



## Letter of Transmittal

Attn: Bill Jeffers  
Re: Metro Centre East – Section 9

Date: 1-21-05  
Job No: 6077-4H

*If enclosures are not as noted, please notify us at once. Thank you!*

To: Vanderburgh County Surveyors Office  
Room 325 – Civic Center Complex  
Evansville, IN 47708

### We are sending you by:

☒ Messenger ☐ US Mail ☐ US Mail, Certified ☐ For Pick Up ☐ Overnight Service ☐ Email

### We are sending:

☐ Shop Drawings ☐ Prints ☐ Specifications ☐ Report ☐ Copy of Letter ☐ Other

Copies	Doc. Date	Description
3	1/05	Final Drainage Report Revisions
3	1/05	Sheets: Infrastructure Plan
3	1/05	Primary Plat

### These are Transmitted as Checked Below:

☐ For Approval ☐ Approved as Submitted ☐ Resubmit ☐ Copies for Approval  
☐ For Your Use ☐ Approved as Noted ☐ Submit ☐ Copies for Distribution  
☐ As Requested ☐ Returned for Corrections ☐ Return ☐ Corrected Copies  
☐ For Review & Comment ☐ Other

### Remarks:

Attached are revisions to the Final Drainage Report, Infrastructure Plan, and Primary Plat for Metro Centre East Section 9. We found an error in the Form 800 spreadsheet that resulted in an undersized retention basin. We have corrected the error and re-sized the basin the correct volume. We also have revised the Plat and Infrastructure Plan per your comments. If you have any questions, please give us a call. Thank you.

RECEIVED BY THE  
VANDERBURGH COUNTY  
SURVEYOR'S OFFICE

1/24/05 10:25 AM  
JH

Copies To:  
SPURLING PROPERTIES  
FILE

Signed:

Matthew D. Wallace, P.E., Project Engineer

J:\6077\Civil\Drainage\6077Final Drainage Revisions LOT.doc

**VANDERBURGH COUNTY DRAINAGE BOARD  
FORM 800**

PROJECT: 6077-4(H) DETENTION FACILITY DESIGN RETURN PERIOD: 25 YRS

DESIGNER: Morley and Assoc. RELEASE RATE RETURN PERIOD: 10 YRS

WATERSHED AREA	8.22	ACRES
TIME OF CONCENTRATION (UNDEVELOPED WATERSHED):	34.01	MINUTES
RAINFALL INTENSITY (Iu):	3.04	INCHES/HR
UNDEVELOPED RUNOFF COEFFICIENT (Cu):	0.21	
UNDEVELOPED RUNOFF RATE (Q = Cu*Iu*A):	5.09	CFS
DEVELOPED RUNOFF COEFFICIENT (Cd):	0.75	
UNDETAINED RUNOFF RATE	1.08	CFS
PIPE OUTFLOW	4.78	CFS

STORM DURATION Td (HRS)	RAINFALL INTENSITY Id 25-Year (INCH/HR)	INFLOW RATE I (Td) (Cd*Id*A) (CFS)	OUTFLOW RATE Q (Cu*Iu*A) (CFS)	STORAGE RATE I (Td) - Q (CFS)	REQUIRED STORAGE (I (Td) - Q) *Td/12 (ACRE.FT)
0.08	7.208	44.44	4.78	39.66	0.28
0.17	5.925	36.53	4.78	31.75	0.44
0.25	5.033	31.03	4.78	26.25	0.55
0.33	4.571	28.18	4.78	23.40	0.65
0.42	4.108	25.33	4.78	20.55	0.71
0.50	3.646	22.48	4.78	17.70	0.74
0.58	3.385	20.87	4.78	16.09	0.78
0.67	3.123	19.26	4.78	14.48	0.80
0.75	2.862	17.64	4.78	12.86	0.80
0.83	2.601	16.03	4.78	11.25	0.78
0.92	2.339	14.42	4.78	9.64	0.74
1.00	2.078	12.81	4.78	8.03	0.67
1.25	1.909	11.77	4.78	6.99	0.73
1.50	1.739	10.72	4.78	5.94	0.74
1.75	1.570	9.68	4.78	4.90	0.71
2.00	1.400	8.63	4.78	3.85	0.64
2.50	1.210	7.46	4.78	2.68	0.56
3.00	1.019	6.28	4.78	1.50	0.38
4.00	0.836	5.15	4.78	0.37	0.12

PEAK STORAGE (ACRE.FT):	0.80
PEAK STORAGE (CUBIC FT):	35,030

Stage (ft)	Area	Volume	Cum Vol. (c.f.)
0	9,140	0	0
1	10,748	9,944	9,944
2	12,456	11,602	21,545
3	14,264	13,360	34,905
4	16,173	15,219	50,124

Total Available Storage (ac.ft.)	1.15
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% Peak Storage / Available Storage 69.9%

<b>VANDERBURGH COUNTY DRAINAGE BOARD</b> <b>FORM 800</b>					
PROJECT: <b>6077-4 (H)</b>		DETENTION FACILITY DESIGN RETURN PERIOD: 100 YRS			
DESIGNER: Morley and Assoc.		RELEASE RATE RETURN PERIOD: 10 YRS			
<div style="display: flex; justify-content: space-between;"> <div> WATERSHED AREA  TIME OF CONCENTRATION (UNDEVELOPED WATERSHED):  RAINFALL INTENSITY (Iu):  UNDEVELOPED RUNOFF COEFFICIENT (Cu):  UNDEVELOPED RUNOFF RATE (Q = Cu*Iu*A):  DEVELOPED RUNOFF COEFFICIENT (Cd):  UNDETAINED RUNOFF RATE  PIPE OUTFLOW </div> <div style="text-align: right;"> 8.22 34.01 3.04 0.21 5.09 0.75 1.27 4.78 </div> <div style="text-align: right;"> ACRES MINUTES INCHES/HR CFS CFS CFS </div> </div>					
STORM DURATION Td (HRS)	RAINFALL INTENSITY Id 100-Year (INCH/HR)	INFLOW RATE I (Td) (Cd*Id*A) (CFS)	OUTFLOW RATE Q (Cu*Iu*A) (CFS)	STORAGE RATE I (Td) - Q (CFS)	REQUIRED STORAGE (I (Td) - Q) *Td/12 (ACRE.FT)
0.08	8.469	52.21	4.78	47.43	0.33
0.17	7.126	43.93	4.78	39.15	0.54
0.25	6.194	38.19	4.78	33.41	0.70
0.33	5.665	34.93	4.78	30.15	0.84
0.42	5.137	31.67	4.78	26.89	0.93
0.50	4.608	28.41	4.78	23.63	0.98
0.58	4.284	26.41	4.78	21.63	1.05
0.67	3.960	24.41	4.78	19.63	1.09
0.75	3.636	22.41	4.78	17.63	1.10
0.83	3.311	20.41	4.78	15.63	1.09
0.92	2.987	18.42	4.78	13.64	1.04
1.00	2.663	16.42	4.78	11.64	0.97
1.25	2.444	15.06	4.78	10.28	1.07
1.50	2.224	13.71	4.78	8.93	1.12
1.75	2.005	12.36	4.78	7.58	1.11
2.00	1.785	11.00	4.78	6.22	1.04
2.50	1.538	9.48	4.78	4.70	0.98
3.00	1.291	7.96	4.78	3.18	0.79
4.00	1.062	6.55	4.78	1.77	0.59
<div style="border: 1px solid black; display: inline-block; padding: 5px; margin-top: 10px;"> PEAK STORAGE (ACRE.FT): 1.12  PEAK STORAGE (CUBIC FT): 48,629 </div>					

Stage (ft)	Area	Volume	Cum Vol. (c.f.)
0	9,140	0	0
1	10,748	9,944	9,944
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Total Available Storage (ac.ft.)	1.15
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% Peak Storage / Available Storage      97.0%

system is designed for pre-cast concrete structures, with pipe material of either reinforced concrete pipe (RCP) or double wall, smooth interior high-density polyethylene pipe (HDPE).

The majority of the runoff generated on the site will be conveyed to the detention basin. Storm water from sub-basins 13, 17 and 18 will be allowed to drain off undetained. The lots were assumed to have approximately 75% impervious coverage. This yielded a developed runoff coefficient of 0.75. Calculations were done using the standard Form 800, and the required storage was determined to be 0.80 acre-feet. The proposed basin has an available volume of approximately 1.15 acre-feet. The proposed basin is designed to have a wet bottom and have approximately 4 feet of storage. The release rate was determined by taking the predeveloped peak discharge rate for the site for the 10 year event and adding it to the peak discharge rate for the 25 year event for the offsite area and then subtracting the peak discharge rates for the undetained areas (25 year event). This calculation yielded an allowable discharge rate of 5.15 (cfs). The basin will pass through the offsite water from sub-basin 19, 1.14 cfs, as undetained. The basin will be discharging 4.78 cfs, the available storage used for the 25 yr. event is 69.9%. The available storage used for the 100 yr. event is 97.0%; therefore we are able to store the 100 yr. event with excess storage available.

MORLEY AND ASSOCIATES INC.  
STORM SEWER DESIGN SHEET - RATIONAL METHOD

PROJECT: Metro Centre East Property  
OUR PROJECT # 6077-4 (H)  
MANNINGS n 0.013  
COUNTY: Vanderburgh  
DATE: 1/10/05  
DESIGN PERIOD 25 YEARS

Line Number	Upstream Structure	Pipe # or Swale	Downstream Structure	Length (ft)	Subbasin no.	Cj	Aj (ac.)	CjAj	Sum CjAj	Tj (min) (5.0)	Tcum (min) (5.0)	I (25) (in/hr)	Q (25) (cfs)	Pipe	Pipe	Pipe	Velocity (ft/sec)	Travel Time (min)	Upstream Invert	Downstream Invert	% Of Capacity	Upstream FG		
														diameter (in)	Slope (ft/ft)	or Swale Cap. (cfs)								
1	CI	821	822	823	CI	27.28	15	0.79	0.76	0.60	0.60	15.06	15.06	5.03	3.02	15	0.24%	3.14	2.56	0.18	383.71	383.65	0.96	386.22
1	CI	823	824	825	MH	7.00	14	0.79	0.82	0.65	1.25	14.95	15.24	5.01	6.24	15	1.01%	6.50	5.30	0.02	383.65	383.57	0.96	386.22
1	MH	825	826	827	MH	242.08					1.25		15.26	5.01	6.24	21	0.16%	6.31	2.63	1.54	383.57	383.19	0.99	386.68
1A			S828A	828	FES	152.50	16	0.75	1.74	1.31	1.31	16.42	16.42	4.90	6.43	1	0.81%	15.91	2.00	1.27	387.05	385.81	0.40	
1A	FES	828	829	827	MH	95.50					1.31		16.42	4.90	6.43	15	2.74%	10.70	8.72	0.18	385.81	383.19	0.60	388.01
1	MH	827	830	831	FES	180.95					2.56		16.80	4.87	12.45	30	0.10%	12.92	2.63	1.15	383.19	383.01	0.96	388.13
2	FES	832	833	834	FES	489.71									5.51	21	0.15%	6.03			383.01	382.30	0.91	
3			S835	Basin		481.46										1	0.81%	15.91	2.00	4.01	387.02	383.12		

VANDERBURGH COUNTY DRAINAGE BOARD  
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0.92	2.339	14.42	4.78	9.64	0.74
1.00	2.078	12.81	4.78	8.03	0.67
1.25	1.909	11.77	4.78	6.99	0.73
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1.75	1.570	9.68	4.78	4.90	0.71
2.00	1.400	8.63	4.78	3.85	0.64
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FORM 800

PROJECT: 6077-4 (H) DETENTION FACILITY DESIGN RETURN PERIOD: 100 YRS

DESIGNER: Morley and Assoc. RELEASE RATE RETURN PERIOD: 10 YRS

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3.00	1.291	7.96	4.78	3.18	0.79
4.00	1.062	6.55	4.78	1.77	0.59

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The majority of the runoff generated on the site will be conveyed to the detention basin. Storm water from sub-basins 13, 17 and 18 will be allowed to drain off undetained. The lots were assumed to have approximately 75% impervious coverage. This yielded a developed runoff coefficient of 0.75. Calculations were done using the standard Form 800, and the required storage was determined to be 0.80 acre-feet. The proposed basin has an available volume of approximately 1.15 acre-feet. The proposed basin is designed to have a wet bottom and have approximately 4 feet of storage. The release rate was determined by taking the predeveloped peak discharge rate for the site for the 10 year event and adding it to the peak discharge rate for the 25 year event for the offsite area and then subtracting the peak discharge rates for the undetained areas (25 year event). This calculation yielded an allowable discharge rate of 5.15 (cfs). The basin will pass through the offsite water from sub-basin 19, 1.14 cfs, as undetained. The basin will be discharging 4.78 cfs, the available storage used for the 25 yr. event is 69.9%. The available storage used for the 100 yr. event is 97.0%; therefore we are able to store the 100 yr. event with excess storage available.



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MANNINGS n 0.013  
COUNTY: Vanderburgh  
DATE: 1/10/05  
DESIGN PERIOD 25 YEARS

Line Number	Upstream Structure	Pipe # or Swale	Downstream Structure	Length (ft)	Subbasin no.	Cj	Aj (ac.)	CjAj	Sum CjAj	Tj (min) (5.0)	Tcum (min) (5.0)	I (25) (in/hr)	Q (25) (cfs)	Pipe diameter (in) Or Swale Depth (Ft)	Pipe Slope (ft/ft)	Pipe or Swale Cap. (cfs)	Velocity (ft/sec)	Travel Time (min)	Upstream Invert	Downstream Invert	% Of Capacity	Upstream FG	
1	CI	821	822	823	CI 27.28	15	0.79	0.76	0.60	0.60	15.06	15.06	5.03	3.02	15	0.24%	3.14	2.56	0.18	383.71	383.65	0.96	386.22
1	CI	823	824	825	MH 7.00	14	0.79	0.82	0.65	1.25	14.95	15.24	5.01	6.24	15	1.01%	6.50	5.30	0.02	383.65	383.57	0.96	386.22
1	MH	825	826	827	MH 242.08					1.25	15.26	5.01	6.24	21	0.16%	6.31	2.63	1.54	383.65	383.57	0.96	386.22	
1A		S828A	828	FES	152.50	16	0.75	1.74	1.31	1.31	16.42	16.42	4.90	6.43	1	0.81%	6.31	2.63	1.54	383.57	383.19	0.99	386.68
1A	FES	828	829	827	MH 95.50					1.31	16.42	16.42	4.90	6.43	1	0.81%	15.91	2.00	1.27	387.05	385.81	0.40	
1	MH	827	830	831	FES 180.95					1.31	16.42	16.42	4.90	6.43	15	2.74%	10.70	8.72	0.18	385.81	383.19	0.60	388.01
										2.56	16.80	16.80	4.87	12.45	30	0.10%	12.92	2.63	1.15	383.19	383.01	0.96	388.13
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UNDEVELOPED RUNOFF RATE ( $Q = C_u \cdot I_u \cdot A$ ): 5.09 CFS  
DEVELOPED RUNOFF COEFFICIENT ( $C_d$ ): 0.75  
UNDETAINED RUNOFF RATE 1.27 CFS  
PIPE OUTFLOW 4.78 CFS

STORM DURATION $T_d$ (HRS)	RAINFALL INTENSITY $I_d$ 100-Year (INCH/HR)	INFLOW RATE $I(T_d)$ ( $C_d \cdot I_d \cdot A$ ) (CFS)	OUTFLOW RATE $Q$ ( $C_u \cdot I_u \cdot A$ ) (CFS)	STORAGE RATE $I(T_d) - Q$ (CFS)	REQUIRED STORAGE $(I(T_d) - Q) \cdot T_d / 12$ (ACRE.FT)
0.08	8.469	52.21	4.78	47.43	0.33
0.17	7.126	43.93	4.78	39.15	0.54
0.25	6.194	38.19	4.78	33.41	0.70
0.33	5.665	34.93	4.78	30.15	0.84
0.42	5.137	31.67	4.78	26.89	0.93
0.50	4.608	28.41	4.78	23.63	0.98
0.58	4.284	26.41	4.78	21.63	1.05
0.67	3.960	24.41	4.78	19.63	1.09
0.75	3.636	22.41	4.78	17.63	1.10
0.83	3.311	20.41	4.78	15.63	1.09
0.92	2.987	18.42	4.78	13.64	1.04
1.00	2.663	16.42	4.78	11.64	0.97
1.25	2.444	15.06	4.78	10.28	1.07
1.50	2.224	13.71	4.78	8.93	1.12
1.75	2.005	12.36	4.78	7.58	1.11
2.00	1.785	11.00	4.78	6.22	1.04
2.50	1.538	9.48	4.78	4.70	0.98
3.00	1.291	7.96	4.78	3.18	0.79
4.00	1.062	6.55	4.78	1.77	0.59

PEAK STORAGE (ACRE.FT):	1.12
PEAK STORAGE (CUBIC FT):	48,629

Stage (ft)	Area	Volume	Cum Vol. (c.f.)
0	9,140	0	0
1	10,748	9,944	9,944
2	12,456	11,602	21,545
3	14,264	13,360	34,905
4	16,173	15,219	50,124

Total Available Storage (ac.ft.)	1.15
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% Peak Storage / Available Storage 97.0%

system is designed for pre-cast concrete structures, with pipe material of either reinforced concrete pipe (RCP) or double wall, smooth interior high-density polyethylene pipe (HDPE).

The majority of the runoff generated on the site will be conveyed to the detention basin. Storm water from sub-basins 13, 17 and 18 will be allowed to drain off undetained. The lots were assumed to have approximately 75% impervious coverage. This yielded a developed runoff coefficient of 0.75. Calculations were done using the standard Form 800, and the required storage was determined to be 0.80 acre-feet. The proposed basin has an available volume of approximately 1.15 acre-feet. The proposed basin is designed to have a wet bottom and have approximately 4 feet of storage. The release rate was determined by taking the predeveloped peak discharge rate for the site for the 10 year event and adding it to the peak discharge rate for the 25 year event for the offsite area and then subtracting the peak discharge rates for the undetained areas (25 year event). This calculation yielded an allowable discharge rate of 5.15 (cfs). The basin will pass through the offsite water from sub-basin 19, 1.14 cfs, as undetained. The basin will be discharging 4.78 cfs, the available storage used for the 25 yr. event is 69.9%. The available storage used for the 100 yr. event is 97.0%; therefore we are able to store the 100 yr. event with excess storage available.

MORLEY AND ASSOCIATES INC.  
STORM SEWER DESIGN SHEET - RATIONAL METHOD

PROJECT: Metro Centre East Property  
OUR PROJECT # 6077-4 (H)  
MANNINGS n 0.013

COUNTY: Vanderburgh  
DATE: 1/10/05  
DESIGN PERIOD 25 YEARS

Line Number	Upstream Structure	Pipe # or Swale	Downstream Structure	Length (ft)	Subbasin no.	Cj	Aj (ac.)	CjAj	Sum CjAj	Tj (min) (5.0)	Tcum (min) (5.0)	I(25) (in/hr)	Q(25) (cfs)	Pipe Diameter (in) Or Swale Depth (Ft)	Pipe Slope (ft/ft)	Pipe or Swale Cap. (cfs)	Velocity (ft/sec)	Travel Time (min)	Upstream Invert	Downstream Invert	% Of Capacity	Upstream FG		
1	CI	821	822	823	CI	27.28	15	0.79	0.76	0.60	0.60	15.06	15.06	5.03	3.02	15	0.24%	3.14	2.56	0.18	383.71	383.65	0.96	386.22
1	CI	823	824	825	MH	7.00	14	0.79	0.82	0.65	1.25	14.95	15.24	5.01	6.24	15	1.01%	6.50	5.30	0.02	383.65	383.57	0.96	386.22
1	MH	825	826	827	MH	242.08					1.25		15.26	5.01	6.24	21	0.16%	6.31	2.63	1.54	383.57	383.19	0.99	386.68
1A			S828A	828	FES	152.50	16	0.75	1.74	1.31	1.31	16.42	16.42	4.90	6.43	1	0.81%	15.91	2.00	1.27	387.05	385.81	0.40	
1A	FES	828	829	827	MH	95.50					1.31		16.42	4.90	6.43	15	2.74%	10.70	8.72	0.18	385.81	383.19	0.60	388.01
1	MH	827	830	831	FES	180.95					2.56		16.80	4.87	12.45	30	0.10%	12.92	2.63	1.15	383.19	383.01	0.96	388.13
2	FES	832	833	834	FES	489.71																		
												5.51	21	0.15%	6.03					383.01	382.30	0.91		
3			S835	Basin		481.46																		
														1	0.81%	15.91	2.00	4.01		387.02	383.12			