Ivy Pointe Boulevard

Extension from Ferguson Drive to Aicholtz Road

Roadway and Storm Drainage Study

Union Township
Clermont County, Ohio

Prepared December 3, 2010

CREATING YOUR VISION

McGill Smith Punshon, Inc.

3700 Park 42 Drive, Suite 190B, Cincinnati, Ohio 45241-2097
(office) 513.759.0004 (fax) 513.563.7099
www.mcgillsmithpunshon.com

McGill Smith Punshon, Inc.

December 3, 2010

Mr. A. Steven Wharton, Secretary / Treasurer
Clermont County Transportation Improvement District
c/o Economic Development Corporation of Clermont County
2379 Clermont Center Drive
Batavia, OH 45103

RE: Ivy Pointe Boulevard
Extension from Ferguson Drive to Aicholtz Road
Roadway and Storm Drainage Study
PID No. 90110
MSP No. 10321.10

Dear Mr. Wharton:

McGill Smith Punshon, Inc. is pleased to provide the following Roadway and Storm Drainage Study for the extension of Ivy Pointe Boulevard from Ferguson Drive to Aicholtz Road. The report has been carried out in accordance with the terms and conditions of Consultant Agreement 2010-06, dated June 1, 2010.

We thank you for the opportunity to assist the Clermont County Transportation Improvement District with this important project. Please contact us if we may provide addition service in this matter.

Respectfully Submitted,

McGill Smith Punshon, Inc.

James H. Watson, P.E.
Senior Vice President

Richard L. Arnold II, LEED AP
Vice President, Land Development

Table of Contents

Appendix

Critical Storm Calculations

Trunk Storm Sewer Preliminary Design Calculations

Regional Basin Outlet Works Preliminary Design

Flow Schematic: 10-Year Post-Development Storm Event

Flow Schematic: 50-Year Post-Development Storm Event

Flow Schematic: 100-Year Post-Development Storm Event

Introduction

McGill Smith Punshon, Inc. has been engaged by the Clermont County Transportation District to prepare a development study for the north end of the Ivy Pointe Commerce Park. Purposes of the study include :

- Evaluating alternative alignments of the extension of Ivy Pointe Boulevard form the intersection of Ferguson Drive and existing Ivy Pointe Boulevard to Aicholtz Road.

- Investigating the viability of providing regional storm water detention facilities for the northerly potion of the Ivy Pointe Commerce Park and surrounding properties.

- Determining if and how the alignment of a planned sanitary sewer extension serving the southwesterly portion of the Eastgate area could be integrated with the alignment of future Ivy Pointe Boulevard.

The results of the study are detailed in the following report.

Existing Conditions

Existing conditions of the study area are illustrated on the base map provided as Exhibit 1. The base map identifies pertinent existing storm utilities, roadways, watercourses, property lines of affected parcels, ownership information and parcel identification numbers. Mapping information has been compiled from a number of sources including Clermont County GIS mapping, site plans of the Eastgate Professional Park and construction plans for Ferguson Drive. A field survey was performed to collect as-built data for an existing stormwater detention basin located at the northeast corner of Ferguson Drive and Ivy Pointe Boulevard. As-built data was also collected for storm sewers serving the Eastgate Professional Park.

Ivy Pointe Boulevard Alignments

The typical roadway section for Ivy Pointe Boulevard conforms to the County standard for commercial streets having a width of 34 feet measured at the backs of curb. A 60-foot wide right-of-way is proposed. Horizontal geometry has been established using a design speed of 40 miles per hour, corresponding with a minimum centerline curve radius of 500 feet.

Development areas will be maximized by positioning Ivy Pointe Boulevard as eastwardly as possible as depicted in Exhibit 2. This plan, referred herein as the easterly alignment, illustrates a development concept containing 577,000 gross square feet of Class A office space contained in three 6-story office buildings west of

Ivy Pointe Boulevard and a 3-story office building east of Ivy Pointe Drive. Consistent with the expectations for Class A office space, parking requirements are determined by providing one space per 200 square feet of building area. Aligning Ivy Pointe Boulevard in this manner will require the removal and/or relocation of two elevated billboard signs and a cell tower facility.

If it is not feasible to remove or relocate the billboards or the cell tower, the alignment of Ivy Pointe Boulevard must be shifted west as depicted in Exhibit 3. This plan, referred herein as the westerly alignment, reduces the area available for parking, corresponding with a reduction of office space. The height of Buildings 2 and 3 is reduced to 5-stories and the total gross area of office space is reduced to 521,000 square feet. It will be important to identify if view easements are associated with the billboards that could affect building locations and the viability of this option.

In comparison to the easterly alignment, the westerly alignment is approximately 40 feet longer and will result in a storm sewer installation that will be approximately $40,000 more costly. Both alternatives propose intersecting Aicholtz Road at a point approximately 75 feet west of existing Omni Drive, requiring the relocation of a 300-foot segment of Omni Drive. Slightly skewing the alignment crossing Aicholtz Road will help minimize the relocation length of Omni Drive.

Sanitary Sewer System

MSP has been retained by the Clermont County Water Resources Department to design a 12” sanitary sewer extension from the terminus of Aicholtz Road at I-275 to an existing sewer at the Ivy Pointe Drive/Ferguson Drive roundabout. A design parameter was to locate the sewer within land owned by Clermont County CIC Inc. As shown in Exhibit 4, The desired sanitary sewer alignment co-exists with alignment options presented herein for Ivy Pointe Boulevard. Accordingly, the sanitary sewer project can move forward independent of the roadway extension project. Care must be taken that the depth of the sanitary sewer is sufficient to avoid conflict with the storm sewer system that will parallel Ivy Pointe Boulevard.

Regional Storm Water Management System

It is widely believed that a regional approach to stormwater detention is more effective than the piece-meal approach that is typically used. While the piece-meal approach can be utilized to meet the local regulations, randomly located basins may actually result in increased peak flow rates and downstream flooding. A regional approach can optimize control of runoff from watershed-wide activities, increase opportunities for storm water reuse and create an opportunity to utilize the facility an amenity.

The area best suited for a regional stormwater detention facility is located north of Aicholtz Road between I-275 and Omni Drive. At present, the area contains of four

residences and an undeveloped wooded area. A 156-acre watershed is tributary to this location that includes the northerly portion of the Ivy Pointe Commerce Park, the Eastgate Professional Park, and a portion of Eastgate Pavilion. Exhibit 5 illustrates the various drainage subareas within the watershed. Runoff from the watershed is received by an 84-inch culvert that passes under I-275. The construction of a detention basin at this location will impact approximately 450 feet of an existing stream. Presumably, impact mitigation can be provided by incorporating wetland areas into the design of the detention facility. It is recommended that a environmental and wetland consultant is engaged to evaluate impacts and mitigation strategies associated the basin and to coordinate approval through appropriate state and federal agencies.

The basin is expected to have a range of operation between elevations 850 and 858. For the purposes of this study, the footprint of the regional detention facility, depicted in Exhibit 6, is limited between Omni Drive to the east, Aicholtz Road to the south, a future I-275 off ramp to the west, and the outdoor storage lot of an existing self-storage facility to the north. The depth of the basin, as measured from existing ground, will be on the order of 18 feet, hence a geotechnical investigation of the area is recommended to evaluate the presence of bedrock and any resulting limitations. The detention basin will have a peak storage capacity of approximately 14 acre-feet. Allowing the basin to perform with one foot of freeboard during the critical storm event will reduce the effective capacity of the basin to approximately 12 acre-feet.

Storage volume requirements were estimated using USDA Technical Release 55 methods. A pre-development curve number of 80 was selected based on land uses depicted in the 1975 Soil Survey of Clermont County, Ohio. The post-development condition of the watershed is assumed to be 75% impervious, corresponding with a curve number of 92. The resulting critical storm frequency is 10 year. Supporting calculations for the critical storm as well as other aspects of the preliminary design are contained in the appendix section of this report.

Applying these parameters to TR-55 estimating methods, while limiting critical storm discharge rates on 1-year pre-development values, yields a unit storage volume requirement of approximately 6,000 cubic feet (0.139 acre-feet) per tributary acre. Accordingly, a 12 acre-foot detention facility has sufficient capacity to serve approximately one-half of 156-acre development area. Existing and additional detention facilities will be required to supplement the regional facility.

Unless the adjoining outdoor storage lot to the north is acquired, enabling the basin to be expanded, the basin cannot provide enough storage to limit the 10-year critical storm discharge rate to the 1-year predevelopment value of 70 cfs for the entire watershed. The basin outlet works can likely be designed to limit the critical storm discharge rate very close to the 2-year pre-development discharge rate of 95 cfs without need of expanding the basin northward. A variance from the Clermont County

Water Management and Sediment Control (WMSC) Regulations will likely become necessary in order to apply the 2-year predevelopment discharge rate.

To meet compliance with the current Ohio EPA Stormwater General Permit as well as the WMSC Regulations, newly developed sites must incorporate permanent post-construction measures that provide perpetual management of runoff quantity and quality. This requirement is often met by designing detention facilities in a manner that extends detention times for common rainfall events. The regional basin can meet this requirement for approximately 60 acres of development area, enough to cover subareas 1 and 2 as well as the undeveloped area in Subarea 3 and the north end of Subarea 4. The regional basin cannot provide water quality volume for Subarea 7.

Supplemental Detention Facilities

Utilizing in-line detention within segments of Hall's Run west of I-275 appears not to be viable. Existing homes along the creek limits storage capacity to an insignificant volume. Assuming the homes are removed, the peak storage volume in a 1,500-foot long segment of Hall's Run, east of the intersection of Rust Lane and Old State Route 74, produces approximately 10 acre-feet of storage. In that this segment of Hall's Run has a tributary area of over 900 acres, the detention facility will fill too quickly to have any measureable effect on peak flow rates.

Subareas 1, 4, 6, 8 and a portion of Subarea 5 are served by existing detention facilities. Due to its proximity to the regional facility, the existing basin in Subarea 4 that presently serves the Eastgate Professional Office Park can be eliminated. A basin serving Comfort Inn, located in Subarea 5, provides a very modest volume of storage and could be eliminated as well to accommodate a higher use for the property. Elimination of the Comfort Inn basin will likely require an upgraded storm sewer system along Aicholtz Road, that could presumably be provided as part of the Aicholtz Road Improvement Project.

An existing basin serving Subarea 1 and identified as Ivy Pointe Commerce Park Basin No. 2, located northeast of the Ferguson Drive/ Ivy Pointe Boulevard roundabout, must remain in operation. This basin provides nearly 4 acre-feet of storage, a significant amount, and fits fairly well within the development concept. Basins serving Subareas 6 and 8 do not provide substantial storage volumes, but their elimination may be impractical.

Subarea 7, located at the southerly extent of the watershed, contains 36 acres and is presently undeveloped. Runoff from this watershed is received by a small diameter storm sewer system serving Buildings 4358 and 4360 of the Eastgate Professional Office Park. The limited capacity of the receiving system will dictate stormwater detention requirements more so than would current County regulations. It might be prudent for the future developers of Subarea 7 to construct a storm system

independent of the Eastgate Professional Office Park system, not only for purposes of achieving greater discharge capacity but also to avoid or minimize future liabilities associated with the shared use of a private storm sewer system. The independent storm system, depicted on Exhibit 7, would presumably discharge into the Ivy Pointe Commerce Park Basin No. 2 and will require the acquisition of easements from multiple property owners.

Trunk Storm Sewer System

In order to collect and convey undetained storm water runoff from the large impervious areas anticipated along the extension of Ivy Pointe Boulevard, a large diameter storm sewer collection system will be required. The upstream end of the storm sewer system will begin with a connection to an existing 36-inch storm sewer that conveys discharge from the existing Ivy Pointe Commerce Park Basin No. 2.

At present and as planned, existing Basin No. 2 receives runoff from Subarea 1.For the purpose of this analysis, it is assumed that detained runoff from Subarea 7 will be routed to Basin No. 2 as well where runoff from Subarea 7 will be once again detained. Though preliminary routing indicates the peak 100-year discharge rate will be on the order of 50 cfs, it may be prudent for the storm sewer extension to have a greater capacity. Accordingly, design of the upstream end of the trunk storm sewer system is based on 102 cfs, the peak 50-year predevelopment discharge rate for Subareas 1 and 7. From there, the preliminary design of the trunk sewer is based on peak 50-year post-development discharge rates as received from the various downstream drainage subareas.

Corresponding pipe sizes vary from 48-inch at the upstream end of the project to 60-inch at the downstream end. The upstream pipe runs will have depths on the order of 15 feet. Care must be taken in the design of both storm and sanitary sewers to avoid grade conflicts. Vertical and/or horizontal relocation of existing 8-inch and 16-inch water mains along Aicholtz Road may be required to accommodate the trunk storm sewer.

Summary

- A sanitary sewer extension serving the southwesterly portion of the Eastgate area can be integrated with the alignment of future Ivy Pointe Boulevard and can be constructed independently from the roadway project.

- A regional storm water retention basin located north of Aicholtz Road and east of Omni Drive cannot alone provide adequate control of runoff from the entire tributary watershed. However, a substantial portion of existing and future development sites can be adequately served by a regional basin. Key issues in the development of a regional facility includes state and federal permitting of stream impacts and investigation of any limitation imposed by bedrock.

- In-line detention in Hall's Run west of I-275 appears not to be viable due the location of existing homes and the magnitude of the tributary watershed.

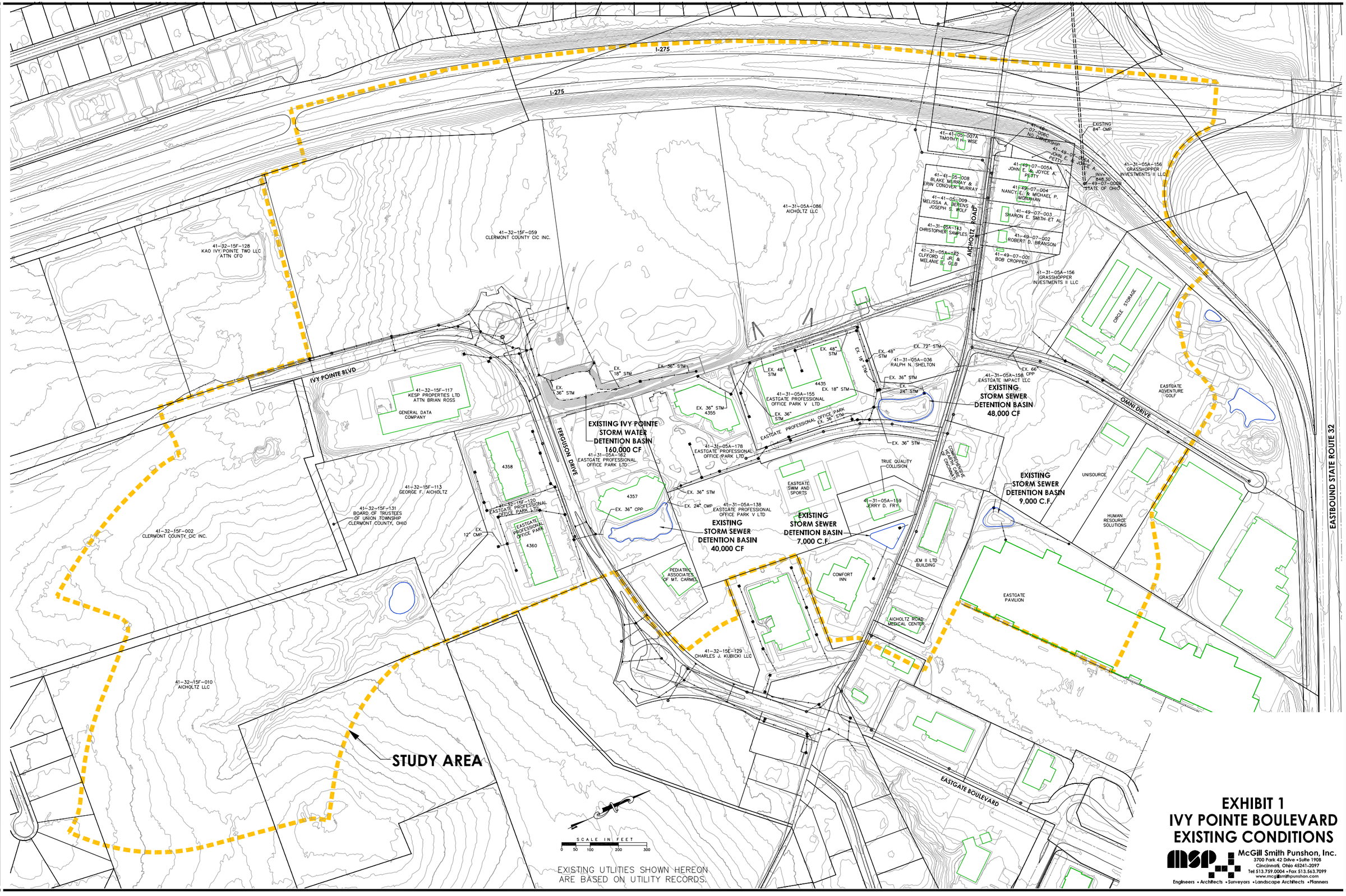
- Important to the design and functionality of a regional basin will be a variance from the Clermont County WMSC regulations limiting the peak allowable discharge rate during a critical storm event to the peak 1-year predevelopment value. Utilizing a peak 2-year predevelopment value will be beneficial to the design, cost and performance of this regional basin.

- Upon completion of the regional basin, an existing detention facility serving Eastgate Professional Office Park can be eliminated. A basin serving Comfort Inn can be eliminated as well provided an upgraded storm sewer system is included as part of the Aicholtz Road Improvement Project.

- The existing Ivy Pointe Commerce Park Basin No. 2, located northeast of the Ferguson Drive/ Ivy Pointe Boulevard roundabout, must remain in operation irrespective of the regional detention basin.

- The area designated as Subarea 7, located at the southerly end of the watershed, must be self-supporting in terms of providing stormwater detention and water quality volume. No existing or proposed downstream facilities are sufficiently sized to accommodate Subarea 7.

- Care must be taken in the design of both storm and sanitary sewers to avoid grade conflicts. Vertical and/or horizontal relocation of existing 8-inch and 16-inch water mains along Aicholtz Road will be required to accommodate the trunk storm sewer.



EXISTING UTLITIES SHOWN HEREON ARE BASED ON UTILITY RECORDS.

EXHIBIT 1
IVY POINTE BOULEVARD
EXISTING CONDITIONS

McGill Smith Punshon, Inc.
3700 Park 42 Drive • Suite 1908
Cincinnati, Ohio 45241-2097
Tel 513.759.0004 • Fax 513.563.7099
www.mcgillsmithpunshon.com
Engineers • Architects • Surveyors • Landscape Architects • Planners

I-275

I-275

FUTURE RAMP PER FIGURE 3
PREFRERED ALTERNATE
INTERCHANGE MODIFICATION STUDY
BY ENTRAN, MARCH, 2008

FUTURE
AICHOLTZ ROAD
CONNECTION

ANTICIPATED
RIGHT-OF-WAY
BY ODOT

EX. 8"
WATERMAIN

FUTURE
100' R/W

A
6-STORY
201,000 S.F.

B
6-STORY
172,000 S.F.

C
6-STORY
172,000 S.F.

CLASS A OFFICE

EX. 16"
WATERMAIN

AICHOLTZ ROAD

PROPOSED
REGIONAL
STORM WATER
RETENTION
BASIN
12 AC./FT.

EX. 8"
SAN TO BE
REPLACED

60"STM

54"STM

60"STM

72"STM

50'
R/W

60' R/W

PROPOSED EASTERLY ALIGNMENT

30"STM

30"STM

54"STM

54"STM

12" SAN

12" SAN

EX CELL TOWER
(TO BE REMOVED)

EX. 8"
WATERMAIN

EX. 72" STM

D
3-STORY
32,000 S.F.

EX.
18" STM

EX. 36" STM

48"STM

EX. 48"
STM

EX. 48"
STM

EXISTING
ELEVATED SIGNS
(TO BE REMOVED)

EX. 18" STM

OMNI DRIVE

POTENTIAL 1.9 AC.
DEVELOPMENT PARCEL

EXISTING
STORM SEWER
DETENTION BASIN
48,000 CF

EX. 66"
CPP

EX. 36" STM

EX.
24" STM

IVY POINTE BLVD

EX.
36" STM

GENERAL DATA
COMPANY

EX. 36" STM
4355

4435

EX. 18" STM

EX. 36"
STM

EASTGATE PROFESSIONAL OFFICE PARK

EX. 36" STM

EXISTING IVY POINTE
STORM WATER
DETENTION BASIN
160,000 CF

FERGUSON DRIVE

EX. 16"
WATERMAIN

EX. 36" STM

EX. 16"
WATERMAIN

EX. 8"
WATERMAIN

TRUE QUALITY
COLLISION

COMPREHENSIVE
HEARTH CARE
OF CINCINNATI

4358

4357

EX. 36" STM

EX. 24" CMP

EX. 36" CPP

EASTGATE
SWIM AND
SPORTS

EXISTING
STORM SEWER
DETENTION BASIN
40,000 C.F.

EXISTING
STORM SEWER
DETENTION BASIN
7,000 C.F.

EX.
12" CMP

EASTGATE
PROFESSIONAL
OFFICE PARK

4360

SCALE IN FEET
0 50 100 200 300

EXHIBIT 2
IVY POINTE BOULEVARD EASTERLY ALIGNMENT DEVELOPMENT CONCEPT

McGill Smith Punshon, Inc.
3700 Park 42 Drive • Suite 190B
Cincinnati, Ohio 45241-2097
Tel 513.759.0004 • Fax 513.563.7099
www.mcgillsmithpunshon.com
Engineers • Architects • Surveyors • Landscape Architects • Planners

I-275

I-275

FUTURE RAMP PER FIGURE 3
PREFRERED ALTERNATE
INTERCHANGE MODIFICATION STUDY
BY ENTRAN, MARCH, 2008

FUTURE
AICHOLTZ ROAD
CONNECTION

ANTICIPATED
RIGHT-OF-WAY
BY ODOT

EX. 8"
WATERMAIN

FUTURE
100' R/W

A
6-STORY
201,000 S.F.

CLASS A OFFICE
B
5-STORY
144,000 S.F.

C
5-STORY
144,000 S.F.

EX. 16"
WATERMAIN

AICHOLTZ ROAD

PROPOSED
REGIONAL
STORM WATER
RETENTION
BASIN
12 AC./FT.

EX. 8"
SAN TO BE
REPLACED

60"STM

30"STM

54"
STM

30"STM

54" STM

60'
R/W

PROPOSED WESTERLY ALIGNMENT

54"STM

54" STM

60"STM

12" SAN

D
3-STORY
32,000 S.F.

48" STM

EX.
18" STM

EX. 36" STM

12" SAN
EX CELL TOWER

EX. 8"
WATERMAIN

EX. 72" STM

72"STM

50'
R/W

EX. 48"
STM

EXISTING
ELEVATED SIGNS

EX. 18" STM

EX. 48"
STM

OMNI DRIVE

EX. 66"
CPP

IVY POINTE BLVD

EX. 36" STM

EX. 36" STM

POTENTIAL 1.9 AC.
DEVELOPMENT PARCEL

EXISTING
STORM SEWER
DETENTION BASIN
48,000 CF

GENERAL DATA
COMPANY

EX. 36" STM
4355

4435

EX. 18" STM

EX. 36"
STM

EASTGATE PROFESSIONAL OFFICE PARK

EX. 36" STM

EXISTING IVY POINTE
STORM WATER
DETENTION BASIN
160,000 CF

FERGUSON DRIVE

EX. 36" STM

EX. 16"
WATERMAIN

EX. 8"
WATERMAIN

EX. 16"
WATERMAIN

TRUE QUALITY
COLLISION

COMPREHENSIVE
HEARTH CARE
OF CINCINNATI

4358

4357

EX. 36" CPP

EX. 24" CMP

EASTGATE
SWIM AND
SPORTS

EXISTING
STORM SEWER
DETENTION BASIN
40,000 C.F.

EXISTING
STORM SEWER
DETENTION BASIN
7,000 C.F.

12" EX.
CMP

EASTGATE
PROFESSIONAL
OFFICE PARK

4360

SCALE IN FEET
0 50 100 200 300

EXHIBIT 3
IVY POINTE BOULEVARD
WESTERLY ALIGNMENT
DEVELOPMENT CONCEPT

McGill Smith Punshon, Inc.
3700 Park 42 Drive • Suite 1908
Cincinnati, Ohio 45241-2097
Tel 513.759.0004 • Fax 513.563.7099
www.mcgillsmithpunshon.com
Engineers • Architects • Surveyors • Landscape Architects • Planners

I-275

I-275

FUTURE RAMP PER FIGURE 3
PREFRERED ALTERNATE
INTERCHANGE MODIFICATION STUDY
BY ENTRAN, MARCH, 2008

FUTURE
AICHOLTZ ROAD
CONNECTION

ANTICIPATED
RIGHT-OF-WAY
BY ODOT

EX 12"SANITARY
SEWER

EX. 8"
WATERMAIN

FUTURE
100' R/W

EXISTING
84" CMP

EX. 16"
WATERMAIN

AICHOLTZ ROAD

EX 8"SANITARY SEWER
TO BE REPLACED
W/ 12"SANITARY

PROPOSED
REGIONAL
STORM WATER
RETENTION
BASIN
12 AC./FT.

EX. 8"
SAN TO BE
REPLACED

CIRCLE STORAGE

PROPOSED
12"SANITARY
SEWER

ALTERNATIVE
ROADWAY
ALIGNMENTS

12" SAN

EX 8"SANITARY
SEWER

12" SAN
EX CELL TOWER

EX. 8"
WATERMAIN

72"STM

50'
R/W

EX 8"SANITARY
SEWER

EX. 48"
STM

EX. 72" STM

EX. 18" STM

EX. 48"
STM

EX. 48"
STM

EXISTING
ELEVATED SIGNS

EX. 36" STM

OMNI DRIVE

EX. 18" STM

4435

EX 8"SANITARY
SEWER

EX. 36"
STM

EX. 36"
STM

EASTGATE PROFESSIONAL OFFICE PARK

EX.

IVY POINTE BLVD

EX.
18" STM

EX. 36" STM

EX.
36" STM

EX. 36" STM
4355

GENERAL DATA
COMPANY

SCALE IN FEET

0 100 200 400 600

EXHIBIT 4
IVY POINTE BOULEVARD
PROPOSED SANITARY
SEWER ALIGNMENT

McGill Smith Punshon, Inc.
3700 Park 42 Drive • Suite 190B
Cincinnati, Ohio 45241-2097
Tel 513.759.0004 • Fax 513.563.7099
www.mcgillsmithpunshon.com
Engineers • Architects • Surveyors • Landscape Architects • Planners

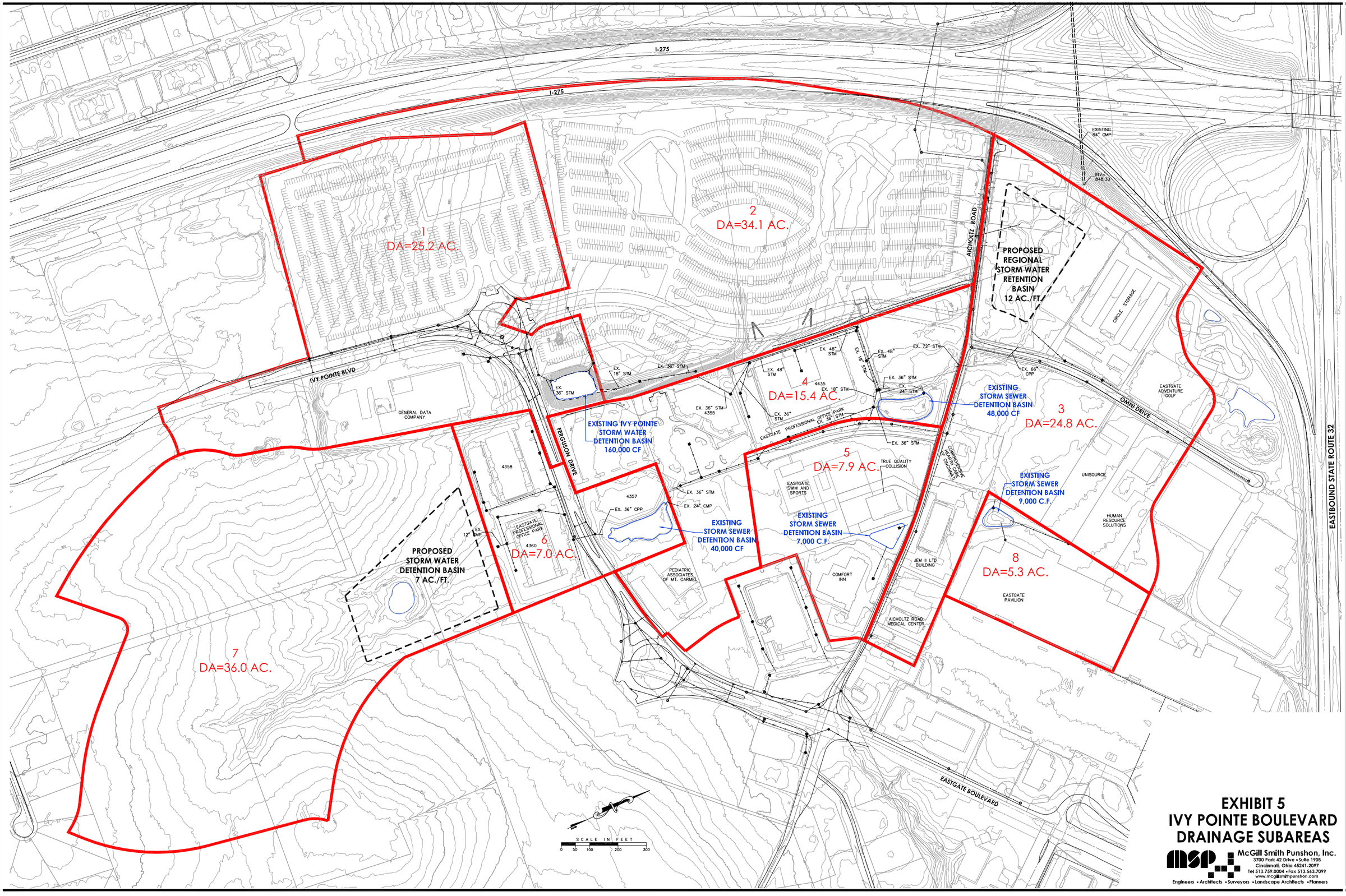


EXHIBIT 5
IVY POINTE BOULEVARD DRAINAGE SUBAREAS

McGill Smith Punshon, Inc.
3700 Park 42 Drive • Suite 1908
Cincinnati, Ohio 45241-2097
Tel 513.759.0004 • Fax 513.563.7099
www.mcgillsmithpunshon.com
Engineers • Architects • Surveyors • Landscape Architects • Planners

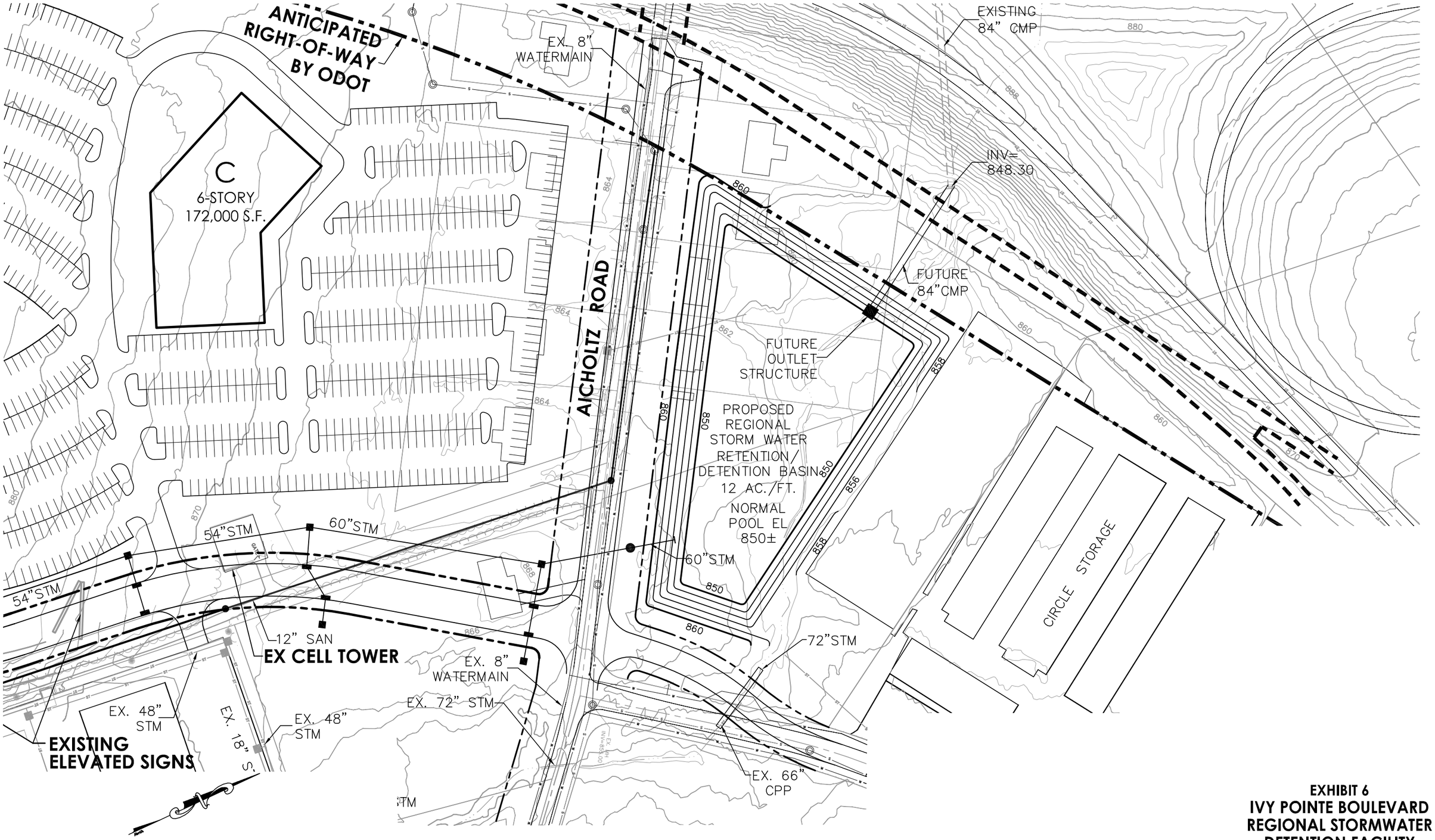


EXHIBIT 6

IVY POINTE BOULEVARD REGIONAL STORMWATER DETENTION FACILITY

McGill Smith Punshon, Inc.
3700 Park 42 Drive • Suite 190B
Cincinnati, Ohio 45241-2097
Tel 513.759.0004 • Fax 513.563.7099
www.mcgillsmithpunshon.com
Engineers • Architects • Surveyors • Landscape Architects • Planners

IVY POINTE BLVD

JACK BORE & CASING

36"STM

36"STM

12"STM

FUTURE SUBAREA 7 DETENTION BASIN 7± AC/ FT STORAGE BELOW FREEBOARD

GENERAL DATA COMPANY

4358

4360

EASTGATE PROFESSIONAL OFFICE PARK

EX. 12" CMP

FERGUSON DRIVE

EX. 36" STM

EX. 18" STM

EXISTING IVY POINTE STORM WATER DETENTION BASIN 160,000 CF

4357

EX. 36" CPP

EX. 24" CMP

EXISTING STORM SEWER DETENTION BASIN 40,000 CF

EX. 36" STM

4355

EX. 36" STM

EX. 48" STM

EX. 18" STM

EXISTING ELEVATED SIGNS

EX CELL TOWER

EX. 48" STM

EX. 48" STM

EX. 18" STM

4435

EX. 18" STM

EX. 36" STM

EX. 24" STM

EX. 36" STM

EASTGATE PROFESSIONAL OFFICE PARK

EX. 36" STM

EX. 8" WATERMAIN

EX. 36" STM

EX. 16" WATERMAIN

TRUE QUALITY COLLISION

EASTGATE SWIM AND SPORTS

EXISTING STORM SEWER DETENTION BASIN 7,000 C.F.

PEDIATRIC ASSOCIATES OF MT. CARMEL

COMFORT INN

JEM BU

SCALE IN FEET

0 50 100 200 300

EXHIBIT 7
IVY POINTE BOULEVARD SUBAREA 7 STORM SEWER CONCEPT

McGill Smith Punshon, Inc.
3700 Park 42 Drive • Suite 1908
Cincinnati, Ohio 45241-2097
Tel 513.759.0004 • Fax 513.563.7099
www.mcgillsmithpunshon.com
Engineers • Architects • Surveyors • Landscape Architects • Planners

Ivy Pointe - Regional Detention Basin | **MSP No.** | **10321.10**
Critical Storm Calculations & Allowable Discharge Rates | **Date** | **11/24/2010**

	1-yr unit acre	2-yr unit acre	1-yr predev Subareas 1-8	2-yr predev Subareas 1-8	100-yr predev Subareas 1-8
Pre-development Data					
Drainage Area (ac)	1.0	1.0	155.7	155.7	155.7
Curve Number	80	80	80	80	80
Frequency (yr)	1	1	1	2	100
P, Rainfall (in)	2.5	2.9	2.5	2.9	5.6
Q, Runoff (in)	0.89	1.18	0.89	1.18	3.42
Q, Runoff Volume (cf)	3227	4267	502392	664388	1934292
Time of Concentration (hr)	1.00	1.00	1.00	1.00	1.00
Ia/P	0.20	0.17	0.20	0.17	0.09
Peak Unit Discharge (csm/in)	323	333	323	333	357
Peak Discharge (cfs)	0.45	0.61	69.8	95.2	297.2
Post-development Data					
Drainage Area (ac)	1.0	1.0	155.7	107.4	
Curve Number	92	92	92	92	
Frequency (yr)	1	2	1	2	
P, Rainfall (in)	2.5	2.9	2.5	2.9	
Q, Runoff (in)	1.69	2.07	1.69	2.07	
Q, Runoff Volume (cf)	6146	7503	956946	805773	
Time of Concentration (hr)	0.30	0.30	0.30	0.30	
Ia/P	0.07	0.06	0.07	0.06	
Peak Unit Discharge (csm/in)	676	676	676	676	
Peak Discharge (cfs)	1.8	2.2	278.5	234.5	
Runoff Percent Increase	**90%**	**76%**	**90%**	**21%**	
Critical Storm Frequency (yr)	**10**	**10**	**10**	**use 10**	
Post-development CN	92	92	92	92	
Critical storm rainfall (in)	4.1	4.1	4.1	4.1	
Critical storm runoff (in)	3.21	3.21	3.21	3.21	
Time of Concentration (hr)	0.30	0.30	0.30	0.30	
Ia/P	0.04	0.04	0.04	0.04	
peak unit discharge (csm/in)	676	676	676	676	
Critical storm peak discharge (cfs)	3.4	3.4	528.6	364.6	
Allowable discharge (cfs)	0.45	0.61	69.8	95.2	
Qout/Qin	0.132	0.180	0.132	0.261	
Vstorage/Vrunoff	0.520	0.473	0.520	0.406	
Runoff volume (ac-ft)	0.3	0.3	41.7	28.8	
Detention volume required (ac-ft)	0.139	0.127	21.68	11.68	
Detention volume required (cu ft)	6065	5518	944326	508834	

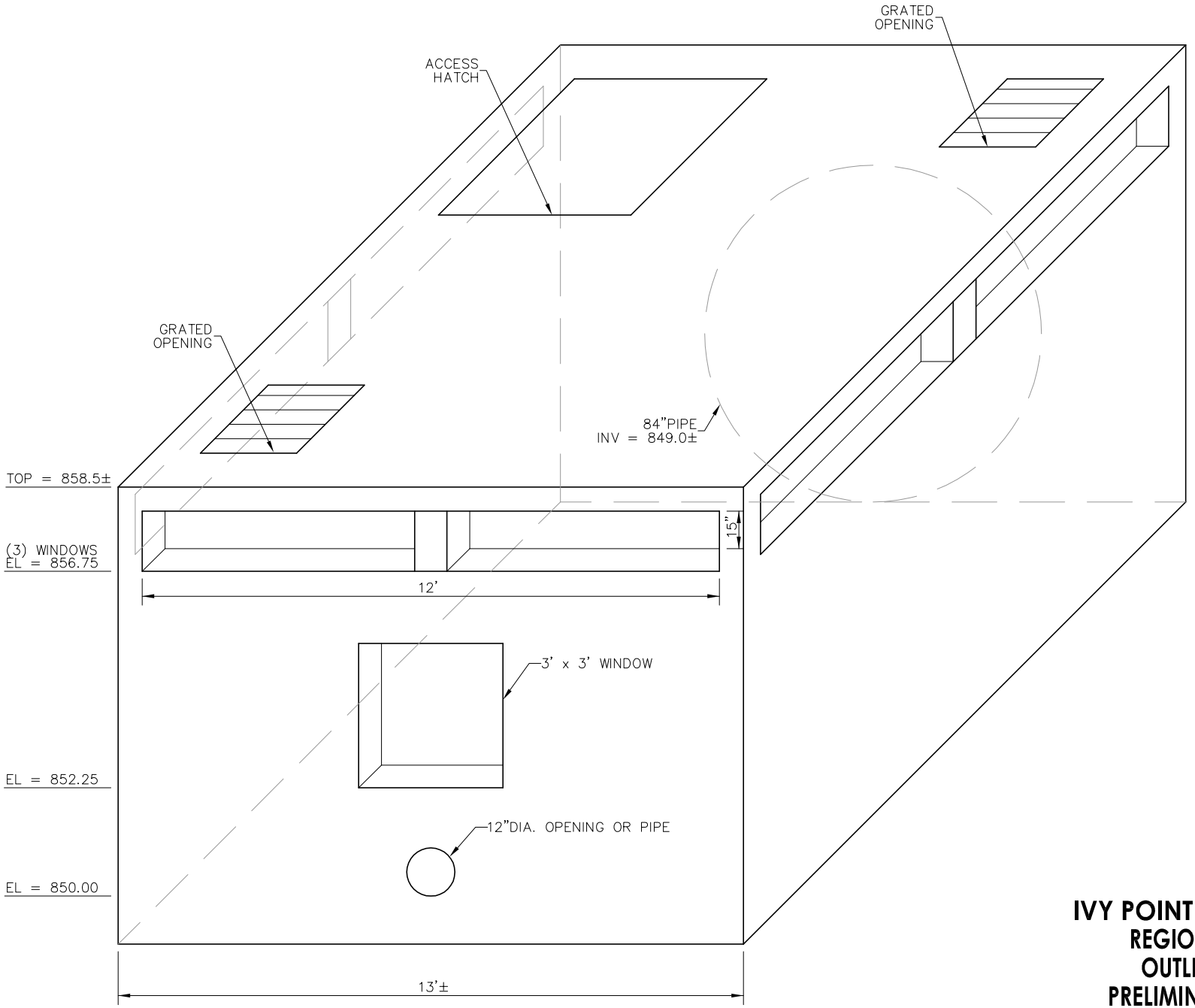
IVY POINTE BOULEVARD **MSP No. 10321.10**
PRELIMINARY TRUNK STORM SEWER DESIGN **DATE 12/1/2010**

DESIGN FREQ = 50 YEAR
P= 5.1

STRUCTURE	CN	AREA	SUMAREA	q'	RUNOFF	q'p	Q	D	S	n	CAP	VEL	LENGTH	INV IN	INV OUT	TOP EL	DEPTH
Westerly Roadway Alignment																	
Ex Basin	80	61.20	61.20	357	2.9803	101.7	101.7	48	0.005	0.013	101.57	8.08	300	869.37	868.20	868.20	0.00
Area 2A	92	11.40	72.60	676	4.1870	50.4	152.2	54	0.006	0.013	152.32	9.58	120	866.70	866.20	881.00	14.80
Area 2B	92	6.90	79.50	676	4.1870	30.5	182.7	54	0.008	0.013	175.89	11.06	280	865.48	865.48	880.00	14.52
Area 2C	92	5.30	84.80	676	4.1870	23.4	206.1	54	0.012	0.013	215.42	13.54	320	863.24	863.24	877.00	13.76
Area 2D	92	8.70	93.50	676	4.1870	38.5	244.6	60	0.008	0.013	232.95	11.86	260	859.40	858.90	868.00	9.10
Area 2D	92	6.50	100.00	676	4.1870	28.7	273.3	60	0.01	0.013	260.44	13.26	80	856.82	856.82	865.00	8.18
San Xing	92	0.00	100.00	676	4.1870	0.0	273.3	60	0.01	0.013	260.44	13.26	70	856.02	856.02	855.80	-0.22
Reg Basin	92	0.00	100.00	676	4.1870	0.0	273.3	60						855.32	855.32	852.00	-3.32
Easterly Roadway Alignment																	
Ex Basin	80	61.20	61.20	357	2.9803	101.7	101.7	48	0.005	0.013	101.57	8.08	240	869.37	868.20	883.00	14.80
Area 2A & 2B	92	18.30	79.50	676	4.1870	80.9	182.7	54	0.011	0.013	206.25	12.97	320	867.00	866.50	882.00	15.50
Area 2C	92	5.30	84.80	676	4.1870	23.4	206.1	54	0.011	0.013	206.25	12.97	200	862.98	862.98	870.00	7.02
Area 2D	92	6.40	91.20	676	4.1870	28.3	234.4	60	0.011	0.013	273.15	13.91	260	860.78	860.28	868.00	7.72
Area 2D	92	8.80	100.00	676	4.1870	38.9	273.3	60	0.011	0.013	273.15	13.91	80	857.42	857.42	865.00	7.58
San Xing	92	0.00	100.00	676	4.1870	0.0	273.3	60	0.011	0.013	273.15	13.91	70	856.54	856.54	855.80	-0.74
Reg Basin	92	0.00	100.00	676	4.1870	0.0	273.3	60						855.77	855.77	852.00	-3.77

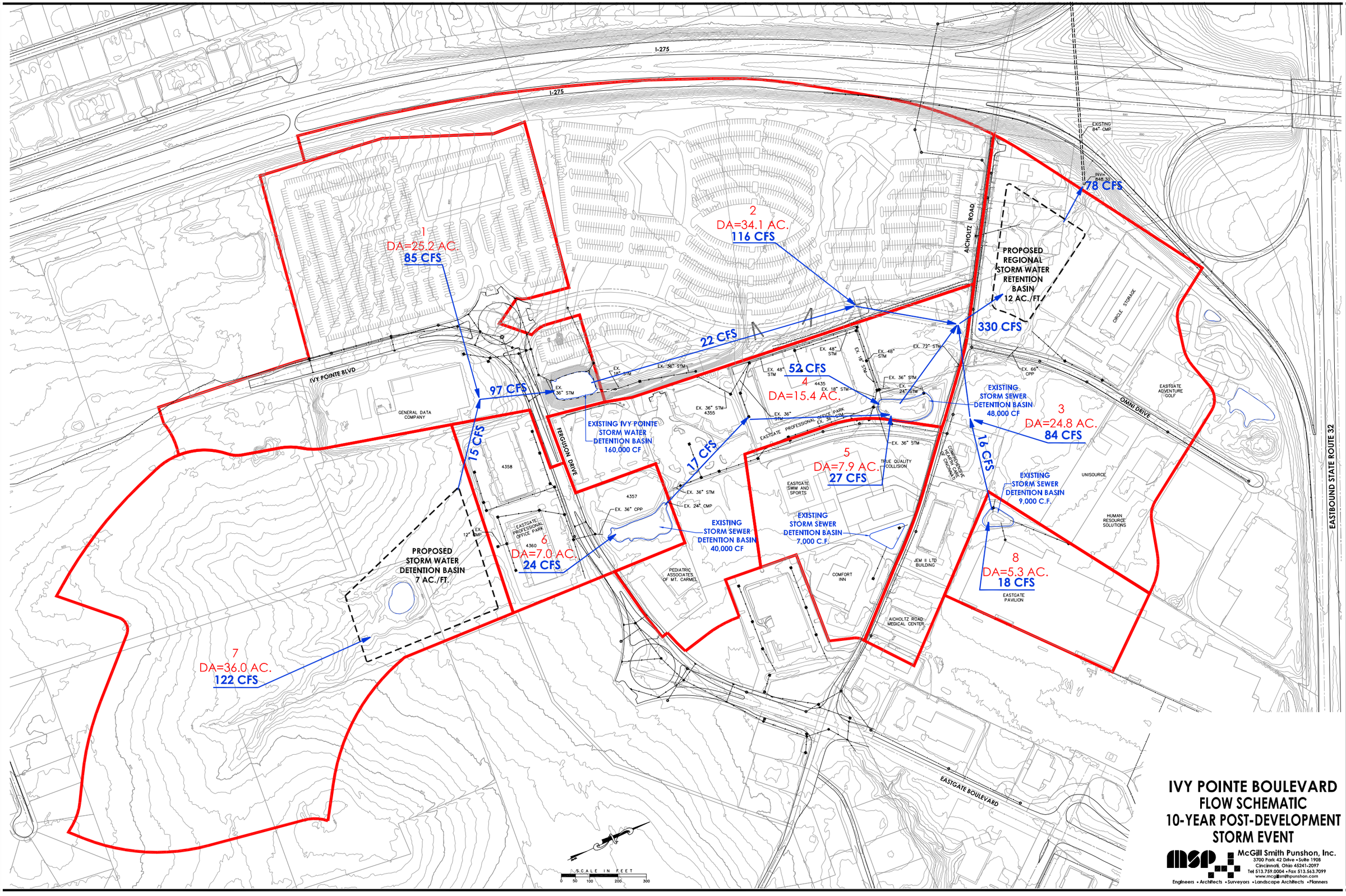
Top Elevation @ San Xing - Elevation 855.8 is estimated to be the lowest useable storm sewer elevation at the point of crossing a sanitary sewer in Aicholtz Road.

Otherwise, top elevations shown hereon are approximate roadway grades.



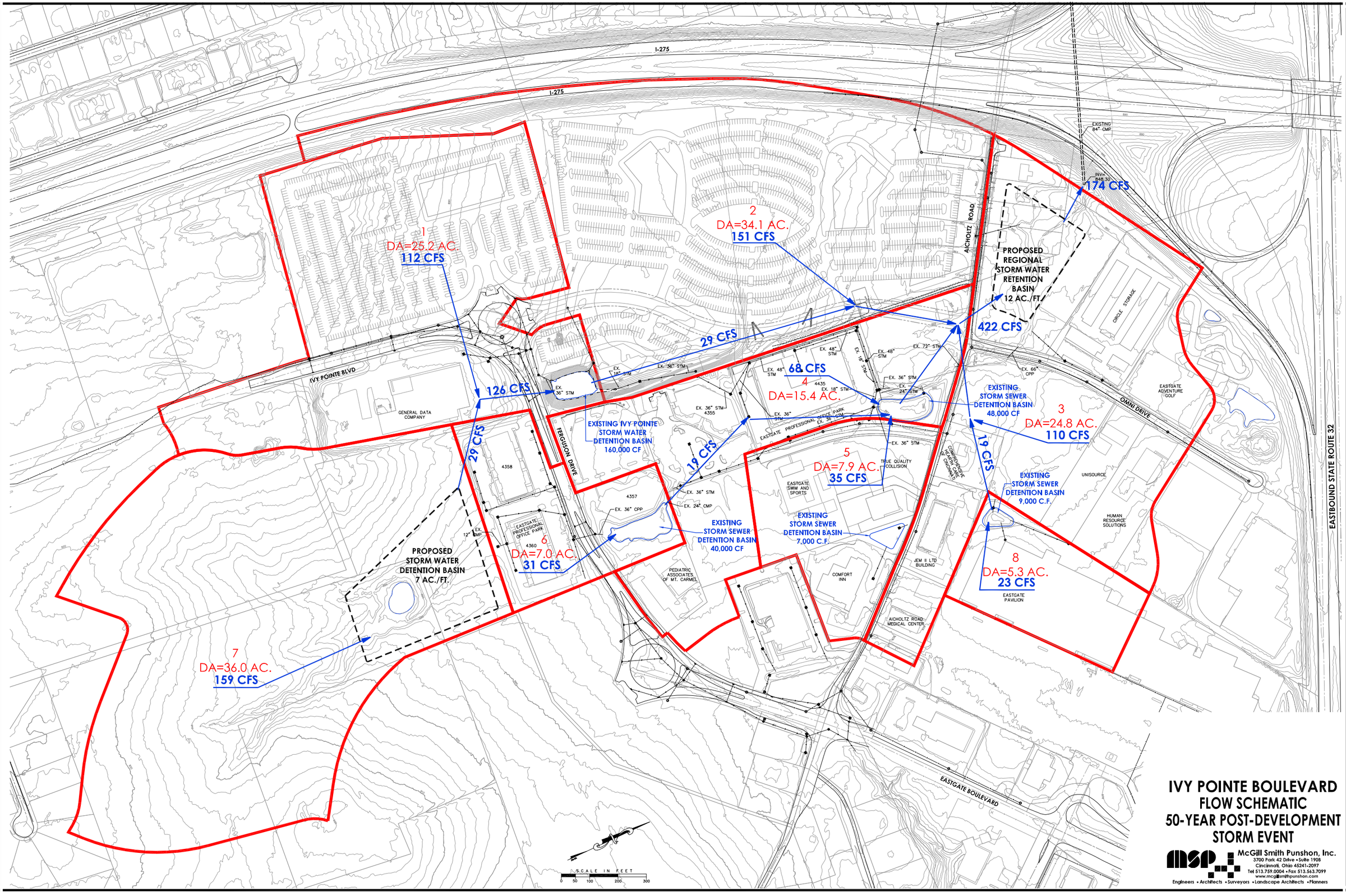
IVY POINTE BOULEVARD
REGIONAL BASIN
OUTLET WORKS
PRELIMINARY DESIGN

McGill Smith Punshon, Inc.
3700 Park 42 Drive • Suite 190B
Cincinnati, Ohio 45241-2097
Tel 513.759.0004 • Fax 513.563.7099
www.mcgillsmithpunshon.com
Engineers • Architects • Surveyors • Landscape Architects • Planners



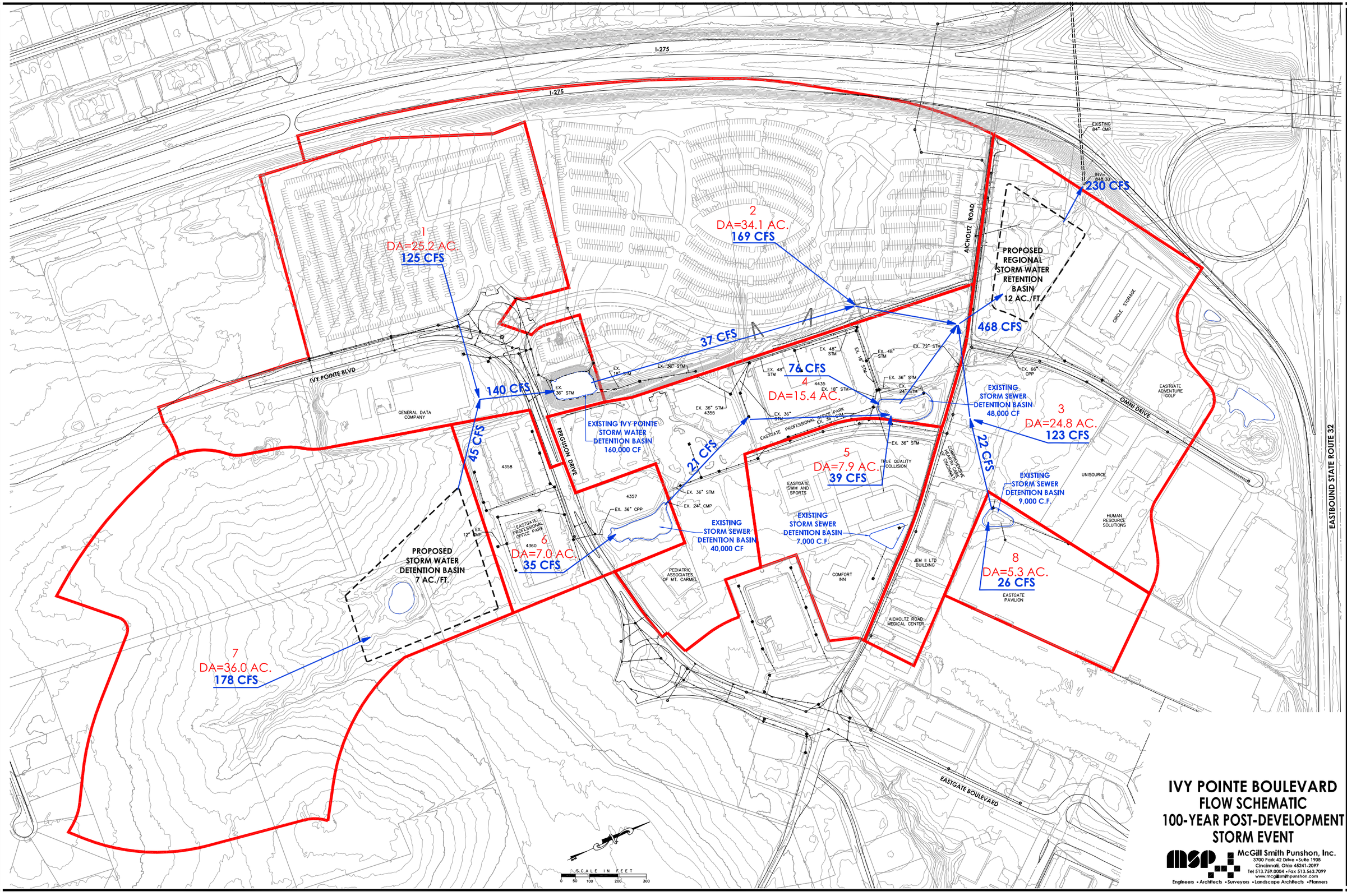
IVY POINTE BOULEVARD
FLOW SCHEMATIC
10-YEAR POST-DEVELOPMENT STORM EVENT

McGill Smith Punshon, Inc.
3700 Park 42 Drive • Suite 1908
Cincinnati, Ohio 45241-2097
Tel 513.759.0004 • Fax 513.563.7099
www.mcgillsmithpunshon.com
Engineers • Architects • Surveyors • Landscape Architects • Planners



IVY POINTE BOULEVARD
FLOW SCHEMATIC
50-YEAR POST-DEVELOPMENT STORM EVENT

McGill Smith Punshon, Inc.
3700 Park 42 Drive • Suite 1908
Cincinnati, Ohio 45241-2097
Tel 513.759.0004 • Fax 513.563.7099
www.mcgillsmithpunshon.com
Engineers • Architects • Surveyors • Landscape Architects • Planners



IVY POINTE BOULEVARD
FLOW SCHEMATIC
100-YEAR POST-DEVELOPMENT STORM EVENT

McGill Smith Punshon, Inc.
3700 Park 42 Drive • Suite 1908
Cincinnati, Ohio 45241-2097
Tel 513.759.0004 • Fax 513.563.7099
www.mcgillsmithpunshon.com
Engineers • Architects • Surveyors • Landscape Architects • Planners