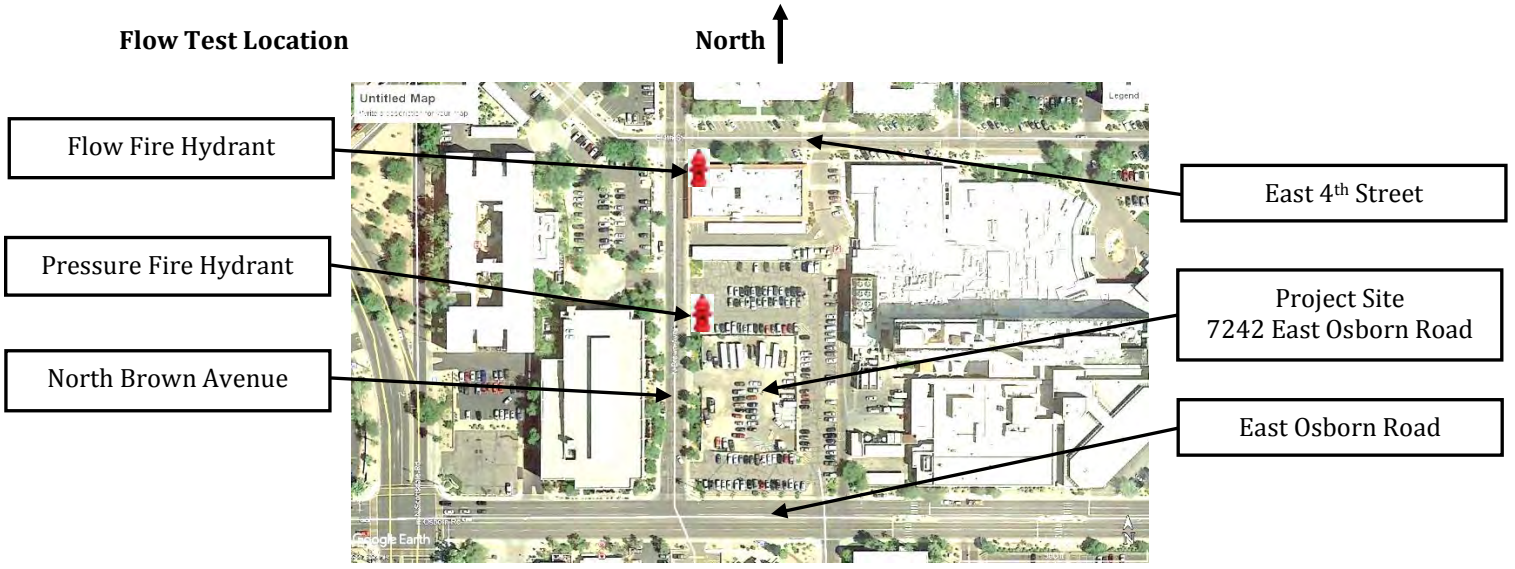
Distance between hydrants: Approx.: 290 feet

Main size: Not Provided

Flowing GPM: **1,803 GPM**

GPM @ 20 PSI**:** **4,392 GPM**

Flow Test Location **North**



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EXISTING WATER SYSTEM PRESSURES

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona

Project Number: 194976
Project Engineer: John Bulka, P.E.

Flow Test Location: 7242 E Osborn Road, Scottsdale AZ
Date of Flow Test: April 12, 2019

Pressure Hydrant		**Flow Hydrant**	
Static Pressure (psi)	72.0		
Residual Pressure (psi)	62.0	Flow (gpm)	1803
Calculated Flow at 20 psi	4392 gpm	Calculated Flow at	20 psi

Discharge (gpm)	Pressure (psi)	Head (ft)
0	72.0	166.2
1803	62.0	143.2
4392	20	46.2

Notes:
1. Values provided from a flow test by the Arizona Flow Testing LLC

FlexTable: Junction Table

Active Scenario: Calibration-Static

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.70	73
EX J-2	1,244.50	0	1,412.70	73
EX FH-1	1,245.00	0	1,412.70	73
EX FH-FLOW	1,247.50	0	1,412.70	71
EX J-3	1,248.00	0	1,412.70	71
EX FH-TEST	1,246.50	0	1,412.70	72
EX J-BLDG	1,248.00	0	1,412.70	71
EX J-4	1,247.00	0	1,412.70	72
J-1	1,245.00	0	1,412.70	73
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

FlexTable: Junction Table

Active Scenario: Calibration-Flow

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,389.70	63
EX J-2	1,244.50	0	1,389.70	63
EX FH-1	1,245.00	0	1,389.70	63
EX FH-FLOW	1,247.50	1,803	1,375.86	56
EX J-3	1,248.00	0	1,375.86	55
EX FH-TEST	1,246.50	0	1,389.70	62
EX J-BLDG	1,248.00	0	1,375.86	55
EX J-4	1,247.00	0	1,375.86	56
J-1	1,245.00	0	1,389.70	63
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

FlexTable: Junction Table

Active Scenario: Calibration-Max

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,292.70	21
EX J-2	1,244.50	0	1,292.70	21
EX FH-1	1,245.00	0	1,292.70	21
EX FH-FLOW	1,247.50	4,392	1,220.72	-12
EX J-3	1,248.00	0	1,220.72	-12
EX FH-TEST	1,246.50	0	1,292.70	20
EX J-BLDG	1,248.00	0	1,220.72	-12
EX J-4	1,247.00	0	1,220.72	-11
J-1	1,245.00	0	1,292.70	21
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

FlexTable: Pipe Table

Active Scenario: Average Day Demand

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	98	0.62
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	98	0.02
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	98	0.02
EX P-2	8.0	EX J-2	J-1	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-1	EX FH-1	Ductile Iron	130.0	-98	0.62
P-1	4.0	J-1	J-BLDG	Ductile Iron	130.0	(N/A)	(N/A)

FlexTable: Junction Table

Active Scenario: Average Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.50	73
EX J-2	1,244.50	0	1,412.50	73
EX FH-1	1,245.00	0	1,412.52	72
EX FH-FLOW	1,247.50	0	1,412.60	71
EX J-3	1,248.00	0	1,412.60	71
EX FH-TEST	1,246.50	0	1,412.60	72
EX J-BLDG	1,248.00	0	1,412.60	71
EX J-4	1,247.00	0	1,412.60	72
J-1	1,245.00	98	1,412.50	72
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

FlexTable: Pipe Table

Active Scenario: Max Day

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	195	1.25
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	195	0.03
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	195	0.03
EX P-2	8.0	EX J-2	J-1	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-1	EX FH-1	Ductile Iron	130.0	-195	1.25
P-1	4.0	J-1	J-BLDG	Ductile Iron	130.0	(N/A)	(N/A)

FlexTable: Junction Table

Active Scenario: Max Day

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,411.98	73
EX J-2	1,244.50	0	1,411.98	72
EX FH-1	1,245.00	0	1,412.03	72
EX FH-FLOW	1,247.50	0	1,412.33	71
EX J-3	1,248.00	0	1,412.33	71
EX FH-TEST	1,246.50	0	1,412.33	72
EX J-BLDG	1,248.00	0	1,412.33	71
EX J-4	1,247.00	0	1,412.33	72
J-1	1,245.00	195	1,411.98	72
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

FlexTable: Pipe Table

Active Scenario: Peak Hour

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	342	2.18
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	342	0.06
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	342	0.06
EX P-2	8.0	EX J-2	J-1	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-1	EX FH-1	Ductile Iron	130.0	-342	2.18
P-1	4.0	J-1	J-BLDG	Ductile Iron	130.0	(N/A)	(N/A)

20-DR-2019
8/21/2019

FlexTable: Junction Table

Active Scenario: Peak Hour

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,410.66	72
EX J-2	1,244.50	0	1,410.66	72
EX FH-1	1,245.00	0	1,410.82	72
EX FH-FLOW	1,247.50	0	1,411.65	71
EX J-3	1,248.00	0	1,411.65	71
EX FH-TEST	1,246.50	0	1,411.65	71
EX J-BLDG	1,248.00	0	1,411.65	71
EX J-4	1,247.00	0	1,411.65	71
J-1	1,245.00	342	1,410.66	72
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

Fire Flow Node FlexTable: Fire Flow Report

Active Scenario: Max Day + Fire Flow

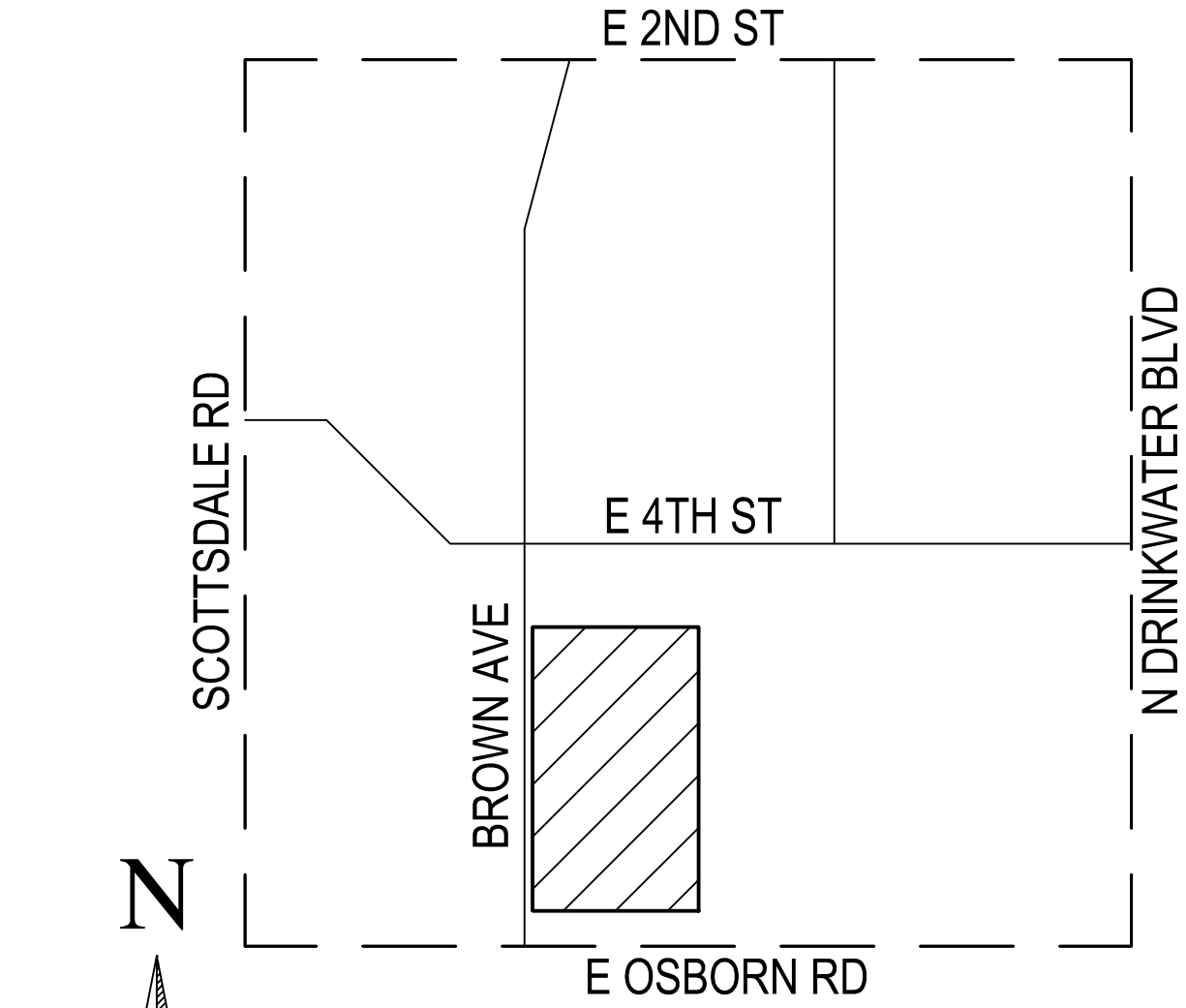
Label	Elevation (ft)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Hydraulic Grade (ft)
EX J-1	1,244.00	2,500	2,327	30	30	1,411.98
EX J-2	1,244.50	2,500	2,402	30	30	1,411.98
EX FH-1	1,245.00	2,500	2,690	30	30	1,412.03
EX FH-FLOW	1,247.50	2,500	2,888	30	30	1,412.33
EX J-3	1,248.00	2,500	2,792	30	30	1,412.33
EX FH-TEST	1,246.50	2,500	3,685	30	31	1,412.33
EX J-BLDG	1,248.00	2,500	2,276	30	30	1,412.33
EX J-4	1,247.00	2,500	1,718	30	30	1,412.33
J-1	1,245.00	2,695	2,764	30	30	1,411.98
J-BLDG	1,304.50	(N/A)	(N/A)	15	(N/A)	(N/A)

FlexTable: Junction Table

Active Scenario: Model Scenario 3

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,326.05	35
EX J-2	1,244.50	0	1,326.05	35
EX FH-1	1,245.00	2,500	1,326.10	35
EX FH-FLOW	1,247.50	0	1,364.21	50
EX J-3	1,248.00	0	1,364.21	50
EX FH-TEST	1,246.50	0	1,364.21	51
EX J-BLDG	1,248.00	0	1,364.21	50
EX J-4	1,247.00	0	1,364.21	51
J-1	1,245.00	0	1,326.05	35
J-BLDG	1,304.50	195	1,323.42	8

VICINITY MAP



VICINITY MAP

N.T.S.

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WWW.WOODPATEL.COM

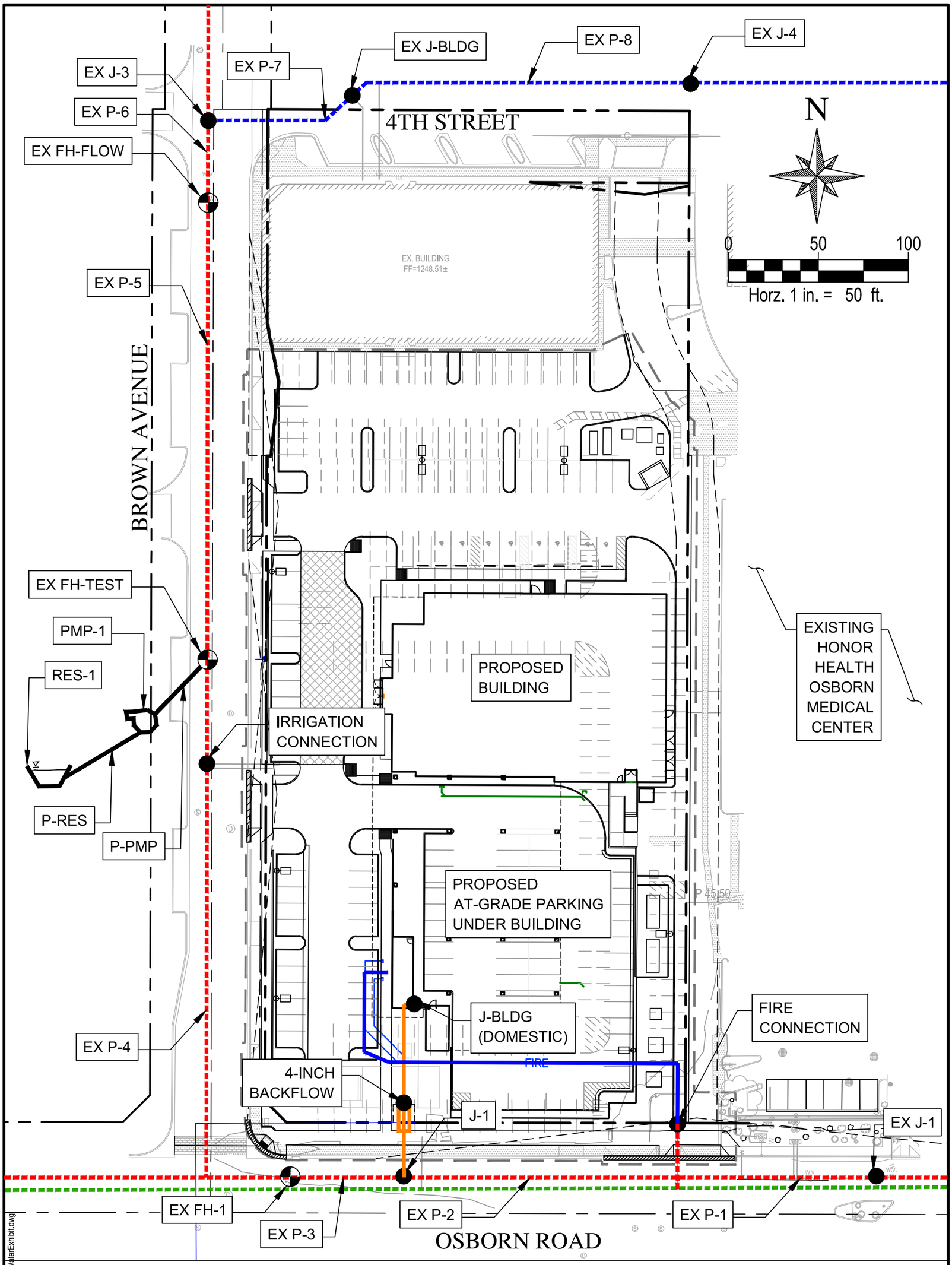
HONOR HEALTH MEDICAL OFFICE BUILDING

VICINITY MAP

DATE: 08-19-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

20-DR-2019
8/21/2019

WATER EXHIBIT



PIPE DIAMETER	EXISTING	PLANNED
4-INCHES		
6-INCHES		
INCHES		
-INCHES		
INCH METER		

NOT
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HONOR HEALTH MEDICAL OFFICE BUILDING

WATER EXHIBIT

DATE:	SCALE:	SHEET
04-19-2019	1" = 50'	01 of 01
JOB NO.:	DESIGN: JB	
194976	DRAWN: AF	

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20-DR-2019
8/21/2019

WOOD PATEL

FINAL Basis of Design Report

☐ APPROVED

☑ APPROVED AS NOTED

☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE

SCOTTSDALE WATER

9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If approved; the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY ldillon DATE 9/24/2019

FINAL WATER DISTRIBUTION SYSTEM BASIS OF DESIGN REPORT FOR HONOR HEALTH NEUROSCIENCE INSTITUTE

August 19, 2019
WP# 194976

20-DR-2019
8/21/2019

Round 2 comments LDillon 9/24/19

1) Verify that existing water service stub out is available and meets min 6-inch minimum requirement.
2) If meter is 3" or larger place in vault per COS detail 2345. 4-inch domestic meter proposed in text.
3) Meter needs to be in easement in visible, safe, and accessible location.
4) BFP needs to be in visible, safe, and accessible location.

FINAL WATER BOD CHECKLIST

Step	DS&PM Requirement	DS&PM Requirement Specifications	Name and Date ✓
1	Design Policy	A Professional Engineer analyzed the new development's impact on the city's water system	✓
2	Final BOD Report Format Guidelines	Table of contents	✓
		Maps and supporting materials are 11X17 and attached as an appendix	✓
		Reports are sealed, signed, and dated on the cover by a Professional Engineer	✓
3	Report Cover and Vicinity Map shall include:	Development's name, full address, and case number	✓
		Developer/owner's name, address, and phone number	✓
		Engineer or design firm's name, address, and phone number	✓
		The original BOD submittal date and any subsequent revision dates	✓
		A map identifying the project's location, major cross streets and city quarter-section	✓
4	Introduction	Summary of the proposed development including number of residential units, square footages of non-residential developments, and related site improvements	✓
		Summary of any previous development	
5	Existing Conditions	Existing zoning and land use	
		Existing topography, vegetation, and landform features	
		Existing utilities in the vicinity	
		Summary and attached results of recent certified hydrant flow test of existing water system	✓
		List of existing site water meters including size, location, and use for fee credit purposes	
6	Proposed Conditions	Proposed connections to the city's water system and extension of any water lines	✓
		Project's location within the appropriate water zone(s) and boundaries shown	
		Second sourcing for all water extensions when necessary	
		Required fire flow	
7	Hydraulic Modeling Computations	All relevant computations and hydraulic network diagrams listed for average day demand, peak hour demand, and maximum day demand	
8	Network Diagram	Shows all features and appurtenances related to the water distribution system	
9	Summary	Summary of the proposed water improvements stating that all the city's design standards have been met or note why there is an exception	
		Included a project schedule indicating proposed start and completion dates	
		Stated any intent to request a credit, oversize or payback agreement	
10	Supporting Maps	Scaled site plan showing existing and proposed utility lines and improvements	
		Screen existing topography; labels existing and proposed contours	
		Locations and sizes of meters, fire lines, hydrants	
		Labels and dimensions of property lines, right-of-ways, easement lines	
		Water boundary lines related to topography	

WOOD PATEL

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Robert D. Gofonia, PE, RLS

August 19, 2019

Mr. Levi Dillion, PE
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

480.312.5319
ldillion@scottsdaleaz.gov

Re: **Honor Health Neuroscience Institute**
Final Water Distribution System Basis of Design Report
WP# 194976

Dear Mr. Dillion:

This Final Water Distribution System Basis of Design Report is prepared for Devenney Group Ltd., Architects and submitted to the City of Scottsdale. The proposed Honor Health Neuroscience Institute development (Site) is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the Site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian (refer to the attached *Vicinity Map)*. The proposed 5-story office building is 117,000 square-feet and is anticipated to be outpatient only. Proposed improvements will include associated hardscape, parking, and landscaping.

The Site has public waterline infrastructure on three (3) sides. There is one (1) 12-inch DIP and one (1) 8-inch ACP water main in Osborn Road. There is one (1) 8-inch CIP water main in Brown Avenue and one (1) 6-inch CIP water main in 4th Street. The Site proposes two (2) private water connections that utilize City of Scottsdale public waterline for domestic water to the existing public 8-inch waterline and fire protection that connect to the existing public 12-inch waterline in Osborn Road. The existing irrigation meter will be reused. Refer to the attached *Water Exhibit* for a depiction of the existing water infrastructure surrounding the Site.

The design criteria used to estimate potable water demands and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (WOODPATEL) understanding of the requirements listed in the *City of Scottsdale Design Standards and Policies Manual*, 2018. The following is a summary of the primary design criteria utilized:

- Average Day Water Demand, Office:.....6 gpd*
- Maximum Day Demand: .....2.0 x ADD
- Peak Hour Demand: .....3.5 x ADD
- Minimum Residual Pressure, Peak Hour: .....50 psi
- Minimum Residual Pressure, Maximum Day + Fire Flow:.....30 psi

Your water exhibit shows 6"

- Maximum System Pressure ..... 120 psi
- Maximum Pipe Head Loss, Maximum day Demand ..... 8 ft / 1000 ft
- Maximum Pipe Head Loss, Peak Hour Demand ..... 10 ft / 1000 ft
- Minimum Pipe Diameter, Public Water Line ..... 8 inches

Abbreviations: gpd = gallons per day; sf = square feet; ADD = average day demand; psi = pounds per square inch
*Includes both inside and outside use per Figure 6-1.2, COS Design Standards & Policies Manual

Domestic water service will be provided by a proposed 4-inch private waterline and a 4-inch domestic meter. Fire protection for the proposed building will be provided by one (1) proposed 8-inch fire line for an automatic fire-sprinkler service. Irrigation water service is anticipated to be provided by an existing 1-inch irrigation line.

The average day water demand for the proposed 117,000 square-foot Site is projected to be approximately 97.6 gallons per minute (gpm). Maximum day demands and peak hour demands are projected to be 195.2 gpm and 341.6 gpm, respectively (refer to the attached *Calculations*).

WaterCAD V8i, by Haestad Methods, was utilized to analyze the existing water distribution system and proposed improvements. Results from a fire hydrant flow test, conducted on April 12, 2019 by Arizona Flow Testing LLC, were utilized to simulate the City of Scottsdale's water supply for the Site (refer to attached *Modeling Results*).

The hydraulic modeling results indicate the proposed system is capable of delivering peak hour demands, totaling 342 gpm, to the proposed Site with pressures ranging from 71 to 72 pounds per square inch (psi). Fire flow results indicate residual pressures exceed 30 psi within the Site, with 2,500-gpm fire hydrant flows during maximum day demand. Hydraulic modeling results, calculations, and exhibits involved in the water system analysis are attached.

At the request of the City of Scottsdale, WOODPATEL ran an additional scenario to model the pressures at the highest finished floor in the Fire Flow Scenario. Utilizing the headloss assumptions as included in the Design Standards and Policies Manual, we were unable to indicate that sufficient pressures at the highest finished floor were maintained in the fire flow condition. Additional investigation by the Fire Sprinkler designer will be required to confirm if a booster pump is needed.

Thank you for your review of the Final Water Distribution System Basis of Design Report provided for the Honor Health Neuroscience Institute project. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc.

if not met a domestic booster pump may be needed

John "Gordy" Ritchie, PE
Project Manager

JGR/se

se
Y:\WP\Reports\Commercial\194976 Honor Health Neuroscience Institute Final Water BOD.docx

20-DR-2019
8/21/2019

CALCULATIONS AND HYDRAULIC MODELING RESULTS

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TABLE 1 - WATER DEMAND DESIGN FLOWS

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Engineer: John Ritchie, P.E.
Date: 4/19/2019

LAND USE AND DWELLING UNIT BREAKDOWN BY JUNCTION

HYDRAULIC MODEL NODE	ELEVATION (ft)	PRESSURE ZONE	LAND USE	DWELLING UNITS	DEMAND VALUE	UNITS	AVERAGE DAILY DEMAND			MAXIMUM DAY DEMAND				PEAK HOUR DEMAND			
							(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)	Peaking Factor	(gpd)	(gpm)	Total (gpm)
J-1	1,245.00	-	Commercial (Office)	117,000	0.000834	gpm/sf	140,544.00	97.6	97.6	2.0	281,088.00	195.2	195.2	3.5	491,904.00	341.6	341.6
Total				**117,000**			**140,544**	**97.6**	**97.6**		**281,088**	**195.2**	**195.2**		**491,904**	**341.6**	**341.6**

Notes:
1. Per the City of Scottsdale Design Standards and Policies Manuel, dwelling units for an office building are measured in square feet.
2. The proposed building water demand was estimated assuming 5th floor addition.

FIRE HYDRANT FLOW TEST

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	Honor Health MOB
Project Address:	7242 East Osborn Road, Scottsdale, Arizona, 85251
Client Project No.:	194976
Arizona Flow Testing Project No.:	19131
Flow Test Permit No.:	C57857
Date and time flow test conducted:	April 12, 2019 at 8:00 AM
Data is current and reliable until:	October 12, 2019
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Ray Padilla –City of Scottsdale-Inspector (602-541-0586)

Raw Test Data

Static Pressure: **85.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **75.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **23.0 PSI**

(Measured in pounds per square inch)

Diffuser Orifice Diameter: One 4-inch Hose Monster
(Measured in inches)

Coefficient of Diffuser: .7875

Flowing GPM: **1,803 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **4,955 GPM**

Data with 13 PSI Safety Factor

Scottsdale requires a maximum Static Pressure of 72 PSI for AFES Design.

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **62.0 PSI**
(Measured in pounds per square inch)

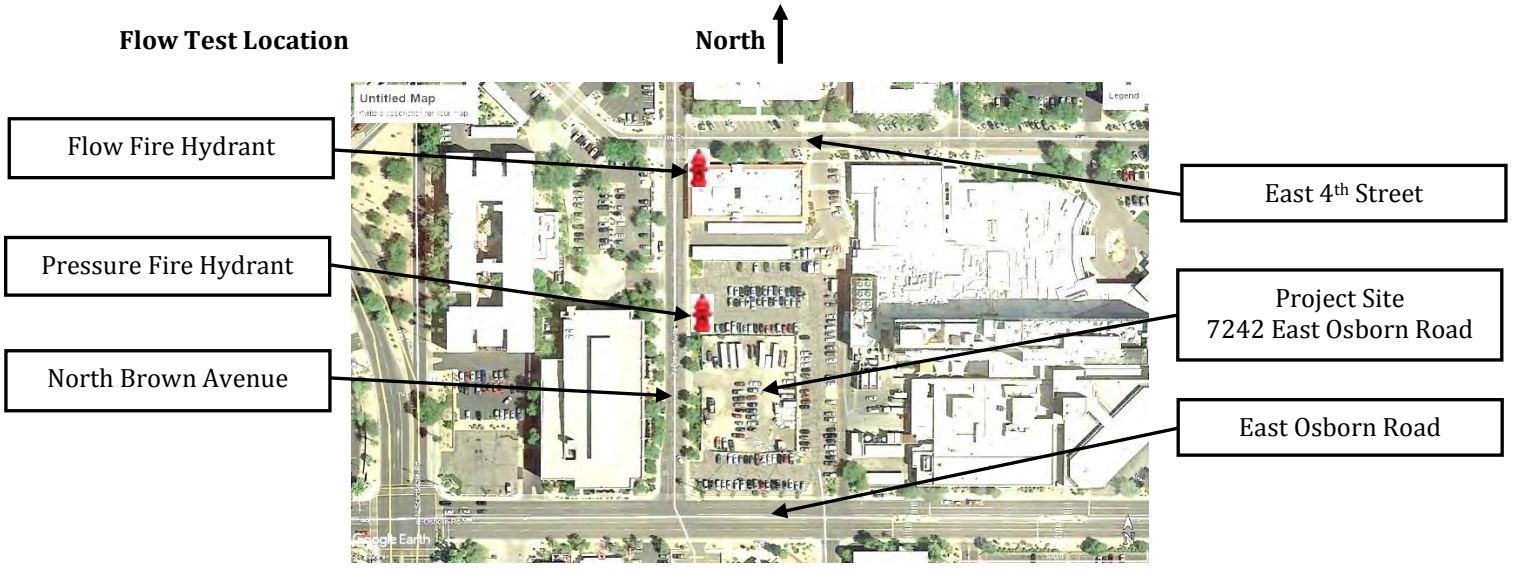
Distance between hydrants: Approx.: 290 feet

Main size: Not Provided

Flowing GPM: **1,803 GPM**

GPM @ 20 PSI**:** **4,392 GPM**

Flow Test Location **North**



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EXISTING WATER SYSTEM PRESSURES

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona

Project Number: 194976
Project Engineer: John Bulka, P.E.

Flow Test Location: 7242 E Osborn Road, Scottsdale AZ
Date of Flow Test: April 12, 2019

Pressure Hydrant		**Flow Hydrant**	
Static Pressure (psi)	72.0		
Residual Pressure (psi)	62.0	Flow (gpm)	1803
Calculated Flow at 20 psi	4392 gpm	Calculated Flow at	20 psi

Discharge (gpm)	Pressure (psi)	Head (ft)
0	72.0	166.2
1803	62.0	143.2
4392	20	46.2

Notes:
1. Values provided from a flow test by the Arizona Flow Testing LLC

FlexTable: Junction Table

Active Scenario: Calibration-Static

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.70	73
EX J-2	1,244.50	0	1,412.70	73
EX FH-1	1,245.00	0	1,412.70	73
EX FH-FLOW	1,247.50	0	1,412.70	71
EX J-3	1,248.00	0	1,412.70	71
EX FH-TEST	1,246.50	0	1,412.70	72
EX J-BLDG	1,248.00	0	1,412.70	71
EX J-4	1,247.00	0	1,412.70	72
J-1	1,245.00	0	1,412.70	73
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

FlexTable: Junction Table

Active Scenario: Calibration-Flow

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,389.70	63
EX J-2	1,244.50	0	1,389.70	63
EX FH-1	1,245.00	0	1,389.70	63
EX FH-FLOW	1,247.50	1,803	1,375.86	56
EX J-3	1,248.00	0	1,375.86	55
EX FH-TEST	1,246.50	0	1,389.70	62
EX J-BLDG	1,248.00	0	1,375.86	55
EX J-4	1,247.00	0	1,375.86	56
J-1	1,245.00	0	1,389.70	63
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

FlexTable: Junction Table

Active Scenario: Calibration-Max

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,292.70	21
EX J-2	1,244.50	0	1,292.70	21
EX FH-1	1,245.00	0	1,292.70	21
EX FH-FLOW	1,247.50	4,392	1,220.72	-12
EX J-3	1,248.00	0	1,220.72	-12
EX FH-TEST	1,246.50	0	1,292.70	20
EX J-BLDG	1,248.00	0	1,220.72	-12
EX J-4	1,247.00	0	1,220.72	-11
J-1	1,245.00	0	1,292.70	21
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

FlexTable: Pipe Table

Active Scenario: Average Day Demand

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	98	0.62
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	98	0.02
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	98	0.02
EX P-2	8.0	EX J-2	J-1	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-1	EX FH-1	Ductile Iron	130.0	-98	0.62
P-1	4.0	J-1	J-BLDG	Ductile Iron	130.0	(N/A)	(N/A)

FlexTable: Junction Table

Active Scenario: Average Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,412.50	73
EX J-2	1,244.50	0	1,412.50	73
EX FH-1	1,245.00	0	1,412.52	72
EX FH-FLOW	1,247.50	0	1,412.60	71
EX J-3	1,248.00	0	1,412.60	71
EX FH-TEST	1,246.50	0	1,412.60	72
EX J-BLDG	1,248.00	0	1,412.60	71
EX J-4	1,247.00	0	1,412.60	72
J-1	1,245.00	98	1,412.50	72
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

FlexTable: Pipe Table

Active Scenario: Max Day

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	195	1.25
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	195	0.03
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	195	0.03
EX P-2	8.0	EX J-2	J-1	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-1	EX FH-1	Ductile Iron	130.0	-195	1.25
P-1	4.0	J-1	J-BLDG	Ductile Iron	130.0	(N/A)	(N/A)

FlexTable: Junction Table

Active Scenario: Max Day

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,411.98	73
EX J-2	1,244.50	0	1,411.98	72
EX FH-1	1,245.00	0	1,412.03	72
EX FH-FLOW	1,247.50	0	1,412.33	71
EX J-3	1,248.00	0	1,412.33	71
EX FH-TEST	1,246.50	0	1,412.33	72
EX J-BLDG	1,248.00	0	1,412.33	71
EX J-4	1,247.00	0	1,412.33	72
J-1	1,245.00	195	1,411.98	72
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

FlexTable: Pipe Table

Active Scenario: Peak Hour

Label	Diameter (in)	Start Node	Stop Node	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-1	8.0	EX J-1	EX J-2	Ductile Iron	130.0	0	0.00
EX P-6	8.0	EX FH-FLOW	EX J-3	Ductile Iron	130.0	0	0.00
EX P-4	8.0	EX FH-TEST	EX FH-1	Ductile Iron	130.0	342	2.18
EX P-5	8.0	EX FH-TEST	EX FH-FLOW	Ductile Iron	130.0	0	0.00
EX P-7	6.0	EX J-3	EX J-BLDG	Ductile Iron	130.0	0	0.00
EX P-8	6.0	EX J-BLDG	EX J-4	Ductile Iron	130.0	0	0.00
P-RES	48.0	RES-1	PMP-1	Ductile Iron	130.0	342	0.06
P-PMP	48.0	PMP-1	EX FH-TEST	Ductile Iron	130.0	342	0.06
EX P-2	8.0	EX J-2	J-1	Ductile Iron	130.0	0	0.00
EX P-3	8.0	J-1	EX FH-1	Ductile Iron	130.0	-342	2.18
P-1	4.0	J-1	J-BLDG	Ductile Iron	130.0	(N/A)	(N/A)

20-DR-2019
8/21/2019

FlexTable: Junction Table

Active Scenario: Peak Hour

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,410.66	72
EX J-2	1,244.50	0	1,410.66	72
EX FH-1	1,245.00	0	1,410.82	72
EX FH-FLOW	1,247.50	0	1,411.65	71
EX J-3	1,248.00	0	1,411.65	71
EX FH-TEST	1,246.50	0	1,411.65	71
EX J-BLDG	1,248.00	0	1,411.65	71
EX J-4	1,247.00	0	1,411.65	71
J-1	1,245.00	342	1,410.66	72
J-BLDG	1,304.50	(N/A)	(N/A)	(N/A)

Fire Flow Node FlexTable: Fire Flow Report

Active Scenario: Max Day + Fire Flow

Label	Elevation (ft)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Hydraulic Grade (ft)
EX J-1	1,244.00	2,500	2,327	30	30	1,411.98
EX J-2	1,244.50	2,500	2,402	30	30	1,411.98
EX FH-1	1,245.00	2,500	2,690	30	30	1,412.03
EX FH-FLOW	1,247.50	2,500	2,888	30	30	1,412.33
EX J-3	1,248.00	2,500	2,792	30	30	1,412.33
EX FH-TEST	1,246.50	2,500	3,685	30	31	1,412.33
EX J-BLDG	1,248.00	2,500	2,276	30	30	1,412.33
EX J-4	1,247.00	2,500	1,718	30	30	1,412.33
J-1	1,245.00	2,695	2,764	30	30	1,411.98
J-BLDG	1,304.50	(N/A)	(N/A)	15	(N/A)	(N/A)

FlexTable: Junction Table

Active Scenario: Model Scenario 3

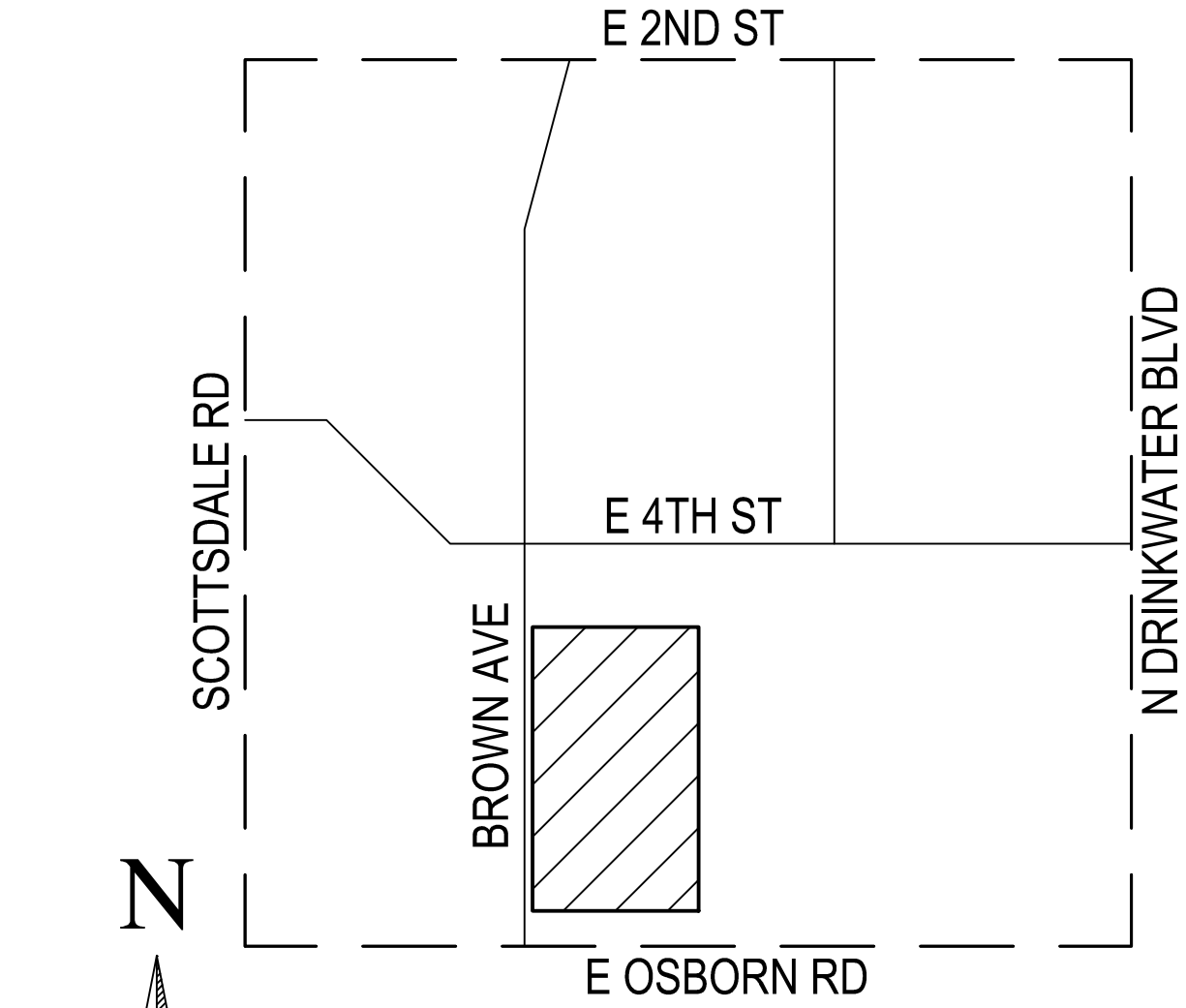
Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX J-1	1,244.00	0	1,326.05	35
EX J-2	1,244.50	0	1,326.05	35
EX FH-1	1,245.00	2,500	1,326.10	35
EX FH-FLOW	1,247.50	0	1,364.21	50
EX J-3	1,248.00	0	1,364.21	50
EX FH-TEST	1,246.50	0	1,364.21	51
EX J-BLDG	1,248.00	0	1,364.21	50
EX J-4	1,247.00	0	1,364.21	51
J-1	1,245.00	0	1,326.05	35
J-BLDG	1,304.50	195	1,323.42	8

60ft building

15psi not met

A DOMESTIC BOOSTER PUMP WILL LIKELY BE NEEDED

VICINITY MAP



VICINITY MAP

N.T.S.

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WWW.WOODPATEL.COM

HONOR HEALTH MEDICAL OFFICE BUILDING

VICINITY MAP

DATE: 08-19-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

20-DR-2019
8/21/2019

WATER EXHIBIT

EX J-3
EX P-7
EX J-BLDG
EX P-8
EX J-4
EX P-6
EX FH-FLOW
4TH STREET
N
0 50 100
Horz. 1 in. = 50 ft.
EX. BUILDING
FF=1248.51±
EX P-5
BROWN AVENUE
EX FH-TEST
PMP-1
RES-1
IRRIGATION CONNECTION
PROPOSED BUILDING
EXISTING HONOR HEALTH OSBORN MEDICAL CENTER
P-RES
P-PMP
PROPOSED AT-GRADE PARKING UNDER BUILDING
P 45.50
3" or larger will require meter vault. Meter needs to be in easement.
EX P-4
J-BLDG (DOMESTIC)
FIRE CONNECTION
FIRE
4-INCH BACKFLOW
J-1
EX J-1
EX FH-1
EX P-3
EX P-2
EX P-1
OSBORN ROAD
Utilizing existing stub, confirm available and that it is 6-inch min required

20-DR-2019
8/21/2019

PIPE DIAMETER	EXISTING	PLANNED
4-INCHES		
6-INCHES		
8-INCHES		
12-INCHES		
4-INCH METER		

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HONOR HEALTH MEDICAL OFFICE BUILDING

WATER EXHIBIT

DATE:	SCALE:	SHEET
04-19-2019	1" = 50'	01 of 01
JOB NO.: 194976	DESIGN: JB	
	DRAWN: AF	

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WASTEWATER COLLECTION SYSTEM
BASIS OF DESIGN REPORT
FOR
HONOR HEALTH
MEDICAL OFFICE BUIILDING

April 17, 2019
WP# 194976

Prepared For:

Devenney Group Ltd., Architects
Mr. Dudley Campbell
201 West Indian School Road
Suite 102
Phoenix, Arizona 85013
Phone: (602) 943-7645

Submitted To:

City of Scottsdale
Mr. Levi Dillion, P.E.
Water Resources Administration
9379 East San Salvador Drive
Scottsdale, Arizona 85258
Phone: (480)-312-5319

Prepared By:

Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8500
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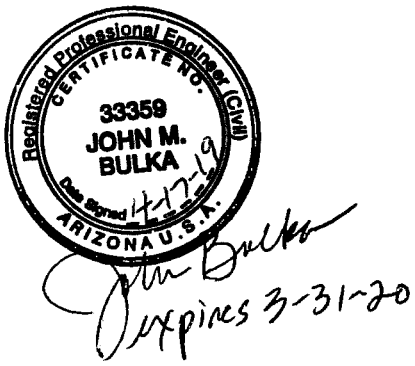

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Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S., CFM
Michael T. Young, P.E., LEED AP
James S. Campbell, P.E., LEED GA
Thomas R. Gettings, R.L.S.
Darin L. Moore, P.E., LEED GA
Jeffrey R. Minch, P.E., CFM
Robert D. Gofonia, P.E., R.L.S.

April 17, 2019

Mr. Levi Dillion, P.E.
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

Phone: (480)-312-5319
Email: ldillion@scottsdaleaz.gov

Re: **Honor Health Medical Office Building**
Wastewater Collection System, Basis of Design Report
Scottsdale, Arizona
WP# 194976

Dear Mr. Dillion:

The proposed Honor Health Medical Office Building development is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian. Refer to the attached *Vicinity Map* for the project location. The proposed 4-story office building will be 92,000 square feet (sf), with an option to add a 25,000-sf fifth floor. The proposed building is located at southeast corner of the site, with proposed parking lots on the north and west sides of the proposed building. At-grade parking will also be located under the south side of the building. The development will include associated hardscape and landscaping.

Wastewater flowing from the proposed Honor Health Medical Office Building will discharge to a 6-inch private sewer line on the west side of the proposed building. The 6-inch private sewer line discharges into the City of Scottsdale's existing public 8-inch VCP sewer line in Brown Avenue.

The design criteria used to estimate wastewater flows and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the requirements listed in the City of Scottsdale's *Design Standards and Policies Manual,* 2018. The following is a summary of the primary design criteria utilized:

• Average Day Wastewater flows, Office:	0.4 gpd/sq. ft.
• Peaking Factor, Office:	3
• Minimum Mean Full Flow Velocity:	2.50 fps
• Minimum Peak Full Flow Velocity:	10.0 fps
• Minimum Peak Flow d/D Ratio (12" dia. Or less sewers):	d/D = 0.65

Abbreviations: gpd = gallons per day; fps = feet per second

Based on the above design criteria, the projected average day flow for the proposed 117,000-sf Honor Health Medical Office Building project is approximately 44,800 gallons per day (gpd), or 33 gallons per minute (gpm). The peak flow is projected to be 140,400 gpd. The proposed sewer slopes, projected flow velocities, and pipe flow capacities are summarized on the attached spreadsheets.

It is assumed the infiltration and inflow from wet weather has been accounted for in the published design flow rates for the development and the maximum d/D. Therefore, those flows have not been added into the calculations. The proposed sanitary sewer collection system is designed to have adequate capacity to serve the proposed development.

Thank you for your review of the Wastewater Collection System Basis of Design Report provided for the Honor Health Medical Office Building development. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc.

John M. Bulka, P.E.
Project Manager

JMB/km

Y:\WP\Reports\Commercial\194976 Honor Health Medical Office Building Wastewater Basis of Design Report.docx

WASTEWATER DESIGN FLOWS & FLOWMASTER RESULTS

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TABLE 1 - WASTEWATER DESIGN FLOWS

Project: Honor Health Medical Office Building
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Manager: John Bulka, P.E.
Date: 4/17/2019

UPSTREAM NODE	DOWNSTREAM NODE	APPLICABLE UNIT	NUMBER OF UNITS	ADF/ APPLICABLE UNIT (GPD)[1]	TOTAL ADF (GPD)	PEAKING FACTOR[2]	PEAK FLOW (GPD)	TOTAL ADF (GPM)	PEAK FLOW (GPM)
Building Connection 1	Privite Sewer Connection	SF	117,000	0.4	46,800	3.00	140,400	33	98
Total					**46,800**		**140,400**	**33**	**98**

1. Average Daily Flow Demand based upon office building square footage per City of Scottsdale Design Standards and Policies Manual (2018)
2. Peaking Factor per City of Scottsdale Design Standards and Policies Manual (2018)

Proposed 6" Sewer Line (2.0%)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02000	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

Results

Normal Depth	1.87	in
Flow Area	0.05	ft²
Wetted Perimeter	0.59	ft
Hydraulic Radius	1.06	in
Top Width	0.46	ft
Critical Depth	0.23	ft
Percent Full	31.2	%
Critical Slope	0.00445	ft/ft
Velocity	4.16	ft/s
Velocity Head	0.27	ft
Specific Energy	0.42	ft
Froude Number	2.18	
Maximum Discharge	1.11	ft³/s
Discharge Full	1.03	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	31.19	%
Downstream Velocity	Infinity	ft/s

Proposed 6" Sewer Line (2.0%)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.87	in
Critical Depth	0.23	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.00445	ft/ft

Proposed 6" Sewer Line (2.5%)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02500	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

Results

Normal Depth	1.77	in
Flow Area	0.05	ft²
Wetted Perimeter	0.57	ft
Hydraulic Radius	1.01	in
Top Width	0.46	ft
Critical Depth	0.23	ft
Percent Full	29.4	%
Critical Slope	0.00446	ft/ft
Velocity	4.50	ft/s
Velocity Head	0.31	ft
Specific Energy	0.46	ft
Froude Number	2.44	
Maximum Discharge	1.24	ft³/s
Discharge Full	1.15	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

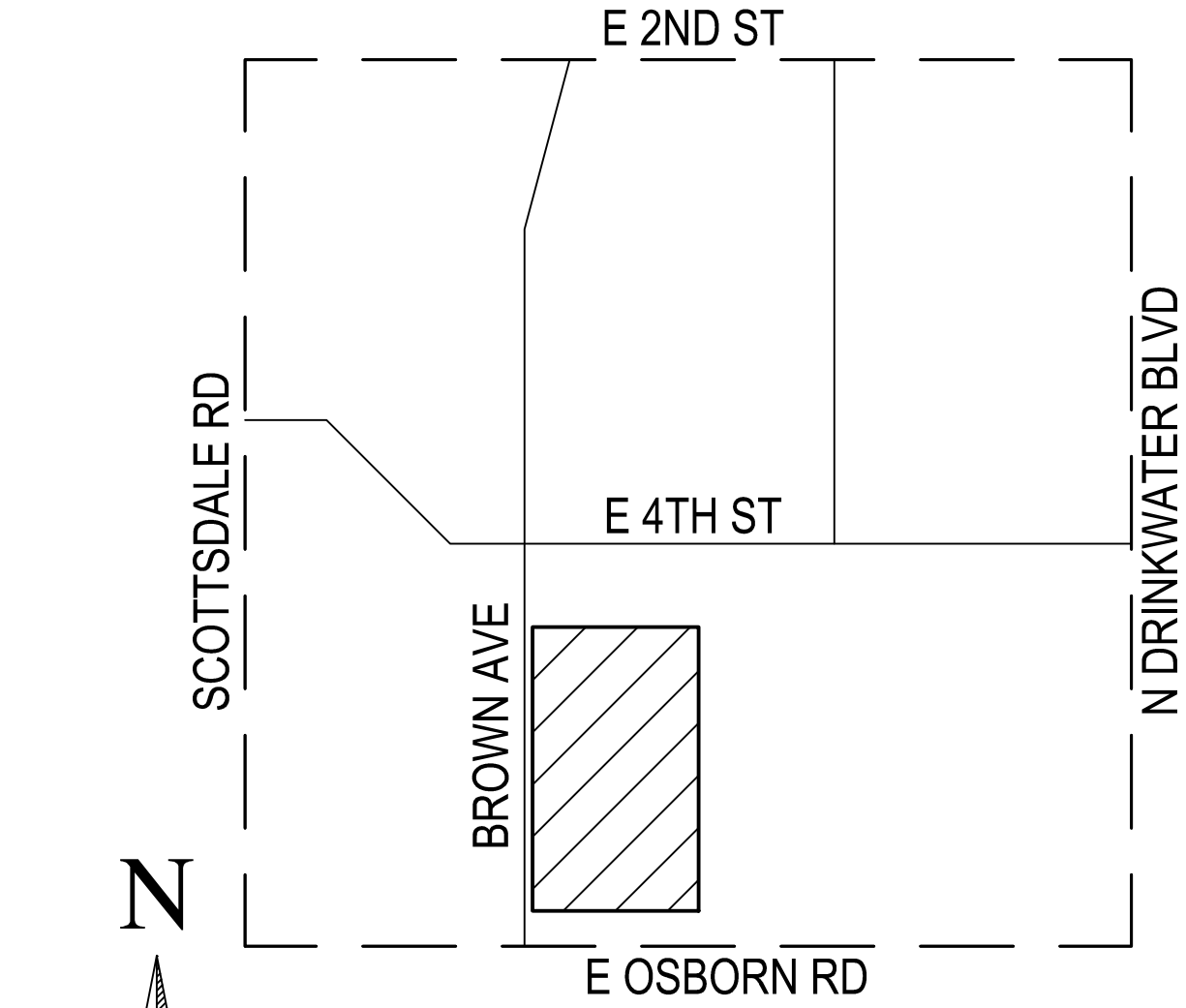
Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	29.45	%
Downstream Velocity	Infinity	ft/s

Proposed 6" Sewer Line (2.5%)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.77	in
Critical Depth	0.23	ft
Channel Slope	0.02500	ft/ft
Critical Slope	0.00446	ft/ft

VICINITY MAP



VICINITY MAP

N.T.S.

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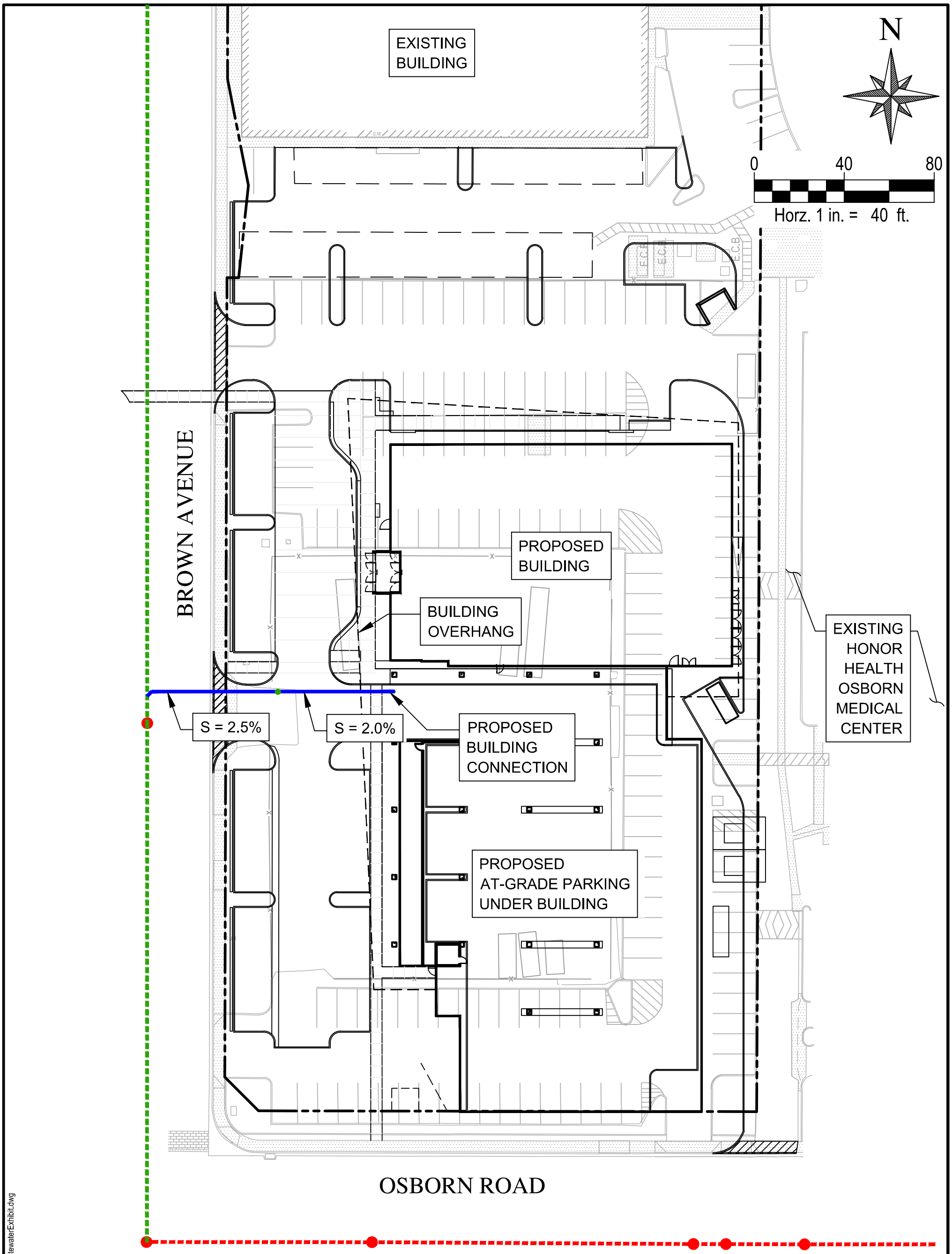
HONOR HEALTH MEDICAL OFFICE BUILDING

VICINITY MAP

DATE: 04-17-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

WASTEWATER EXHIBIT



PIPE DIAMETER	EXISTING	PLANNED
6-INCHES		
8-INCHES		
12-INCHES		
MANHOLE		
CLEANOUT		

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HONOR HEALTH MEDICAL OFFICE BUILDING

Wastewater Exhibit

DATE:	SCALE:	SHEET
04-17-2019	1" = 40'	01 of 01
JOB NO.:	DESIGN: JB	
194976	DRAWN: AF	

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E01

PRODUCT: EIFS
MANUFACTURER: DRYVIT
FINISH: #200 GIBRALTAR TERRANEO

M01

PRODUCT: METAL PANEL
MANUFACTURER: PURE + FREEFORM
FINISH: #MK-019

M02

PRODUCT: METAL PANEL
MANUFACTURER: MORIN
FINISH: BONE WHITE

HONORHEALTH OSBORN
7400 E. OSBORN RD., SCOTTSDALE, AZ 85251
04.19.19

NEUROSCIENCE INSTITUTE

HONORHEALTH

Devenney GROUP

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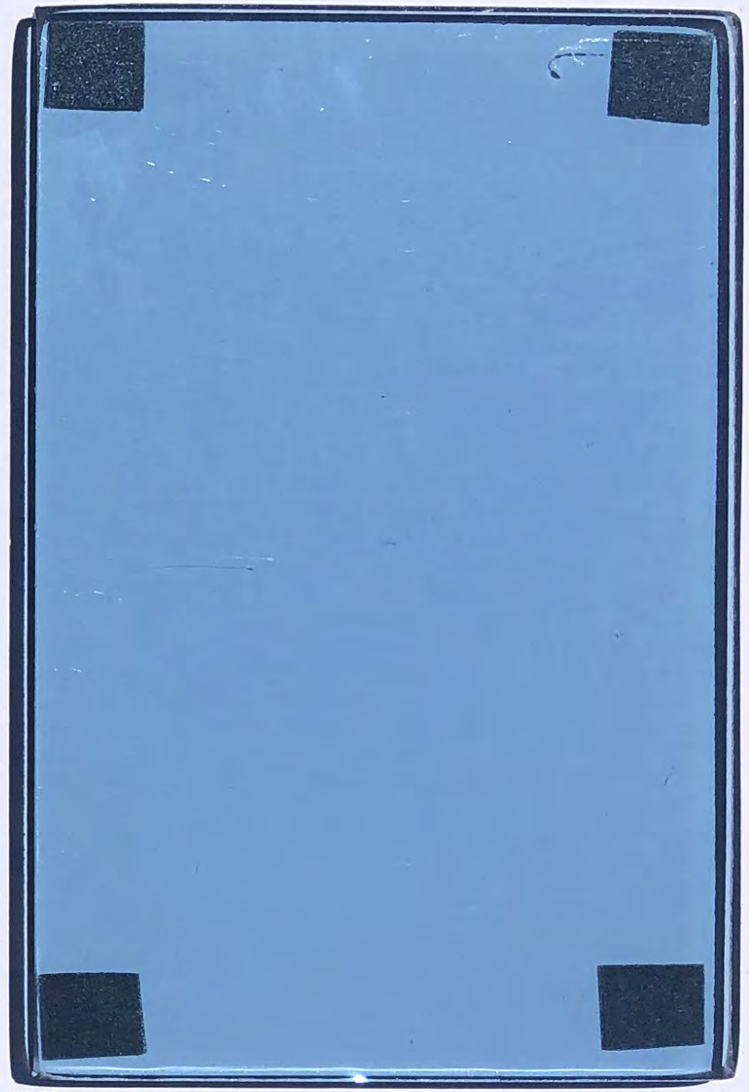
GL01

PRODUCT: GLASS
MANUFACTURER: VIRACON
FINISH: VE3-2M, 1" INSULATING
REFLECTIVITY: 6% EXTERIOR, 9% INTERIOR, 12% SOLAR

GL01S

PRODUCT: SPANDREL GLASS
MANUFACTURER: VIRACON
FINISH:VE3-2M, 1" INSULATING WITH V175 HIGH OPACITY WHITE CERAMIC FRIT ON #4 SURFACE



GL02

PRODUCT: GLASS
MANUFACTURER: VIRACON
FINISH: VUE 1-40
REFLECTIVITY: 15% EXTERIOR & INTERIOR, 27% SOLAR

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7400 E. OSBORN RD., SCOTTSDALE, AZ 85251
04.19.19

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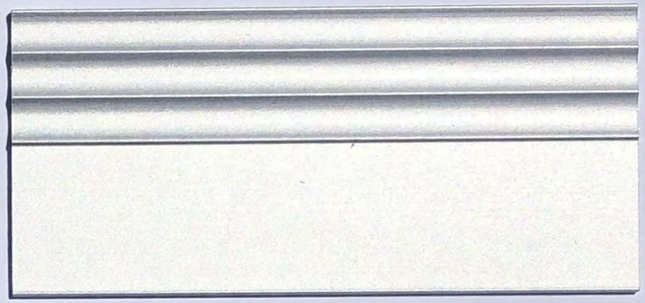
NORTHWEST VIEW

EXTERIOR ELEVATION - WEST

EXTERIOR MULLION
MANUFACTURER: ARCADIA
FINISH: AB-7 STD. DARK BRONZE



EXTERIOR MULLION
MANUFACTURER: ARCADIA
FINISH: #11/CLEAR AC-2

PT01
PRODUCT: PAINT
MANUFACTURER: SHERWIN WILLIAMS
FINISH: SW 7069 IRON ORE

GL02S
PRODUCT: GLASS SPANDREL
MANUFACTURER: VIRACON
FINISH: VUE1-40, 1" INSULATING, WITH V933 WARM GRAY #4

HONORHEALTH OSBORN
7400 E. OSBORN RD., SCOTTSDALE, AZ 85251
04.19.19

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WOOD PATEL

FINAL Basis of Design Report

☐ APPROVED

☑ APPROVED AS NOTED

☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE

SCOTTSDALE WATER

9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If approved; the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY ldillon **DATE** 9/24/2019

FINAL WASTEWATER COLLECTION SYSTEM BASIS OF DESIGN REPORT FOR HONOR HEALTH NEUROSCIENCE INSTITUTE

August 19, 2019
WP# 194976

20-DR-2019
8/21/2019

Round 2 comments LDillon 9/24/19

1) While it was initially questioned why the sewer was being routed to Brown the round 1 BOD comments stated that preferred sewer service line routing was indeed out to Brown as was shown. This was to avoid another connection for the new 12" Osborn sewer to deal with. If not large effort route to Brown.
2) If utilizing existing sewer stub out, confirm available and that it is 6-inch min required.
3) An in-lieu agreement will need to be completed and executed prior to plan approval to cover the cost portion of the new parallel sewer. This shall be determined per the method outlined in my July 25th, 2019 email attached herein. The final cost basis shall be agreed upon with the Water Resources' Department and shall be based on the City design engineers' opinion of cost of the parallel sewer project or bids for similar City projects acceptable to Water Resources. STIPULATION

WOOD PATEL

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Darrel E. Wood, PE, RLS
Ashok C. Patel, PE, RLS, CFM
Michael T. Young, PE, LEED AP
James S. Campbell, PE, LEED GA
Thomas R. Gettings, RLS
Darin L. Moore, PE, LEED GA
Jeffrey R. Minch, PE, CFM
Robert D. Gofonia, PE, RLS

August 19, 2019

Mr. Levi Dillion, PE
Sr. Water Resources Engineer
City of Scottsdale
9379 East San Salvador Drive
Scottsdale, Arizona 85258

480.312.5319
ldillion@scottsdaleaz.gov

Re: **Honor Health Neuroscience Institute**
Final Wastewater Collection System Basis of Design Report
WP# 194976

material type

Dear Mr. Dillion:

This Final Wastewater Collection System Basis of Design Report is prepared for Devenney Group Ltd., Architects and submitted to the City of Scottsdale. The proposed Honor Health Neuroscience Institute development (Site) is a 3.30-acre site located at the northeast corner of Brown Avenue and Osborn Road, and is an expansion of the Honor Health Scottsdale Medical Center. More specifically, the Site is located in the northwest quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Meridian (refer to the attached *Vicinity Map)*. The proposed 5-story office building is 117,000 square-feet and is anticipated to be outpatient only. Proposed improvements will include associated hardscape, parking, and landscaping.

Wastewater flowing from the Site will discharge to an 8-inch private sewer line on the south side of the proposed building. The 8-inch private sewer line will connect to an existing 8-inch stub south of the property and discharge into existing sewer main within Osborn. Per coordination with the City of Scottsdale, the existing sewer main will not have sufficient capacity at the time of project completion. An in-lieu-of construction payment to the City will be required proportional to the capacity impact and length of sewer impacted to Miller Road. Refer to the attached email from the Levi Dillion for a rough cost estimate. Final costs are to be determined by the Water Resources Department at a later date.

The design criteria used to estimate wastewater flows and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (WOODPATEL) understanding of the requirements listed in the City of Scottsdale's *Design Standards and Policies Manual,* 2018. The following is a summary of the primary design criteria utilized:

- Average Day Wastewater Demand, Office: ..... 0.4 gpd / sq. ft
- Peak Factor, Office: 3
- Minimum Mean Full Flow Velocity: ..... 2.50 fps
- Minimum Peak Full Flow Velocity: ..... 10.0 fps
- Minimum Peak Flow d/D Ratio (12" dia. Or less sewers): ..... d/D = 0.65

Abbreviations: gpd = gallons per day; fps = feet per second

20-DR-2019
8/21/2019

Based on the above design criteria, the projected average day flow for the proposed 117,000 square-foot Site is approximately 44,800 gallons per day (gpd), or 33 gallons per minute (gpm). The peak flow is projected to be 140,400 gpd. The proposed sewer slopes, projected flow velocities, and pipe flow capacities are summarized on the attached spreadsheets.

It is assumed the infiltration and inflow from wet weather has been accounted for in the published design flow rates for the development and the maximum d/D. Therefore, those flows have not been added into the calculations. The proposed sanitary sewer collection system is designed to have adequate capacity to serve the proposed development.

Thank you for your review of the Final Wastewater Collection System Basis of Design Report provided for the Honor Health Neuroscience Institute development. Feel free to contact me if you have any questions.

Sincerely,

Wood, Patel & Associates, Inc.

John “Gordy” Ritchie, PE
Project Manager

JGR/se

se
Y:\WP\Reports\Commercial\194976 Honor Health Neuroscience Institute Final Wastewater BOD.docx

WASTEWATER DESIGN FLOWS & FLOWMASTER RESULTS

WOOD/PATEL
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CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

TABLE 1 - WASTEWATER DESIGN FLOWS

Project: Honor Health Neuroscience Institute
Location: Scottsdale, Arizona
References: City of Scottsdale Design Standards and Policies Manual (2018)

Project Number: 194976
Project Manager: John Ritchie, P.E.
Date: 4/19/2019

UPSTREAM NODE	DOWNSTREAM NODE	APPLICABLE UNIT	NUMBER OF UNITS	ADF/ APPLICABLE UNIT (GPD)[1]	TOTAL ADF (GPD)	PEAKING FACTOR[2]	PEAK FLOW (GPD)	TOTAL ADF (GPM)	PEAK FLOW (GPM)
Building Connection 1	Privite Sewer Connection	SF	117,000	0.4	46,800	3.00	140,400	33	98
Total					**46,800**		**140,400**	**33**	**98**

1. Average Daily Flow Demand based upon office building square footage per City of Scottsdale Design Standards and Policies Manual (2018)
2. Peaking Factor per City of Scottsdale Design Standards and Policies Manual (2018)

8" Sewer Line

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.05200	ft/ft
Diameter	6.00	in
Discharge	140400.00	gal/day

0.013

Results

Normal Depth	1.47	in
Flow Area	0.04	ft²
Wetted Perimeter	0.52	ft
Hydraulic Radius	0.86	in
Top Width	0.43	ft
Critical Depth	0.23	ft
Percent Full	24.4	%
Critical Slope	0.00446	ft/ft
Velocity	5.84	ft/s
Velocity Head	0.53	ft
Specific Energy	0.65	ft
Froude Number	3.50	
Maximum Discharge	1.79	ft³/s
Discharge Full	1.66	ft³/s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	24.45	%
Downstream Velocity	Infinity	ft/s

20-DR-2019
8/21/2019

8" Sewer Line

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.47	in
Critical Depth	0.23	ft
Channel Slope	0.05200	ft/ft
Critical Slope	0.00446	ft/ft

From: John "Gordy" Ritchie
Sent: Wednesday, August 7, 2019 3:07 PM
To: Aaron Fabian
Subject: FW: Honor Health NSI MOB - Sewer Construction Fees

Follow Up Flag: Follow up
Flag Status: Flagged

FYI for the Sewer BOD Report

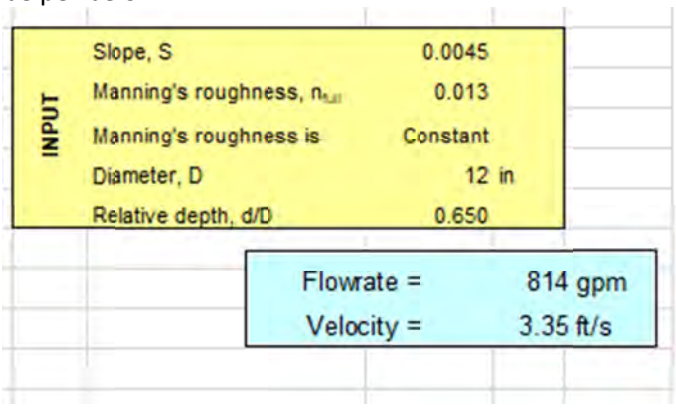
John "Gordy" Ritchie, PE
Project Manager

D: 602.336.7908
M: 520.907.7783
jritchie@woodpatel.com
www.woodpatel.com

From: Dillon, Levi [mailto:LDillon@Scottsdaleaz.gov]
Sent: Thursday, July 25, 2019 7:19 PM
To: John "Gordy" Ritchie
Cc: Irene Clark (iclark@devenneygroup.com); Mars, Scott; Hayes, Eliana
Subject: RE: Honor Health NSI MOB - Sewer Construction Fees

Hello Mr. Ritchie,

Based on preliminary profile information the hydraulic design capacity of the new 12" Osborn sewer will be per below:



As a draft example only:

- New Osborn 12” parallel sewer cost: 3,000ft X $400/ft= $1.2M (note that a large portion of the sewer is 16 feet deep and there are many existing utilities, so the unit cost is only a placeholder as shown here).
- Length of new sewer impacted by this project: 2,220ft (2200/3000=74%)
- Portion of new 12” sewer peak capacity contributed by this development: 98gpm/ 814gpm = 12%
- **Example of In-lieu capital cost attributable to the development: $1.2M X 12% X 74%= $107,000**

Please note that the in-lieu cost portion will not be firmly set until the final cost basis of the project is set by Water Resources and the in-lieu amount is included in the respective agreement.

For the purposes of your basis of design report you can simply include this email as documentation within the report and clearly refer to it in the report text.

Hope this helps for now.

Levi C. Dillon, P.E. | *Sr. Water Resources Engineer*

SCOTTSDALE WATER

"Water Sustainability through Stewardship, Innovation and People"

Contact Info
Direct: (480) 312-5319
Main office: (480) 312-5685
Fax: (480) 312-5615
Mailing/Office Address
Water Resources Administration
9379 E. San Salvador Dr.
Scottsdale, AZ. 85258

Sending me an attachment over 5MB? Please use the link below:
https://securemail.scottsdaleaz.gov/dropbox/ldillon@scottsdaleaz.gov

---

From: John "Gordy" Ritchie <JRitchie@WoodPatel.com>
Sent: Tuesday, July 23, 2019 10:37 AM
To: Dillon, Levi <LDillon@Scottsdaleaz.gov>
Cc: Irene Clark (iclark@devenneygroup.com) <iclark@devenneygroup.com>
Subject: Honor Health NSI MOB - Sewer Construction Fees

Levi,

As requested, I wanted to follow up on our conversation this morning regarding the “in-lieu” construction fees as mentioned in your comments to our Wastwater BOD report. Per our discussion, I have the parameters for a rough estimate I can provide to the owner. However, we

would like to be able to get some more finalized fee parameters prior to our DRB resubmittal. Please let me know when you have some more firm numbers so we can provide an accurate calculation.

Thanks.

John "Gordy" Ritchie, PE
Project Manager

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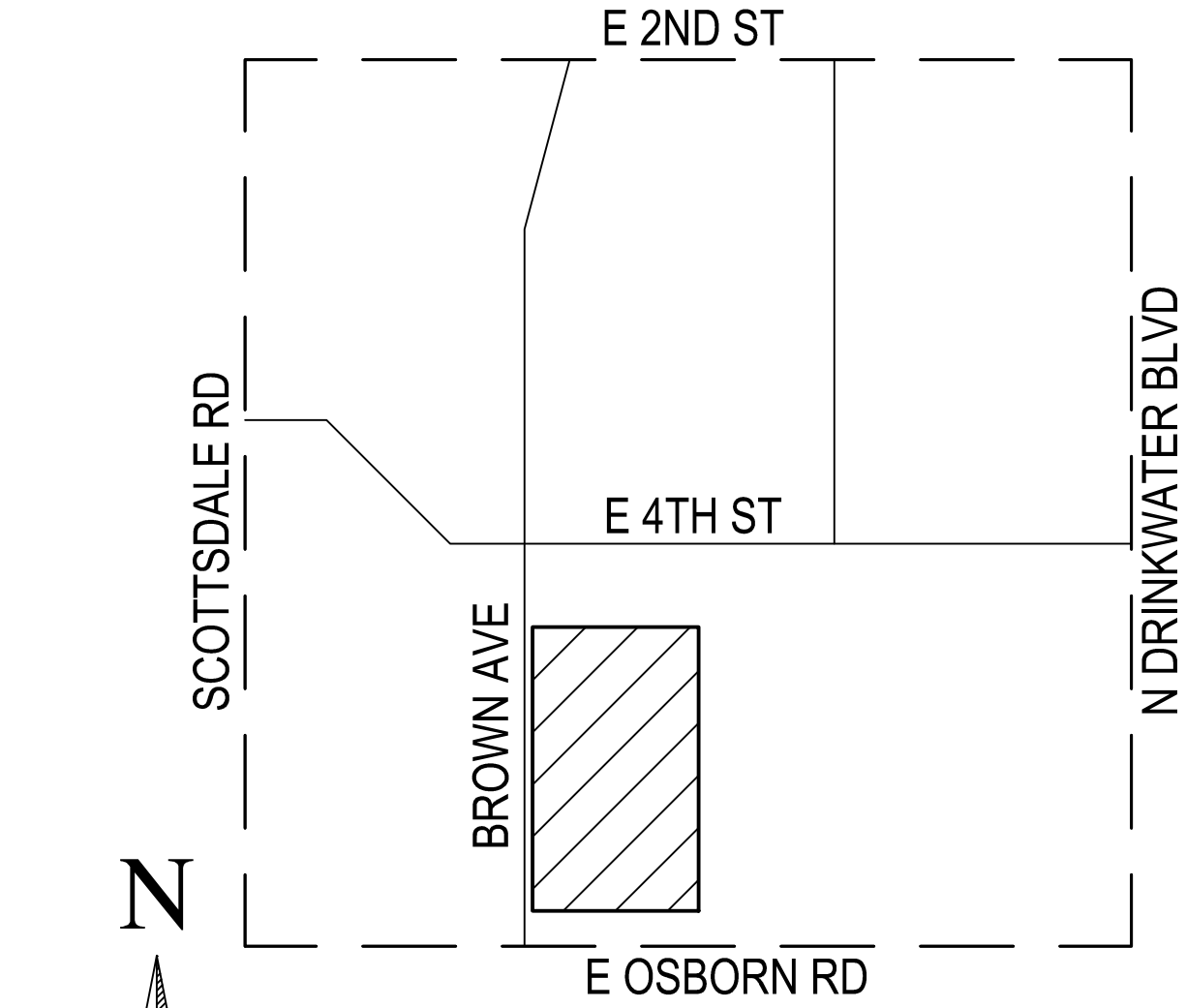
M: 520.907.7783
jritchie@woodpatel.com
www.woodpatel.com

VICINITY MAP



VICINITY MAP

N.T.S.

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HONOR HEALTH NEUROSCIENCE INSTITUTE

VICINITY MAP

DATE: 08-19-2019	SCALE: N/A	SHEET 01 OF 01
JOB NO.: 194976	DESIGN: JB DRAWN: AF	

20-DR-2019
8/21/2019

WASTEWATER EXHIBIT

EXISTING BUILDING

N

0 40 80

Horz. 1 in. = 40 ft.

BROWN AVENUE

preferred connection point was here per round 1 submittal and confirmed with comments, why changed?

PROPOSED BUILDING

V=5 fps @ peak design, 6.5fps full, less than 10, ok

called out as 6in

EXISTING HONOR HEALTH OSBORN MEDICAL CENTER

PROPOSED BUILDING CONNECTION INV 43.50

PROPOSED AT-GRADE PARKING UNDER BUILDING

PROPOSED 8" SS LINE S = 5.2%

PROPOSED STUB CONNECTION INV 32.25

MAG 440-3 Connection with clean-out in ROW.

OSBORN ROAD

Utilizing existing stub, confirm available and that it is 6-inch min required

PIPE DIAMETER	EXISTING	PLANNED
6-INCHES		
8-INCHES		
12-INCHES		
MANHOLE		
CLEANOUT		

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HONOR HEALTH NEUROSCIENCE INSTITUTE

WASTEWATER EXHIBIT

DATE:	SCALE:	SHEET
08-19-2019	1" = 40'	01 of 01
JOB NO.: 194976	DESIGN: JB	
	DRAWN: AF	

20-DR-2019
8/21/2019

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