



- Community Planning & Development
- Landscape Architecture
- Civil Engineering
- Surveying
- Construction Services
- Information Technology Services

Peridian Group, Inc.

**RECEIVED**

**APR 15 2004**

**CITY MANAGERS OFFICE  
LAWRENCE, KS**

April 14, 2004

Mr. Dave Corliss  
Assistant City Manager  
P.O. Box 708  
Lawrence, KS 66044

RE: East Lawrence Expansion and PS-25 Capacity

Dear Dave,

As a follow-up to our meeting with City staff and Black & Veatch on March 16<sup>th</sup>, I have sent you this letter along with a memorandum summarizing our analysis we performed as result of that meeting. As directed, we developed an anticipated schedule for development of the area East of O'Connell Road and North of 31<sup>st</sup> Street. In addition, we analyzed the sewer capacity at East Hills PS-25 both now and as the area develops, and looked at when improvements will be needed for PS-25.

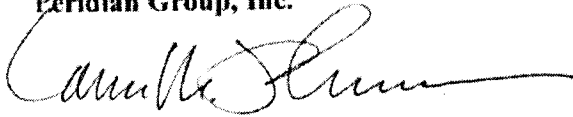
We arrived at the following conclusions based upon our anticipated schedule of development of the area (see attached schedule):

- (1) Today, there is existing capacity at the East Hills PS-25.
- (2) Development of the area East of O'Connell Road and North of 31<sup>st</sup> Street could proceed forward at this time without needing improvements to PS-25 until mid 2007.
- (3) Once the improvements (an upgrade to 4.6 mgd) are made to PS-25, development could proceed through the year 2009.
- (4) In 2010 or 2011 depending upon rate of growth at that time, additional study should be performed to determine if capacity exists in PS-25 for growth to continue until the Wakarusa WWTP is operational.
- (5) After the Wakarusa WWTP is operational, sewer flow from the area South of K-10 can be pumped to the new WTP, therefore opening up capacity at the East Hills PS-25 to handle growth of the area North of K-10 through 2025.

Please forward this letter along with the attached information for review to the appropriate City staff, and Black & Veatch representatives. Would you like to schedule a meeting to discuss this information prior to the May 5<sup>th</sup> Study session, or discuss at that time? If possible, I'd like to know if there are any questions by City staff, Black & Veatch and/or if they are in general concurrence with what we have presented prior to the study session.

If you have any questions please contact me at (785) 838-3338.

Sincerely,  
**Peridian Group, Inc.**

A handwritten signature in black ink, appearing to read "Lance M. Johnson", written over a horizontal line.

Lance M. Johnson, P.E.  
President

Attachments

Cc: File



**2009**

Farmland NE Multi-Family Tract Area	13.4	Acres
Kitsmiller North PRD-1 Units	90	Units
PDO Investors Single-Family Area	12	Acres
Doores Addition Area	5	Acres

**2010**

Kitsmiller North PRD-1 Units	47	Units
PDO Investors Single-Family Area	13	Acres

**2011**

Kitsmiller North PRD-1 Units	47	Units
Queen Commercial Area	8	Acres
Industrial Area E. of Franklin Road	10	Acres

# Memo

**To:** Chuck Adcock, City of Lawrence  
**From:** Curtis R. Talcott, P.E.  
**CC:** Dave Wagner, Terese Gorman, Sandra Day, Jim Stuit, Dave Corliss, Mike Wildgen, Lance Johnson  
**Date:** April 14, 2004  
**Re:** East Lawrence Expansion and PS-25 Capacity

---

On March 16, 2004, Peridian Group met with City staff and representatives from Black & Veatch (B&V) to discuss progress on the formation of a benefit district for sanitary sewers in east Lawrence. During the meeting a technical memorandum from B&V, dated February 14, 2004, was discussed in regards to projected wastewater flows for expansion in east Lawrence. B&V stated in the memo that projected flows, provided by Peridian Group and checked by B&V, would exceed the capacity of the Kansas River Treatment Plant. The capacity of the pump station in East Hill Business Park (PS-25) was also discussed with regard to future flows from south of K-10 highway. B&V recommended that flows from south of K-10 be pumped to the proposed Wakarusa River Treatment Plant following its construction in 2011. This would keep the capacity of the Kansas River Treatment Plant from being exceeded and reduce the amount of capacity upgrade required for PS-25 from 4.0 mgd to 2.6 mgd. The City requested that Peridian Group project expected growth in east Lawrence through the year 2011, then calculate the resulting wastewater flows. The City also requested that the capacity of PS-25 be analyzed with regards to the projected flows.

Attached is a spreadsheet showing wastewater calculations for projected expansion in East Lawrence through 2011, in response to our meeting on March 16, 2004. Wastewater calculations were performed using the same methodology used by B&V in the City's Wastewater Master Plan. Population equivalents were calculated for each proposed area of expansion. An average daily flow (ADF) was then calculated using 120 gal/day per capita. Infiltration was calculated using a rate of 500 gal/acre/day for residential areas and 200 gal/acre/day for commercial/industrial areas. Inflow was calculated using a "K" of 0.0050 for residential areas and 0.0030 for commercial/industrial areas. Intensities for inflow were taken, based on area, from the design curve for Section 9 provided to Peridian Group by the City. Peak flow was then calculated by adding infiltration and inflow to the ADF. The peak factor was then calculated to verify a factor greater than 3.

The following are cumulative peak flows to EL2PS-1 for projected growth as outlined on the attached spreadsheet.

Year	Peak Flow (MGD)	Population	Acres Developed
2005	0.119	135	12.9
2006	1.076	1182	115.3
2007	2.101	2710	220.8
2008	2.787	3191	315.3
2009	3.202	3507	362.2
2010	3.378	3666	383.8
2011	3.529	3783	410.4

Based on information in the 2003 Master Plan, the existing lift station in East Hills Business Park (PS-25) has a capacity of 1.95 mgd. Information provided to Peridian Group by the Utilities Department indicated that the average run time for the pumps was 52 hours a month for the last nine months (See attached email). The pumps have two speed motors. At low speed the pumps have a capacity of 340 gal/min and at high speed 675 gal/min. The pumps are currently (and have been) running in the low mode. The 1.95 mgd capacity for the lift station in the 2003 Master Plan equates to two pumps running at high speed. However, Utilities Department staff has told Peridian Group that PS-25 only has two pumps. If this is the case then the capacity of PS-25 is only 0.97 mgd. Therefore, ADF for PS-25 was calculated using one pump at low speed. One pump running a low speed for an average of 52 hours a month equates to an ADF of 0.04 mgd (See attached calculations). Using a peak factor of 6.25 this calculates to a peak flow of 0.25 MGD. Peak flows from the East Hill Business Park are expected to be 1.6 mgd by 2010 according to the 2003 Master Plan. The following table shows flows to PS-25 for years 2005 to 2011.

Year	East Lawrence		Total Peak Flow (MGD)
	EHBP Peak Flow (MGD)	Peak Flow (MGD)	
2005	0.25	0.12	0.37
2006	0.52	1.08	1.60
2007	0.79	2.10	2.89
2008	1.06	2.79	3.85
2009	1.33	3.20	4.53
2010	1.60	3.38	4.98
2011	1.64	3.53	5.17

A 4.0 MGD upgrade for PS-25 was projected for the year 2010 in the 2003 Master Plan. With projected flows, south of K-10, recommended to be pumped to the Wakarusa Treatment Plant after 2011, an upgrade of 2.65 mgd is recommended to handle future flows through 2025 for EHBP and Farmland north of K-10, according to the technical memorandum dated February 14, 2004 from B&V. This upgrade would bring the capacity of PS-25 to 4.6 mgd.

### **Conclusions**

The existing peak flow for PS-25 was calculated as 0.25 mgd. This leaves 1.70 mgd of existing capacity available. The table above shows that growth for 2005 and 2006 could be handled with the existing capacity of PS-25. By mid 2007, Peridian Group recommends the projected upgrade to PS-25 from 1.95 mgd to 4.6 mgd. An upgrade in capacity to 4.6 mgd, as recommended by B&V, would handle projected flows through 2009. If growth occurs as projected through 2009, then flows would have to be analyzed before development projected for years 2010 and 2011 could occur, prior to the opening of the Wakarusa WWTP.

Note: The projected flow of 1.60 mgd for EHBP in 2010, provided by B&V seems high based on the current peak of 0.25 mgd calculated from pump run times for the previous nine months. Also, current pump stations PS-34 and PS-38 would be removed with the construction of EL2PS-1. This would provide some additional capacity at the Kansas River WWTP following connection of EL2PS-1 to the Wakarusa River WWTP. Further investigation will need to be made into the capacity of PS-25 based on differing information contained in the 2003 Master Plan and that provided by Utilities Department staff.

Projected Wastewater Flows to EL2PS-1

	units and/or acreage	capita/ unit	units/ acre	units	avg. flow g/p/d	ADF (MGD)	Infilt. (gpd)	Inflow (MGD)	Area (Ac.)	Peak Flow (MGD)	Peak Factor	Popul.	Popul. Equiv.	Comm. Ac.	Resid. Ac.	Cumm. Ac.	Intensity (in/hr)
2005																	
Farmland NW Single-Family Units	14	3.20			120	0.005	1750	0.029	3.50	0.037	6.79	45	45		3.50		2.6
Farmland NW Duplex Units	30	3.00			120	0.011	2585	0.043	5.17	0.057	5.26	90	90		5.17		2.6
Farmland NW Commercial area	4.23	6.00			120	0.003	846	0.021	4.23	0.025	6.28		25	4.23			2.6
Total:						0.019	5181	0.094	12.90	0.119	6.17	135	160	4.23	8.67	12.90	2.6
2006																	
Farmland NE Single-Family Units	125	3.20			120	0.048	11205	0.188	22.41	0.247	5.16	400	400		22.41		2.6
Farmland NE Duplex Units	100	3.00			120	0.036	11935	0.201	23.87	0.248	6.90	300	300		23.87		2.6
Farmland NE Commercial area	23	6.00			120	0.017	4600	0.116	23.00	0.137	8.28		138	23.00			2.5
Kitsmiller North PRD-1 Units	80	2.50			120	0.024	6870	0.115	13.74	0.146	6.10	200	200		13.74		2.6
Kitsmiller South Single-Family Units	46	3.20			120	0.018	9675	0.163	19.35	0.190	10.75	147	147		19.35		2.6
Total:						0.161	49466	0.866	115.27	1.076	6.67	1182	1345	27.23	88.04	115.27	2.57
2007																	
Farmland NE Duplex Units	100	3.00			120	0.036	11935	0.201	23.87	0.248	6.90	300	300		23.87		2.6
Farmland Multi-Family Tract Units	232	2.50			120	0.070	7755	0.130	15.51	0.208	2.98	580	580		15.51		2.6
Kitsmiller North PRD-1 Units	90	2.50			120	0.027	8230	0.138	16.46	0.174	6.43	225	225		16.46		2.6
Kitsmiller South Single-Family Units	56	3.20			120	0.022	11780	0.198	23.56	0.231	10.75	179	179		23.56		2.6
Kitsmiller South Duplex Units	62	3.00			120	0.022	4075	0.068	8.15	0.095	4.25	186	186		8.15		2.6
Going South, LLC area	5	3.20	4.00	17	120	0.006	2500	0.042	5.00	0.051	7.98	16	16		5.00		2.6
PDO Investors Single-Family area	13	3.20	4.00	43	120	0.017	6500	0.109	13.00	0.132	7.98	42	42		13.00		2.6
Total:						0.361	102241	1.638	220.82	2.101	5.82	2710	2873	27.23	193.59	220.82	2.41
2008																	
Farmland NE M-1 Commercial	16.59	6.00			120	0.012	3318	0.084	16.59	0.099	8.28		100	16.59			2.6
Farmland NE M-1 Industrial	14.57	10.00			120	0.017	2914	0.073	14.57	0.094	5.37		146	14.57			2.6
Kitsmiller North PRD-1 Units	90	2.50			120	0.027	8230	0.138	16.46	0.174	6.43	225	225		16.46		2.6
Kitsmiller South Single-Family Units	59	3.20			120	0.023	12410	0.209	24.82	0.244	10.75	189	189		24.82		2.6
Going South, LLC area	5	3.20	4.00	17	120	0.006	2500	0.042	5.00	0.051	7.98	16	16		5.00		2.5
PDO Investors Single-Family area	12	3.20	4.00	40	120	0.015	6000	0.101	12.00	0.122	7.98	38	38		12.00		2.6
Doores Addition area	5	3.20	4.00	17	120	0.006	2500	0.042	5.00	0.051	7.98	16	16		5.00		2.6
Total:						0.468	140113	2.179	315.26	2.787	5.96	3194	3603	58.39	256.87	315.26	2.31
2009																	
Farmland NE Multi-Family Tract area	13.43	2.50	10.00	134	120	0.040	6715	0.113	13.43	0.160	3.97	34	34		13.43		2.6
Kitsmiller North PRD-1 Units	90	2.50			120	0.027	8230	0.138	16.46	0.174	6.43	225	225		16.46		2.6
PDO Investors Single-Family area	12	3.20	4.00	40	120	0.015	6000	0.101	12.00	0.122	7.98	38	38		12.00		2.6
Doores Addition area	5	3.20	4.00	17	120	0.006	2500	0.042	5.00	0.051	7.98	16	16		5.00		2.6
Total:						0.557	163558	2.481	362.15	3.202	5.75	3507	3916	58.39	303.76	362.15	2.27
2010																	
Kitsmiller North PRD-1 Units	47	2.50			120	0.014	4300	0.072	8.60	0.091	6.43	118	118		8.60		2.6
PDO Investors Single-Family area	13	3.20	4.00	43	120	0.017	6500	0.109	13.00	0.132	7.98	42	42		13.00		2.6
Total:						0.588	174358	2.617	383.75	3.378	5.75	3666	4075	58.39	325.36	383.75	2.25

2011

Kitsmiller North PRD-1 Units	47	2.50	120	0.014	4300	0.072	8.60	0.091	6.43	118	118	8.00	2.6
Queen Commercial area	8	6.00	120	0.008	1600	0.040	8.00	0.048	8.28		48	8.00	2.6
Industrial area E. of Franklin Rd	10	10.00	120	0.012	2000	0.050	10.00	0.064	5.37		100	10.00	2.6
<b>Total</b>				<b>0.619</b>	<b>182258</b>	<b>2.727</b>	410.35	<b>3.529</b>	5.70	3784	4340	76.39	333.96
							410.35					410.35	2.22

- (1) Assumes 17% ROW in Residential Areas
- (2) Avg. Daily flow of 120 g/d/cap
- (3) Infiltration Residential = 500 gpad  
Industrial/Commercial = 200 gpad
- (4) Inflow Coeff. "K" Residential = 0.0050  
Industrial/Commercial = 0.0030

**Curt Talcott**

---

**From:** Chuck Adcock [cadcock@ci.lawrence.ks.us]  
**Sent:** Monday, March 22, 2004 4:24 PM  
**To:** 'ctalcott@peridiangroup.com'  
**Cc:** Jim Stuit; Dave Wagner  
**Subject:** EHBP PS#25

Curt,

Per our recent meeting I want to give you some flow info for the EHBP (PS#25).

Over a 9 month average in 2003 we saw total pump hours of 52 hours per month.

The pumps/motors are two speed and are currently (and have been) running in the low mode. 340 gpm @ 62'

They will automatically switch to the higher mode, when needed. That is 675 gpm @ 132'.

Please call with any questions.

CA

4/13/2004

## Flow Information for EHBP PS#25

340 gpm*60 min/hr =	20400 gal/hr
20400 gal/hr*52 hr/mo =	1060800 gal/mo
1060800 gal/mo/30d/mo =	35360 gal/d
35360 gal/d/1000000 gal =	<b>0.0354 MGD</b>

340 gpm*1440 min/d =	489600 gal/d
489600 gal/d/1000000 gal =	<b>0.4896 MGD</b>

675 gpm*60 min/hr =	40500 gal/hr
40500 gal/hr*52 hr/mo =	2106000 gal/mo
2106000 gal/mo/30d/mo =	70200 gal/d
70200 gal/d/1000000 gal =	<b>0.0702 MGD</b>

675 gpm*1440 min/d =	972000 gal/d
972000 gal/d/1000000 gal =	<b>0.9720 MGD</b>

# Memo

**To:** Lance Johnson  
**From:** Bill Newsome  
**Date:** March 17, 2004  
**Re:** Delivery numbers for sewer work

Here's when we see the various improvements in our development being delivered:

<u>Year</u>	<u>Description</u>
2005	Farmland NW: all lots that go to sanitary sewer benefit district two office lots
2006	Farmland NE: 125 single-family lots 100 duplex units (50 lots) 100% of commercial
2007	Farmland NW: multi-family tract Farmland NE: 100 duplex units (50 lots)
2008	Farmland NE: M-1 tract
2009	Farmland NE: Multi-family tract

Is it reasonable to get something to the City during the week of March 29?

Let me know if you have questions.

Cc: Doug Compton