

May 16th, 2022

City of Lansing, KS Community & Economic Development Department 800 First Terrace Lansing, KS 66043

Re: Stormwater Letter – Primus Dental

To Whom It May Concern:

We are submitting this letter on behalf of Primus Companies for the proposed development of a parcel of land located on 1st st Terrace in Lansing, KS. The purpose of this letter is to provide compliance with the city's storm water discharge criteria, and compliance with the previously approved stormwater Management Studies performed by GBA and EBH for the regional detention. This report follows the design requirements of the Lansing Design Criteria for Storm Drainage Facilities.

The following exhibits are attached for your reference:

- Exhibit A Existing Conditions
- Exhibit B Proposed Conditions
- Exhibit C Storm Water Calculations

Existing Drainage Conditions:

The existing site is approximately 1.26 acres of a temporarily undeveloped lot (See Exhibit A). The existing site topography generally slopes to the east, and runoff is directed into first terrace where it eventually is routed into the existing storm sewer along the street. An existing 36" RCP directs flow into our site from the west side of Hwy 7. There is no information for the flows from this existing pipe however there are no proposed modifications to the pipe, and it shall remain as is in the proposed conditions. The pre-developed site was assigned a "C" value of 0.65. The existing site drainage conditions are summarized in the table below. (See Exhibit C).

Drainage Area	Area	С	Tc	
-	(acres)		(min)	
On site	1.26	0.65	5	
Offsite	0.16	0.30	5	

Table 1 – Existing Conditions H	ydrologic Parameters
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Table 2 – Summary	of Existing	Onsite Flows
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Drainage Area	Q ₁₀ (cfs)	Q ₂₅ (cfs)	Q ₁₀₀ (cfs)
Outfall A	6.28	7.15	8.52

Proposed Conditions:

The proposed overall development of the site will be medical office use and contain a new building and associated parking and utilities. Future improvements include an additional building and parking. The proposed impervious area of the overall development, including future improvements, will be 0.72 acres, which is a 57% increase. This is in conformance with the previous report prepared by GBA, with an assumed increase area 0f 80% (C=0.80) for Heavy Industrial Areas. The proposed improvements will increase the impervious area on site, and therefore increase the runoff volumes as shown in Table 4 (*See Exhibit B*). The proposed site topography will mimic the existing site and direct water to the east where a portion of the site will flow into First Terrace, and another portion to be captured by storm inlet and routed to the existing storm sewer along First Terrace. The existing 36" RCP discharge will be routed overland by swale along the north property line and into a proposed area inlet and into the existing storm sewer. During larger storm events the area inlet will overflow into First Terrace. The proposed development was assigned a "C" value of 0.80 for Heavy Industrial, which is in conformance with the previously approved drainage reports prepared by GBA and EBH. The proposed site drainage conditions are summarized in the table below. (See Exhibit C).

Drainage Area	Area	С	Tc	
	(acres)		(min)	
On site	1.26	0.80	5	
Offsite	0.16	0.16	5	

Table 3 – Proposed Overall Conditions Hydrologic Parameters

	Drainage Area	Q ₁₀ (cfs)	Q ₂₅ (cfs)	Q ₁₀₀ (cfs)
	Outfall A	7.65	8.71	10.38

Table 4 – Summary of Proposed Onsite Flows

Stormwater Detention:

The proposed development detention is provided by an existing pond to the southeast of the development. The pond was designed to accommodate these proposed improvements. Per the conditions noted above for the assumed increase of impervious area, there are no recommendations to modify the existing detention pond.

Conclusions:

The proposed improvements shall be constructed in accordance with the City of Lansing's Engineering Design Criteria. The stormwater discharge from the proposed development will not exceed the design capacities of the adjacent public storm sewer systems or regional detention.

Based on the information provided herein, we request your approval of this storm drainage Letter. If you have any questions or comments or need additional information, please do not hesitate to call me at (515) 867-2755 or via e-mail at bfreeman@olsson.com.

Sincerely,

OLSSON ulla

Bradley Freeman, PE Project Engineer







EXHIBIT C Watershed Model Schematic



Legend

Hyd. Origin Description

1	Rational	Existing Site
2	Rational	Offsite
3	Rational	Proposed Site
4	Combine	Existing
5	Combine	Proposed

Project: Hydro.gpw

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Hydrograph Return Period Recap Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd.	Hydrograph	Hydrograph Inflow		Peak Outflow (cfs)						Hydrograph	
NO.	(origin)	nya(s)	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	Description
1	Rational						5.937	6.753		8.052	Existing Site
2	Rational						0.348	0.396		0.472	Offsite
3	Rational						7.307	8.311		9.910	Proposed Site
4	Combine	1, 2,					6.284	7.149		8.524	Existing
5	Combine	2, 3,					7.654	8.707		10.38	Proposed
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Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	5.937	1	5	1,781				Existing Site
2	Rational	0.348	1	5	104				Offsite
3	Rational	7.307	1	5	2,192				Proposed Site
4	Combine	6.284	1	5	1,885	1, 2,			Existing
5	Combine	7.654	1	5	2,296	2, 3,			Proposed
Hyc	lro.gpw				Return P	eriod: 10 Y	ear	Thursday, 0	5 / 12 / 2022

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 1

Existing Site

Hydrograph type	= Rational	Peak discharge	= 5.937 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 1,781 cuft
Drainage area	= 1.260 ac	Runoff coeff.	= 0.65
Intensity	= 7.249 in/hr	Tc by User	= 5.00 min
IDF Curve	= KCMO.IDF	Asc/Rec limb fact	= 1/1



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 2

Offsite

= Rational	Peak discharge	= 0.348 cfs
= 10 yrs	Time to peak	= 5 min
= 1 min	Hyd. volume	= 104 cuft
= 0.160 ac	Runoff coeff.	= 0.3
= 7.249 in/hr	Tc by User	= 5.00 min
= KCMO.IDF	Asc/Rec limb fact	= 1/1
	 Rational 10 yrs 1 min 0.160 ac 7.249 in/hr KCMO.IDF 	= RationalPeak discharge= 10 yrsTime to peak= 1 minHyd. volume= 0.160 acRunoff coeff.= 7.249 in/hrTc by User= KCMO.IDFAsc/Rec limb fact



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 3

Proposed Site

Hydrograph type	= Rational	Peak discharge	= 7.307 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 2,192 cuft
Drainage area	= 1.260 ac	Runoff coeff.	= 0.8
Intensity	= 7.249 in/hr	Tc by User	= 5.00 min
IDF Curve	= KCMO.IDF	Asc/Rec limb fact	= 1/1



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 4

Existing

Hydrograph type Storm frequency	= Combine = 10 yrs	Peak discharge Time to peak	= 6.284 cfs = 5 min
Time interval	= 1 min	Hyd. volume	= 1,885 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.420 ac



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 5

Proposed

Hydrograph type	= Combine	Peak discharge	= 7.654 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 2,296 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.420 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	6.753	1	5	2,026				Existing Site
2	Rational	0.396	1	5	119				Offsite
3	Rational	8.311	1	5	2,493				Proposed Site
4	Combine	7.149	1	5	2,145	1, 2,			Existing
5	Combine	8.707	1	5	2,612	2, 3,			Proposed
Hyc	lro.gpw				Return P	eriod: 25 Y	ear	Thursday, 0	5 / 12 / 2022

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 1

Existing Site

Hydrograph type	= Rational	Peak discharge	= 6.753 cfs
Storm frequency	= 25 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 2,026 cuft
Drainage area	= 1.260 ac	Runoff coeff.	= 0.65
Intensity	= 8.245 in/hr	Tc by User	= 5.00 min
IDF Curve	= KCMO.IDF	Asc/Rec limb fact	= 1/1



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 2

Offsite

Hydrograph type	= Rational	Peak discharge	= 0.396 cfs
Storm frequency	= 25 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 119 cuft
Drainage area	= 0.160 ac	Runoff coeff.	= 0.3
Intensity	= 8.245 in/hr	Tc by User	= 5.00 min
IDF Curve	= KCMO.IDF	Asc/Rec limb fact	= 1/1



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Thursday, 05 / 12 / 2022

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 3

Proposed Site

Hydrograph type	= Rational	Peak discharge	= 8.311 cfs
Storm frequency	= 25 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 2,493 cuft
Drainage area	= 1.260 ac	Runoff coeff.	= 0.8
Intensity	= 8.245 in/hr	Tc by User	= 5.00 min
IDF Curve	= KCMO.IDF	Asc/Rec limb fact	= 1/1



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 4

Existing

Hydrograph type Storm frequency	= Combine = 25 vrs	Peak discharge Time to peak	= 7.149 cfs = 5 min
Time interval	= 1 min	Hyd. volume	= 2,145 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.420 ac



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 5

Proposed

Hydrograph type Storm frequency	= Combine = 25 vrs	Peak discharge Time to peak	= 8.707 cfs = 5 min
Time interval	= 1 min	Hyd. volume	= 2,612 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.420 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	8.052	1	5	2,416				Existing Site
2	Rational	0.472	1	5	142				Offsite
3	Rational	9.910	1	5	2,973				Proposed Site
4	Combine	8.524	1	5	2,557	1, 2,			Existing
5	Combine	10.38	1	5	3,115	2, 3,			Proposed
Hydro.gpw			Return P	eriod: 100	Year	Thursday, 0	5 / 12 / 2022		

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 1

Existing Site

Hydrograph type	= Rational	Peak discharge	= 8.052 cfs
Storm frequency	= 100 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 2,416 cuft
Drainage area	= 1.260 ac	Runoff coeff.	= 0.65
Intensity	= 9.832 in/hr	Tc by User	= 5.00 min
IDF Curve	= KCMO.IDF	Asc/Rec limb fact	= 1/1



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Thursday, 05 / 12 / 2022

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 2

Offsite

Hydrograph type	= Rational	Peak discharge	= 0.472 cfs
Storm frequency	= 100 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 142 cuft
Drainage area	= 0.160 ac	Runoff coeff.	= 0.3
Intensity	= 9.832 in/hr	Tc by User	= 5.00 min
IDF Curve	= KCMO.IDF	Asc/Rec limb fact	= 1/1



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 3

Proposed Site

Hydrograph type	= Rational	Peak discharge	= 9.910 cfs
Storm frequency	= 100 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 2,973 cuft
Drainage area	= 1.260 ac	Runoff coeff.	= 0.8
Intensity	= 9.832 in/hr	Tc by User	= 5.00 min
IDF Curve	= KCMO.IDF	Asc/Rec limb fact	= 1/1



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 4

Existing

Hydrograph type Storm frequency	= Combine = 100 vrs	Peak discharge Time to peak	= 8.524 cfs = 5 min
Time interval	= 1 min	Hyd. volume	= 2,557 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.420 ac



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No. 5

Proposed

Hydrograph type Storm frequency Time interval	= Combine = 100 yrs = 1 min	Peak discharge Time to peak	= 10.38 cfs = 5 min = 3 115 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.420 ac



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Return Period	Intensity-Duration-Frequency Equation Coefficients (FHA)								
(Yrs)	В	D	E	(N/A)					
1	47.7559	11.1000	0.8294						
2	71.8477	13.3000	0.8718						
3	0.0000	0.0000	0.0000						
5	75.7517	14.2000	0.8271						
10	86.7192	15.3000	0.8244						
25	103.3028	16.6000	0.8227						
50	116.5747	17.3000	0.8234						
100	124.5734	17.6000	0.8144						

File name: KCMO.IDF

Intensity = B / (Tc + D)^E

				Intens	ity Values	(in/hr)									
5 min	10	15	20	25	30	35	40	45	50	55	60				
4.76	3.81	3.19	2.76	2.44	2.19	1.99	1.83	1.69	1.58	1.48	1.39				
5.70	4.62	3.90	3.38	2.99	2.69	2.45	2.24	2.08	1.93	1.81	1.70				
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
6.58	5.43	4.65	4.08	3.64	3.30	3.02	2.79	2.59	2.42	2.28	2.15				
7.25	6.05	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46				
8.25	6.95	6.03	5.34	4.81	4.38	4.03	3.73	3.48	3.26	3.08	2.91				
9.05	7.66	6.67	5.92	5.34	4.87	4.48	4.16	3.88	3.64	3.43	3.25				
9.83	8.35	7.30	6.49	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60				
	5 min 4.76 5.70 0.00 6.58 7.25 8.25 9.05 9.83	5 min 10 4.76 3.81 5.70 4.62 0.00 0.00 6.58 5.43 7.25 6.05 8.25 6.95 9.05 7.66 9.83 8.35	5 min 10 15 4.76 3.81 3.19 5.70 4.62 3.90 0.00 0.00 0.00 6.58 5.43 4.65 7.25 6.05 5.21 8.25 6.95 6.03 9.05 7.66 6.67 9.83 8.35 7.30	5 min 10 15 20 4.76 3.81 3.19 2.76 5.70 4.62 3.90 3.38 0.00 0.00 0.00 0.00 6.58 5.43 4.65 4.08 7.25 6.05 5.21 4.59 8.25 6.95 6.03 5.34 9.05 7.66 6.67 5.92 9.83 8.35 7.30 6.49	Intens 5 min 10 15 20 25 4.76 3.81 3.19 2.76 2.44 5.70 4.62 3.90 3.38 2.99 0.00 0.00 0.00 0.00 0.00 6.58 5.43 4.65 4.08 3.64 7.25 6.05 5.21 4.59 4.12 8.25 6.95 6.03 5.34 4.81 9.05 7.66 6.67 5.92 5.34 9.83 8.35 7.30 6.49 5.87	Intensity Values 5 min 10 15 20 25 30 4.76 3.81 3.19 2.76 2.44 2.19 5.70 4.62 3.90 3.38 2.99 2.69 0.00 0.00 0.00 0.00 0.00 0.00 6.58 5.43 4.65 4.08 3.64 3.30 7.25 6.05 5.21 4.59 4.12 3.74 8.25 6.95 6.03 5.34 4.81 4.38 9.05 7.66 6.67 5.92 5.34 4.87 9.83 8.35 7.30 6.49 5.87 5.36	Intensity Values (in/hr) 5 min 10 15 20 25 30 35 4.76 3.81 3.19 2.76 2.44 2.19 1.99 5.70 4.62 3.90 3.38 2.99 2.69 2.45 0.00 0.00 0.00 0.00 0.00 0.00 0.00 6.58 5.43 4.65 4.08 3.64 3.30 3.02 7.25 6.05 5.21 4.59 4.12 3.74 3.43 8.25 6.95 6.03 5.34 4.81 4.38 4.03 9.05 7.66 6.67 5.92 5.34 4.87 4.48 9.83 8.35 7.30 6.49 5.87 5.36 4.94	Intensity Values (in/hr) 5 min 10 15 20 25 30 35 40 4.76 3.81 3.19 2.76 2.44 2.19 1.99 1.83 5.70 4.62 3.90 3.38 2.99 2.69 2.45 2.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 6.58 5.43 4.65 4.08 3.64 3.30 3.02 2.79 7.25 6.05 5.21 4.59 4.12 3.74 3.43 3.17 8.25 6.95 6.03 5.34 4.81 4.38 4.03 3.73 9.05 7.66 6.67 5.92 5.34 4.87 4.48 4.16 9.83 8.35 7.30 6.49 5.87 5.36 4.94 4.59	Intensity Values (in/hr) 5 min 10 15 20 25 30 35 40 45 4.76 3.81 3.19 2.76 2.44 2.19 1.99 1.83 1.69 5.70 4.62 3.90 3.38 2.99 2.69 2.45 2.24 2.08 0.00 1.69	Intensity Values (in/hr) 5 min 10 15 20 25 30 35 40 45 50 4.76 3.81 3.19 2.76 2.44 2.19 1.99 1.83 1.69 1.58 5.70 4.62 3.90 3.38 2.99 2.69 2.45 2.24 2.08 1.93 0.00 2.79 2.59 2.42 7.25 6.05 5.21 4.59 4.12 3.74 3.43 3.17 <td< td=""><td>Intensity Values (in/hr) 5 min 10 15 20 25 30 35 40 45 50 55 4.76 3.81 3.19 2.76 2.44 2.19 1.99 1.83 1.69 1.58 1.48 5.70 4.62 3.90 3.38 2.99 2.69 2.45 2.24 2.08 1.93 1.81 0.00 <t< td=""></t<></td></td<>	Intensity Values (in/hr) 5 min 10 15 20 25 30 35 40 45 50 55 4.76 3.81 3.19 2.76 2.44 2.19 1.99 1.83 1.69 1.58 1.48 5.70 4.62 3.90 3.38 2.99 2.69 2.45 2.24 2.08 1.93 1.81 0.00 <t< td=""></t<>				

Tc = time in minutes. Values may exceed 60.

	Rainfall Precipitation Table (in)							
Storm Distribution	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	3.00	3.60	0.00	4.60	5.40	6.30	7.00	7.90
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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