

AGENDA
UTILITIES SERVICE BOARD MEETING

Utilities Service Center Boardroom
City of Bloomington Utilities
600 E Miller Dr
Bloomington, IN 47401

Seth Debro, President
Kirk White, Vice President
Jeff Ehman
Amanda Burnham
Jim Sherman
Megan Parmenter
Molly Stewart
David Hittle, ex officio
Matt Flaherty, ex officio

This meeting may be attended electronically via Zoom by using the following link:

Join Zoom Meeting

<https://bloomington.zoom.us/j/87474937381?pwd=j2WWZrFOAkahScaJ9Eel1nWbDktV7y.1>

Meeting ID: 874 7493 7381

Passcode: 312769

Monday, January 13th, 2025

5:00 p.m. Regular Meeting

- I. Call to Order
- II. Petitions and Communications for Items or Topics Not Found on the Agenda*
- III. Appeal of Service Fee Charge - David Wierhake
- IV. Approval of the Minutes of the Previous Meeting
 - a. December 30, 2024
- V. Approval of the Claims
 - a. Payable Invoices
 - b. Standard Invoices
 - c. Utility Bills
 - d. Wire Transfers
 - e. Customer Refunds
- VI. Approval of Consent Agenda: \$754.59
 - a. Koorsen Fire and Security, Inc., \$754.59, Alarm communicator upgrade at the Utilities Service Center
- VII. Request Approval of Agreement for Services with M.E. Simpson Company, Inc. - Nancy Axsom
- VIII. Request Approval of Amendment No.1 with Black & Veatch Corporation, Inc. - Dan Hudson
- IX. Request Approval for Construction Services with Kokosing Industrial, Inc. - Mark Menefee
- X. Request Approval of Resolution 2025-01 to Designate Surplus Property for Auction - Jose Fuentes
- XI. Request Approval of CBU Stormwater Design Manual - Phil Peden and Caden Swanson
- XII. Old Business
- XIII. New Business

- XIV. Subcommittee Reports
- XV. Staff Reports
- XVI. Petitions and Communications*
- XVII. Adjournment

*Public Comment will be limited to 5 minutes per person

MEMORANDUM OF LAW

TO: UTILITIES SERVICE BOARD
FROM: CHRISTOPHER J. WHEELER
RE: WIERHAKE APPEAL OF SERVICE FEE CHARGE
DATE: THURSDAY, JANUARY 9, 2024

Mr. Wierhake is a CBU customer who failed to make timely payment of his September 2024, and October 2024, water bills. CBU did nothing to cause Mr. Wierhake to miss these payments. He just says it was an oversight and that he misplaced these two months of bills. CBU asserts that at no time did Mr. Wierhake ever contact CBU to work out any sort of repayment schedule and did not seek any financial assistance through SCCAP to help with his delinquent bill.

Robin Guyton, Account Collections Specialist for CBU, will tell the USB that Mr. Wierhake has historically from time to time paid his bills late. He will pay his account balance every couple of months. Because of this practice, he has received a notice of disconnect from CBU on a multitude of other occasions. But, unlike in this instance, he would always get paid up before the disconnect date. However, this time around, and for reasons unknown to CBU, he did not pay his balance.

On or about October 21, 2024, CBU issued a notice of intent to disconnect to Mr. Wierhake. CBU complied with CBU Rules and Regulations Section 7.7, which requires the notice to be in writing and to be issued to the residential customer either by mail, by personal deliver, or via electronic communication. In this case, the notice was mailed to his residence at 520 W. Smith Avenue. CBU Rules and Regulations Section 7.9 requires that the notice provide the date of termination, the reason for termination, and a telephone number to reach CBU. The notice complied with these requirements.

CBU discontinued Mr. Wierhake's water on Tuesday, November 12, 2024, at 10:00 a.m. On the same day, Mr. Wierhake then paid his bill on line and, at Mr. Wierhake's request, CBU restored his water service on November 12, 2024, at 1:30 p.m.

CBU has an approved charge for service calls to residences for the purpose of turning water services on and off. This charge has been on the books since at least 1979. The current amount of this service charge was most recently approved by the Utilities Service Board, the City of Bloomington Common Council, and the Indiana Utilities Regulatory Commission during CBU's 2016-2017 water rate case. The charge is currently \$45.00 per service call. See Bloomington Municipal Code 9.12.020.

Mr. Wierhake has provided no argument for why he should not be charged a service call charge when his water service is turned off and on. He has not alleged any error or omission on the part of CBU that would render the charge improperly assessed. Rather, Mr. Wierhake simply did not pay his water bills on time. His cavalier approach to paying his utility bill eventually caught up to him and CBU appropriately disconnected his water service due to his failure to pay this water bill. Mr. Wierhake should not be reimbursed for his failure to pay his water bills.

The USB should deny Mr. Wierhake's appeal.

City of Bloomington's Utilities Service Board

Decision on Appeal of Charge and Billing for

Turn On/Turn Off

On December 1, 2024, the City of Bloomington Utilities Department (“CBU”) issued a bill containing a charge for turn on/turn off (the “Charge”) at the property located at 520 W. Smith Ave., Bloomington, Indiana (the “Property”). The charge for turn on/turn off was issued as a result of an involuntary termination of service at the Property which occurred on November 12, 2024. The Property owner timely filed a request for Appeal. A hearing on the Appeal took place on January 13, 2025, and The Utilities Service Board now finds as follows:

A. Facts.

1. David Wierhake (“Appellant”) is the owner of the Property.
2. Appellant did not appear in person but did submit his position in writing, which was submitted to, reviewed by, and considered by the USB.
3. Appellant did not pay his water bill during the months of September and October, 2024.
4. Pursuant to City of Bloomington Utilities Rules, Regulations and Standards of Service Section 7.3.5, CBU may, upon proper notice, terminate a customer’s water service for non-payment of said customer’s water bill.
5. On or about October 21, 2024, CBU issued written notice to the Appellant in accordance with City of Bloomington Utilities Rules, Regulations and Standards of Service Section 7.7 and said notice met the requirements set forth in Section 7.9.
6. Appellant did not seek any relief from CBU for these unpaid water bills and did not seek any assistance from SCCAP.
7. CBU followed the required procedures for termination of service set forth in City of Bloomington Utilities Rules, Regulations and Standards of Service Section 7.10.
8. CBU terminated water service on November 12, 2024, at 10:00 a.m..
9. Appellant then paid his past due account later on the same day, November 12, 2024.
10. At Appellant’s request, service was restored to the Property on November 12, 2024, at 1:30 p.m.
11. CBU issued a bill to the Appellant on December 1, 2024, which contained an additional charge of \$90.00 for the turn/on/turn off of service, all in keeping with City of Bloomington Utilities Rules, Regulations and Standards of Service Section 5.5 and Bloomington Municipal Code 9.12.020.
12. On December 10, 2024, Appellant paid this additional charge.
13. Appellant now appeals this additional charge and seeks reimbursement.

B. Findings of Fact and Conclusions of Law:

1. The City of Bloomington Utilities Rules, Regulations and Standards of Service in effect at all times relevant herein, were appropriately adopted by the Utilities Service Board on October 7, 2024.
2. CBU did nothing to cause Appellant to not pay his utility bills.

3. CBU was authorized to terminate services to the Property due to unpaid bills.
4. CBU provided the proper notice as required under Section 7 of the City of Bloomington Utilities Rules, Regulations and Standards of Service.
5. The charge that was assessed by CBU in this case is a charge that was approved by the Utilities Service Board, City Council and Indiana Utilities Regulatory Commission and is an appropriate estimation of the cost associated with providing service calls to residences which includes the termination and restoration of water services during the water rate case of 2016-2017. See Bloomington Municipal Code 9.12.020.

C. Order:

1. The City of Bloomington Utilities Service Board hereby denies the appeal and upholds the additional charge of \$90.00 issued by CBU.

So ordered this 13th day of January, 2025.

Seth Debro, Chair
Utilities Service Board
City of Bloomington

**UTILITIES SERVICE BOARD MEETING
12/30/2024**

Utilities Service Board meetings are available at CATSTV.net.

CALL TO ORDER

Board President Parmenter called the regular meeting of the Utilities Service Board to order at 5:00 p.m. The meeting took place in the Utilities Service Boardroom at the City of Bloomington Utilities Service Center, 600 East Miller Drive, Bloomington, Indiana.

Board members present: Megan Parmenter, Kirk White, Jim Sherman, David Hittle, Jeff Ehman, Seth Debro, David Hittle

Board members absent: Amanda Burnham, Matt Flaherty

Staff present: Katherine Zaiger, Matt Havey, James Hall, Steven Stanford, Daniel Frank

Guests present: None

PETITIONS AND COMMUNICATIONS: None

MINUTES

Board Member Sherman moved, and Debro seconded the motion to approve the Regular minutes of the 12/16/2024 meeting, pending correction. Motion carried, six ayes

CLAIMS

Sherman moved, and White seconded the motion to approve the Utility Bills:

Invoices included \$44,128.51 from the Water Fund and \$9,243.77 from the Wastewater Fund.

Motion carried, six ayes. Total claims approved: \$53,372.28.

Sherman moved, and White seconded the motion to approve the Wire Transfers, Fees, and Payroll for \$505,151.42. Motion carried, six ayes.

Sherman moved, and Debro seconded the motion to approve the Customer

Refunds: Customer Refunds included \$474.07 from the Water Fund, \$5,590.82 from the Wastewater Fund,

Motion carried, six ayes. Total refunds approved: \$6,064.89

Sherman moved, and Debro seconded the motion to approve the Special Check Run for Bond Payments and Solar Panel Payment

Refunds: Special Check Run included \$39,841.58 from the Water Fund, \$3,291,329.51 from the Water Sinking Fund, \$185,887.18 from the Wastewater Fund, and \$5,492,620.64 from the Wastewater Sinking Fund.

Motion carried, six ayes. Total refunds approved: \$9,009,678.91

Sherman moved, and Debro seconded the motion to approve the Special Check Run for Credit Card Payments and Solar Administration Fees

Refunds: Special Check Run included \$1,732.55 from the Water Fund, \$74.14 from the Water Sinking Fund, \$2,228.53 from the Wastewater Fund, \$111.22 from the Wastewater Sinking Fund, and \$32.79 from the Stormwater Fund.

Motion carried, six ayes. Total refunds approved: \$4,179.23

OLD BUSINESS: None

NEW BUSINESS: None

SUBCOMMITTEE REPORT: None

STAFF REPORTS: None

PETITIONS AND COMMUNICATIONS:

Parmenter expressed gratitude for all the CBU employees who have worked on and throughout the holidays in service to the community.

ADJOURNMENT: Parmenter adjourned the meeting at 5:05 pm

Seth Debro, President

Date

City of Bloomington Utilities
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Paydate: 01/17/25

Payables G/L Date: 12/29/24

Vendor	Invoice No.	Invoice Description	Invoice Amount	Water O&M	Water Construction	Wastewater O&M	Wastewater Construction	Stormwater O&M
2NDNATURE Software, INC	23-984-10	D24-140 - Street Sweeping Routing Plan to 10/25/24 - ENV	4,720.00					4,720.00
A&M Graphics (Baugh Fine Print and Mailing)	43632	Septage & grease tickets - CS24-015	451.50			451.50		
A&M Graphics (Baugh Fine Print and Mailing)	43635M	Printing & mailing of Nov 2024 water / wastewater bills-ACCT	14,640.96	5,856.38		8,784.58		
Airgas Specialty Products, INC	9156609633	Ammonium hydroxide - 15,260 @ .1385 delivered 12/16/24-Monroe	2,113.51	2,113.51				
All-Phase Electric Supply, INC	0740-1025681	Mini circuit for pump @ Oolitic LS - LS24-103	93.19			93.19		
Amazon.com Sales, INC (Amazon.com Services LLC)	11YQ-7MNP-7WTN	Credit memo for back brace posture corrector - PUR24-484	(31.49)	(12.60)		(18.89)		
Amazon.com Sales, INC (Amazon.com Services LLC)	1319-FYR6-PXY9	ACCT24-193 - Mouse pad with wrist support ergonomic	7.98	3.19		4.39		.40
Amazon.com Sales, INC (Amazon.com Services LLC)	133M-N4XQ-616V	244833 - Logitech MK335 wireless keyboard and mouse combo	89.97	35.99		53.98		
Amazon.com Sales, INC (Amazon.com Services LLC)	16LN-DP3L-94XW	243678 - Otterbox iPhone 14 & iPhone 13-Apple 20W USB-C Power	64.79	25.92		38.87		
Amazon.com Sales, INC (Amazon.com Services LLC)	19K9-JXKG-6G7F	PUR24-506-PVC cement-hand santizer-mouse pad-cork board	167.59	67.04		92.17		8.38
Amazon.com Sales, INC (Amazon.com Services LLC)	1C7H-FVTF-RN66	ACCT24-193-DeLUX wireless small ergonomic mouse (Ashley C.)	26.45	10.58		14.55		1.32
Amazon.com Sales, INC (Amazon.com Services LLC)	1CGQ-GD4G-1W6M	244803 - OtterBox Iphone 15-defender case-Apple 20W USB-C	54.29			54.29		
Amazon.com Sales, INC (Amazon.com Services LLC)	1DJT-66V4-MK7T	245033 - OtterBox Iphone 15 defender case-Apple 20W USB-C	54.74	21.90		32.84		
Amazon.com Sales, INC (Amazon.com Services LLC)	1J9R-FV3F-P3CL	244856A - supersheildz (3 pack) for Samsung	7.99			7.99		
Amazon.com Sales, INC (Amazon.com Services LLC)	1K6X-3PNF-1TMY	PUR24-526-Digital tire inflator-penlight-threadlocker-1/4 hose	491.47	196.59		270.31		24.57
Amazon.com Sales, INC (Amazon.com Services LLC)	1KX1-YVLP-LPGK	TD24-601 - Batteries - for remote to ditch compactor	86.22	34.49		47.42		4.31
Amazon.com Sales, INC (Amazon.com Services LLC)	1KYR-63NV-1QGX	ENV24-301-Winrise office ergonomic desk chair-Justin Meschter	151.99	151.99				
Amazon.com Sales, INC (Amazon.com Services LLC)	1L34-3Q77-D6WK	243712- Otterbox Deffender Series Screen-Apple 20W USB-C	50.90	20.36		30.54		
Amazon.com Sales, INC (Amazon.com Services LLC)	1LLP-9VF7-KLLW	TD24-640 - Waders for Brad Elkins-grey-X-Large	108.32	43.32		59.58		5.42
Amazon.com Sales, INC (Amazon.com Services LLC)	1LYK-7R1V-DTYR	TD24-658 - Waders for Christian Eberle-grey-Large	108.32	43.32		59.58		5.42
Amazon.com Sales, INC (Amazon.com Services LLC)	1MC3-M7FP-LPP1	Credit memo for returned monthly planner - ENV24-252	(10.39)					(10.39)
Amazon.com Sales, INC (Amazon.com Services LLC)	1PF6-YDC7-DMWP	Credit memo for returned OttBox Case-W. Henderson - DR - #244856	(45.95)			(45.95)		
Amazon.com Sales, INC (Amazon.com Services LLC)	1PRJ-JKK3-FM1M	PUR24-510- 80 pound commerical sure spread ice melt walk behind	256.41	102.56		153.85		

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Vendor	Invoice No.	Invoice Description	Invoice Amount	Water O&M	Water Construction	Wastewater O&M	Wastewater Construction	Stormwater O&M
Amazon.com Sales, INC (Amazon.com Services LLC)	1T11-TY1T-CTWR	PUR24-537 - Adhesive hooks-detergent-heater-pop up notes	288.55	115.42		173.13		
Amazon.com Sales, INC (Amazon.com Services LLC)	1W7M-MK4N-H6V3	PUR24-520-10" Soild wheel replacement-rear view mirror-rip tie	427.74	171.10		235.25		21.39
Amazon.com Sales, INC (Amazon.com Services LLC)	1WY3-NL4Q-17XG	244518 - Otterbox Iphone 14 & Iphone 13 (only)-Apple 20W USB-C	109.78	109.78				
BBC Pump And Equipment Company, INC	30089806	LS24-107 Cap & Cord Assy 50'	2,309.71			2,309.71		
Black Lumber Co. INC	591230	Mouse bait station for BS & LS - LS24-111	47.96	19.18		28.78		
Black Lumber Co. INC	591679	Dust Pan, broom, green cube tap - TD24-663	32.96	13.18		18.13		1.65
Bloomington Hardware Co., INC	717319	BP24-458-HD leaf pool rake-12" ALU reach ext pole	68.97			68.97		
Bloomington Hardware Co., INC	717326	BP24-459 -Heater-pool skimmers-poles and hinges	294.23			294.23		
BP Energy Holding Company LLC(BP Energy Retail CO)	21374758 CBU	Energy services for Vectren - 10/2024 billing period - ACCT	259.00	93.76		165.24		
Brenntag Mid-South, INC	BMS741525-B	Payment due from short paid inv #BMS741525 - Sod Hydrox - BP	180.00			180.00		
Brenntag Mid-South, INC	BMS823367	Sodium Hydroxide-45,000 Delivered 12/13/24 - Monroe - PUR24-007	8,550.00	8,550.00				
Brenntag Mid-South, INC	BMS826382	Sodium Hydroxide-3,000 delivered 12/19/2024-Blucher PUR24-080	900.00			900.00		
Brenntag Mid-South, INC	BMS830272	Sodium Hydroxide-44,920 Delivered 12/26/24 - Monroe - PUR24-007	8,534.80	8,534.80				
Brightview Holdings, INC (Brightview Landscapes)	9182080	City of Bloomington Clean up - PUR24-188	550.00	220.00		302.50		27.50
Building Associates, INC	W22-4620 #18	W22-4620 - Monroe WTP Filter Media Replacement to 11/21/24 - ENG	100,883.15		100,883.15			
Carson Swofford	674dbcaacb6c4	Reimbursement for seminar "Biosolids & Residuals" - ENV24-302	45.00			45.00		
Central Supply Company, INC	S101154145.001	DM24-181 Pipe for the water line along the contract chamber	1,166.71			1,166.71		
Central Supply Company, INC	S101162924.001	DM24-186 Cushion Ring for raw pump station	7.16			7.16		
Chemical Resources, INC	1181022	Sodium Aluminate - 45,680 Delivered 12/17/24-Dillman-PUR24-015	14,526.24			14,526.24		
Chemtrade Chemicals Corporation	90179313	Alum Sulfate - 11.726 @ 635.00 - delivered 12/05/24 - MN	7,446.01	7,446.01				
Chemtrade Chemicals Corporation	90180969	Alum Sulfate - 11.611 @ 635.00 - delivered 12/10/24 - MN	7,372.99	7,372.99				
Chemtrade Chemicals Corporation	90183688	Alum Sulfate - 11.789 @ 635.00 - delivered 12/18/24 - MN	7,486.02	7,486.02				
Chemtrade Chemicals Corporation	90185334	Alum Sulfate - 11.611 @ 635.00 - delivered 12/23/24 - MN	7,372.99	7,372.99				

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Chemtrade Chemicals Corporation	90187095	Alum Sulfate - 11.640 @ 635.00 - delivered 12/31/24 - MN	7,391.40	7,391.40				
City Of Bloomington	11/30/24 Fuel	Fuel charges for all utilities vehicles - November 2024 - ACCT	14,540.95	5,423.86		9,117.09		
City Of Bloomington	12/11/24 SetRate	Set rate for all vehicle parts & repairs - December 2024 - ACCT	50,062.83	15,219.11		34,843.72		
Commonwealth Engineers, INC	61715	S22-6610 - Sanitary Lift Station Design to 11/30/24 - ENG	2,661.82				2,661.82	
Core & Main, LP	V781722	PUR24-441-Meter Housing-Cables-Locking Nuts	3,038.00	3,038.00				
Core & Main, LP	V971231	PUR24-442-Brass Couplers-Bends-Unions-Tracer Wire	670.70	670.70				
Core & Main, LP	W081056	TD24-275 unipro communicators, safety socket, port radio and pin	2,460.00	2,460.00				
Core & Main, LP	W176182	PUR24-441-Meter Housing - 40	1,348.00	1,348.00				
Core & Main, LP	W206192	PUR24-535-2"x100' Poly Pipe	892.00	892.00				
Core & Main, LP	W206218	PUR24-534 - Bend 12" 45" MJ	2,398.60	2,398.60				
Curry Auto Center, INC	5118142	PUR24-542 GMC Rear Wheel Well	165.75	66.30		91.16		8.29
Daniel A Frank	425144183	Reimbursement for felt pads and shelf brackets - ADMIN25-003	21.90	8.75		12.05		1.10
Donohue & Associates INC	14144-21	W22-4619-Monroe WTP Chemical Feed Lines Design to 12/07/24 - ENG	7,316.74		7,316.74			
E&B Paving, INC	30061789	Asphalt - Storm - 11/15/24 - w/o 31702 - SW, TD	1,227.49					1,227.49
E&B Paving, INC	30062241-B	Asphalt - Water - 12/04/24 - TD	119.00	119.00				
Eco-Friendly Solutions, INC	50717	PUR24-523 Found RTU3 area running below set point	491.00	196.40		270.05		24.55
Eco-Friendly Solutions, INC	50719	PUR24-522 Met w/ Energy Mgmt tech for boiler temp and ops	248.00	99.20		136.40		12.40
Electric Plus, INC	47260	BP24-349 Electrical work on outlets on clarifier	220.00			220.00		
Engraving & Stamp Center, INC	48495	Employee recognition plaque engraving - BP24-432	15.40			15.40		
Eurofins Eaton Analytical, INC	8100115313	Testing - Trihalomethanes & Haloacetic Acids-12/05/24 - DL24-091	1,719.00	1,719.00				
Faco, LLC	30235	DM24-180 Differential Switch Assembly	411.42			411.42		
Fastenal Company	INBLM233567	Blue caution paint for locates - PUR24-512	91.39	36.56		50.26		4.57
Ferguson Enterprises, INC	0398048	DM24-171-8" Plug VLV Gear Hand WHL-FLG Pkg	12,945.78			12,945.78		
Ferguson Enterprises, INC	0401999	DM24-171-1/8FLG PKG	259.34			259.34		
Ferguson Enterprises, INC	0381993-1	PUR24-326 Valve Box, Reducers, Manhole and Brass	4,208.00	4,208.00				
Ferguson Enterprises, INC	0381993-2	PUR24-326-Coupling-hymax coupling-curb grate	1,732.64	1,732.64				
First Financial Bank / Credit Cards	126950038	TD24-582 -DSL application fee-Sean Breton	31.03	12.41		17.07		1.55
First Financial Bank / Credit Cards	190761100	TD24-580-DSL application fee - Jared Zikes - IDEM	31.03	12.41		17.07		1.55
First Financial Bank / Credit Cards	200078369	MN24-203 - Compressor parts-kaeser filter-5gallon oil-quide ring	1,480.04	1,480.04				
First Financial Bank / Credit Cards	456174114351	TD24-625 -Lodging 1 night (Gambold Ceremony) -Kevin Housel-	358.00	143.20		196.90		17.90

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First Financial Bank / Credit Cards	10825-B	LS24-112 - McKissick SHB spilt overhaul ball - 3/8"	471.55	188.62		259.35		23.58
First Financial Bank / Credit Cards	19346-C	BP24-425 - Conference fee-Joe Werner	340.00			340.00		
First Financial Bank / Credit Cards	19346-D	BP24-427 - Conference fee-Zach Burnworth	340.00			340.00		
First Financial Bank / Credit Cards	19346-E	ADMIN24-097 - Transaction fees for conference	51.00	20.40		30.60		
First Financial Bank / Credit Cards	19346-F	BP24-426 - Conference fee-Tyler Steury	340.00			340.00		
First Financial Bank / Credit Cards	19346-G	DR24-135-Conference fee- Laura "Janie" Werner	340.00			340.00		
First Financial Bank / Credit Cards	19346-I	BP24-428 - Conference fee-James White	340.00			340.00		
First Financial Bank / Credit Cards	TD24-588 Elkins	Credit for hotel expenses due to grant - TD24-588A	(179.00)	(71.60)		(98.45)		(8.95)
First Financial Bank / Credit Cards	TD24-588A Housel	Credit for hotel expenses due to grant - TD24-588A	(140.00)	(56.00)		(77.00)		(7.00)
Fisher Scientific Company, LLC	1479609	Filter paper 24CM - MN24-064	260.08	260.08				
Fisher Scientific Company, LLC	3899669	Phenylarsine oxide .00564N 1L (qty 6) - MN139	883.08	883.08				
Fisher Scientific Company, LLC	5561247	Filter paper 24CM (3 PKS) - MN24-172	720.77	720.77				
Gripp, INC	8031	S24-6805 - Smartcover Equipment Maintenance - ENG	3,016.00			3,016.00		
Gripp, INC	8047	S24-6804 - Flow Monitoring Equipment Maintenance - ENG	5,674.46			5,674.46		
Gripp, INC	8111	S24-6804 - Teledyne Isco Duratracker Replacement Meter - ENG	7,861.00			7,861.00		
HACH Company	14294561	MN24-210 DESICCANT FOR HACH TU5300SC	129.80	129.80				
HB Warehouse LLC (Resource Services)	23643	MN24-202 FOLDED PAPER TOWELS	38.83	38.83				
HB Warehouse LLC (Resource Services)	24274	BP24-423 Paper plates, gloves and kitchen towel	262.47			262.47		
Hydra-Stop, LLC	52049	PUR24-518-Cutters-Nylon Lock Thread Cup	4,135.37	4,135.37				
Indiana Oxygen Company, INC	10538134	Fill 33lb propane cylinders (10) - PUR24-489	280.50	112.20		154.28		14.02
Indiana Oxygen Company, INC	10552518	Monthly cylinder rental @ Dillman - 12/01-12/31/24 - DR	387.08			387.08		
Indiana Section American Water Works	21674-A	Water Institute Conference Fee for Shawn Medsker - MN23-215	125.00	125.00				
Indiana Underground Plant Protection Service, INC	INV-09607	Monthly per ticket fee for line locates - November 2024 - TD	1,769.85	707.94		1,061.91		
Industrial Service & Supply, INC	84867	Hose, ferrule, male stems for truck 626 - TD24-660	40.11	16.04		22.06		2.01

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Vendor	Invoice No.	Invoice Description	Invoice Amount	Water O&M	Water Construction	Wastewater O&M	Wastewater Construction	Stormwater O&M
Industrial Service & Supply, INC	84878	PVC suction hose, cam-locks, clamps - BP24-431	443.48			443.48		
Industrial Service & Supply, INC	84884	Gauges (2) 1/4" for hydrant pressure testing - ENV24-296	62.24	62.24				
Industrial Service & Supply, INC	84995	Punch lock clamp, male NPT solid for truck 626 - TD24-674	9.95	3.98		5.47		.50
Interstate Battery System of Bloomington, INC	1172417	Batteries 4D0XHD (2) - BP24-436	418.00			418.00		
Irving Materials, INC	11510096	Concrete - Water @ 6511 N Showers Rd - 11/26/24 - TD	1,007.50	1,007.50				
Irving Materials, INC	11510097	Concrete - Water @ 7470 S Shields Ridge - 11/26/24 -w/o 28488-TD	6,967.50	6,967.50				
Irving Materials, INC	11512643	Concrete - Water @ 2206 E 8th St - 12/09/24 - w/o 32241 - TD	1,007.50	1,007.50				
Irving Materials, INC	11513045	Concrete - Water @ 818 S Stull Ave - 12/10/24 0 w/o 30485 - TD	1,047.50	1,047.50				
Irving Materials, INC	11513546	Concrete - Sewer @ 10th & Pete Ellis - 12/11/24 - w/o 32687 - TD	830.00			830.00		
Irving Materials, INC	11513547	Concrete - Water @ 2521 S Rogers - 12/11/24 - w/o 30394 - TD	437.50	437.50				
Irving Materials, INC	11513944	Concrete - Sewer @ S Nancy St - 12/12/24 - w/o 32795 - TD	525.00			525.00		
Irving Materials, INC	11514808	Concrete - Water @ 1827 E 10th St - 12/17/24 - w/o 29519 - TD	528.00	528.00				
IU Health OCC Health Services	00163070-00	Audio hearing test for 7 Blucher employees-10/08-10/09-BP24-462	259.00			259.00		
IU Health OCC Health Services	00163788-00	PE Respirator Clearance - 1 DR employee 11/13/24 - DR24-138	95.00			95.00		
IU Health OCC Health Services	00163789-00	PE Respirator Clearance - 1 DR employee 11/13/24 - DR24-138	95.00			95.00		
IU Health OCC Health Services	00164127-00	Audio hearing test for 1 Blucher employees-11/25/24-BP24-452	37.00			37.00		
IU Health OCC Health Services	00164128-00	PE Respirator Clearance - 1 Monroe employee - 11/18/24 - MN24-213	95.00	95.00				
IU Health OCC Health Services	00164129-00	DS DOT 5 Panel E Screen 1 TD employee -11/19/24 - TD24-664	50.00	20.00		27.50		2.50
IU Health OCC Health Services	00164130-00	PE Respirator Clearance - 1 Monroe employee - 11/18/24 - MN24-214	95.00	95.00				
IU Health OCC Health Services	00164131-00	DS DOT 5 Panel E Screen 1 Monroe employee 1/20/24 - MM24-188	50.00	50.00				
IU Health OCC Health Services	00164132-00	DS DOT 5 Panel E Screen 1 TD employee -11/19/24 - TD24-664	50.00	20.00		27.50		2.50
IU Health OCC Health Services	00164133-00	PE Respirator Clearance - 1 ENV employee - 11/18/24 - ENV24-299	95.00	38.00		52.25		4.75
IU Health OCC Health Services	00164581-00	Audio hearing test for 1 Blucher employee-12/12/24-BP24-463	37.00			37.00		

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J&S Locksmith Shop, INC	262521	Keys made (4) for Booster Stations - LS24-118	20.00	20.00				
James Clay Hall	435300662049	Reimburesment - WWO Cert Fee @ Ivy Tech - TD24-679	40.00			40.00		
Jasper Electric Motors	RI14745	MN24-158 Rebuild Electric Motor	2,049.46	2,049.46				
JCI Jones Chemicals, INC	956722	Sodium Hypochlorite 4,503 delivered 11/27/2024-Monroe PUR24-012	7,632.59	7,632.59				
JCI Jones Chemicals, INC	957200	Sodium Hypochlorite 4,487 delivered 12/05/2024-Monroe PUR24-012	7,605.47	7,605.47				
JCI Jones Chemicals, INC	958118	Sodium Hypochlorite 4,503 delivered 12/18/2024-Monroe PUR24-012	7,632.59	7,632.59				
JCI Jones Chemicals, INC	958550	Sodium Hypochlorite 4,389 delivered 12/24/2024-Monroe PUR24-012	7,439.36	7,439.36				
John Deere Financial f.s.b. (Rural King)	153991	Buckets (4), rake, fork handle - BP24-454	55.14			55.14		
John Deere Financial f.s.b. (Rural King)	181101	Large straw bale - TD24-677	47.94	19.17		26.37		2.40
John Deere Financial f.s.b. (Rural King)	242885	Shop towels, cable ties - PUR24-514	142.84	57.14		78.56		7.14
John Deere Financial f.s.b. (Rural King)	244740	Flyflight Sticky inserts, refills, ant killer & bait - PUR24-533	113.91	45.56		62.65		5.70
John Deere Financial f.s.b. (Rural King)	255257	Wash mop, brush, wash mitt, sponge, bits - PUR24-528	139.91	55.96		76.95		7.00
John Deere Financial f.s.b. (Rural King)	303851	Clothing allowance for Oritz-Sanchez, Steury, Burnworth-BP24-434	899.73			899.73		
John Deere Financial f.s.b. (Rural King)	309787	Bag of Havoc rat & mouse bait - LS24-113	49.99	20.00		29.99		
John Deere Financial f.s.b. (Rural King)	311599	Wood shavings, glade, soap, trash bags - BP24-453	130.43			130.43		
Jose Fuentes	B 165994	LS24-117 - Reimbursement to Jose Fuentes for freight charges	39.71	15.88		23.83		
Kent Crozier (Analytical Environmental Laboratory)	104260	Testing - Odor & taste contaminants (2)-11/1-11/25/24-ENV24-305	770.00	770.00				
Kirby Risk Corp	S210631058.001	Starting sequence relay for pump 3 @ SC BS - LS24-109	174.36			174.36		
Kirby Risk Corp	S210631067	Scotchcast potting kit for Knightridge LS - LS24-108	77.00			77.00		
Kirby Risk Corp	S210634997.001	Slotted channel, conduit clamp, fender washer - DM24-185	381.42			381.42		
Kirby Risk Corp	S210637702.001	Motor overlaod for Cory Lane LS - LS24-114	157.34			157.34		
Kirby Risk Corp	S210641005.001	AB Contactor Max 43 Amp 600v - DM24-190	347.60			347.60		
Kirby Risk Corp	S210642174.001	Unistrut, base, conduit clamp - BP24-446	108.23			108.23		
Kleindorfer's Hardware LLC	761785	Wrench, pull cord handle, rope for #553 - TD24-503-B	30.68	12.27		16.87		1.54
Kleindorfer's Hardware LLC	765577	Hose clamps, heat tapes, pipe insulation - BP24-430	125.13			125.13		
Kleindorfer's Hardware LLC	796583	Brass 90 degree elbows (6) - MM24-192	19.14	19.14				
Kleindorfer's Hardware LLC	796591	Muratic acid, nitrate disp gloves, sink plunger - MM24-193	64.25	64.25				
Kleindorfer's Hardware LLC	796755	Bales of straw (103) - stock - TD24-678	721.00	300.00		396.00		25.00
Kleindorfer's Hardware LLC	796812	Hose quick lock, leak lock for truck #553 - TD24-680	55.47	22.19		30.51		2.77

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Kleindorfer's Hardware LLC	797144	Thermoid tubing for truck #543 - TD24-666	16.20	16.20				
Kleindorfer's Hardware LLC	797457	Tapcons - stock parts - DM24-197	72.08			72.08		
Kleindorfer's Hardware LLC	797632	Mouse traps & glue traps - BP24-420	9.04			9.04		
Kleindorfer's Hardware LLC	798327	Oakum rope & graphite packing for water valve repair - TD24-662	32.98	32.98				
Kleindorfer's Hardware LLC	798340	Electric heater, pvc coupler, palm sander - MM24-180	217.93	217.93				
Kleindorfer's Hardware LLC	798410	Misc Sandpaer sheets - MM24-185	16.50	16.50				
Kleindorfer's Hardware LLC	800719	Misc cable ties, shackles for truck/crane #612 - LS24-116	178.70	71.48		107.22		
Kleindorfer's Hardware LLC	800895	FH screws for truck #690 - LS24-115	15.20	6.08		9.12		
Kleindorfer's Hardware LLC	800983	Hammer, punch, pipe cutter - TD24-668	62.22	24.89		34.22		3.11
Kokosing Industrial, INC	S23-6711 #8	S23-6711 - Lift Station Improvements Project to 11/30/24 - ENG	159,346.43				159,346.43	
Koorsen Fire & Security, INC	JB00827040	CS24-013 Aiphone Intercom System	4,338.29	1,735.32		2,386.06		216.91
Lores Tyler Steury	18362-I	Travel reimb - Per diems - IDEM Complainece - BP24-439	35.00			35.00		
Lores Tyler Steury	19346-A	Travel reimb - Per Diems - INAWWA Conference - 12/03/24- BP24-442	21.00			21.00		
MacAllister Machinery Co, INC	R67626020001	Excavator rental - 12/16-12/19/24 - TD24-654	2,786.70	2,786.70				
Mark Osborne (Control Freaks Consulting)	472Inv-MM24-183	On-Call Contract - Install tank level sensor @ Monoe - MM24-183	375.00	375.00				
Midwest Color Printing, INC	INV-21720-A	Business cards for Katherine Zaiger - ADMIN24-095	75.83	30.33		41.71		3.79
Monroe County Government	20241205-COBU	Misc copies made by Engineering Dept - November 2024 - ENG	29.00	11.60		17.40		
Nugent, INC (Utility Supply Company)	1505270	TD24-627-M-66 Fisher Valve & box locator	1,190.00	1,190.00				
Nugent, INC (Utility Supply Company)	1506050	PUR24-476-Ford 3/4"flare copper coupling-no lead	112.00	112.00				
Nugent, INC (Utility Supply Company)	1506052	PUR24-476-Brass nipple nl-brass bushing nl	812.20	812.20				
Nugent, INC (Utility Supply Company)	1506053	TD24-627-M-66 fisher valve & box locator	1,190.00	1,190.00				
Nugent, INC (Utility Supply Company)	1506054	PUR24-444-Gasketed sewer cap	430.30	172.12		236.66		21.52
Nugent, INC (Utility Supply Company)	1506057	PUR24-143-Dual angle check	1,871.64	1,871.64				
Nugent, INC (Utility Supply Company)	1506058	PUR24-476-1"female flare x 1" fip nut	146.76	146.76				
Nugent, INC (Utility Supply Company)	1506185	Credit memo for returned 11 degree elbows (10) PUR24-445	(430.30)			(430.30)		
Nugent, INC (Utility Supply Company)	1507089	PUR24-502-4"x13" Hyd Cplg Swivel x Swivel Domest	2,215.00	2,215.00				
Nugent, INC (Utility Supply Company)	1507090	PUR24-503-Screws-o-ring seals-valve stem o-ring	3,332.75	3,332.75				

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Nugent, INC (Utility Supply Company)	1507091	PUR24-517-6x71/2 Sb ss bolt & nut repair clamp	4,169.20	4,169.20				
Nugent, INC (Utility Supply Company)	1507092	PUR23-270-3/4"Mueller CTS-1"Mueller CTS	706.08	706.08				
Nugent, INC (Utility Supply Company)	1507093	PUR24-519-3/4 Reed hammer type flare tool	34.41	34.41				
Office Depot, INC	395058150001	Monthly planner - ENG24-085	22.99	9.20		13.79		
Office Depot, INC	395058152001	Monthly planner - ENG24-085	24.99	10.00		14.99		
Office Depot, INC	401281901001	Deskpad (2), erasables yearly - MN24-209	60.37	60.37				
Office Depot, INC	401516276001	Paper clips, markers, disinfectant, plates, caddy - DR24-137	145.65			145.65		
Office Depot, INC	401516277001	Styrofoam cups, eyeglass tissues - DR24-137	164.48			164.48		
Office Depot, INC	404010126001	Trash liners (1 CT) - DR24-140	66.39			66.39		
Office Depot, INC	404010127001	Clipboards (10), clip paper 10 pk - DR24-140	10.81			10.81		
Pace Analytical Services, INC	2450255041	TKN, Nitrate analysis - for Dillman & Blucher NPDES - DL24-089	242.80			242.80		
Pace Analytical Services, INC	2450255191	Testing - Blucher Influent/Effluent-Local Limits Study-ENV24-297	1,011.80			1,011.80		
Pace Analytical Services, INC	2450255415	Testing - Dillman Pretreatment Local Limits Study - ENV24-307	1,032.80			1,032.80		
Pace Analytical Services, INC	2450255523	Testing - Dillman INF Annual Asbestos - 12/04/24 - ENV24-308	324.10			324.10		
Pace Analytical Services, INC	2450255524	Testing - Dillman EFF Annual Asbestos - 12/04/24 - ENV24-309	324.10			324.10		
Pace Analytical Services, INC	2450255696	TKN, Nitrate analysis - for Dillman & Blucher NPDES - DL24-089	183.50			183.50		
Pace Analytical Services, INC	2450255982	Testing - Dillman Sludge Annual Asbestos - 12/04/24 - ENV24-310	127.00			127.00		
Pace Analytical Services, INC	2450256422	Testing - Blucher Influent/Effluent-Local Limits Study-ENV24-311	1,011.80			1,011.80		
Pace Analytical Services, INC	2450256519	Testing - Cook Polymer Annual Pretreatment Sampling - ENV24-312	241.50			241.50		
Palmer Trucks, INC	153899	TD23-848 - Tandem dump truck	173,452.00	69,380.80		95,398.60		8,672.60
Paragon Micro, INC	C03830	Dell P3223DE LED Monitor for Ashley Cranor - #244438	359.99	144.00		215.99		
Paragon Micro, INC	S5180599	Fujitsu fi-8040 document scanner for Ashely Cranor - #244181	499.99	200.00		299.99		
Paragon Micro, INC	S5181449	Dell Latitude 5550, Thunderbolt Dock, Monitor- J.Eller- #244192	1,954.95	1,954.95				
Paragon Micro, INC	S5181640	Adobe Acrobat subscription for Ashley Cranor - #243969	240.99	96.40		144.59		
Paragon Micro, INC	S5183008	Fujitsu fi-8040 document scanner for Tammy Johnson - #244526	499.99	200.00		299.99		
Quality Supply & Tool Co INC	319817-00	Credit memo for returned red break lights - PUR23-304	(2,599.80)	(1,039.92)		(1,559.88)		
Quality Supply & Tool Co INC	320069-00	TD24-645-B TOOLS, BATTERY PACKS, CHARGERS	998.47	399.39		549.16		49.92
Quality Supply & Tool Co INC	320070-00	TD24-655 SAW BLADES, FLAPPERS AND BATTERY PACKS	53.16	21.26		29.24		2.66

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Quality Supply & Tool Co INC	320115-00	TD24-649 TOOL BATTERIES	234.54	234.54				
Quality Supply & Tool Co INC	320201-00	TD24-655 SAW BLADES, FLAPPERS AND BATTERY PACKS	641.91	256.76		353.05		32.10
Quality Supply & Tool Co INC	320215-00	PUR24-521 CHARGER, VACUUM, LINEMANS HAMMER	2,239.83	895.93		1,231.91		111.99
Quality Supply & Tool Co INC	320291-00	PUR24-513 WIPES, WARMERS AND CAUTION TAPE	467.70	187.08		257.23		23.39
Quality Supply & Tool Co INC	320291-01	PUR24-513 WIPES, WARMERS AND CAUTION TAPE	128.80	51.52		70.84		6.44
Quality Supply & Tool Co INC	320292-00	Blue & green marking paint - PUR24-001	567.60	227.04		312.18		28.38
Quality Supply & Tool Co INC	320319-00	DM24-187 Fabrication of threaded pipe	59.08			59.08		
Quality Supply & Tool Co INC	320418-00	TD24-667 VARIOUS TOOLS FOR TRUCK 636	211.69	84.68		116.43		10.58
Quality Supply & Tool Co INC	320422-00	TD24-669 TOOLS AND BATTERY PACKS FOR 573	863.31	863.31				
Quality Supply & Tool Co INC	320441-00	TD24-670 - 14 horse rasp file without tang	62.18	24.87		34.20		3.11
Quality Supply & Tool Co INC	320454-00	TD24-671 - Replacement wheel-adjustable head wrench-vice	265.10	106.04		145.80		13.26
Rentokil North American INC (Terminix Commercial)	440418332	Pest control @ Blucher WWTP - 11/17/24 - BP	91.24			91.24		
Republic Services, INC	0694-003622339	Trash removal @ Monroe WTP - 12/01-12/31/24 - MN	269.99	269.99				
Republic Services, INC	0694-003622340	Trash removal @ Blucher WWTP - 12/01-12/31/24 - BP	269.11			269.11		
Richard's Small Engine, INC	565012	Concrete saw repair on truck #29 - TD24-657	117.31	46.92		64.52		5.87
Richardson Enterprises of Blqtn, LLC (FastSigns)	INV-61092	MN24-215 Eye Wash Station Signs	395.26	395.26				
Riverway Plumbing LLC	3703	TD24-656 EMERGENCY CALL	800.00			800.00		
Rogers Group, INC	0071205627	Stone #53 - Water - 12/05/24 - w/o 32370 - TD	199.63	199.63				
Rogers Group, INC	0071205628	Stone #11 - Stock - 12/03/24 - TD	341.41	136.56		187.78		17.07
Rogers Group, INC	0071205629	Stone #53 - Stock - 12/03/24 - TD	198.09	79.24		108.95		9.90
Rogers Group, INC	0071205726	Stone # - Water - 12/10/24 - w/o 28488 - TD	315.18	315.18				
Rogers Group, INC	0071205727	Stone #53 - Wastewater - 12/11/24 - w/o 32693 - TD	102.90			102.90		
Rogers Group, INC	0071205728	Stone #11 & #53 - Stock - 12/13/24 - TD	482.67	193.07		265.47		24.13
Rogers Group, INC	0071205820	Stone #8 & #11 - Water - 12/16-12/19/24 - w/o 32929 - TD	7,874.21	7,874.21				
Rogers Group, INC	0071205821	Stone #8 & #11 - Water - 12/18-12/20/24 - w/o 32929 - TD	1,540.01	1,228.53		285.53		25.95
Schaeffer Manufacturing Company	BS3475-INV1	Compressor & electric oil - LS24-104	716.25	716.25				
Service Express, INC	4346	CBU Portion-Powerededge @ SC, MN, DR - 10/01-12/31/24 - ACCT	930.00	510.00		420.00		
South Central GWB Company, INC	7198874	Programmable thermostats for dewatering building - MM24-181	399.54	399.54				
Southern Indiana Parts, INC (Napa Auto Parts)	591644	Parts cleaner, repellent, air fresheners, wd-40 - PUR24-339	417.34	166.94		229.54		20.86
Southern Indiana Parts, INC (Napa Auto Parts)	614084	Weathershield hose, hose end fittings for #625 - TD24-673	24.42	9.77		13.43		1.22
Stantec Consulting Services INC	2321273	ACCT24-042 SUPPORT AND TESTIMONY FOR WATER RATE	4,668.75	4,668.75				
Staples Contract & Commercial, INC	6017464905	Ziplock storage bags (6 bx) - PUR24-499	81.33	32.53		44.73		4.07

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Staples Contract & Commercial, INC	6018875595	Gel pens - CS24-016	11.72	4.69		6.45		.58
Staples Contract & Commercial, INC	6018954254	Mesh task chair - CS24-016	304.44	121.78		167.44		15.22
Staples Contract & Commercial, INC	6019375307	Task chair, calendar, dispenser, post-its, pens, glue-ACCT24-194	266.18	106.47		146.40		13.31
Staples Contract & Commercial, INC	6019694984	Slider storage bags (6 ea) - PUR24-499	28.29	11.32		15.56		1.41
State Of Indiana	11/30/2024 CBU	Monthly Water Usage - 11/01-11/30/24 - MN	13,903.99	13,903.99				
The Etica Group, INC	0230275.00-34	D21-120 - Drainage Improvements-Dunn/Kirkwood to Indiana/6th-ENG	2,625.00					2,625.00
The Henry P Thompson Company	40785B28563	BP24-433 UV Lights for Disinfection	1,300.00			1,300.00		
The Home City Ice Company	7331242136	Ice delivered on 12/09/24 - TD24-1002	178.20	71.28		98.01		8.91
The Home City Ice Company	7331242196	Ice delivered 12/23/2024 - TD24-1002	170.10	68.04		93.55		8.51
Tri-State Bearing Co, INC	1453013-00	Ball bearings for PD Blower Drive VFD - DM24-182	20.88			20.88		
Truewerk INC	INV0633435	TD24-585-Wooble jacket-werkpant-flannel shirt (Brandon Slone)	302.25	120.90		181.35		
Truewerk INC	INV0633436	TD24-585- Werkpant - short sleeve tee - ong sleeve tee (Matt K)	281.25	112.50		168.75		
Truewerk INC	INV0633437	TD254-585-Long sleeve tee x2 - werkpant x2 (Scott Runyon)	306.75	122.70		184.05		
Truewerk INC	INV0633438	TD24-585-Hoodie-werkpant-long sleeve tee (Sean Breton)	301.50	120.60		180.90		
Truewerk INC	INV0633439	TD24-585-Werkpant-long sleeve tee-hoodie (Katelyn Drescher)	305.25	122.10		183.15		
Truewerk INC	INV0633440	TD24-585-Shacket-pant-short sleeve tee-hooide(Austin Bennington)	294.00	117.60		176.40		
Truewerk INC	INV0633442	TD24-585-Cap-quarter zip-werkpant-hoodie-long sleeve(Dennis D.)	308.25	123.30		184.95		
Truewerk INC	INV0633443	TD24-585-Hoodie-long sleeve shirt-werkpant-vest (James Hall)	297.00	118.80		178.20		
Truewerk INC	INV0633444	TD24-585-Short sleeve shirt-flannel-henley (Justin White)	308.25	123.30		184.95		
Truewerk INC	INV0633445	TD24-585-Werkpant-quarter zip-shirt-belt-werksock(Josh Wathen)	298.50	119.40		179.10		
Truewerk INC	INV0633454	TD24-585-Pant-hoodie-johnease xlarge-wearsock (Tyler Morrison)	308.25	123.30		184.95		
Truewerk INC	INV0644843	TD24-585-Werkpant-hoodie x2-quarter zip (Brian Shipley)	301.50	120.60		180.90		
Truewerk INC	INV0644844	TD24-585-Werkpant-hoodie-werksock (Ryan Moore)	309.00	123.60		185.40		
Truewerk INC	INV0644852	TD24-585-Werkpant-hoodie-short sleeve tee (Zach Palu)	301.50	120.60		180.90		
Truewerk INC	INV0683912	TD24-585 - Womens T2 pants - (Katelyn Drescher)	133.50	53.40		80.10		
Truewerk INC	INV0688464	TD24-585Woobie vest-flannel x3 -long sleeve shirt (Paul Edwards)	301.50	120.60		180.90		

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Vendor	Invoice No.	Invoice Description	Invoice Amount	Water O&M	Water Construction	Wastewater O&M	Wastewater Construction	Stormwater O&M
ULINE, INC	186941019	PUR24-527 - Additional beams for pallet racks 108"	478.73	191.49		263.30		23.94
United Parcel Service, INC	0000430948484	Shipping & service charge - 11/21-11/30/24 - PUR	68.37	6.76		61.61		
United Parcel Service, INC	0000430948464-B	Shipping charges & weekly service charge - 11/07-11/16/24 - PUR	258.76	6.76		251.16		.84
United Parcel Service, INC	0000430948494-B	Shipping & service charge - 12/02-12/07/24 - PUR	49.36	19.74		29.62		
United Parcel Service, INC	0000430948503-B	Weekly service charge - 12/16/24 - PUR	30.00	12.00		18.00		
United Parcel Service, INC	0000430948504-A	Weekly service charge - 12/14/24 - PUR	16.90	6.76		10.14		
United Parcel Service, INC	0000430948514-A	Weekly service charge - 12/21/24 - PUR	16.90	6.76		10.14		
Vestis Group, INC (FKA Aramark)	12/31/24 SUPPLY	Weekly mats & supplies - 11/01-11/30/24 - MN, BP, DR, PUR	1,890.04	792.26		1,097.78		
Virtuoso Sourcing Group, LLC	32227	Collection Agency Fee - 12/09/24 - AR	20.78	8.31		12.47		
Virtuoso Sourcing Group, LLC	32228	Collection Agency Fee - 12/12/24 - AR	18.71	7.48		11.23		
W.W. Grainger, INC	9337345129	DM24-185A THERMOSTAT	110.70			110.70		
W.W. Grainger, INC	9342160117	BP24-445 Binder Clips, Disposable Gloves	50.53			50.53		
Wendell E Winks	18362-G	Travel reimb - Per diems - IDEM Training @ Linton - BP24-447	35.00			35.00		
Wessler Engineering, INC	45687	W24-4800 - Monroe WTP AMP-CIP 2024 to 11/11/24 - ENG	13,312.72	13,312.72				
Xylem Water Solutions USA, INC	3556C75129	MM24-020-Labor	2,640.00	2,640.00				
Xylem Water Solutions USA, INC	3556D52464	BP24-373-Impeller-Cover-Shipping	3,773.95			3,773.95		
Young Trucking, INC	130402	Hauling sludge from Blucher WWTP - 11/27/24 - BP	1,473.12			1,473.12		
Young Trucking, INC	130462	Hauling sludge from Dillman WWTP - 12/02-12/05/24 - DR	9,547.82			9,547.82		
Young Trucking, INC	130463	Hauling sludge from Monroe WTP - 12/02/24 - MN	775.34	775.34				
Young Trucking, INC	130518	Hauling sludge from Blucher WWTP - 12/11-12/13/24 - BP	2,120.60			2,120.60		
Young Trucking, INC	130519	Hauling sludge from Dillman WWTP - 12/09-12/10/24 - DR	9,435.89			9,435.89		
Young Trucking, INC	130578	Hauling sludge from Blucher WWTP - 12/18/24 - BP	2,337.01			2,337.01		
Zachary M Burnworth	18362-H	Travel reimb - Per diems - IDEM Training @ Linton - BP24-440	35.00			35.00		
Zachary M Burnworth	19346-B	Travel reimb-Per Diems-INAWWA Conference- 12/3-12/5 - BP24-443	75.00			75.00		
Grand total:			851,754.41	304,091.64	108,199.89	259,253.25	162,008.25	18,201.38

City of Bloomington Utilities
 Accounts Payable by G/L Distribution Report
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Vendor	Invoice No.	Invoice Description	Invoice Amount	Water O&M	Wastewater O&M
Alliance of Indiana Rural Water	20777	Large Utility Member Fee for 2025 - ADMIN25-002	660.00	660.00	
Alliance of Indiana Rural Water	21492	Utility Leadership & Legislative Conf - Shane Ira - MN24-207	165.00	165.00	
Indiana Industrial Operators Association, INC	ENV25-001	WITtec Conference Registration for Carson Swofford - ENV25-001	725.00		725.00
Indiana Industrial Operators Association, INC	ENV25-002- Hume	WITtec Conference Registration for Breanna Hume - ENV25-002	725.00		725.00
SwiftComply US Opco, INC	INV-10047	Saas-FOG Essentials, Online Manifest Submission 2025-ENV24-285	11,613.27		11,613.27
Grand total:			<u>13,888.27</u>	<u>825.00</u>	<u>13,063.27</u>

City of Bloomington Utilities
Accounts Payable by G/L Distribution Report
Paydate: 01.09.2025
Utility Claims List

Vendor	Invoice No.	Invoice Description	Invoice Amount	Water O&M	Waste Water O&M
AT&T	812R95925712 12/	White pages listing for Dillman, Blucher & Monroe 11/11-12/10/25	18.00	6.00	12.00
AT&T Mobility II, LLC	287299116581-01	Cell phone service for all utilities departments 11/12-12/11/24	5,396.37	2,154.25	3,242.12
AT&T Mobility II, LLC	287302159878 12/	AT&T - 287302159878 -Engineering 11/12-12/11/25	42.24	16.90	25.34
City Of Bloomington Utilities	201411-001 12/24	Service - 201411-001 Hydrant Meter 73497245 11/1-12/1/24	71.82	71.82	
City Of Bloomington Utilities	201428-001 12/24	Service - 201428-001 Hydrant Meter 61221925 11/1-12/1/24	63.31	63.31	
City Of Bloomington Utilities	201435-001 12/24	Service - 201435-001 - Hydrant Meter 11/1-12/1/24	101.52	101.52	
City Of Bloomington Utilities	201481-001 12/24	Service - 201481-001 - Hydrant Meter - 11/1-12/1/24	17.29	17.29	
City Of Bloomington Utilities	36777-001 12/24	36777-001 Tamarron LS Water/Wastewater charges11/01-12/01/24	27.88		27.88
City Of Bloomington Utilities	39355-001 12/24	39355-001 Dillman WWTP Water/Wastewater charges11/01-12/01/24	1,719.01		1,719.01
City Of Bloomington Utilities	40754-001 12/24	40754-001 Blucher Poole Water/Wastewater charges 11/01-12/01/24	2,757.41		2,757.41
City Of Bloomington Utilities	50913-001 12/24	50913-001 Service Center Water/Wastewater charges 11/01-12/01/24	1,430.42	572.17	858.25
Duke Energy	2132-9100 12/24	Service - Service Center Building @ 600 E Miller Dr 11/9-12/7/24	1,513.31	605.32	907.99
Duke Energy	2057-6357 1/25	Service - IU Hospital Lift Station - 11/19-12/17/24	371.40		371.40
Duke Energy	2132-9275 12/24	Service - Hyde Park / Olcott Lift Station 11/10-12/9/24	77.87		77.87
Duke Energy	2132-9324 12/24	Service - Barge Lane SW Tank 11/10-12/9/24	44.39	44.39	
Duke Energy	2132-9457 1/25	Service - Profile Pkwy Lift Station 11/23-12/23/24	34.20		34.20
Duke Energy	2132-9481 1/25	Service - Vernal Pike Lift Station 11/23-12/23/24	210.65		210.65
Duke Energy	2132-9639 1/25	Service - Westwood Lift Station (outdoor lighting) 11/23-12/23/2	23.90		23.90
Duke Energy	2132-9663 12/24	Service - Bulk Water Station @ 3230 S Walnut St 11/10-12/9/24	80.08	80.08	
Duke Energy	2132-9697 12/24	Service - Park 37 Lift Station 11/10-12/9/24	47.72		47.72
Duke Energy	2132-9829 1/25	Service - Curry Pike Davis Lift Station 11/23-12/23/24	80.52		80.52
Duke Energy	2132-9853 1/25	Service - Arlington Park Lift Station 11/20-12/18/24	357.43		357.43
Duke Energy	2132-9960 1/25	Service - Southwest Booster Station 11/23-12/23/24	1,806.06	1,806.06	
Duke Energy	2132-9994 12/24	Service - South Tank @ E Miller Drive 11/9-12/7/24	130.67	130.67	
Duke Energy	2139-0113 1/25	Service - Oolitic Lift Station 11/20-12/18/24	86.73		86.73
Duke Energy	2139-0288 1/25	Service - Kensington Park Lift Station 11/22-12/20/24	261.73		261.73
Duke Energy	2139-0361 1/25	Service - Stonelake Drive Lift Station 11/19-12/17/24	40.87		40.87
Duke Energy	2139-0395 1/25	Service - Curry Industrial Park Lift Station 11/23-12/23/24	34.34		34.34
Duke Energy	2139-0452 12/24	Service - Karst Park Lift Station/Fairgrounds 11/10-12/9/24	168.69		168.69
Duke Energy	2139-0489 12/24	Service - W 17th Street Lift Station 11/19-12/17/24	190.08		190.08
Duke Energy	2139-0543 1/25	Service - Hyde Park Edward Lift Station 11/10-12/9/24	71.32		71.32

City of Bloomington Utilities
 Accounts Payable by G/L Distribution Report
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 Utility Claims List

Vendor	Invoice No.	Invoice Description	Invoice Amount	Water O&M	Waste Water O&M
Duke Energy	2139-0577 12/24	Service - Adams Street Lift Station 11/10-12/9/24	124.51		124.51
Duke Energy	2139-0600 12/24	Service - Red Bud Tower Tank 11/10-12/9/9/24	109.66	109.66	
Duke Energy	2139-0650 12/24	Service - Winston Thomas Lagoon (lighting) 11/10-12/9/24	22.50		22.50
Duke Energy	2139-0717 1/24	Service - Fullerton Pike Lift Station 11/21-12/19/24	54.98		54.98
Duke Energy	2139-0741 1/25	Service - West Tank Outdoor Lighting @ Waynes Lane 11/23-12/23/2	23.62	23.62	
Smithville Telephone Co Inc	8128241616 1/25	Service - 812-824-1616 SE Pumping Station - BS 11/20-12/19/24	97.28	97.28	
Verizon Wireless	942364297 12/24	Service - Cradlepoint booster for WIFI - Engineering 11/18-12/17	50.16	20.06	30.10
Totals			17,759.94	5,920.40	11,839.54

WIRE TRANSFERS, FEES & PAYROLL FOR THE MONTH OF JANUARY, 2025

INDIANA DEPARTMENT OF REVENUE \$86,130.59

Sales Tax

NPC & Tyler CC Fees \$28,885.88

Credit Card Fees

FIRST FINANCIAL

Bank Fees

GROSS PAYROLL \$468,495.66

FICA TAX \$27,870.66

TOTAL \$611,382.79

City of Bloomington Utilities
Accounts Payable by G/L Distribution Report
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Utility Customer Refunds

Vendor	Invoice No.	Invoice Description	Invoice Amount	Check Number	Reason for Refund	Water Funds	Wastewater Funds	Stormwater Funds	Sanitation
Kevin Carr	12255-008	Customer Refund	\$21.97	30817	Final bill		\$21.97		
James Gwaltney	14027-002	Customer Refund	\$65.58	30821	Final bill		\$65.58		
Matthew Wisen	15682-017	Customer Refund	\$17.15	30855	Final bill		\$17.15		
Justin White	17841-020	Customer Refund	\$50.49	30854	Final bill		\$50.49		
David Allen Thompson	25044-002	Customer Refund	\$33.04	30853	Final bill		\$33.04		
Jane Hatchel	6741-001	Customer Refund	\$145.88	30822	Inactive Account		\$145.88		
Sally Mulzer	17125-024	Customer Refund	\$20.27	30846	Inactive Account		\$20.27		
Travis Johnson	38707-012	Customer Refund	\$11.09	30839	Inactive Account	\$3.33	\$7.76		
Frank Motley	5510-001	Customer Refund	\$41.03	30845	Inactive Account		\$41.03		
Eleanor Bernstein	14566-003	Customer Refund	\$17.65	30816	Inactive Account		\$17.65		
Steve Sutliff	15875-017	Customer Refund	\$42.72	30852	Inactive Account		\$42.72		
David & Bonnie Steele	6560-022	Customer Refund	\$25.55	30851	Inactive Account		\$25.55		
College Rentals Inc	7458-022	Customer Refund	\$85.48	30818	Inactive Account		\$85.48		
Brian Kaplan	8900-003	Customer Refund	\$1,181.99	30843	Inactive Account		\$1,181.99		
John Simpson	9916-003	Customer Refund	\$89.11	30850	Inactive Account		\$89.11		
Sarge Rentals	13551-018	Customer Refund	\$44.67	30847	Inactive Account		\$44.67		
Sarge Rentals	6332-025	Customer Refund	\$16.25	30848	Inactive Account		\$16.25		
Sarge Rentals	6565-035	Customer Refund	\$27.26	30849	Inactive Account		\$27.26		
Steve Dunphy	6365-024	Customer Refund	\$16.25	30819	Inactive Account		\$16.25		
Kerry Griffith	6404-024	Customer Refund	\$21.98	30820	Inactive Account		\$21.98		
David Henson	6468-033	Customer Refund	\$41.98	30827	Inactive Account		\$41.98		
David Henson	16584-035	Customer Refund	\$55.62	30828	Inactive Account		\$55.62		
Whitney Kesler	6551-029	Customer Refund	\$103.05	30844	Inactive Account		\$103.05		
Hunter Townhouses on 10th LLC	19438-032	Customer Refund	\$7.58	30835	Inactive Account		\$7.58		
Hunter Townhouses on 10th LLC	19441-033	Customer Refund	\$10.17	30836	Inactive Account		\$10.17		
Hunter Townhouses on 10th LLC	19442-034	Customer Refund	\$10.17	30837	Inactive Account		\$10.17		
Hunter Townhouses on 10th LLC	19443-028	Customer Refund	\$6.80	30838	Inactive Account		\$6.80		
Hunter Townhouses on 10th LLC	19446-022	Customer Refund	\$9.06	30832	Inactive Account		\$9.06		
Hunter Townhouses on 10th LLC	19450-027	Customer Refund	\$10.17	30833	Inactive Account		\$10.17		
Hunter Townhouses on 10th LLC	21982-033	Customer Refund	\$23.81	30834	Inactive Account		\$23.81		
Joseph Christine LLC	195-002	Customer Refund	\$40.07	30840	Inactive Account		\$40.07		
Joseph Christine LLC	33072-006	Customer Refund	\$28.92	30841	Inactive Account		\$28.92		
Joseph Christine LLC	33707-005	Customer Refund	\$75.60	30842	Inactive Account		\$75.60		
Hunter Regency Court	16137-020	Customer Refund	\$16.25	30829	Inactive Account		\$16.25		
Hunter Regency Court	16178-006	Customer Refund	\$71.94	30830	Inactive Account		\$71.94		
Hunter Regency Court	16136-017	Customer Refund	\$4.53	30831	Inactive Account		\$4.53		
Hays Building LLC	1849-012	Customer Refund	\$28.67	30823	Inactive Account		\$28.67		

City of Bloomington Utilities
 Accounts Payable by G/L Distribution Report
 Paydate:1.17.25
 Utility Customer Refunds

Vendor	Invoice No.	Invoice Description	Invoice Amount	Check Number	Reason for Refund	Water Funds	Wastewater Funds	Stormwater Funds	Sanitation
Hays Building LLC	1867-031	Customer Refund	\$0.25	30824	Inactive Account		\$0.25		
Hays Building LLC	37693-032	Customer Refund	\$57.37	30825	Inactive Account		\$57.37		
Hays Building LLC	37696-026	Customer Refund	\$7.80	30826	Inactive Account		\$7.80		
Total			<u><u>\$2,585.22</u></u>			<u><u>\$3.33</u></u>	<u><u>\$2,581.89</u></u>	<u><u>\$0.00</u></u>	<u><u>\$0.00</u></u>



CONTRACT COVER MEMORANDUM

TO: Controller, Mayor, USB
FROM: Jose Fuentes
DATE: JANUARY 13, 2025
RE: REQUEST APPROVAL OF AGREEMENT FOR SERVICES

Contract Recipient/Vendor Name:	Koorsen Fire & Security, Inc.
Department Head Initials of Approval:	/KZ/
Responsible Department Staff: <i>(Return signed copy to responsible staff)</i>	Jose Fuentes
Responsible Attorney: <i>(Return signed copy to responsible attorney)</i>	Christopher J. Wheeler
Record Destruction Date: <i>(Legal to fill in)</i>	2/9/2035
Legal Department Internal Tracking #: <i>(Legal to fill in)</i>	25-014
Due Date For Signature:	asap
Expiration Date of Contract:	2/9/2025
Renewal Date for Contract:	none
Total Dollar Amount of Contract:	\$754.59
Funding Source:	6101-52-900008-13121 6201-52-950008-13121 6501-52-950008-13124
W9/EFT Complete: <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes
Affirmative Action Plan Complete (if applicable): <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes
Procurement Summary Complete: <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes
Living Wage (if applicable)	Yes

Summary of Contract: To provide and install new internet/cellular dialer



CONTRACT COVER MEMORANDUM

TO: Controller, Mayor and USB
FROM: Nancy Axsom
DATE: 1/3/25
RE: Request Approval of Service Agreement

Contract Recipient/Vendor Name:	M.E. Simpson Company, Inc.
Department Head Initials of Approval:	/KZ/
Responsible Department Staff: <i>(Return signed copy to responsible staff)</i>	Nancy Axsom
Responsible Attorney: <i>(Return signed copy to responsible attorney)</i>	Christopher J. Wheeler
Record Destruction Date: <i>(Legal to fill in)</i>	7/31/2035
Legal Department Internal Tracking #: <i>(Legal to fill in)</i>	25-002
Due Date For Signature:	Asap
Expiration Date of Contract:	July 31, 2025
Renewal Date for Contract:	None
Total Dollar Amount of Contract:	\$170,000.00
Funding Source:	009-U13121
W9/EFT Complete: <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes
Affirmative Action Plan Complete (if applicable): <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes
Procurement Summary Complete: <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes

Summary of Contract: M. E. Simpson Company, Inc. will conduct fire hydrant maintenance and capacity testing for the purposes of maintaining a working fire protection system and remaining compliant with the Insurance Services Office (ISO), American Water Works Association (AWWA), and the National Fire Protection Association (NFPA).



CONTRACT COVER MEMORANDUM

TO: Controller, Mayor & USB
FROM: Daniel Hudson
DATE: 1/7/2024
RE: Request for Approval for an amendment to the Black & Veatch engineering study contract for the plant process and capacity evaluation of the Blucher Poole WWTP

Contract Recipient/Vendor Name:	Black & Veatch Corporation, Inc.
Department Head Initials of Approval:	/KZ/
Responsible Department Staff: <i>(Return signed copy to responsible staff)</i>	Daniel Hudson
Responsible Attorney: <i>(Return signed copy to responsible attorney)</i>	Christopher Wheeler
Record Destruction Date: <i>(Legal to fill in)</i>	6/30/2035
Legal Department Internal Tracking #: <i>(Legal to fill in)</i>	25-004 (amending 24-239)
Due Date For Signature:	January 13, 2025
Expiration Date of Contract:	Original December 31, 2024, New June 30, 2025
Renewal Date for Contract:	N/A
Total Dollar Amount of Contract:	Original NTE \$210,490.00, Amendment No.1 NTE No change \$210,490.00
Funding Source:	010-U13121
W9/EFT Complete: <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes
Affirmative Action Plan Complete (if applicable): <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes
Procurement Summary Complete: <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes
Living Wage (if applicable): <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes

Summary of Contract: extending the termination date of the contract



CONTRACT COVER MEMORANDUM

TO: Controller, Mayor & USB
FROM: Mark Menefee
DATE: January 10, 2025
RE: Request Approval for Construction Services with Kokosing Industrial, Inc.
For the Dillman Road WWTP Site Safety and Process Improvements

Contract Recipient/Vendor Name:	Kokosing Industrial, Inc.
Department Head Initials of Approval:	/KZ/
Responsible Department Staff: <i>(Return signed copy to responsible staff)</i>	Mark Menefee
Responsible Attorney: <i>(Return signed copy to responsible attorney)</i>	Christopher J. Wheeler
Record Destruction Date: <i>(Legal to fill in)</i>	Est. 1/22/2037
Legal Department Internal Tracking #: <i>(Legal to fill in)</i>	25-005
Due Date For Signature:	For USB meeting on 1/13/2025
Expiration Date of Contract:	Est. 1/22/2027
Renewal Date for Contract:	N/A
Total Dollar Amount of Contract:	NTE \$5,025,000.00
Funding Source:	6201-U13121
W9/EFT Complete: <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes
Affirmative Action Plan Complete (if applicable): <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes
Procurement Summary Complete: <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes
Living Wage Ordinance (If applicable) <i>(Staff Member of Responsible Dept. to fill in)</i>	Yes

Summary of Contract The project will increase the rated capacity of the Dillman WWTP with the installation of a new Centrifugal Blower. Work also includes, replacement of the Pump Station Suction Piping and addition of isolation valves; improvements to the plumbing and HVAC in the Disc Filter and Disinfection buildings; guardrail, fence, and gate replacements. The work also includes Aeration Tank Walkway Repair and Gate/Valve Replacements.

**RESOLUTION 2025-01
TO DESIGNATE SURPLUS PROPERTY FOR AUCTION**

WHEREAS, the City of Bloomington Utilities Department (“CBU”) is in possession of various items of office supplies that are no longer needed by CBU; and

WHEREAS, CBU wishes to have these items declared as surplus and sold through the City’s Auction Process; and

WHEREAS, these items have been approved for surplus designation by the City Controller; and

WHEREAS, CBU will first offer any office furniture to all other departments in the City of Bloomington with any and all officer furniture items that remain unclaimed going into the auction.

WHEREAS, Indiana Code § 5-22-22-4, permits the City of Bloomington and the City of Bloomington Utilities Service Board to declare that these items are surplus designate them for sale by auction.

NOW, THEREFORE, BE IT RESOLVED THAT:

1. The CBU property identified in Exhibit “A” as attached hereto and by this reference incorporated herein, is surplus property.
2. CBU shall first offer these items to all other departments in the City of Bloomington and any unclaimed items will then be listed for auction through the City of Bloomington Auction Process.

SO ADOPTED by the Utilities Service Board at its regularly scheduled meeting on January 13, 2025.

Seth Debro, President
Utilities Service Board

ATTEST:

Katherine Zaiger, Director
City of Bloomington Utilities Department



City of Bloomington

Disposal / Surplus / Trade In Form

PAGE NO.

1 of 1

DATE:

1/9/2025

PHONE:

812-327-0805

DEPT: City of Bloomington Utilities

LOCATION: CBU Service Center

DEPT. HEAD / DIVISION DIRECTOR: Jose Fuentes

EMAIL:

jose.fuentes@bloomington.in.gov

Please note: per State Statute IC 5-22-22-6 - If the property is one (1) item with an estimated value of \$1,000, or more than one (1) item with an estimated value of less than \$5,000, we can sell the property without public notice. If these two thresholds are exceeded, notice of sale must be given by publication of the time, place, and terms of the sale at least 15 days before the date of the sale.

DESCRIPTION (List Make, Model, and Year)	QTY	DECLARATION REASON (works, needs repair, not repairable, etc)	SERIAL /VIN NO.	COB ASSET # Capital Asset # assigned by OOTC	DEPT. ASSET #	DISPOSITION REQUESTED (Please check one)	NAME OF VENDOR/PERSON OR COMPANY THE ITEM WAS SURPLUSED OR TRADED TO	ESTIMATED VALUE	SURPLUS DATE
1. Stand Up & Desk Filing	1	Surplus			CBU	<input checked="" type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input type="checkbox"/> Dispose		\$100.00	12/18/24
2. Computer Speakers	1	Surplus			CBU	<input checked="" type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input type="checkbox"/> Dispose		\$15.00	12/18/24
3. Office Supplies	1	Surplus			CBU	<input checked="" type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input type="checkbox"/> Dispose		\$15.00	12/18/24
4. Tote, Mat, Hard Hat & Duster	1	Surplus			CBU	<input checked="" type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input type="checkbox"/> Dispose		\$10.00	12/18/24
5. BIF Meter Pump	1	Dispose	93265-1		Dillman	<input type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input checked="" type="checkbox"/> Dispose	BIF	\$0.00	12/31/24
6. Leeson Electric Motots	1	Dispose	110031-00		Dillman	<input type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input checked="" type="checkbox"/> Dispose	Leeson Electric Corp	\$0.00	13/31/2024
7. Leeson Electric Motots	4	Dispose			Dillman	<input type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input checked="" type="checkbox"/> Dispose	Leeson Electric Corp	\$0.00	12/31/24
8. Sony Camera & Recorder with accessories	1	Surplus	DCR-PC150-NT50		CBU	<input checked="" type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input type="checkbox"/> Dispose	Sony	\$75.00	01/06/25
9.						<input type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input type="checkbox"/> Dispose			
10.						<input type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input type="checkbox"/> Dispose			
11.						<input type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input type="checkbox"/> Dispose			
12.						<input type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input type="checkbox"/> Dispose			
13.						<input type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input type="checkbox"/> Dispose			
14.						<input type="checkbox"/> Sell <input type="checkbox"/> Trade <input type="checkbox"/> Transfer <input type="checkbox"/> Dispose			
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Stormwater Design Manual City of Bloomington Utilities

Last Revised: December 30, 2024



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CHAPTER 1 - INTRODUCTION

1.1 Purpose

This document, the CBU Stormwater Design Manual, contains the necessary technical standards for administering the requirements of the CBU Stormwater Management Ordinance (SMO). This document shall be considered as a companion document to the Ordinance. Whereas the Ordinance contains the majority of the regulatory authority and general requirements of comprehensive stormwater management, this document contains the necessary means and methods for achieving compliance with the Ordinance. In case there are conflicts between the requirements contained in this document and the ordinance, the requirements of the Ordinance shall prevail.

Measures taken to control stormwater impacts shall assure that new development minimizes impacts to downstream sewers, ditches and structures. The following principles apply to all new developments and modifications to existing land uses:

- (a) Design for the minimum amount of downstream, upstream and peripheral impact.
- (b) Design a stormwater collection and conveyance system that requires minimal maintenance.
- (c) Design a stormwater collection and conveyance system that causes a minimal amount of erosion and sedimentation.

Because topography and the availability of adequate outlets for storm runoff vary with the site, the stormwater drainage systems are site specific. It is recommended that each proposed development project be discussed with CBU during the initial planning stage of the project to obtain early input and feedback regarding stormwater issues.

1.2 Description and Use

1.2.1 Compliance with other Standards

Compliance with this standard does not eliminate the need to comply with other applicable City, County, State and Federal ordinances and regulations. This includes, but is not limited to, the submission and approval of IAC titles of primary and secondary, permits for construction in a regulated floodplain/floodway, building and zoning permits, construction inspections, and coordination with other administering authorities. Section 1.3 includes additional requirements with each administering authority.

1.2.2 Conflicting Standards

The provisions of this document shall be deemed as additional requirements to minimum standards required by other applicable ordinances and standards. In the case of conflicting requirements, the most restrictive shall apply.

1.3 Additional Standards and References

1.3.1 Additional Design Standards

For design elements not included in this manual, such as Erosion and Sediment Control, or for conflicts in design requirements the following standards shall be used in the order noted:

- (a) City of Bloomington (CBU) Construction Specifications for Wastewater, Water, and Storm Projects. (most current version). <https://bloomington.in.gov/engineering/resources>
- (b) Indiana Department of Environmental Management (IDEM) (most current version). Indiana Storm Water Quality Manual. <https://www.in.gov/idem/stormwater/resources/indiana-storm-water-quality-manual/>
- (c) Indiana Department of Transportation (INDOT) Design Manual (most current version). <https://www.in.gov/indot/design-manual/>
- (d) INDOT Construction Standards. (most current version). <https://www.in.gov/dot/div/contracts/standards/book/sep21/sep.htm>

1.3.2 CBU Reference Data

The City's GIS staff maintains spatial data and provides mapping and spatial analysis services to support operations of City Departments, Boards and Commissions. Publicly available GIS information for the City of Bloomington can be accessed from <https://bloomington.in.gov/gis>.

Note: All GIS and electronic database materials, and any services which may be provided related thereto, are provided "as-is" without any warranty of any kind, and all warranties on merchantability and fitness for a particular purpose are hereby disclaimed.

1.3.3 Additional References

- (a) City of Bloomington Stormwater Management Ordinance. <https://bloomington.in.gov/utilities/stormwater>
- (b) United States Department of Agriculture, Natural Resources Conservation Service. (NRCS) (most current). Web Soil Survey. <https://websoilsurvey.nrcs.usda.gov/>
- (c) NRCS TR-55: Urban Hydrology for Small Watersheds. (June 1986). <https://www.nrc.gov/docs/ML1421/ML14219A437.pdf>
- (d) IDEM Construction Stormwater General Permit (CSGP) Construction/Stormwater Pollution Prevention Plan Development Guidance (most current) <https://www.in.gov/idem/stormwater/construction-land-disturbance-permitting/guidance-for-construction-plan-storm-water-pollution-plan-development/>

CHAPTER 2 - GENERAL REQUIREMENTS

2.1 Purpose

The purpose of this chapter is to outline requirements for proposed drainage improvements that fall within the jurisdiction of City of Bloomington Utilities (CBU).

2.1.1 Low Impact Development Statement

A Low Impact Development (LID) approach utilizing green infrastructure (GI) such as bioretention, sand filters, bioswales, filter strips, or green roofs is preferred by CBU.

LID design approaches are fundamentally different from conventional design approaches and challenge traditional thinking regarding development standards, watershed protection, and public participation. LID combines fundamental hydrologic concepts with many of today's common stormwater strategies, practices and techniques to reshape development patterns in a way that maintains natural watershed hydrologic functions. The five principles of LID are:

- (a) Conservation of existing natural and topographic features;
- (b) Minimization of land clearing and impervious surfaces;
- (c) Maintenance or lengthening of the pre-developed time of concentration;
- (d) Installation of integrated structural best management practices; and
- (e) Use of pollution prevention measures and practices.

2.2 Pre-Submittal

2.2.1 Early Coordination

For the convenience of the applicant, early coordination with CBU staff may be requested by the petitioner, required by other City Departments, and/or necessary for large, unique, or complex projects. The purpose of early coordination is to clarify requirements prior to submittal, minimize review time, and reduce submittal revisions.

2.2.2 Waivers and Special Conditions

USB has the authority to modify, grant exemptions, and/or waive certain requirements of this Stormwater Design Manual. Modifications, waivers, special conditions, and exceptions may be considered where standards of engineering practice cannot be substantially met due to site restraints or that a waiver or special condition is in the best interest of public good.

2.2.3 Stormwater Permits

Table 2-1 Required Submittals for Stormwater Management Permit

Project Type	Cumulative Disturbed Area	Required Submittals for Permit
All	< 2,500 sq. ft.	No Stormwater Management Permit Needed
Single-family residential (SFR)	2,500 sq. ft to 1 acre	No Stormwater Management Permit Needed
Linear underground utilities		
Non-SFR	2,500 sq. ft to 1 acre	Application Form Construction Plans Stormwater Drainage Report Soil Erosion and Sediment Control Plan O&M Manual
Linear above-ground utilities		
City-owned projects		
All	>1 acre	Application Form Construction Plans Stormwater Drainage Report Stormwater Pollution Prevention Plan O&M Manual

Note: Required submittal items are described further this chapter.

CBU reserves the right to require additional information as necessary to evaluate the adequacy of the proposed stormwater facility.

2.3 Key Performance Standard Requirements

The purpose of this section is to summarize key performance standards for stormwater management on sites requiring a Stormwater Management Permit. These performance standards are intended to limit non-point runoff pollution and reduce the potential for flooding to impact new developments or their neighbors.

Additionally, the subsequent chapters in this design manual include further design standards, requirements, and methodologies and shall be reviewed in their entirety before designs are prepared.

2.3.1 Water Quantity Requirements

For sites under 2.5 acres, the General Peak Discharge Rate in Table 2-3 applies, while sites over 2.5 acres must use the Critical Watershed Peak Discharge Rate as shown in Table 2-3. The post-construction peak discharge rate of the area disturbed by the construction project shall be less than or equal to the following:

Table 2-3 Peak Discharge Limits

Design Frequency	<i>General Peak Discharge Rate (<2.5 acres)</i>	<i>Critical Watersheds Peak Discharge Rate (>2.5 acres)</i>
10-year	0.5 cfs/acre	0.25 cfs/acre
100-year	0.9 cfs/acre	0.45 cfs/acre

2.3.2 Detention In-Lieu Fee/Peak Discharge In-Lieu/Water Quantity/Flooding mitigation/flooding waiver

In highly urbanized areas of Bloomington, such as the downtown area, detention may not be feasible and an In-Lieu fee would be required. In special circumstances, the director may approve additional stormwater infrastructure in lieu of stormwater detention.

2.3.3 Water Quality Requirements

Total suspended solids (TSS) are a pollutant commonly found in urban runoff, referring to solid particles larger than 2-microns in diameter suspended in stormwater. The upper size limit of TSS depends on the velocity patterns in stormwater flows but is generally considered 100-125 microns in the context of stormwater pollution regulations.

To meet the City’s goal of TSS reduction in stormwater, a combination of best management practices (BMP’s) shall be designed including LID/GI designs to capture the runoff from a storm of 1-inch depth over the drainage area. The runoff from a 1-inch rainfall is referred to as the water quality volume (WQ_v),

$$WQ_v = \frac{(P)(R_v)(A)}{12}$$

where;

WQ_v = Water Quality volume (acre-feet)

P = Precipitation Depth, 1-inch

R_v = Volumetric Runoff Coefficient, 0.005 + 0.009(I) where I is the percent impervious cover

A = Disturbed Area (acre)

2.3.4 Green Infrastructure Requirement

A minimum of 50% of WQ_v shall be treated by green infrastructure. If a development cannot treat a minimum of 50% of WQ_v utilizing GI, then the Owner shall pay an In-Lieu Fee described further in section 2.3.3.2.

2.3.5 Green Infrastructure In-Lieu Fee

The applicant is required to provide a justification for not implementing LID/GI BMPs. Should the developer consider GI to be unfeasible for capturing WQ_v , they are advised to consult with CBU prior to finalizing the concept. In cases where CBU grants approval for an in-lieu fee, the developer will be obligated to pay the GI in-lieu fee corresponding to the WQ_v that has not been captured as required by Section 2.3.2. The rates for the in-lieu fees are detailed in Table 2-4:

Table 2-4 Green Infrastructure In -Lieu Fee

<i>Year</i>	<i>Price per Cubic Foot</i>
April 2024	\$22.00
After April 2024	Adjusted based on Consumer Price Index (CPI) Adjusted price per cubic foot = (current CCI / April 2024 CCI) * \$22

The U.S. Bureau of Labor Statistics Consumer Price Index (<https://www.bls.gov/cpi/>) shall be used to adjust the price to the current date.

2.3.6 Treatment Train Required

More than one BMP must be implemented as part of a treatment train, unless determined infeasible by the Assistant Director of the Engineering Division of CBU.

Further treatment of pollutants may be required by the City’s MS4 NPDES permit.

2.3.7 Storm Conveyance Design Requirements

The following criteria in Table 2-5 shall be adhered to when designing a facility within stormwater utility jurisdiction. Roadway classifications may be found in the City of Bloomington Transportation Plan.

Table 2-5 Minimum Design Storm Frequency Requirements

<i>Infrastructure</i>	<i>Minimum Design Frequency</i>
Storm sewers and inlets on grade	10-year
Storm sewers and inlets in sump	10-year
Culverts - Driveway	10-year
Road Culverts - Arterial	100-year
Road Culverts - Collector	50-year
Road Culverts - Local	25-year
Open Channels/Bioswales	10-year
Emergency Spillways	100-year

2.4 Stormwater Permit Component

2.4.1 Submittal Content and Format

The submittal materials outlined in this section shall be provided and sealed by an Indiana Licensed Professional Engineer or Professional Land Surveyor engaged in storm drainage design under whose supervision the plans were prepared and shall be submitted directly to CBU.

Required submittal content depends on the type of project and the total cumulative area of land disturbed during construction. The project’s disturbed area includes any cumulative surface area that will be disturbed by construction including on-site disturbance. Off-site soil disposals, lay down areas or other related offsite activities need to have their own IDEM Construction Stormwater General Permit in their local MS4 area. Further guidance on disturbed area can be found in the City’s Title 13: Stormwater Management Ordinance (SMO). Table 2-1 summarizes the project requirements based on project type and amount of disturbance.

CBU reserves the right to reject application submittals not meeting the requirements set forth in this document.

2.4.2 Format of Submittal

All documents shall be submitted in PDF format of a standard size. The preferred maximum size for plans and drawings is 36-inch by 24-inch.

PDF drawing submittals shall not contain SHX comments or untitled viewports. AutoCAD drawings exported to PDF may use TrueType fonts or set the PDFSHX system variable to zero if using SHX fonts. Untitled viewports shall be deleted from drawing files or from PDF's prior to submittal. All PDFs shall be labeled, contain a scale, and contain page labels that are descriptive of each sheet when applicable.

2.4.3 Application Form

An Application Form for Stormwater Management Permit must be completed and signed by the applicant. Application forms are available for download online at <https://bloomington.in.gov/utilities/stormwater>.

2.4.4 Stormwater Drainage Report

The Stormwater Drainage Report shall include the following information:

- (a) A written narrative describing: Methodology used in the report including a brief description of software used, if applicable.
- (b) Existing site conditions. (Known drainage concerns, specific problem areas identified during site inspections, and downstream condition)
- (c) Description of proposed stormwater management techniques
- (d) A summary of calculations or modeling indicating conformance with water quality and peak discharge performance standards.
- (e) Shop drawings for storm structures, green infrastructure and other BMPs including but not limited to engineered soil, special outfall structures or pre-treatment structures.
- (f) Drainage area map which indicates all existing and proposed on-site and off-site drainage areas, overflow paths, the TOC path, and the limits of the 100-year floodplain for all areas with contributing drainage watersheds of five acres or greater. The map shall include a scale, north arrow, and labeled contours at a minimum. Include finish floor elevations of adjacent or impacted properties.
- (g) Hydrologic calculations, including:
 - (1) Measurement of drainage areas.
 - (2) Curve number and time of concentration calculations for peak discharge calculations.
 - (3) Runoff coefficient calculations for peak flow conveyance capacity requirements

- (4) Hydraulic calculations, including precipitation data used and pond outfall details.
- (5) Inlet grate and gutter flow calculations showing conformance with design requirements.
- (6) Closed conduit and open channel calculations showing conformance with design requirements.
- (7) Hydraulic grade line calculations showing conformance with design requirements.
- (8) Summary of design and hydraulic performance of BMP's.
- (9) Complete input and output data from hydraulic model.

2.4.5 Construction Plans

The following information must be included in the construction plans:

- (a) Location and Vicinity Map
 - (1) Location and vicinity of the proposed development
 - (2) Reference a nearby major roadway intersection
 - (3) Include the ¼ Section, Township, Range, and Civil Township.
- (b) Site Grading Plan
 - (1) Show proposed contour lines in bold lineweight with existing contour lines in regular lineweight. Spot elevations are required where necessary to define the existing or proposed drainage routes.
 - (2) Show curb and gutter, sidewalk, pavement, ground and other elevations required by site design.
 - (3) Show drainage structures with rim or other elevations required for drainage.
 - (4) Show stormwater management facilities and BMP's.
 - (5) 100-year water surface elevation for stormwater detention and water quality that match values determined in drainage report.
 - (6) Show minimum finish floor elevations.
 - (7) Indicate any Karst or protected areas on the plans.
- (c) Landscaping and/or Restoration Plan
 - (1) Location, type, species, quantity, and size of plantings. Plantings shall be listed by both botanical name and common name. Some hybrid plants may not be accepted.
 - (2) Projects without landscaping plans may submit a restoration plan showing the final stabilization of all disturbed areas.
 - (3) Stormwater Utility Plan
- (d) The stormwater utility plan shall be drawn to a sufficient scale to accurately depict all features that affect stormwater design, and an arrow indicating north shall appear on each page. Existing and proposed on-site land contours shall be shown at one-foot contour intervals except where slopes are steeper than twenty

percent. A benchmark, which is easily accessible and re-locatable, shall be shown. The benchmark shall be determined by City datum, unless otherwise permitted by CBU.

- (e) The stormwater utility plan shall show the locations of all existing and proposed stormwater facilities with appropriate right-of-way and easement limits. Storm drains and manholes and other structures shall be located by dimensions on the plans in relation to surrounding physical features. However, the areas where physical features are not available, coordinates of manholes and bearings of storm drains shall be based on the state plane coordinate system. The stormwater utility plan shall show the direction of flow, elevation of inverts, gradient, materials and size of existing and proposed storm drains.
- (f) For all storm sewers a plan and profile in conformance with this manual shall be submitted.
- (g) The profile shall be shown under the plan and shall extend a sufficient distance downstream of the outlet to allow any pertinent information concerning the outfall channel to be shown. All invert elevations and pipe slopes shall be listed. For each pipe the length, size, material and class shall be annotated on the profile sheet near the dimension line. Detail title and/or number references shall be called out on the profile plan.
- (h) The storm drain and inlet profile shall generally be drawn on a scale of one inch equals fifty feet horizontal, one inch equals five feet vertical. Where a storm drain is located inside the limits of an existing or proposed pavement or shoulder, the center line grade of the road shall be shown. Where a storm drain is located outside pavement or shoulder, the existing ground over the storm drain with proposed grading shall be shown. If the storm drain is to be constructed on fill, the profile of the undisturbed earth, at the storm drain location, shall be shown. All utility locations at intersections with the storm drain shall be shown.
- (i) Underground vaults and structures shall include practices to facilitate regular cleaning and maintenance. Confined space entry procedures shall be followed.

2.4.6 Soil Erosion and Sediment Control Plan

A Soil Erosion and Sediment Control plan shall include at a minimum:(

- (a) A drawing indicating type and location of all erosion and sediment control measures required to meet performance standards of the Construction Stormwater General Permit and the Indiana Stormwater Quality Manual during construction and through stabilization.
- (b) A suggested construction sequence to meet erosion and sediment control requirements.
- (c) Standard details indicating the minimum requirements and installation practices for each type of erosion, sediment control, and stabilization measure.

2.4.7 Stormwater Pollution Prevention Plan (SWPPP)

A SWPPP is required for any site which involves the cumulative disturbance of 1-acre or more of ground surface. Requirements for a SWPPP are set forth in the current Construction Stormwater General Permit issued by IDEM. Further information on best practices for SWPPP preparation can be found in the Indiana Stormwater Quality Manual.

2.4.8 As-built Submittal

As-built or record drawings are required in pdf format at the end of the project detailing any changes from the design to stormwater infrastructure including revised inverts, alignment, or structure locations and details. These can either be annotated in the PDF or by other computer aided design software.

2.4.9 Geospatial Data Submittal

Projects requiring a Stormwater Management Permit shall submit geospatial data to CBU prior to kickoff of construction, and shall be updated after substantial completion of the project. Geospatial data shall be submitted in a shapefile or ArcGIS geodatabase digital format. All data submitted will become a part of the public record.

A template for the geospatial data submittal is provided on the City's website at <https://bloomington.in.gov/utilities/stormwater>. All pertinent layers and data fields shall be completed for the development. Additional information is provided at the link provided.

Geospatial data submittals shall include the following features at a minimum:

- (a) **Buildings:** Polygons of new and modified building footprints.
- (b) **Easements and ROW:** Lines delineating right-of-way and any easements within project boundaries.
- (c) **Edge of Pavement:** Lines delineating the outside edges of paved or unpaved streets, parking, sidewalks, trails, bike paths, or any other pavement.
- (d) **Storm Mains:** Features of the storm sewer system represented by a polyline such as pipes, culverts, ditches, hybrid ditches, etc.
- (e) **Storm Structures:** Features of the storm sewer system represented by a point such as manholes, inlets, wet/dry wells, etc.
- (f) **Stormwater Quantity/Quality Features:** Polygons, polylines, or point features of the storm sewer system which treat stormwater runoff for water quality and/or quantity such as detention ponds, mechanical BMPs, forebays, rain gardens, underground detention, etc.

Surveyed information provided shall be spatially verified with a minimum of mapping grade GPS, sub-foot or better. Geospatial data shall be provided in Indiana State Plane West coordinate system using North American Vertical Datum of 1988 (NAVD88).

2.4.10 Operations and Maintenance (O&M) Manual

Following completion of construction, the Owner is responsible for long-term operation and maintenance of stormwater management facilities. Owners will be responsible for all maintenance including but not limited to pond banks, erosion control measures, riprap, vegetation, outfall protection and all periodic cleanout and dredging. It is the designer's responsibility to determine which operation and maintenance measures are necessary to prolong the optimal function of the facility.

Stormwater management facilities including pipes, structures, ponds, detention/retention facilities, bioswales, open channels, subsurface drains, water quality BMPs, and low impact development practices shall have an O&M manual.

Draft O&M Manual submittals must be received by CBU prior to permit approval.

- (a) All O&M manuals shall include the following information, at a minimum:
 - (1) Owner Information. The first section of the manual shall contain information about all people involved with the operations and maintenance of the facility. This section shall list the names and contact information of all responsible parties, including property owner(s), maintenance staff, and person(s) responsible for performing inspections. The responsibilities of each individual shall be clearly defined. Contact information shall include business or mobile phone number, address for giving notice, and email address (if available).
 - (2) Site Map. The O&M manual shall include a site map and exhibits drawn to a legible scale on 8.5"x11" or 11x17" sized page that clearly indicates the following:
 - (A) A north arrow and a legend
 - (B) The location of the stormwater management facility or BMP.
 - (C) Plan and cross-section details, showing applicable features.
 - (D) The flow of stormwater through the site, including an overview of the stormwater's path through the onsite stormwater facilities and BMPs.
 - (E) Dimensions, easements, outlets/discharge points and outfall locations, drainage patterns, stormwater runoff flow directions, the extent and depth (elevation) of high water levels, flood, as that term is defined by the State of Indiana Department of Natural Resources, routing path, signage, connecting structures, weirs, invert elevations, structural controls used to control stormwater flows, and other relevant features.
- (b) O&M Practices. Each stormwater management facility and BMP shall require specific inspection and maintenance procedures.

- (c) Narrative shall be written in simple, layperson's terms, including:
- (1) Guidance on owner-required periodic inspections and inspections to be performed by CBU.
 - (2) Guidance on routine maintenance to be performed by the owner including but not limited to mowing and removal of debris.
 - (3) Guidance on remedial maintenance such as inlet replacement, outlet work, etc. to be performed by the owner.
 - (4) Guidance on sediment removal, both narrative and graphical, describing when sediment removal shall occur to ensure that the stormwater management facility or BMP remains effective as a stormwater management device. Guidance shall include instructions as to how the depth of sediment shall be measured and at what measurement removal will be required.
 - (5) Instructions on inspection and clean-out of BMPs, sumps, trash screens, settling pits, and oil/grease collection chambers.
 - (6) Instructions on proper disposal of removed sediments, trash, debris, and other substances.
 - (7) Guidance and methods for preventing water stagnation and all recommended maintenance.
 - (8) The minimum requirements below shall also be incorporated into the inspection and maintenance regimen and clearly documented in the O&M manual.
 - (9) Operation and maintenance procedures and practices shall be reviewed and assessed annually.
 - (10) Access routes, including roadways and sidewalks, shall be inspected annually and maintained as needed.
 - (11) Drainage structures and flow restrictors shall be inspected and cleaned semi-annually or per the manufacturer's recommendations, whichever is more stringent.
 - (12) Volume control facilities and BMPs shall be inspected semi-annually and after significant rainfall events exceeding one and one-half (1.5) inches (as measured by the National Oceanic and Atmospheric Administration) within a 24-hour period, or per the manufacturer's recommendations, whichever is more stringent.
 - (13) The owner shall keep an updated log book or inspection worksheets documenting the performance of the required operation and maintenance activities for perpetuity. Note inspection dates, facility components inspected, facility condition, and any maintenance performed or repairs made. Documentation must be produced upon the request of the CBU Personnel, within forty-eight (48) hours of the request.
 - (14) Vegetation shall be maintained on a regular basis per design specifications.
 - (15) Pest control measures shall be implemented to address insects, rodents,

- and other pests. Natural pest control is preferred over chemical treatments.
- (16) Mechanical measures shall be maintained on a regular basis per the manufacturer's recommendations.
 - (17) Signage and fencing shall be installed and maintained where necessary to protect property and the public. Native vegetation plantings shall have "No Mow" or other appropriate signage.
- (d) The approved O&M manual shall be signed by the owner and notarized before the Certificate of Completion is issued.
- (1) If the project is not a City-owned project located in the right-of-way, the document(s), in a form acceptable to CBU and City Legal, shall then be recorded at the Monroe County Recorder's Office. A copy of the recorded O&M document(s) shall be provided to CBU.
 - (2) If the O&M document(s) relate to a City-owned project located in the right-of-way, then the document(s), in a form acceptable to CBU and City Legal, shall be kept on file with the City Department that owns and/or maintains the stormwater facilities associated with the project. A copy of the O&M document(s) shall be provided to CBU.
- (e) Right-of-Entry Statement. The O&M manual shall include a statement that CBU has the right to enter the property to inspect the stormwater management facility or BMP.
- (f) Implementation Schedule. An inspection and maintenance schedule shall be prepared in a tabular format and included in the O&M manual. This schedule shall provide for routine examination of all stormwater management facilities and BMPs on the property and incorporate the varying maintenance needs of each.
- (g) Drainage Easement(s) Documentation. The O&M manual shall include a figure showing the location of access and drainage easement(s) around the stormwater management facilities and BMPs.

2.5 Post-Permit Issuance

2.5.1 Notice of Intent

The applicant may not submit the NOI to IDEM (if applicable) or commence land-disturbing activities until the Stormwater Management Permit is issued.

2.5.2 Submittal to Monroe County Soil and Water Conservancy District

If a SWPPP is to be submitted to the Monroe County Soil and Water Conservancy District (SWCD) or directly to IDEM, if directed by the SWCD, then the SWPPP shall be submitted to CBU's MS4 staff for review and a determination made as to whether the plan meets the minimum requirements

of the CSGP prior to submission to SWCD or IDEM.

2.6 Project Closeout

2.6.1 Certificate of Completion

A Certificate of Completion shall be required for any project for which a Stormwater Management Permit was issued by CBU. Requirements to obtain a Certificate of Completion are detailed in the SMO. The list of requirements include:

- (a) An application for a Certificate of Completion submitted to CBU when a project is believed by the responsible parties to be complete.
- (b) As-built plans meeting requirements set forth in this Chapter and shall be provided to CBU prior to the final walkthrough of the site.
- (c) Final site walkthrough and inspection by CBU staff.
- (d) O&M requirements meeting held between CBU, the contractor, and the property owner.
- (e) Revisions to the O&M documents reviewed by CBU, if applicable, signed by the owner, and recorded with property deed(s) or plat(s).
- (f) Recording of drainage, utility, and/or access easements with the Monroe County Recorder's Office. A copy of all recorded easements shall be provided to CBU.
- (g) Delivery of maintenance bond, in an acceptable form, to CBU staff.
- (h) Final submission of geospatial data, including revisions accepted by CBU, and meeting requirements set forth in this Chapter.

CHAPTER 3 - HYDROLOGY

3.1 Purpose

This chapter sets the hydrologic design procedure requirements that shall be followed when determining the quantity of on-site and off-site stormwater runoff for a project site and the impact on upstream and downstream stormwater facilities.

3.2 Determination of Runoff Rates and Volumes

Runoff rates shall be computed for the area of the parcel under development plus the drainage area tributary to the parcel under development. Hydrologic methodology shall be determined as shown in Table 3-1.

Table 3-1 Criteria for Determining Hydrologic Method.

<i>Development Area</i>	<i>Drainage Area</i>	<i>Depressional Storage</i>	<i>Required Methodology</i>
Less than 5 acres	Less than 25 acres	None	Rational Method or TR-55 (curve number)
Less than 5 acres	More than 25 acres	None	TR-55 (curve number) Method
More than 5 acres	More than 25 acres	Significant	
Any	More than 1 sq. mi.	Any	Contact IDNR*

*Note: For the design of any major drainage system (tributary area greater than 1 square mile) the discharge must be obtained from or be accepted by the Indiana DNR. Other portions of the site must use the discharge methodology in the applicable section of this Chapter.

3.2.1 Rational Method

The Rational Method may be used to determine runoff rates for smaller developments or those without detention as listed in Table 3-1. Note that for the purpose of determining the post-developed runoff coefficients, due to significant disturbance to the upper soil layers during the construction activities, the initially determined hydrologic soil group from the NRCS web soil survey for disturbed areas shall be changed to the next less infiltrating capacity category (i.e., A to B, B to C, and C to D).

In the Rational Method, the peak rate of runoff, Q , in cubic feet per second (cfs) is computed as:

$$Q = CIA$$

where;

- Q = Flow
- C = Runoff coefficient representing the characteristics of the drainage area
- I = Average intensity of rainfall in inches per hour for a duration equal to the time of concentration (t_c) for a selected rainfall frequency.
- A = Tributary drainage area in acres.

Values for the runoff coefficient "C" are provided in Table 3-3, which show values for different types of surfaces and local soil characteristics. The composite "C" value used for a given drainage area with various surface types shall be the weighted average value for the total area calculated from a breakdown of individual areas having different surface types. Rainfall intensity shall be determined from the rainfall frequency data shown in Table 3-6.

Table 3-3 Rural Runoff Coefficients

Runoff Coefficients for Hydrologic Soil Group					
Description of Area	% Imp	A	B	C	D
Lawns, open spaces, parks, golf courses cemeteries, etc.					
Flat Slope (0 to 1%)		0.04 – 0.09	0.07 – 0.12	0.11 – 0.16	0.15 – 0.20
Average Slope (2 to 7%)		0.09 – 0.14	0.12 – 0.17	0.16 – 0.21	0.20 – 0.28
Steep Slope (> 8%)		0.14 – 0.18	0.17 – 0.24	0.21 – 0.31	0.28 – 0.38
Parking Lots, Roofs and Driveways		0.95	0.95	0.95	0.95
Streets and Roads:					
Paved w/curbs & storm sewers excl. ROW		0.95	0.95	0.95	0.95
Gravel including ROW		0.62 - 0.67	0.65 - 0.70	0.66 - 0.73	0.67 - 0.75
Dirt including ROW		0.56 - 0.62	0.58 - 0.65	0.59 - 0.68	0.61 - 0.71
Paved w/open ditches including ROW		0.72 - 0.76	0.73 - 0.78	0.74 - 0.79	0.75 - 0.81
Commercial and Business Areas	85%	0.81 - 0.84	0.82 - 0.85	0.83 - 0.86	0.84 - 0.87
Industrial and Manufacturing Districts	72%	0.70 - 0.74	0.71 - 0.75	0.72 - 0.78	0.73 - 0.79
Residential					
1/8 acre lot or less, Apartments and Townhouses	65%	0.64 - 0.68	0.65 - 0.70	0.66 - 0.73	0.67 - 0.75
¼ acre lot	38%	0.39 - 0.48	0.41 - 0.51	0.43 - 0.56	0.46 - 0.60
1/3 acre lot	30%	0.31 - 0.41	0.34 - 0.45	0.37 - 0.51	0.39 - 0.56
½ acre lot	25%	0.27 - 0.38	0.29 - 0.42	0.32 - 0.47	0.35 - 0.53
1 acre lot	20%	0.23 - 0.34	0.25 - 0.39	0.28 - 0.44	0.31 - 0.50
2 acre lot	12%	0.15 - 0.28	0.18 - 0.33	0.22 - 0.39	0.25 - 0.45
Developing Areas					
Newly graded w/o vegetation or control measures		0.63 - 0.69	0.67 - 0.73	0.71 - 0.76	0.77 - 0.83
Newly graded w/ established erosion control measures		0.59 - 0.65	0.60 - 0.67	0.62 - 0.70	0.63 - 0.73
Agricultural Land Uses					
Pasture or Range Land					
Flat Slope (0 to 1%)		0.04 – 0.09	0.07 – 0.12	0.11 – 0.16	0.15 – 0.20
Average Slope (2 to 7%)		0.09 – 0.14	0.12 – 0.17	0.16 – 0.21	0.20 – 0.28
Steep Slope (> 8%)		0.14 – 0.18	0.17 – 0.24	0.21 – 0.31	0.28 – 0.38
Cultivated land with conservation treatments					
Cultivated land without conservation treatments		0.56 - 0.62	0.58 - 0.65	0.62 - 0.70	0.67 - 0.75
Wood or forested land					
Flat Slope (0 to 1%)		0.01 - 0.04	0.02 - 0.07	0.06 - 0.11	0.10 - 0.15
Average Slope (2 to 7%)		0.04 – 0.09	0.07 – 0.12	0.11 – 0.16	0.15 – 0.20
Steep Slope (> 8%)		0.09 – 0.14	0.12 – 0.17	0.16 – 0.21	0.20 – 0.28

3.2.2 TR-55 (Curve Number Method)

In general, TR-55 methodology shall be used as outlined in the U.S. Department of Agriculture (USDA) - NRCS TR-55 Manual. A computer model such as TR-20 (NRCS) or HEC-HMS (USACE) that can generate hydrographs based on the NRCS TR-55 time of concentration and curve number calculation methodologies may be used along with a 24-hour duration NRCS Type II storm.

Table 3-4 provides curve numbers for different land use classifications. Rainfall depths to be used with TR-55 methodology are shown in Table 3-7.

In urban or developed areas, the time of concentration shall be the sum of the inlet time and flow time in the stormwater facility from the most remote part of the drainage area to the point under consideration. The flow time in the storm sewers may be estimated by the distance in feet divided by velocity of flow in feet per second. The velocity shall be determined by the Manning's Equation. Inlet time is the combined time required for the runoff to reach the inlet of the storm sewer. It includes overland flow time and flow time through established surface drainage channels such as bioswales, ditches, and sheet flow across such areas as lawns, fields, and other graded surfaces.

For sheet flow calculations, maximum sheet flow length shall not exceed 100 feet. Note that for the purpose of determining the post-developed conditions curve numbers, due to significant disturbance to the upper soil layers during the construction activities, the initially determined hydrologic soil group for disturbed areas shall be changed to the next less infiltrating capacity category (i.e., A to B, B to C, and C to D).

The post-developed CN for the protected undisturbed or restored disturbed areas may be determined based on pre-development underlying soil layer.

Table 3-4 Curve Numbers for Hydrologic Soil Groups

Curve Number for Hydrologic Soil Group					
Description of Area	% Imp	A	B	C	D
Lawns, open spaces, parks, golf courses cemeteries, etc.					
Good condition 75% or more grass coverage		39	61	74	80
Fair condition 50% to 75% grass coverage		49	69	79	84
Poor condition less than 50% grass coverage		68	79	86	89
Parking Lots, Roofs and Driveways		98	98	98	98
Streets and Roads:					
Paved w/curbs & storm sewers excl. ROW		98	98	98	98
Gravel including ROW		76	85	89	91
Dirt including ROW		72	82	87	89
Paved w/open ditches including ROW		83	89	92	93
Commercial and Business Areas	85%	89	92	94	95
Industrial and Manufacturing Districts	72%	81	88	91	93
Residential					
1/8 acre lot or less, Apartments and Townhouses	65%	77	85	90	92
¼ acre lot	38%	61	75	83	87
1/3 acre lot	30%	57	72	81	86
½ acre lot	25%	54	70	80	85
1 acre lot	20%	51	68	79	84
2 acre lot	12%	46	65	77	82
Developing Areas					
Newly graded w/o vegetation or control measures		77	86	91	94
Newly graded w/ established erosion control measures		74	83	88	90
Agricultural Land Uses					
Pasture or Range Land					
Good condition, protected from grazing		39	61	74	80
Fair condition, some grazing, mowed for hay		49	69	79	84
Poor condition, used for grazing		68	79	86	89
Cultivated land with conservation treatments		62	71	78	81
Cultivated land without conservation treatments		72	81	88	91
Wood or forested land					
Mature stand with good cover		25	55	70	77
Mixed specimens with average cover		36	60	73	79
Thin stand, with poor cover		45	66	77	83

3.3 Rainfall

Rainfall intensity to be used with the Rational Method shall be taken from Table 3-6. Rainfall depths to be used with the TR-55 Method shall be taken from Table 3-7. The NRCS Type II distribution ordinates are found in Table 3-8, and shall be used only when a rainfall generator is not available in the chosen hydrologic modeling software.

Table 3-6 Rainfall Intensities (Inches/Hour) for Storm Durations

Duration	Return Period (Years)					
	2	5	10	25	50	100
5 Min	4.61	6.59	7.46	8.60	9.52	10.4
10 Min	3.58	5.12	5.76	6.58	7.21	7.84
15 Min	2.92	4.19	4.72	5.42	5.95	6.49
30 Min	1.93	2.87	3.28	3.83	4.25	4.69
1 Hour	1.18	1.80	2.09	2.48	2.80	3.13
2 Hour	0.690	1.06	1.23	1.48	1.69	1.92
3 Hour	0.491	0.753	0.883	1.07	1.22	1.39
6 Hour	0.297	0.456	0.535	0.650	0.747	0.853
12 Hour	0.175	0.264	0.307	0.368	0.419	0.474
24 Hour	0.106	0.159	0.185	0.221	0.251	0.283

Source: NOAA, National Weather Service, "Precipitation-Frequency Atlas of the United States", NOAA Atlas 14, Volume 2, Version 3, rev 2006, for City of Bloomington, Indiana. (values for intermediate durations can be logarithmically interpolated.) (All rainfall intensities are based on Annual Maximum series)

Table 3-7 Rainfall Depths (Inches) for Various Return Periods

Duration	Return Period (Years)						
	1	2	5	10	25	50	100
24 Hrs.	2.56	3.07	3.83	4.44	5.31	6.04	6.81

Source: NOAA, National Weather Service, "Precipitation-Frequency Atlas of the United States", NOAA Atlas 14, Volume 2, Version 2, rev 2006, for [your location], Indiana. (Rainfall depths for 2- through 100-year storm are based on annual maximum series. 1-year rainfall depth is based on partial duration series)

Table 3-8 NRCS Type II Rainfall Distribution Ordinates

<i>Cumulative Storm Time (hr)</i>	<i>Cumulative Percent of Storm Depth</i>	<i>Cumulative Storm Time (hr)</i>	<i>Cumulative Percent of Storm Depth</i>	<i>Cumulative Storm Time (hr)</i>	<i>Cumulative Percent of Storm Depth</i>
0.00	0	8.25	12.6	16.50	89.3
0.25	0.2	8.50	13.3	16.75	89.8
0.50	0.5	8.75	14	17.00	90.3
0.75	0.8	9.00	14.7	17.25	90.8
1.00	1.1	9.25	15.5	17.50	91.3
1.25	1.4	9.50	16.3	17.75	91.8
1.50	1.7	9.75	17.2	18.00	92.2
1.75	2	10.00	18.1	18.25	92.6
2.00	2.3	10.25	19.1	18.50	93
2.25	2.6	10.50	20.3	18.75	93.4
2.50	2.9	10.75	21.8	19.00	93.8
2.75	3.2	11.00	23.6	19.25	94.2
3.00	3.5	11.25	25.7	19.50	94.6
3.25	3.8	11.50	28.3	19.75	95
3.50	4.1	11.75	38.7	20.00	95.3
3.75	4.4	12.00	66.3	20.25	95.6
4.00	4.8	12.25	70.7	20.50	95.9
4.25	5.2	12.50	73.5	20.75	96.2
4.50	5.6	12.75	75.8	21.00	96.5
4.75	6	13.00	77.6	21.25	96.8
5.00	6.4	13.25	79.1	21.50	97.1
5.25	6.8	13.50	80.4	21.75	97.4
5.50	7.2	13.75	81.5	22.00	97.7
5.75	7.6	14.00	82.5	22.25	98
6.00	8	14.25	83.4	22.50	98.3
6.25	8.5	14.50	84.2	22.75	98.6
6.50	9	14.75	84.9	23.00	98.9
6.75	9.5	15.00	85.6	23.25	99.2
7.00	10	15.25	86.3	23.50	99.5
7.25	10.5	15.50	86.9	23.75	99.8
7.50	11	15.75	87.5	24.00	100
7.75	11.5	16.00	88.1		
8.00	12	16.25	88.7		

Source: National Resources Conservation Service (NRCS), "TR-20 Computer Program for Project Formulation Hydrology", page F9, May 1982.

NOTE: For use only when SCS Type II rainfall distribution is not a default option in the computer program.

3.3.1 Management of Off-site Runoff

Runoff from all upstream tributary areas (off-site land areas) may be bypassed around the retention/detention facility without attenuation. A separate outlet system or channel may be required in specific situations. Such runoff may also be routed through the detention/retention facility, provided that a separate outlet system or channel is incorporated for the safe passage of such flows, i.e., not through the primary outlet of a detention facility.

Note that the efficiency of the retention/detention facility in controlling the on-site runoff may be severely affected if the off-site area is considerably larger than the on-site area. As a general guidance, on-line detention may not be effective in controlling on-site runoff where the ratio of off-site area to on-site area is larger than 5:1. Additional detention (above and beyond that required for on-site area) may be required by *CBU* when the ratio of off-site area to on-site area is larger than 5:1.

CHAPTER 4 - HYDRAULICS

4.1 Purpose

All storm sewers, whether private or public, and whether constructed on private or public property shall conform to the design standards and other requirements contained herein. Proposed storm sewer systems must be sized and designed to convey at least the 10-year frequency on-site stormwater runoff, as well as the anticipated 10-year frequency tributary off-site stormwater runoff based on the future developed condition.

An analysis of the emergency routing of stormwater runoff through the subject development must be provided to confirm that the development will not obstruct the free flow of floodwaters from the tributary off-site property in its current condition and after development.

4.2 Hydraulic Methodology

4.2.1 Determination Of Hydraulic Capacity for Storm Sewers

Determination of hydraulic capacity for storm sewers must be done using Manning's Equation where:

$$V = (1.486/n)(R^{2/3})(S^{1/2})$$

Then:

$$Q = (V)(A)$$

Where:

- Q = capacity in cubic feet per second
- V = mean velocity of flow in feet per second
- A = cross sectional area in square feet
- R = hydraulic radius in feet
- S = slope of the energy grade line in feet per foot
- n = Manning's "n" or roughness coefficient

The hydraulic radius, R, is defined as the cross-sectional area of flow divided by the wetted flow surface or wetted perimeter. Allowable "n" values and full-flow maximum permissible velocities for storm sewer materials are listed in Table 4-2.

Table 4-1 Typical Values of Manning's "n" and Maximum Velocities

<i>Material</i>	<i>Manning's "n"</i>	<i>Maximum Velocities (feet/second)</i>
Closed Conduits		
Concrete	0.013	10
Vitrified Clay	0.013	10
HDPE & Polypropylene	0.012	10
PVC	0.012	10
Corrugated Metal Pipe	0.024	7
Open Channels		
Concrete, Trowel Finish	0.013	10
Concrete, Broom Finish	0.015	10
Gunite	0.018	10
Riprap Placed	0.030	10
Riprap Dumped	0.035	10
Gabion	0.028	10
New Earth (1)	0.025	4
Existing Earth (2)	0.030	4
Dense Growth of Weeds	0.040	4
Dense Weeds and Brush	0.040	4
Bioswale	0.040	4

Source of manning "n" values: HERPICC Stormwater Drainage Manual, July 1995.

- (1) New earth (uniform, sodded, clay soil)
- (2) Existing earth (fairly uniform, with some weeds).
- (3) Values assume good condition.

4.2.2 Inlet Sizing and Spacing

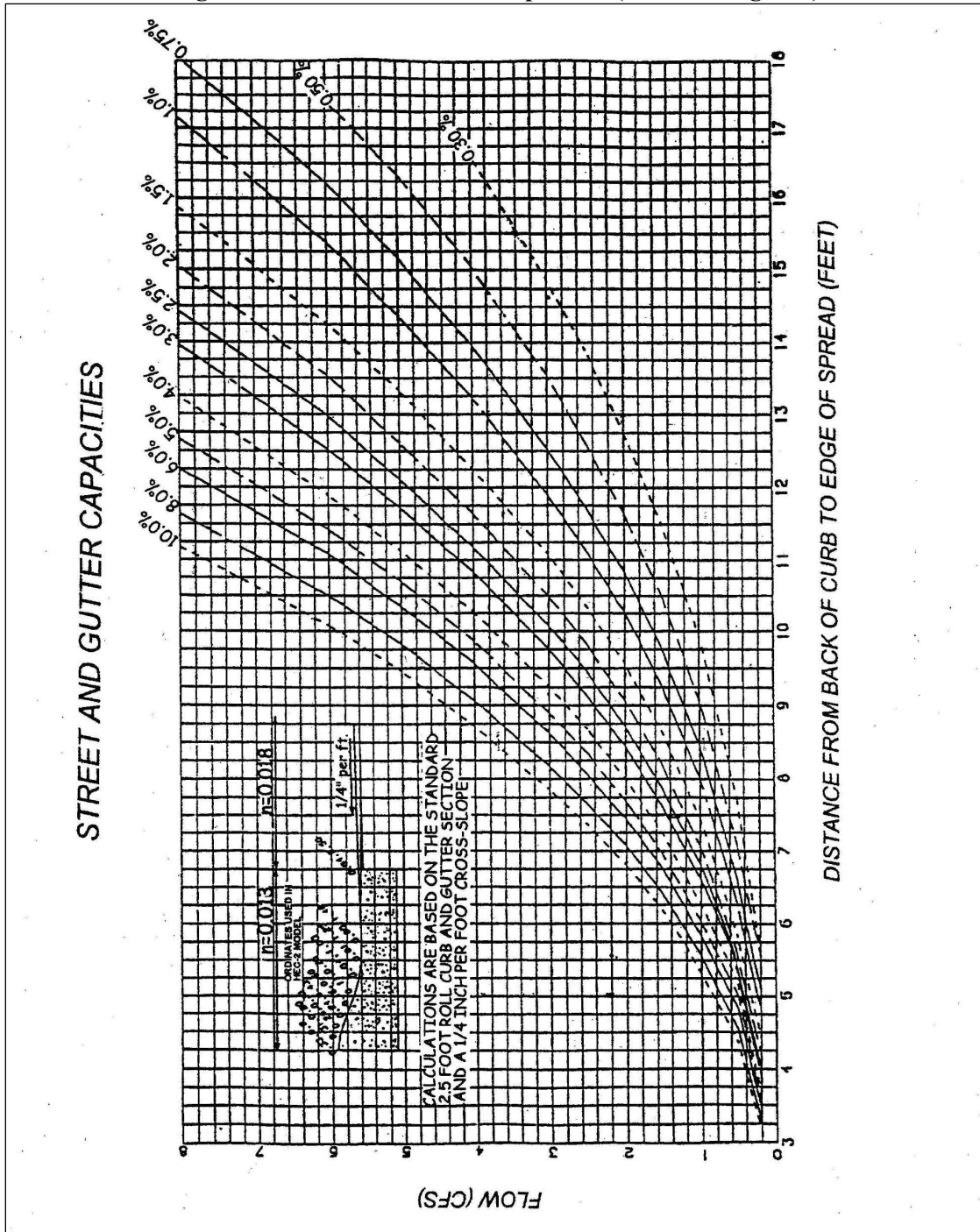
Inlets or drainage structures shall be utilized to collect surface water through grated openings and convey it to storm sewers, channels, or culverts. The inlet grate opening provided shall be adequate to pass the design 10-year flow with 50% of the sag inlet areas clogged. Inlets shall be provided so that surface water is not carried across or around any intersection nor for a distance greater than five hundred (500) feet. An overflow channel from sag inlets to the overflow channel or basin shall be provided at sag inlets. Inlet design and spacing may be done using the hydraulic equations by manufacturers' or orifice/weir equations.

CBU requires the use of an 18-inch gutter pan where curb and gutter is utilized. The minimum longitudinal slope of the gutter shall be 0.50%, unless waived by CBU.

Gutter spread on continuous grades may be determined using the Manning's equation, or by using Figure 4-3. Further guidance regarding gutter spread calculation may be found in the latest edition of LTAP Stormwater Drainage Manual, available from the Local Technical Assistance Program (LTAP). At the time of printing of this document, contact information for LTAP was:

Indiana LTAP
Purdue University
Email: inltap@ecn.purdue.edu
Website: www.purdue.edu/INLTAP/

Figure 4-3 Street and Gutter Capacities (continuous grade)



4.2.3 Pavement Encroachment

Local streets shall be designed so that one clear 8.0-foot travel lane is maintained during the 10-year storm. Arterials and Collectors shall be designed so that runoff does not reduce the clear travel lane to less than 8.0 feet for any lane. Bicycle lanes and on street parking spaces may be fully encroached with stormwater runoff during the 10-year storm. Deviation from these requirements may be granted by City of Bloomington Engineering Department.

Roadway classifications may be found in the City of Bloomington Transportation Plan.

4.2.4 Adequate Outlet

If an adequate outlet is not located on site, then off-site drainage improvements may be required. Those improvements may include, but are not limited to, extending storm sewers, clearing, dredging and/or removal of obstructions to open drains or natural water courses, and the removal or replacement of undersized culvert pipes as required by the CBU.

4.2.5 Special Hydraulic Structures

Special hydraulic structures required to control the flow of water in storm runoff drainage systems include junction chambers, drop manholes, stilling basins, and other special structures. The use of these structures shall be limited to those locations justified by prudent planning and by careful and thorough hydraulic engineering analysis. Certification of special structures by a certified Structural Engineer may also be required.

4.2.6 Non-Gravity Flow Stormwater Systems

Stormwater facilities shall be designed to convey stormwater runoff by gravity flow unless otherwise approved by CBU. In the case that a stormwater facility, such as a lift station, is required, the developer shall coordinate with CBU.

4.3 General Hydraulic Requirements

- (a) The minimum design frequency refers to the design requirements that must be maintained to keep a facility serviceable. In addition to the minimum design frequency, critical structures such as buildings or bridges must be protected from flooding during larger storm events.
- (b) All storm sewers, inlets, catch basins, and street gutters (subject to the “allowable spread” provisions discussed later in this Section) shall accommodate, as a minimum, peak runoff from a 10-year return frequency. Storm sewers shall be designed to convey the 10-year peak flow without surcharge. Any tributary offsite areas must be considered in all design calculations.
- (c) Driveway culvert capacities shall be the same as required for the street classification to which the driveway connects.

- (d) Greater culvert capacity shall be required to protect the finished floor elevation of buildings from the post-developed 100-year frequency storm when, in the opinion of the design engineer or CBU, the finished floor elevation is threatened. If the street or road provides the only access to or from any portion of any commercial or residential development, the crossing shall be designed for a minimum of 100-year frequency storm.
- (e) To ensure access to buildings and allow the use of the roadway by emergency vehicles during storms larger than the design storm, an overflow channel/bioswale between sag inlets and overflow paths or basin shall be provided at sag inlets so that the maximum depth of water that might be ponded in the street sag shall not exceed 7 inches measured from elevation of gutter. All water shall be contained in the right-of-way for a 100-year storm.
- (f) For all new drain tiles and pipes carrying offsite flow from the property smaller than 24 inches in diameter shall be placed in a 20-foot easement (10 feet from centerline on each side) and shall be designated on the record deed or plat as 20-foot Drainage Easement. Pipes that are 24 inches or larger in diameter, shall be placed in a 30-foot easement (15 feet from centerline on each side) and shall be designated on the record plat as 30-foot Drainage Easement. Wider easements may be required by the CBU or designee when the depth of pipe is greater than 6 feet.
- (g) Driveway approaches shall not block flow along the curb. If new developments utilize roll curb the approach should be lowered to the street level.
- (h) When an existing line is extended, the full segment shall be replaced with like material at the same slope and diameter as the existing.
- (i) When road widening occurs, existing inlets need removed and replaced at the curb line not left in traffic paths.

4.3.1 Connections To Storm Sewer System

To allow any connections to the storm sewer system, provisions for the connections shall be shown in the drainage calculations for the system. Specific language shall be provided in the protective covenants, on the record plat, or with the parcel deed of record, noting the ability or inability of the system to accommodate any permitted connections, for example, sump pumps and footing drains.

- (a) **Sump pumps** installed to receive and discharge groundwater or other stormwater shall be connected to a sub-surface drain provided by the developer. Sump pumps installed to receive and discharge floor drain flow or other sanitary sewage shall be connected to the sanitary sewers. A stormwater sump pump shall only be used for the discharge of stormwater.
- (b) **Footing drains and perimeter drains** shall be connected to the sub-surface drain provided by the developer.

- (c) All **roof downspouts**, roof drains, or roof drainage piping shall not be directly connected to the public storm system. Variation from this requirement may be requested and granted by the CBU in special circumstances. No downspouts or roof drains shall be connected to the public sanitary sewers. This is only applicable for public infrastructure.
- (d) Commercial, industrial, and institutional buildings that have their own private storm sewers may direct such drains directly to their systems.
- (e) **Garage and Basement floor drains** shall not be connected to the storm sewers.
- (f) **Swimming Pool drains** shall not be connected to the storm sewers unless the water is dechlorinated prior to being connected to the storm sewer.
- (g) **INDOT Connections** shall be coordinated and approved by INDOT.

In addition, none of the above-mentioned drains shall be connected to any road sub-drain/street underdrains, unless requested as a variance and specifically authorized by the CBU.

4.3.2 Side Slopes

Side slopes of bioswales, overland flow and banks shall be designed to prevent erosion and promote plant growth on the slopes. The following requirements shall be followed:

- (a) Side-slopes shall be no steeper than 3 (horizontal) to 1 (vertical).
- (b) Vegetated areas in or directly adjacent to BMP's steeper than 4 (horizontal) to 1 (vertical) shall be stabilized by plugs.
- (c) Non-vegetated side slopes such as rock riprap and concrete paving will be approved only in special circumstances. CBU reserves the right to reject proposals for non-vegetated side slopes for any reason.
- (d) Retaining walls shall be considered for use in open channels where side slopes exceed 1-1/2 (horizontal) to 1 (vertical). Weep holes shall be installed along all channels with paved side slopes and retaining walls to relieve hydrostatic pressure from groundwater.

4.3.3 Riprap

Riprap shall be limited to those areas at the inlet and outlet below the water surface elevation produced by the 10-year storm event. In no case will riprap be allowed as a material for the floor of the culvert. The use of riprap in open channels and on side slopes will be permitted by CBU only in the case that other stabilization methods, such as vegetation matting or geogrids, are not adequate.

4.4 Storm Sewer Requirements

4.4.1 Minimum Size for Storm Sewers

The minimum diameter of all storm sewers shall be 12 inches. When the minimum 12-inch diameter pipe will not limit the rate of release to the required amount, the rate of release for detention storage shall be controlled by an orifice plate or other device, subject to acceptance of the CBU.

4.4.2 Pipe Cover, Grade, And Separation from Sanitary Sewers

Pipe grade shall be such that, in general, a minimum of 2.0 feet of cover is maintained over the top of the pipe. If the pipe is to be placed under pavement, or within 5 feet of the pavement, then the minimum pipe cover shall be 2.5 feet from top of pavement to top of pipe. Cover less than 2.0 feet over the top of the pipe shall be permitted in certain situations where providing more cover is impractical. In these situations, a more robust engineering design including stronger pipe materials or backfill shall be included in the design details. Uniform slopes shall be maintained between inlets, manholes and inlets to manholes. Final grade shall be set with full consideration of the capacity required, sedimentation problems, and other design parameters.

A minimum of 6-inches of vertical separation and 5 feet horizontal separation between storm sewers and sanitary sewers shall be required. When this is not possible, the sanitary sewer must be encased in concrete or ductile iron within 5 feet, each side, of the crossing centerline.

4.4.3 Storm Sewer Slope

Minimum and maximum allowable slopes shall be those capable of producing velocities of between 2.5 and 10 feet per second, respectively, when the sewer is flowing full. Maximum permissible velocities for various storm sewer materials are listed in Table 4-1. Alignment Storm sewers shall be straight between manholes and/or inlets.

4.4.4 Manholes/Inlets

Manholes and/or inlets shall be installed to provide human access to continuous underground storm sewers for the purpose of inspection and maintenance per the following standards. The casting access minimum inside diameter shall be no less than 22 inches or a rectangular opening of no less than 22 inches by 22 inches. Steps shall be provided in structures deeper than 4 feet, with the first step at the depth of 2 feet and the following steps spaced every 1 foot until the bottom is reached. When grade adjustments of manholes and inlets are required in the field to meet finish design or existing curb grade, adjustment rings with a maximum height of 12 inches may be used. Manholes/Inlets shall be provided at the following locations:

- (1) Where two or more storm sewers converge.
- (2) Where pipe size or the pipe material changes.
- (3) Where a change in horizontal alignment occurs.

- (4) Where a change in pipe slope occurs.
- (5) At intervals in straight sections of sewer, not to exceed the maximum allowed. The maximum distance between storm sewer manholes shall be as shown in Table 4-2.

Table 4-2 Maximum Distance Between Manholes

<i>Size of Pipe (Inches)</i>	<i>Maximum Distance (Feet)</i>
12 through 42	400
48 and larger	600

Manhole/inlet inside sizing shall be according to the CBU Construction Specification for Wastewater, Water, and Storm Projects.

When changing pipe size, match crowns of pipes unless detailed modeling of hydraulic grade line shows that another arrangement would be as effective. Pipe slope shall not be so steep that inlets surcharge (i.e. hydraulic grade line shall remain below rim elevation).

Plans shall note that all inlets castings must be pre-stamped with “Dump no waste, drains to waterways”.

4.4.5 Materials, Installation and Workmanship

Materials, installation, and workmanship are specified in the CBU Construction Specifications for Wastewater, Water, and Storm Projects. (most current version). <https://bloomington.in.gov/engineering/resources>

4.5 Bioswales and Overland Flow Requirements

4.5.1 Drainage of Bioswales

All bioswales shall meet the following requirements and the specifications of the CBU or designee:

- (a) Minimum bioswale flow line slopes are 1%.
- (b) The side slopes of bioswales shall follow requirements set in Section 4.3.2.
- (c) Maximum bioswale flow line slopes are 7%.
- (d) All flow shall be confined to the specific easements associated with each rear and side lot bioswale that are part of the minor drainage system.

- (e) A minimum of 20 feet along the bioswale (10 feet from each side of the centerline) must be designated on the recorded deed or plat as Drainage Easement.

4.5.2 Drainage System Overflow Design

The overflow path and ponding areas shall be calculated with the storm system assumed to be plugged and including all flows from any contributing drainage areas, on-site, and off-site with their proposed anticipated land use. The centerline of this 100-year overflow path shall be clearly shown as a distinctive line symbol on the plans. Easements must cover the emergency overflow path. Encroachments into such easement shall be considered on a case by case basis.

A continuous flood route from the sag inlets to the final outfall shall be shown and the minimum wide enough to contain the 100-year flood elevation or a minimum of 10-feet along the centerline contained within an easement. This overflow path/easement area shall be shown on the plans as hatched area or another distinctive symbol. No obstructions, such as fences or walls, or landscaping, ground-cover notwithstanding shall be constructed within the easement areas in the emergency overflow paths. These areas are easements that are to be maintained by the property owners or be designated as common areas to be maintained by the appropriate homeowner’s association.

The minimum adjacent grade of the portion of any residential, commercial, or industrial building (the ground elevation next to the building after construction is completed that sits adjacent to the emergency flood route or may be subject to flooding by the emergency flood route) shall be a minimum of 1 foot above the estimated 100-year elevation of the emergency flood route assuming that all stormwater pipes are fully clogged. The required minimum adjacent grade of buildings adjacent to an overflow path is provided in Table 4-2 or as alternatively calculated as discussed below.

Table 4-3 Minimum Building Adjacent Grade with Respect to Overflow Path Invert Elevations

<i>Drainage Area (Acres)</i>	<i>Minimum Building adjacent Grade Above Overflow Path Invert (Feet)¹</i>	<i>Minimum Building Adjacent Grade Above Overflow Path Invert, if Overflow Path is in the Street (Feet)¹</i>
Up to 5	2.50	1.50
6-10	3.00	1.50
11-15	3.25	1.75
16-20	3.50	1.75
21-30	4.00	2.00
30-50	4.25	2.00

Notes: ¹ The overflow path Invert refers to the elevation of the flow line of the emergency flow route (typically in the form of a channel, bioswale, or gutter) nearest to the upstream end of a building

As an alternative to using default values in Table 4-3, the overflow path/ponding may be modeled as successive series of natural ponds and open channel segments. For simplification, occasional ponding along the overflow path may be ignored. The calculations for determining the 100-year overflow path/ponding elevations may be based on hand calculation methods utilizing normal depth calculations and storage routing techniques or performed by computer models.

Simply using the values in Table 4-3 is preferred over the much more complicated detailed modeling of the overflow/ponding areas. However, regardless of the methodology used, CBU reserves the right to require independent calculations to verify that the proposed building minimum adjacent grade facing the flood route or the portion of building having a potential to be subject to flooding by the flood route provide adequate freeboard above the anticipated overflow path/ponding elevations.

In case there are more than one flooding sources applicable to a building site, the highest calculated value from Table 4-3 for the building shall govern the placement of the building on that site

In the case of existing upstream detention, an allowance equivalent to the reduction in flow rate provided may be made for upstream detention only when: (1) such detention and release rate have previously been accepted by the CBU or other official charged with the approval authority at the time of the acceptance, and (2) evidence of its construction and maintenance can be shown.

4.6 Culvert Requirements

4.6.1 Culverts Minimum Diameter

The minimum diameter for culverts in public right-of-way shall be 12 inches.

4.6.2 Culvert Minimum Velocity

The minimum design flow velocity in all culverts shall be 3 ft/sec. The maximum velocity at the inlet and outlet shall be limited by the proposed and existing characteristics and conditions affected by erosion and scour.

Energy dissipaters shall be required at outfall locations that are expected to experience erosion.

4.6.3 Maximum Allowable Headwater Elevation

The maximum allowable design headwater for new culverts shall comply with the most stringent of the following:

- (a) Two feet below the lowest ground elevation adjacent to a permanent structure (storage sheds excluded) for a 100-year storm event.
- (b) 0.3 feet below the outside edge of travel lane for the design flow.

- (c) Net increase over existing headwater elevation of no more than 1 foot.

4.6.4 End Treatments

All pipes and culverts in open channels shall have end treatments. Acceptable treatments are summarized below:

- (a) Metal or Concrete Pipe End Section – To be used for all pipes 36 inches or less in diameter, when the skew of the pipe is less than 10 degrees, and when the opening is outside of the roadway clear zone.
- (b) Grated Box End Section – To be used for unprotected pipe ends in the roadway clear zone, when the pipe is greater than 36 inches in diameter, or when a pipe of any size is skewed more than 10 degrees.
- (c) Headwall – Can be used with any pipe opening located outside of the roadway clear zone in lieu of a pipe end section.

CHAPTER 5 - DETENTION REQUIREMENTS

5.1 Purpose

This chapter defines the operational and physical requirements for storage facilities that are to control runoff.

Detention facilities shall be constructed to retain and/or temporarily detain the stormwater runoff that exceeds the maximum peak release rate authorized by the Ordinance and these technical standards. The required volume of storage provided in these detention facilities, together with such storage as may be authorized in other on-site facilities, shall be sufficient to control excess runoff from the 10-year or 100-year storm as explained in Chapter 3. Also, detention facilities shall be constructed to provide adequate capacity to allow for sediment accumulation resulting from development and to permit the facilities to function for reasonable periods between cleanings.

5.2 Types of Runoff Storage Facilities

5.2.1 Storage Basins

Storage basins can be a dry bottom detention basin or wet bottom retention basin and may be incorporated with GI. A dry detention basin is designed with an outlet at an elevation such that runoff completely drains over 48 hours or less. A wet bottom retention basin is constructed to retain a permanent volume of water, to store runoff received from storm events above the normal water surface level of the basin, and to drain the volume over a period of time to return the pond to the normal water surface level.

5.2.2 Other Types of Storage

Other methods of stormwater storage and release may be considered. Alternative types of storage may be considered including, but not limited to, underground storage, non-gravity systems, and rooftop storage. These methods may be beneficial for small watersheds with high percentages of impervious surface and where only a small percentage of the project site is available for the storage of runoff.

5.3 General Requirements for Detention

- (a) The design shall ensure that a minimum 90% of the original retention/detention capacity is restored within 48 hours from the end of the design 100-year storm.
- (b) The extents of the 100-year above-ground water surface elevation of stormwater retention/detention facilities shall be separated by not less than 10 feet from any building or structure to be occupied. The Lowest Adjacent Grade (including walkout basement floor elevation) for all residential, commercial, or industrial buildings shall be set a minimum of 2 feet above the 100-year above-ground water elevation or 2 feet above the emergency overflow weir elevation,

whichever is higher. In addition to the Lowest Adjacent Grade requirements, any basement floor must be at least a foot above the normal water level of any wet-bottom pond or the local groundwater table, whichever is higher, to avoid the overuse of sump pumps and frequent flooding of the basement.

- (c) Above -ground electrical facilities shall not be placed within the extents of the 100-year above-ground water elevation. Detention facilities adjacent to parking lots and roadways shall be separated by an appropriately-selected and designed method of safety barrier, such as guard rails, bollards, or other physical barriers capable of deterring the passage of a vehicle into the pond.
- (d) Outlet control structures shall be designed to operate as simply as possible and shall require little to no maintenance for proper operation. For maintenance purposes, the outlet from the pond (if any) shall be a minimum of 0.5 foot above the normal water level of the receiving water body. They shall limit discharges into existing or planned downstream channels or conduits so as not to exceed the predetermined maximum authorized peak flow rate. If an outlet control structure includes an orifice to restrict the flow rate, such orifice shall be 6 inches in diameter at minimum.
- (e) Emergency overflow facilities such as a weir or spillway shall be provided for the release of exceptional storm runoff or in emergency conditions shall the normal discharge devices become totally or partially inoperative. The overflow facility shall be of such design that its operation is automatic and does not require manual attention.
- (f) Emergency overflow facilities shall be designed to convey the peak inflow to the basin resulting from the 100-year design storm event runoff from the entire tributary area with 1-foot of freeboard to the top of berm. Peak flow shall be developed assuming post-development condition on-site and existing condition off-site. Depth of water over the spillway (high water level in the basin) shall be determined using the broad-crested weir equation:

$$Q = 3LH^{\frac{3}{2}}$$

where;

Q = 100-year runoff (peak inflow to basin),

L = Length of weir in feet, and

H = Depth of water over spillway.

- (g) The emergency overflow routing from the emergency overflow facility to an adequate receiving system must be positive (by gravity) and shown on the construction plans. It must be sized to accommodate the design flow of the pond's emergency overflow weir. A minimum safety factor of 2' outside of the 100-year event along the centerline of this emergency overflow route or the flow width required to accommodate the emergency spillway design flow, whichever is greater, shall be designated as permanent drainage easement. This

emergency overflow path/easement area shall be shown on the plans as hatched area or another distinctive symbol. No fences or landscaping can be constructed within the easement areas. The lowest adjacent grade of all residential, commercial, or industrial buildings along this emergency overflow route shall be set a minimum of 2 feet above the flood elevation along the route, calculated based on the pond's emergency overflow weir design discharge.

- (h) Grass or other suitable vegetative cover shall be provided along the banks of the retention/detention storage basin. Vegetative cover around detention facilities shall be maintained as appropriate.
- (i) Debris and trash removal and other necessary maintenance shall be performed on a regular basis to assure continued operation in conformance to design.
- (j) No residential lots or any part thereof shall be used for any part of a detention basin assumed full to the 100-year water surface elevation or the emergency overflow weir elevation, whichever is higher. Detention basins, assumed full to the 100-year water surface elevation or the emergency overflow weir elevation, whichever is higher, shall be placed within a common area either platted or legally described and recorded as a perpetual drainage easement.
- (k) A minimum of ten (10) feet horizontally from the top of bank of the facility, or the 100-year pool if no defined top of bank is present, shall be dedicated as permanent drainage easement if the above-noted boundary of the common area does not extend that far. Within this easement area, no trees shall be planted within 15 feet of any pipe outlet entering the pond or the outlet for the pond.
- (l) In addition, an exclusive easement to assure access to the pond from an adjacent public street/road right of way shall be required. No above-ground utilities or other obstruction that may hinder access shall be allowed within this exclusive access easement. Additional access easements may be required for larger ponds.
- (m) Side slopes shall be completely seeded or sodded, with a minimum of 6 inches of topsoil. Seed and sod shall be designed such that it will be capable of withstanding periodic flooding.
- (n) Outlets which discharge overland or to open channels shall be designed to eliminate the potential for erosion.
- (o) Whenever possible, the basin shall be designed to serve secondary or multipurpose functions. Recreational facilities, aesthetic qualities (open spaces) or other types of uses shall be considered in detention facility planning.
- (p) Landscaping shall be native vegetation. Acceptable planting species can be found in Appendix C.

5.4 Additional Requirements for Wet Bottom Basins

Where part of a detention facility will contain a permanent pool of water, all the items required for detention storage shall apply. Also, a controlled positive outlet will be required to maintain the design water level in the wet bottom facility and provide required detention storage above the design water level. However, the following additional conditions shall apply:

- (a) Facilities designed with permanent pools or containing permanent lakes shall have a water area of at least one-half (0.5) acre with a minimum depth of six (6) feet. The remaining pond area shall have no extensive shallow areas, except as required to install the safety ramp, safety ledge, and BMPs as required below. Construction trash or debris shall not be placed within the permanent pool.
- (b) All wet detention/retention ponds must be constructed in as natural a shape (footprint) as possible and have a vegetated safety ledge (approximately 6 inches below normal pool) and/or have native vegetation planted on the pond banks to create a riparian buffer (minimum 10 feet wide). Native vegetation can be installed as container grown plants or as seed at the time of construction. If native vegetation is planted on the pond banks, signage must be provided indicating that it is a natural “Do Not Mow” area. The vegetation shall be planted in a manner so as not to hide or disguise the ponds edge. Maintenance of the vegetated barrier shall be the responsibility of the owner or the homeowners’ association. All pond slopes shall follow requirements set in Section 4.24.
- (c) A maintenance ledge six (6) feet in width is required and shall be installed approximately 12 inches above the permanent water level and a non-vegetated safety ledge ten (10) feet in width is required and shall be installed approximately 18 inches below normal pool. The slope between the two ledges shall be stable and protected from erosion.
- (d) The maintenance ledge may be waived if pond side slopes above normal water are 6:1 or flatter. Retention/detention basins shall be designed with an additional ten (10) percent of available capacity to allow for sediment accumulation resulting from development and to permit the pond to function for reasonable periods between cleanings. Basins shall be designed to collect sediment and debris in specific locations, such as a forebay, so that removal costs are kept to a minimum. For wet-bottom ponds, the sediment allowance may be provided below the permanent pool elevation. No construction trash or debris shall be allowed to be placed within the permanent pool. If the pond is used as a sediment control measure during active construction, the performance sureties will not be released until sediment has been cleaned out of the pond and elevations and grades have been reestablished as noted in the accepted plans.

- (e) When the allowable runoff is released in an area that is susceptible to flooding or erosion, the developer may be required to construct appropriate storm drains through such area to avert increased flood hazard caused by the concentration of allowable runoff at one point instead of the natural overland distribution. The requirement of diffused outlet drains shall be at the discretion of CBU.
- (f) Prior to final acceptance of construction and release of bonds, danger signs warning of deep water, possible flood conditions during storm periods, or other dangers, shall be installed at an interval of 400 feet around the perimeter of wet-bottom facilities without a vegetated safety ledge, riparian buffer, or a security fence. Maintenance of the warning signs shall be the responsibility of the owner or the homeowners' association.
- (g) If a retaining wall is used below the normal pool of wet detention pond, the wall shall have either steps or a ladder incorporated into the construction at the center of the wall span.
- (h) A safety ramp exit from the lake shall be required in all cases and shall have a minimum width of twenty (20) feet and exit slope of 6 horizontal to 1 vertical (6:1). The safety ramp shall be constructed of suitable material to prevent structural instability due to vehicles or wave action. Adequate access to the safety ramp shall be provided by locating it adjacent to public right-of-way or by providing a clear route recorded within an access easement or a common area.
- (i) In parks, playgrounds, and athletic fields shall be separated from all stormwater detention facilities by no less than 100 feet, measured from the extents of the 100-year pool of the pond. Trails and sidewalks shall be separated from all stormwater detention facilities by no less than 25 feet, measured from the 100-year pool of the pond.
- (j) Periodic maintenance is required in lakes to control weed and larval growth. The facility shall also be designed to provide for the easy removal of sediment that will accumulate during periods of reservoir operation. A means of maintaining the designed water level of the lake during prolonged periods of dry weather may also be required.
- (k) For maintenance purposes, the outlet of storm sewers entering the pond shall be a minimum of 0.5 foot above the normal pool level.
- (l) Methods to prevent pond stagnation, including but not limited to surface or sub-surface aeration or destratification facilities that can, at the minimum, achieve one complete pond volume turnover per day shall be considered
- (m) Design calculations to substantiate the effectiveness of proposed aeration facilities shall be submitted with final engineering plans. Design calculations shall, at a minimum, indicate that the device and/or series of devices are providing a minimum volume turnover of once per 24 hours over the majority

of the pond volume (i.e. pump radius of influence calculations, etc.). Agreements for the perpetual operation and maintenance of aeration facilities by the property owner or the HOA and included in the O&M manual.

- (n) If the detention pond is also proposed to be for water quality, alternative means of aeration (such as diffuser aeration systems) shall be used that would not result in re-suspension of sediment particles and would not prevent the efficient settling of sediment particles.
- (o) If the facility is being located near an airport, a minimum horizontal separation distance between the airport property and the pond will need to be provided in accordance to Federal Aviation Administration (FAA) advisory Circular 150/5200-33, titled “Hazardous Wildlife Attractions On or Near Airports” and dated 8/28/2007, or the latest update of the same.
- (p) No detention facilities are allowed within FEMA regulatory floodplains.
- (q) Any construction in the floodway of a stream with a drainage area of one square mile or more must satisfy IDNR permit requirements.
- (r) Around the top of the basin, a drivable area shall be constructed with a flat embankment, minimum 10 feet in width to allow access by maintenance vehicles.
- (s) A 10-foot wide earthen safety ledge shall be installed within the outer periphery of the pond between 9 inches and 15 inches below the normal pool elevation. The ledge must be designed such that an individual can walk to a traversable exit point.
- (t) No wet bottom detention basins shall be constructed within a one-mile radius of an airport property.
- (u) Flow length shall be maximized between the primary inflow structure and the outflow structure. Use baffles if short-circuiting cannot be prevented with inflow-outflow placement.
- (v) Provide a sediment forebay or other pretreatment upstream of the inflow structure.
 - (1) The forebay must be sized to contain 0.1 inches of runoff per each impervious acre of contributing drainage. The forebay storage volume counts toward the total water quality storage requirements (see Chapter 6).
 - (2) Exit velocities from the forebay must be non-erosive.
 - (3) Direct maintenance access for appropriate equipment must be provided to the forebay.
 - (4) The bottom of the forebay may be hardened (e.g., using concrete, paver blocks, etc.) to make sediment removal easier.

- (5) A permanent vertical sediment depth measurement system must be installed in the forebay to measure sediment deposition over time. The system must be designed such that it remains intact during the forebay cleanings.

5.5 Additional Requirements for Dry-Bottom Facilities

In addition to general design requirements, retention/detention facilities that will not contain a permanent pool of water shall comply with the following requirements:

- (a) Provisions shall be incorporated into facilities for complete interior drainage of dry bottom facilities, including the provisions of natural grades to outlet structures (if any), longitudinal and transverse grades to perimeter drainage facility. Unless designed as a retention facility, a dual-walled 6-inch underdrain with a minimum of 1.5 feet of cover shall be provided within all dry-bottom ponds.
- (b) Around the top of the basin, a drivable area shall be constructed with a flat embankment to provide sufficient access to the basin for maintenance.
- (c) Provisions shall be incorporated to facilitate complete interior drainage and dewatering of dry bottom basins, unless the basin is constructed as green infrastructure.
- (d) Basins shall include minimum longitudinal grades of 1.5% to outlet structures and 2% transverse grades from perimeter areas. For slopes less than 1.5%, a underdrain shall be used.

5.6 Additional Requirements for Stormwater Wetland

Stormwater wetlands are artificial wetlands created for the purposes of stormwater pollutant removal and quantity control. It is the intent of CBU to encourage regional stormwater wetlands.

Prior to stormwater management plan approval, the following design and site considerations must be followed:

- (a) A water balance must be performed to demonstrate that a stormwater wetland could withstand a thirty-day drought at summer evaporation rates without completely drawing down. Inflow of water must be greater than that leaving the basin by infiltration or exfiltration. The following water balance equation shall be used in calculations:

$$S = Q_i + R + I_{nf} - Q_o - ET$$

Where:

S = net change in storage

Q_i = stormwater runoff inflow

R = contribution from rainfall

I_{nf} = net infiltration (infiltration – exfiltration)

Q_o = surface outflow
ET = evapotranspiration

- (b) The wetland must be designed for an extended detention time of 48 hours for the WQv. The orifices used for extended detention will be vulnerable to blockage from plant material or other debris that will enter the basin with stormwater runoff. Therefore, some form of protection against blockage must be installed (such as some type of non-corrodible wire mesh).
- (c) The frequently flooded zone surrounding the wetland must be located within the permanent easement.
- (d) The surface area of the wetland must account for a minimum of 1 percent of the area of the watershed draining into it (1.5 percent for a shallow marsh design). The length to width ratio must be at least 2:1.
- (e) The design must incorporate long flow paths through the wetland, as appropriate.
- (f) A forebay shall be established at the pond inflow points to capture larger sediments and shall be 4 to 6 feet deep. The depth of the forebay shall contain approximately 10 percent of the total volume of the normal pool. Direct maintenance access to the forebay must be provided with access 25 feet wide minimum and 5:1 slope maximum. Permanent sediment depth markers must be provided.
- (g) If high water velocity is a potential problem, some type of energy dissipation device must be installed.
- (h) Site preparation: Soil types conducive to wetland vegetation shall be used during construction. The wetland must be designed to allow slow percolation of the runoff through the substrate (add a layer of clay for porous substrates). Ensure that the substrate, once flooded, is soft enough to permit relatively easy insertion of the plants.
- (i) Planting: The designer must maximize use of existing- and post-grading pondscaping design to create both horizontal and vertical diversity and habitat. A minimum of two aggressive wetland species of vegetation shall be established in quantity on the wetland. Three additional wetland species of vegetation shall be planted on the wetland, although in far less numbers than the two primary species. 30 to 50 percent of the shallow (12 inches or less) area of the basin shall be planted with wetland vegetation. The optimal depth requirements for several common species of emergent wetland plants are often six inches of water or less. Approximately 50 individuals of each secondary species must be planted per acre; set out in 10 clumps of approximately five individuals and planted within six feet of the edge of the pond in the shallow area leading up to the ponds edge; spaced as far apart as possible, but there is no need to segregate species to different areas of the wetland. Wetland mulch,

if used, shall be spread over the high marsh area and adjacent wet zones (-6 to +6 inches of depth) to depths of 3 to 6 inches. A minimum 25 foot buffer, for all but pocket wetlands, must be established and planted with riparian and upland vegetation (50 foot buffer if wildlife habitat value required in design). In addition, the wetland must be located within a 40-foot wide easement. A list of wetland species indigenous to and commercially available in Indiana in Appendix C.

- (j) Surrounding slopes must be stabilized by planting to aid in trapping pollutants and preventing them from entering the wetland.
- (k) Maintain the wetland to prevent loss of area of ponded water available for emergent vegetation due to sedimentation and/or accumulation of plant material.
- (l) Obtain local assistance for specifications on plants to be used, planting schedule, soil requirements, mulch requirements, etc.
- (m) Construction debris cannot be disposed of in the facility or used as fill in the embankment.
- (n) If the wetland area or sediment forebay is used as a sediment control measure during active construction, the performance sureties will not be released until sediment has been cleaned out of the wetland or forebay and elevations and grades have been reestablished as noted in the approved stormwater management plan for post-construction runoff control.
- (o) Stormwater wetlands must be designed with the recommended proportion of depths. The four basic depths and descriptions are:
 - (1) Deepwater: 1.5 – 6 feet below normal pool elevation. This includes the outlet micropool and deep water channels through the wetland. This zone supports little emergent wetland vegetation but may support floating or submerged vegetation.
 - (2) Low marsh: 6-18 inches below normal pool elevation or water surface elevation. This zone is suitable for the growth of several emergent wetland species.
 - (3) High marsh: 6 inches or less below normal pool elevation. This zone will support a greater density and diversity of wetland vegetation than the low marsh. The high marsh area shall have a greater surface area to volume ratio than the low marsh area.
 - (4) Semi-wet zone: Areas above normal pool elevation inundated by larger storm events. This area supports vegetation that can survive periodic flooding

5.7 Parking Lot Storage

Stormwater runoff storage in parking lots and adjacent areas shall conform to the following requirements:

- (a) Storage areas in parking lots shall be restricted to remote locations which cause the least inconvenience to users. Multistage storage may be considered in parking lot areas.
- (b) The parking lot shall be graded such that pedestrians may travel to and from their vehicles without having to walk through water more than 2 inches in depth.
- (c) The maximum depth of water shall be 6 inches.
- (d) Emergency overland flow routes shall be established for flood events which fill the storage volume.

5.8 Operation and Maintenance

General O&M requirements that apply to all BMPs are provided in chapter 2. Each detention facility outlined in Chapter 5 must have information in the operations and maintenance plan submitted to CBU for approval and maintained and updated by the BMP owner.

- (a) Periodic maintenance is required in ponds, to control weed and larval growth and to control woody vegetation. A plan for maintaining water quality and the designed water level of the pond during prolonged periods of dry weather shall be maintained by the pond owner.
- (b) Stilling/sedimentation basins/sediment forebays shall be cleaned on at 75% capacity. This interval will vary depending upon size of basin and storm event history.
- (c) Facilities shall be provided, or plans shall be developed for auxiliary equipment, to permit draining of permanent pool ponds for emergency purposes, basin cleaning, or shoreline maintenance.
- (d) A stormwater management easement and maintenance agreement is required for each facility. The maintenance covenant must require the owner of the wetland to annually clean the facility and outlet structure. The maintenance agreement must provide for ongoing inspection and maintenance, with more intense activity for the first three years after construction. The easement must include the BMP, all outlet structures and access to the BMP. A copy of the easement shall be included in the digital copy of the BMP operations and maintenance manual.
- (e) The wetland must be maintained to prevent loss of area of ponded water available for emergent vegetation due to sedimentation and/or accumulation of plant material.
- (f) Sediment forebays must be cleaned when 50% full. Pocket wetlands without forebays must be cleaned after a six-inch accumulation of sediment.

- (g) The ponded water area may be maintained by raising the elevation of the water level in the permanent pond, by raising the height of the orifice in the outlet structure, or by removing accumulated solids by excavation.
- (h) Water levels may need to be supplemented or drained periodically until vegetation is fully established.

CHAPTER 6 - STORMWATER QUALITY REQUIREMENTS

6.1 Purpose

This chapter also sets minimum standards for design, maintenance, application, and construction of BMPs and performance criteria for stormwater quality management.

6.2 Types of Green Infrastructure

Table 6-1 describes acceptable GI practices for meeting the water quality performance standards described in Chapter 2. Note permeable pavement is not an acceptable GI practice but does aid in lowering overall runoff from the site by reducing the impervious amount.

Table 6-1 Types of Green Infrastructure

BMP Type	Description
Bioretention	A plant-filled structure that stores and infiltrates stormwater through engineered soil media.
Sand Filter (Bed Filter)	A large regional structure that uses granular media (e.g., sand, activated alumina, or proprietary media) to actively filter stormwater to remove stormwater pollutants. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet.
Bioswale (Vegetated swales)	A plant-filled structure that ponds, holds, and filters stormwater through a specialized soil media. It has a permeable base designed to let water soak in, reducing stormwater volume.
Filter Strip (Biofilter)	A vegetated area where stormwater flows spread naturally, with no outlet structure, using gentle slopes and dense vegetation for runoff filtration. Water treatment involves vegetation absorption and infiltration.
Green Roof	A vegetated layer on the roof of a building where rainwater is passively filtered through a specialized soil media. Effluent discharges via an underdrain. Designs vary from shallow soil layers and simple plant cover to intensive green roofs with deep soil and a more diverse plant selection.

Note: GI projects have specific requirements for geospatial data attribute tables. Please see the geospatial data template at <https://bloomington.in.gov/utilities/stormwater>.

6.3 General Requirements for Green Infrastructure

The following requirements apply to green infrastructure practices in this Chapter:

- (a) **Operation and Maintenance:** Green infrastructure and pre-treatment devices must be included in the O&M Manual submittal. O&M requirements must be site specific.
- (b) **Parking Lot Drainage:** Parking improvements as defined in BMC 13.04.030 of 1500 square feet or more of new or redeveloped parking spaces shall include bioretention.
- (c) **Horizontal Separation:** Utilities shall cross GI at right angles and not run parallel less than 5 feet horizontally from underground utilities. This distance helps prevent any interference between the GI system and the utilities, reducing the risk of damage or operational issues.
- (d) **Vertical Separation:** GI shall maintain a minimum vertical separation of 2 feet from existing utilities. This ensures that the GI and utilities operate independently without risking structural damage or service disruptions.
- (e) **Floodplain:** GI shall not be located in a floodplain.
- (f) **Drainage Easement:** Proposed green infrastructure shall be located within a Drainage Easement as provided by 20.05.040(e)(3).
- (g) **Buffer Distance:** GI (except hydrodynamic separators) shall be offset 100-feet from any water supply well and 50-feet from septic facilities
- (h) **Impermeable Liner.:** GI installed on a site with contaminated soil or treating runoff from land uses likely to increase stormwater pollutant loading shall include an impermeable liner.
- (i) **Perforated underdrains** shall have a minimum diameter of 6 inches and be dual wall.
- (j) **Damage to GI:** When GI is damaged, the standard requirement is to restore it to its original condition using original or approved materials, following a thorough assessment and coordination with CBU to ensure compliance with the SMO and this manual.

6.4 Bioretention

Bioretention GI are plant-filled structures that store and filter stormwater through a specialized soil media. It relies upon a combination of physical, chemical, and biological processes to improve effluent water quality.

6.4.1 Design Elements and Criteria

The following design elements and criteria shall be incorporated into the GI design:

- (a) The drainage area tributary to each bioretention feature shall be no more than 2 acres.
- (b) Average slope of drainage area flow path shall be no more than 6%.
- (c) Bioretention is considered to have a length to width ratio between 2:1 (length to width) or greater than 3:1. GI designed with a longer length to width ratio shall be considered a Bioswale.
- (d) Ponding Depth: Maximum of 12-inches.
- (e) Side Slope: Shall be 3:1 or flatter.
- (f) Engineered Soil (Filter Media) Cross Section
 - (1) Mulch 2 to 3-inch depth
- (g) Filter Media/planting soil minimum depth shall be 24 inches and consist of sandy loam, loamy sand or loam with the following properties
 - (1) 85% to 88% sand
 - (2) 8% to 12% fines
 - (3) 3% to 5% organic matter
 - (4) Less than 6% clay
 - (5) pH between 5.5 and 6.5
 - (6) Minimum infiltration rate of 0.5 inches/hour
 - (7) Maximum soluble salt concentration of 500ppm
- (h) Permeable filter fabric.
- (i) 2-inch minimum depth INDOT #11 stone.
- (j) 12-inch minimum depth INDOT #8 stone.
- (k) Underdrains are required unless a infiltration rate test is provided that determines the native soil infiltration to be more than 1-inch/hour.
 - (1) Underdrains shall be installed within the INDOT #8 stone aggregate layer and have the following requirements:
 - (2) 6-inch diameter perforated PVC pipe.
 - (3) 3/8-inch perforations, spaced on 6-inch centers with a minimum of 4 holes per row.
 - (4) Pipes shall be spaced at a maximum of 10-feet on center.
 - (5) Minimum grade of 1%.
- (l) Pre-treatment: Shall be required depending on flow type entering bioretention:

- (1) Forebay (channel flow): Constructed for channel flow into the bioretention area. Shall be sized for the expected rate of discharge. Shall have a storage volume equivalent to at least 15% of WQv with a 2:1 length-to-width ratio. The material shall be wooden or stone check dam or an earthen or rock berm. Underlying engineered soil media is not required.
- (2) Gravel Diaphragms (sheet flow): A gravel diaphragm located at the edge of the pavement shall be oriented perpendicular to the flow path of impervious runoff, with a 2 to 4 inch drop. Gravel shall not be mobilized by the expected rate of discharge.
- (3) A filter strip of 5 feet minimum length must be provided around perimeter of bioretention feature.
- (m) Gravel Flow Spreaders (concentrated flow): A gravel flow spreader shall be located at curb cuts, downspouts, or other concentrated inflow points, and shall have a 2 to 4-inch elevation drop from impervious surface into a gravel diaphragm.
- (n) Overflow Structure: An overflow structure protected from erosion shall be constructed to convey the exceeded capacity of the BMP.

6.4.2 Landscaping

Landscaping is critical to the performance and function of the bioretention area.

- (a) Green infrastructure plantings shall be plugs.
- (b) Use native plants, selected based upon hardiness and hydric tolerance. See Appendix C for acceptable species.
- (c) Trees shall not be within 10 feet of underdrains, storm structures, and pipes.

6.4.3 Sand Filters (Bed Filter)

Sand filters are structural stormwater controls that temporarily store stormwater and pass it through a filter bed of sand. The filtered runoff is typically collected and returned to the conveyance system, though it can be partially or fully exfiltrated into the surrounding soil in areas with porous soils. Sand filters are primarily designed as off-line structures for stormwater quality and shall not be used for detention.

6.4.4 Design Elements and Criteria

The following design elements and criteria shall be incorporated into the BMP:

- (a) The drainage area of sand filters shall be no more than 10 acres.
- (b) Shall drain within 36 hours after the end of rainfall.
- (c) Maximum allowable design head of 6 feet.

- (d) Engineered Soil (Filter Media) Cross Section
 - (1) Minimum depth of 18-inches sand, 0.04 inch diameter maximum.
 - (2) A layer of permeable filter fabric shall separate the sand and aggregate layers.
 - (3) Minimum 8-inch depth of INDOT #8 stone aggregate. If trenches are used for underdrains, filter fabric shall surround the trench in the trench bottom and sides.
- (e) Underdrains are not required when an infiltration rate test determines native soil infiltration to be more than 1-inch/hour. Underdrains shall be installed within the INDOT #8 stone aggregate layer and have the following requirements:
 - (1) 6-inch diameter dual-walled pipe.
 - (2) 3/8-inch perforations, spaced on 6-inch centers with a minimum of 4 holes per row.
 - (3) Pipes shall be spaced at a maximum of 10-feet on center.
 - (4) Minimum grade of 1%.
- (f) A pretreatment structure shall be installed and constructed so that flow is spread across the surface of filter media.
 - (1) A presetting basin and/or biofiltration bioswale is recommended to pretreat runoff discharging to the sand filter.

6.4.5 Acceptable Sand Filter Variations

There are two primary sand filter system designs, the surface sand filter and the perimeter sand filter. A third variation is an underground system designed for space-limited sites.

- (a) **Surface Sand Filter** - The surface sand filter is a ground-level open-air structure that consists of a pretreatment sediment forebay and a filter bed chamber. This system can treat drainage areas up to 10 acres in size and is typically located off-line. Surface sand filters can be designed as an excavation with an earthen embankment or as a concrete structure.
- (b) **Perimeter Sand Filter** - The perimeter sand filter is an enclosed filter system typically constructed just below grade in a vault along the edge of an impervious area such as a parking lot. The system consists of a sedimentation chamber and a sand bed filter. Runoff flows into the structure through a series of inlet grates located along the top of the control.
- (c) **Underground Sand Filter** - The underground sand filter is intended primarily for extremely space-limited and high-density areas.

6.4.6 Maintenance

Specific O&M requirements for sand filters are listed below:

- (a) Sediment layer buildup shall be scraped off during dry periods using steel rakes or other devices.
- (b) Replace some or all of the sand when permeability of the filter media is reduced to unacceptable levels, which shall be specified in the design of the facility. A minimum infiltration rate of 0.5 inches per hour shall be used for all infiltration designs.

6.5 Bioswale (Vegetated Swale)

Bioswales are designed to convey stormwater runoff and filter and trap pollutants.

6.5.1 Design Requirements

The following design elements and criteria shall be followed:

- (a) Maximum drainage area of 5 acres.
- (b) Maximum longitudinal slope of 4%. Bioswales with longitudinal slopes exceeding 4% will be permitted for conveyance but not credited for water quality volume.
- (c) The maximum design flow depth is 1 foot for 100% AEP flows. A maximum ponding depth of 18 inches is permitted at the downstream end.
- (d) Maximum side slope of 3H:1V.
- (e) Bottom channel width minimum 2 feet and maximum 10 feet.
- (f) Maximum duration of ponding 24 hours. 48 hours ponding time will be permitted with wet-tolerant vegetation.

6.6 Filter Strip (Biofilter)

Filter strips are uniformly graded and densely vegetated sections of land, designed to treat runoff and remove pollutants through vegetative filtering and infiltration. They are considered pre-treatment for other BMPs.

6.6.1 Design Requirements

- (a) The minimum length (in the direction of flow) of a filter strip are as follows:
 - (1) Treatment of impervious area = 20 feet
 - (2) Treatment of pervious area = 10 feet

- (3) Buffer for bioretention = 5 feet
- (b) Slope (in the direction of flow) between 2% and 6%
- (c) Uniform sheet flow must be maintained over the filter strip. A level spreader may be designed to ensure sheet flow into strip.
- (d) Filter strips shall be protected from flows exceeding design capacity.

6.6.2 Level Spreader

- (a) Level Spreader: The grade of a level spreader shall be 0%. The channel grade for the last 20 feet of the dike or diversion entering the level spreader must be less than or equal to 1% and designed to provide a smooth transition into spreader. The depth of a level spreader as measured from the lip must be at least 6 inches. The level spreader lip must be constructed on undisturbed soil (not fill material) to uniform height and zero grade over the length of the spreader. The maximum drainage area to the level spreader shall be 10 acres or less with the optimal size being less than 5 acres. The maximum flow rate into the level spreader is 30 cfs.
- (b) Appropriate length, width, and depth of level spreaders shall be selected from the following table:

Table 6-2 Sizing for level spreaders

<i>Design Flow (cfs)</i>	<i>Inlet Width (ft)</i>	<i>Depth (ft)</i>	<i>End Width (ft)</i>	<i>Length (ft)</i>
0-10	10	0.5	3	10
10-20	16	0.6	3	20
20-30	24	0.7	3	30

- (c) Capacity of the level spreader shall be determined by estimating the volume of flow that is diverted to the spreader for water quality control.
- (d) The released runoff to the outlet shall be on undisturbed stabilized areas in sheet flow and not allowed to re-concentrate below the structure.
- (e) Slope of the filter strip from a level spreader must not exceed 10 percent.

6.7 Green Roofs

A green roof is a vegetated layer on the roof of a building where rainwater is passively filtered through an engineered soil media before discharging to ground level.

The design and construction of green roofs shall meet the Monroe County Building Code and applicable sections of Indiana State Building Code. This section does not replace or alter aforementioned building codes or define a singular code-compliant green roof design.

6.8 Flow Through BMPs

Flow-through BMPs are designed to treat runoff at a calculated water quality treatment flow rate through the system. Examples of flow through BMPs include catch basin inserts, sand filters, and grassed channels. Another flow through BMP is a manufactured treatment device such as a hydrodynamic separator, manufactured infiltration chambers, or other similar type of device discussed in the Water Quality Devices Fact Sheet (<https://www.in.gov/ocra/2367.htm>). Either by providing required WQv or by removal of 80% TSS via a treatment train with GI (listed in Table 6-1) or a manufactured filtration system can be used. Flow through BMPs are sized as followed.

6.8.1 Calculating the Required Treatment Flow Rate (Qwq)

The following procedure shall be used to estimate peak discharges for flow through BMPs (adopted from Maryland, 2000). It relies on the volume of runoff computed using the Small Storm Hydrology Method (Pitt, 1994) and utilizes the NRCS, TR-55 Method.

Using the WQv methodology, a corresponding Curve Number (CNwq) is computed utilizing the following equation:

$$CN_{wq} = \left[\frac{1000}{10 + 5P + 10Qa - 10\sqrt{Qa^2 + 1.25QaP}} \right]$$

where:

- CNwq = curve number for water quality storm event
- P = 1-inch (rainfall for water quality storm event)
- Qa = runoff volume, in inches = 1-inch × Rv = Rv (inches)
- Rv = volumetric runoff coefficient (see previous section)

Due to the complexity of the above equation, the water quality curve number is represented as a function of percent imperviousness in Figure 6-1.

The water quality curve number, CNwq, is then used in conjunction with the standard calculated time-of-concentration, tc, and drainage area as the basis input for TR-55 calculations. Using the SCS Type II distribution for 1 inch of rainfall in 24-hours, the water quality treatment rate, Qwq, can then be calculated.

6.8.2 Selection of Manufactured Treatment Devices

Stormwater Manufactured Treatment Devices (MTD), also known as Hydrodynamic separators are proprietary, and usually include a pollutant-water separation component. The MTD shall be sized to treat flows up to, and including, the Water Quality Treatment Rate (Qwq) calculated for each project site outlet. To be acceptable, the MTD shall meet the following criteria:

- (a) The MTD must be offline and located upstream of detention facilities (if any).
- (b) The MTD must provide complete and unobstructed access to the entire bottom of the system from grade level, if applicable, for ease of maintenance.
- (c) The MTD, or the treatment train (if applicable) that includes the MTD as one of its components, must have the ability to capture or skim pollutants including but not limited to: floating oils / immiscible materials.
- (d) The MTD, or the treatment train (if applicable) that includes the MTD as one of its components, must have the ability to capture both floating and suspended solid material (trash, organic material, etc.) and other pollutants.
- (e) The MTD shall be a manufactured system currently certified by the New Jersey Department of Environmental Protection (NJDEP). A list of NJDEP- MTDs certified for 50% and 80% TSS removal are provided in a table located at <http://www.nj.gov/dep/stormwater/treatment.html>.

To obtain the maximum flow rate for various models of a MTD that is listed in the NJDEP-certified list, the latest verification report from NJCAT Verification Database must be used. A link to the database is provided right above the NJDEP-certified list table.

In summary, the following steps shall be used to determine whether a proposed MTD unit is NJDEP-certified and to determine the accepted maximum flow rate for that unit.

Step 1: Determine if the MTD is NJDEP-certified for 50% treatment rate (when the MTD will be used in a treatment train) or 80% treatment rate (when the MTD will be used alone):

- (a) Go to <http://www.nj.gov/dep/stormwater/treatment.html>
- (b) Look up the name of the MTD in the first column of the table
- (c) Look up the Certified TSS Removal Rate of that MTD in the fourth column

Step 2: Determine the maximum accepted flow rate:

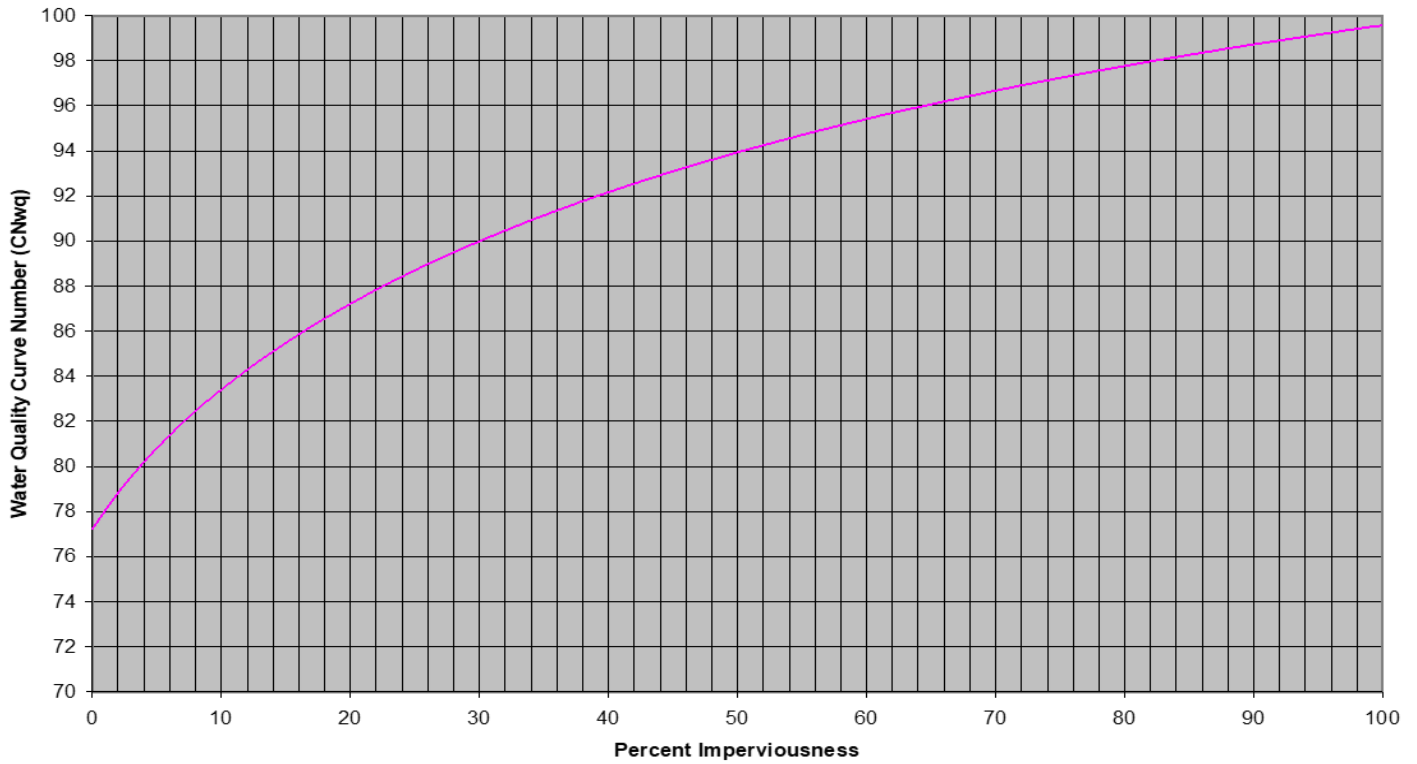
- (a) Click the link “Certification” in the second column of the NJDEP-certified list table referenced in Step 1. In some cases, a table of MTD model versus the NJDEP-certified maximum flow rate is included in the certification letter. In that case, skip to sub-step “g)” (below). If not continue to the sub-step “b)” (below)
- (b) Click the “Click here” link above the NJDEP-certified list table to access NJCAT Verification Database

- (c) Find the name of the MTD manufacturer of interest in first column
- (d) Find the latest entry (one with the latest verification date shown in third column) for that particular MTD
- (e) Click the report download link in the fourth column
- (f) Find the Table in the report (typically towards the end of the report) that lists various MTD model sizes along with the NJDEP 50% (or 80%, if appropriate) TSS Maximum Treatment Flow Rate
- (g) The selected model shall have a maximum flow rate that is equal or larger than the site's required treatment flow rate in the previous section.

Note that the NJDEP-certified manufactured system treatment rates for units not equipped with special filters reflect a standard certified 50% TSS reduction at the listed certified treatment flow rate. Therefore, to achieve the 80% TSS removal requirement, either a treatment train with a conventional listed in Table 6-1 (except for another MTD or a sand filter) must be used or a filtration system must be used instead in accordance with the NJDEP methodology. The treatment train shall not include more than one MTD.

Also, note that multiple inlet or units in series configurations are not accepted unless the NJCAT certification and NJDEP verification is specifically done for such an arrangement.

Figure 6-3 Curve Number Calculation for Water for Water Quality Event
Water Quality Curve Number



APPENDIX A – ABBREVIATIONS AND DEFINITIONS

ABBREVIATIONS

BFE	Base Flood Elevation
BMP	Best Management Practice
CFS	Cubic Feet Per Second
CLOMR	Conditional Letter of Map Revision (from FEMA)
CLOMR-F	Conditional Letter of Map Revision Based on Fill (from FEMA)
CN	Curve Number
COE	United States Army Corps of Engineers
CSMP	Comprehensive Stormwater Management Program
CSO	Combined Sewer Overflow
CWA	Clean Water Act
ERM	Elevation Reference Mark
E&SC	Erosion and Sediment Control
EPA	Environmental Protection Agency
ETJ	Extraterritorial Jurisdiction
FBFM	Flood Boundary and Floodway Map
FEH	Fluvial Erosion Hazard
FEMA	Federal Emergency Management Agency
FHBM	Flood Hazard Boundary Map
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FPG	Flood Protection Grade

FPS	Feet Per Second
GIS	Geographical Information System
GPS	Global Positioning System
HGL	Hydraulic Grade Line
HHW	Household Hazardous Waste
HUC	Hydrologic Unit Code
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
INDOT	Indiana Department of Transportation.
LAG	Lowest Adjacent Grade
LID	Low Impact Development
LOMA	Letter of Map Amendment (from FEMA)
LOMR	Letter of Map Revision (from FEMA)
LOMR-F	Letter of Map Revision Based on Fill (from FEMA)
MCM	Minimum Control Measure
MS4	Municipal Separate Storm Sewer System
NAVD	North American Vertical Datum of 1988
NFIP	National Flood Insurance Program
NGVD 1929	National Geodetic Vertical Datum of 1929
NRCS	USDA-Natural Resources Conservation Service
NPDES	National Pollutant Discharge Elimination System

NPS	Non-point source
POTW	Publicly Owned Treatment Works
SFHA	Special Flood Hazard Area
SWCD	Soil and Water Conservation District
SWPPP	Stormwater Pollution Prevention Plan
SWQMP	Stormwater Quality Management Plan
T_c	Time of Concentration
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

DEFINITIONS

Additional definitions are provided in the stormwater management ordinance.

Acre-Foot (AF). A measure of water volume equal to the inundation of a flat one-acre area to a depth of one foot (43,560 cubic feet).

Administering authority. The designated unit of government given the authority to issue permits.

Agricultural land disturbing activity. Tillage, planting, cultivation, or harvesting operations to produce agricultural or nursery vegetative crops. The term also includes pasture renovation and establishment, the construction of agricultural conservation practices, and the installation and maintenance of agricultural drainage tile. For purposes of this rule, the term does not include land disturbing activities for the construction of agricultural related facilities, such as barns, buildings to house livestock, roads associated with infrastructure, agricultural

Agricultural land use conservation practices. Use of land for the production of animal or plant life, including forestry, pasturing or yarding of livestock, and planting, growing, cultivating, and harvesting crops for human or livestock consumption. Practices that are constructed on agricultural land for the purposes of controlling soil erosion and sedimentation. These practices include grass waterways, sediment basins, terraces, and grade stabilization structures.

Amortization Period. The length of time used to repay a debt or mortgage or to depreciate an initial cost.

Antecedent Runoff Condition. The index of runoff potential before a storm event. The index, developed by the Soil Conservation Service (SCS), is an attempt to account for the variation of the SCS runoff curve number (CN) from storm to storm.

Backflow Preventer. Device that allows liquids to flow in only one direction in a pipe. Backflow preventers are used on sewer pipes to prevent a reverse flow during flooding situations.

Backwater. The rise in water surface elevation caused by some obstruction such as a narrow bridge opening, buildings or fill material that limits the area through which the water shall flow.

Base Flood Elevation. The water surface elevation corresponding to a flood having a one percent probability of being equaled or exceeded in a given year.

Base Flood. See "Regulatory Flood".

Base Flow. Stream discharge derived from groundwater sources as differentiated from surface runoff. Sometimes considered to include flows from regulated lakes or reservoirs.

Basement. A building story that is all or partly underground but having at least one-half of its height below the average level of the adjoining ground. A basement shall not be counted as a story for the purpose of height regulations.

Benchmark. A marked point of known elevation from which other elevations may be established.

Best Management Practice(s) (BMP). Design, construction, and maintenance practices and criteria for stormwater facilities that minimize the impact of stormwater runoff rates and volumes, prevent erosion, and capture pollutants. **Buffer Strip.** An existing, variable width strip of vegetated land intended to protect water quality and habitat.

Building. See "structure".

Capacity (of a storm drainage facility). The maximum flow that can be conveyed or stored by a storm drainage facility without causing damage to public or private property.

Catch Basin. A chamber usually built at the curb line of a street for the admission of surface water to a storm drain or subdrain, having at its base a sediment sump designed to retain grit and detritus below the point of overflow.

CBU. The City of Bloomington, Indiana acting through its Utilities Service Board.

Centerline of Channel. The thalweg of a channel.

Channel. A portion of a natural or artificial watercourse which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water. It has a defined bed and banks which serve to confine the water.

Channel Improvement. Alteration, maintenance, or reconstruction of the channel area for the purpose of improving the channel capacity or overall drainage efficiency. The noted "improvement" does not necessarily imply water quality or habitat improvement within the channel or its adjacent area.

Channel Modification. Alteration of a channel by changing the physical dimensions or materials of its bed or banks. Channel modification includes damming, rip-rapping or other armoring, widening, deepening, straightening, relocating, lining, and significant removal of bottom or woody vegetation. Channel modification does not include the clearing of dead or dying vegetation, debris, or trash from the channel. Channelization is a severe form of channel modification typically involving relocation of the existing channel (e.g., straightening).

Channel Stabilization. Protecting the sides and bed of a channel from erosion by controlling flow velocities and flow directions using jetties, drops, or other structures and/or by fining the channel with vegetation, riprap, concrete, or other suitable lining material.

Channelized Runoff. Water runoff that would have naturally flowed over and through the soil, deflected to and moved through an artificial open channel or waterway that eventually makes its way to surface water resources.

City. The City of Bloomington, Indiana

Class V injection well. A type of well, which typically has a depth greater than its largest surface dimension, emplaces fluids into the subsurface, and does not meet the definitions of Class I through Class IV wells as defined under 40 CFR 146.5. While the term includes the specific examples described in 40 CFR 144.81, septic systems that serve more than one (1) single-family dwelling or provide service for non-domestic waste, dug wells, bored wells, improved sinkholes, french drains, infiltration sumps, and infiltration galleries, it does not include surface impoundments, trenches, or ditches that are wider than they are deep.

Closed Conduit. A pipe, tube, or tile used for transmitting water.

Combined Sewer Overflow. A system designed and used to receive and transport combined sewage so that during dry periods the wastewater is carried to a treatment facility. During storm events, the excess water is discharged directly into a river, stream, or lake without treatment.

Common Area. Any portion of a development that meets the definition listed in Section 20.07 of the BMC. Maintenance of any such area is not the responsibility of CBU.

Compensatory Storage. An artificial volume of storage within a floodplain used to balance the loss of natural flood storage capacity when artificial fill or substructures are placed within the floodplain.

Compost. Organic residue (or a mixture of organic residue and soil) that has undergone biological decomposition until it has become relatively stable humus.

Comprehensive Stormwater Management Program. A comprehensive stormwater program for effective management of stormwater quantity and quality throughout the community.

Constructed Wetland. A manmade shallow pool that creates growing conditions suitable for wetland vegetation and is designed to maximize pollutant removal.

Construction activity. Land disturbing activities, and land disturbing activities associated with the construction of infrastructure and structures. This term does not include routine ditch or road maintenance or minor landscaping projects.

Construction plan. A representation of a project site and all activities associated with the project. The plan includes the location of the project site, buildings and other infrastructure, grading activities, schedules for implementation and other pertinent information related to the project site. A storm water pollution prevention plan is a part of the construction plan.

Construction site. The same as “Project site”

Construction site access. A stabilized stone surface at all points of ingress or egress to a project site, for the purpose of capturing and detaining sediment carried by tires of vehicles or other equipment entering or exiting the project site.

Construction Sequence. The planned construction chronology by plan designers, contractors, and/or developers that describes the relationship between implementation of stormwater quality measures in relation to land disturbance.

Construction Support Activities. Include but are not limited to the following: concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas. Such activities must not support multiple, unrelated projects, be a commercial/industrial operation, or continue to operate beyond the completion of the construction activity for the project it supports.

Contiguous. Adjoining or in actual contact with.

Contour Line. Line on a map which represents a contour or points of equal elevation.

Contour. An imaginary line on the surface of the earth connecting points of the same elevation.

Contractor or subcontractor. An individual or company hired by the project site or individual lot owner, their agent, or the individual lot operator to perform services on the project site.

Control Structure. A structure designed to control the rate of flow that passes through the structure, given a specific upstream and downstream water surface elevation.

Conveyance. Any structural method for transferring stormwater between at least two points. The term includes piping, ditches, bioswales, curbs, gutters, catch basins, channels, storm drains, and roadways.

Convolution. The process of translating precipitation excess into a runoff hydrograph.

Crawl Space. Low space below first floor of a house where there has not been excavation deep enough for a basement, usually less than seven (7) feet in depth, but where there is access for pipes, ducts, utilities and similar equipment.

Critical Duration Analysis. The process of testing different rainfall durations to find that “critical duration”, which produces the highest peak runoff or the highest storage volume.

Cross-Section. A graph or plot of ground elevation across a stream valley or a portion of it, usually along a line perpendicular to the stream or direction of flow.

Crown of Pipe. The elevation of top of pipe.

Cubic Feet Per Second (CFS). Used to describe the amount of flow passing a given point in a

stream channel. One cubic foot per second is equivalent to approximately 7.5 gallons per second.
Culvert. A closed conduit used for the conveyance of surface drainage water under a roadway, railroad, canal or other impediment.

Curve Number (CN). The Soil Conservation Service index that represents the combined hydrologic effect of soil, land use, land cover, hydrologic condition and antecedent runoff condition.

Dam. A barrier to confine or impound water for storage or diversion, to prevent gully erosion, or to retain soil, sediment, or other debris.

Damage. Measurable rise in flood heights on buildings currently subject to flooding, flooding of buildings currently not subject to flooding and increases in volume or velocity to the point where the rate of land lost to erosion and scour is substantially increased.

Datum. Any level surface to which elevations are referred, usually Mean Sea Level.

Dechlorinated swimming pool discharge. Chlorinated water that has either sat idle for seven (7) days following chlorination prior to discharge to the MS4 conveyance, or, by analysis, does not contain detectable concentrations (less than five-hundredths (0.05) milligram per liter) of chlorinated residual.

Depressional Storage Areas. Non-riverine depressions in the earth where stormwater collects. The volumes are often referred to in units of acre-feet.

Design Storm. A selected storm event, described in terms of the probability of occurring once within a given number of years, for which drainage or flood control improvements are designed and built.

Detention Basin. A facility constructed or modified to restrict the flow of storm water to a prescribed maximum rate, and to detain concurrently the excess waters that accumulate behind the outlet.

Detention Facility. A facility designed to detain a specified amount of stormwater runoff assuming a specified release rate. The volumes are often referred to in units of acre-feet.

Detention Storage. The temporary detaining of storage of stormwater in storage facilities, on rooftops, in streets, parking lots, school yards, parks, open spaces or other areas under predetermined and controlled conditions, with the rate of release regulated by appropriately installed devices.

Detention Time. The theoretical time required to displace the contents of a tank or unit at a given rate of discharge (volume divided by rate of discharge).

Detention. Managing stormwater runoff by temporary holding and controlled release.

Detritus. Dead or decaying organic matter; generally contributed to stormwater as fallen leaves and sticks or as dead aquatic organisms.

Developer. Any person financially responsible for construction activity, or an owner of property who sells or leases, or offers for sale or lease, any lots in a subdivision.

Development. Construction and site preparation work involving structures or improvements of any kind, and all land disturbing activities including, but not limited to, digging, drilling, excavating, grading, clearing, earth moving, filling, or performing any subsurface work and shall not be any more restrictive than the same definition in Section 20.07 of the BMC.

Direct Release. A method of stormwater management where runoff from a part or the entire development is released directly to the receiving stream without providing detention.

Discharge. In the context of water quantity provisions, usually the rate of water flow, i.e., a volume of fluid passing a point per unit time commonly expressed as cubic feet per second, cubic meters per second, gallons per minute, or millions of gallons per day. In the context of water quality provisions, the discharge means any addition of liquids or solids to a water body or a flow conveyance facility.

Disposal. The discharge, deposit, injection, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land/or water so that the solid waste or hazardous waste, or any constituent of the waste, may enter the environment, be emitted into the air, or be discharged into any waters, including

Ditch. A man-made, open drainageway in or into which excess surface water or groundwater drained from land, stormwater runoff, or floodwaters flow either continuously or intermittently.

Drain. A buried slotted or perforated pipe or other conduit (subsurface drain) or a ditch (open drain) for carrying off surplus groundwater or surface water.

Drainage Area. The area draining into a stream at a given point. It may be of different sizes for surface runoff, subsurface flow and base flow, but generally the surface runoff area is considered as the drainage area.

Drainage Classification (soil). As a natural condition of the soil, drainage refers to both the frequency and duration of periods when the soil is free of saturation. Soil drainage conditions are defined as:

- *Well-drained*--Excess water drains away rapidly, and no mottling occurs within 36 inches of the surface.
- *Moderately well drained*--Water is removed from the soil somewhat slowly resulting in small but significant periods of wetness, and mottling occurs between 18 and 36 inches.
- *Poorly drained*--Water is removed so slowly that it is wet for a large part of the time, and mottling occurs between 0 and 8 inches.
- *Somewhat poorly drained*--Water is removed from the soil slowly enough to keep it wet for significant periods but not all of the time, and mottling occurs between 8 to 18 inches. *Very poorly drained*--Water is removed so slowly that the water table remains at or near the surface for the greater part of the time; there may also be periods of surface ponding; the soil has a black to gray surface layer with mottles up to the surface.

Drainage. The removal of excess surface water or groundwater from land by means of ditches or subsurface drains. Also see Natural drainage.

Drop Manhole. Manhole having a vertical drop pipe connecting the inlet pipe to the outlet pipe. The vertical drop pipe shall be located immediately outside the manhole.

Dry Well. A type of infiltration practice that allows stormwater runoff to flow directly into the ground via a bored or otherwise excavated opening in the ground surface.

Dry-Bottom Detention Basin. A basin designed to be completely dewatered after having provided its planned detention of runoff during a storm event.

Duration. The time period of a rainfall event.

Earth Embankment. A man-made deposit of soil, rock, or other material often used to form an impoundment.

Elevation Certificate. A form published by the Federal Emergency Management Agency that is used to certify the 100-year or base flood elevation and the lowest elevation of usable space to

which a building has been constructed.

Elevation Reference Mark (ERM). Elevation benchmark tied to the National Geodetic Vertical Datum of 1929 and identified during the preparation of a Flood Insurance Study prepared for the Federal Emergency Management Agency.

Emergency Spillway. Usually, a vegetated earth channel used to safely convey flood discharges around an impoundment structure.

Encroachment. Any private temporary or permanent structure or landscaping element that intrudes into an easement.

Energy Dissipater. A device to reduce the energy of flowing water.

Environment. The sum total of all the external conditions that may act upon a living organism or community to influence its development or existence.

Erosion and sediment control measure. A practice, or a combination of practices, to control erosion and resulting sedimentation. and/or off-site damages.

Erosion and sediment control system. The use of appropriate erosion and sediment control measures to minimize sedimentation by first reducing or eliminating erosion at the source and then as necessary, trapping sediment to prevent it from being discharged from or within a project site.

Erosion control plan. A written description and site plan of pertinent information concerning erosion control measures designed to meet the requirements of the Ordinance or these Standards.

Erosion. The wearing away of the land surface by water, wind, ice, gravity, or other geological agents. The following terms are used to describe different types of water erosion:

- *Accelerated erosion* -- Erosion much more rapid than normal or geologic erosion, primarily as a result of the activities of man.
- *Channel erosion* -- An erosion process whereby the volume and velocity of flow wears away the bed and/or banks of a well-defined channel.
- *Gully erosion* --An erosion process whereby runoff water accumulates in narrow channels and, over relatively short periods, removes the soil to considerable depths, ranging from 1-2 ft. to as much as 75-100 ft.
- *Rill erosion*--An erosion process in which numerous small channels only several inches deep are formed; occurs mainly on recently disturbed and exposed soils (see Rill).
- *Splash erosion*--The spattering of small soil particles caused by the impact of raindrops on wet soils; the loosened and spattered particles may or may not be subsequently removed by surface runoff.
- *Sheet erosion*--The gradual removal of a fairly uniform layer of soil from the land surface by runoff water.

Extraterritorial Jurisdiction (ETJ). Areas located outside the corporate limits of a community over which the community has statutory development authority.

Farm or Field Tile. A pipe installed in an agricultural area to allow subsurface drainage of farmland for the purpose of agricultural production.

FEMA. The Federal Emergency Management Agency.

Filter Strip. Usually a long, relatively narrow area (usually, 20-75 feet wide) of undisturbed or planted vegetation used near disturbed or impervious surfaces to filter stormwater pollutants for the protection of watercourses, reservoirs, or adjacent properties.

Final stabilization. The establishment of permanent vegetative cover or the application of a

permanent non-erosive material to areas where all land disturbing activities have been completed and no additional land disturbing activities are planned under the current permit.

Floatable. Any solid waste that will float on the surface of the water.

Flood (or Flood Waters). A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow, the unusual and rapid accumulation, or the runoff of surface waters from any source.

Flood Boundary and Floodway Map (FBFM). A map prepared by the Federal Emergency Management Agency that depicts the FEMA designated floodways within a community. This map also includes delineation of the 100-year and 500-year floodplain boundaries and the location of the Flood Insurance Study cross-sections.

Flood Crest. The maximum stage or elevation reached or expected to be reached by the waters of a specific flood at a given time.

Flood Duration. The length of time a stream is above flood stage or overflowing its banks.

Flood Easement. Easement granted to identify areas inundated by the 100-year flood and prohibit or severely restrict development activities.

Flood Elevation. The elevation at all locations delineating the maximum level of high waters for a flood of given return period.

Flood Fighting. Actions taken immediately before or during a flood to protect human life and to reduce flood damages such as evacuation, emergency sandbagging and diking.

Flood Forecasting. The process of predicting the occurrence, magnitude and duration of an imminent flood through meteorological and hydrological observations and analysis.

Flood Frequency. A statistical expression of the average time period between floods equaling or exceeding a given magnitude. For example, a 100-year flood has a magnitude expected to be equaled or exceeded on the average of once every hundred years; such a flood has a one-percent chance of being equaled or exceeded in any given year. Often used interchangeably with "recurrence interval".

Flood Hazard Area. Any floodplain, floodway, floodway fringe, or any combination thereof which is subject to inundation by the regulatory flood; or any flood plain as delineated by Zone X on a Flood Hazard Boundary Map.

Flood Hazard Boundary Map (FHBM). A map prepared by the Federal Emergency Management Agency that depicts Special Flood Hazard Areas as a Zone A within a community. There are no study text, base flood elevations, or floodways associated with this map.

Flood Insurance Rate Map (FIRM). A map prepared by the Federal Emergency Management Agency that depicts Special Flood Hazard Areas within a community. This map also includes the 100-year or Base Flood Elevation at various locations along the watercourses. More recent versions of the FIRM may also show the FEMA designated floodway boundaries and the location of the Flood Insurance Study cross-sections.

Flood Insurance Study (FIS). A study prepared by the Federal Emergency Management Agency to assist a community participating in the National Flood Insurance Program in its application of the program regulations. The study consists of a text which contains community background information with respect to flooding, a floodway data table, summary of flood discharges, flood profiles, a Flood Insurance Rate Map, and a Flood Boundary and Floodway Map.

Flood Profile. A graph showing the relationship of water surface elevation to a specific location,

the latter generally expressed as distance above the mouth of a stream of water flowing in a channel. It is generally drawn to show surface elevation for the crest or a specific magnitude of flooding, but may be prepared for conditions at any given time or stage.

Flood Protection Grade (FPG). The elevation of the regulatory or 100-year flood plus two (2) feet of freeboard if the flooding source is a lake, pond, stream, or an open channel/ditch (or 1 foot of freeboard if the flooding source is an overflow path/ponding area provided that the elevation of the overflow path/ponding area is calculated based on the assumption of fully plugged storm pipe system).

Flood Resistant Construction (Flood Proofing). Additions, changes or adjustments to structures or property that are designed to reduce or eliminate the potential for flood damage.

Flood Storage Areas. Depressions, basins, or other areas that normally stand empty or partially empty, but fill with rainfall runoff during storms to hold the runoff and reduce downstream flow rates. The volumes are often referred to in units or acre-feet.

Floodplain Management. The operation of a program of corrective and preventive measures for reducing flood damage, including but not limited to flood control projects, floodplain land use regulations, flood proofing of buildings, and emergency preparedness plans.

Floodplain Regulations. General term applied to the full range of codes, ordinances and other regulations relating to the use of land and construction within floodplain limits. The term encompasses zoning ordinances, subdivision regulations, building and housing codes, encroachment laws and open area (space) regulations.

Floodplain. The channel proper and the areas adjoining the channel which have been or hereafter may be covered by the regulatory or 100-year flood. Any normally dry land area that is susceptible to being inundated by water from any natural source. The floodplain includes both the floodway and the floodway fringe districts.

Floodway Fringe. That portion of the flood plain lying outside the floodway, which is inundated by the regulatory flood.

Floodway. The channel of a river or stream and those portions of the floodplains adjoining the channel which are reasonably required to efficiently carry and discharge the peak flow of the regulatory flood of any river or stream.

Footing Drain. A drain pipe installed around the exterior of a basement wall foundation to relieve water pressure caused by high groundwater elevation.

Forebay (or Sediment Forebay). A small pond placed in front of a larger retention/detention structure such as a wet pond, dry pond, or wetland to intercept and concentrate a majority of sediment that is coming into the system before it reaches the larger structure.

Freeboard. An increment of height added to the base flood elevation to provide a factor of safety for uncertainties in calculations, unknown local conditions, wave actions and unpredictable effects such as those caused by ice or debris jams. (See Flood Protection Grade).

French Drain. A drainage trench backfilled with a coarse, water-transmitting material; may contain a perforated pipe.

Gabion. An erosion control structure consisting of a wire cage or cages filled with rocks.

Garbage. All putrescible animal solid, vegetable solid, and semisolid wastes resulting from the processing, handling, preparation, cooking, serving, or consumption of food or food materials.

Gasoline Outlet. An operating gasoline or diesel fueling facility whose primary function

is the resale of fuels.

Geographical Information System. A computer system capable of assembling, storing, manipulation, and displaying geographically referenced information. This technology can be used for resource management and development planning.

Geotextile Fabric. A woven or non-woven, water-permeable synthetic material used to trap sediment particles, prevent the clogging of aggregates with fine grained soil particles, or as a separator under road aggregate.

Geotextile Liner. A synthetic, impermeable fabric used to seal impoundments against leaks.

Global Positioning System. A system that provides specially coded satellite signals that is processed by a receiver, which determines position, velocity, and time. The system is funded and controlled by the U.S. Department of Defense.

Grade. (1) The inclination or slope of a channel, canal, conduit, etc., or natural ground surface usually expressed in terms of the percentage the vertical rise (or fall) bears to the corresponding horizontal distance. (2) The finished surface of a canal bed, roadbed, top of embankment, or bottom of excavation; any surface prepared to a design elevation for the support of construction, such as paving or the laying of a conduit. (3) To finish the surface of a canal bed, roadbed, top of embankment, or bottom of excavation, or other land area to a smooth, even condition.

Grading. The cutting and filling of the land surface to a desired slope or elevation.

Grass. A member of the botanical family Graminae, characterized by blade-like leaves that originate as a sheath wrapped around the stem.

Grassed Bioswale. A type of vegetative practice used to filter stormwater runoff via a vegetated, shallow-channel conveyance.

Grassed Waterway. A natural or constructed waterway, usually broad and shallow, covered with erosion-resistant grasses and used to conduct surface water from an area.

Green Infrastructure. The range of measures that use plant or soil systems or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspire stormwater and reduce flows to sewer systems or to surface waters.

Green Infrastructure Fund. An account held by CBU which project owners may pay into, with the authorization of CBU, in lieu of constructing green infrastructure. The fund will be used to finance detention and water quality projects at CBU's discretion.

Ground Cover (horticulture). Low-growing, spreading plants useful for low-maintenance landscape areas.

Groundwater Recharge. The infiltration of water into the earth. It may increase the total amount of water stored underground or only replenish supplies depleted through pumping or natural discharge.

Groundwater. Accumulation of underground water, natural or artificial. The term does not include

Habitat. The environment in which the life needs of a plant or animal are supplied.

Hard Surface. See "Impervious Surface."

Hazardous Materials. A substance or material that has been determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and has been so designated. This includes hazardous substances, hazardous wastes, marine pollutants, and elevated temperature materials or any item or chemical which can cause harm to

people, plants, or animals when exposed by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping.

High Water. Maximum designed permitted, or regulated water level for an impoundment.

Highly Erodible Soil. Soil that has an erodibility index of eight or more using the erodibility index.

Household Hazardous Waste. Solid waste generated by households that is ignitable, toxic, reactive, corrosive, or otherwise poses a threat to human health or the environment.

Hydraulic Grade Line (HGL). For Channel flow, the HGL is equal to the water surface whereas for pressure flow it is the piezometric surface.

Hydraulics. A branch of science that deals with the practical application of the mechanics of water movement. A typical hydraulic study is undertaken to calculate water surface elevations.

Hydrodynamic Loads. Forces imposed on structures by floodwaters due to the impact of moving water on the upstream side of the structure, drag along its sides, and eddies or negative pressures on its downstream side.

Hydrograph. For a given point on a stream, drainage basin, or a lake, a graph showing either the discharge, stage (depth), velocity, or volume of water with respect to time.

Hydrologic Unit Code. A numeric United States Geologic Survey code that corresponds to a watershed area. Each area also has a text description associated with the numeric code.

Hydrology. The science of the behavior of water in the atmosphere, on the surface of the earth, and underground. A typical hydrologic study is undertaken to compute flow rates associated with specified flood events.

Hydrometeorologic. Water-related meteorological data such as rainfall or runoff.

Hydrostatic Loads. Those loads or pressures resulting from the static mass of water at any point of floodwater contact with a structure. They are equal in all direction and always act perpendicular to the surface on which they are applied. Hydrostatic loads can act vertically on structural members such as floors, decks and roofs, and can act laterally on upright structural members such as walls, piers, and foundations.

IDEM. Indiana Department of Environmental Management.

IDNR. Indiana Department of Natural Resources.

Illicit Discharge. Any discharge to a conveyance that is not composed entirely of stormwater except naturally occurring floatables, such as leaves or tree limbs.

Impact Areas. Areas defined or mapped that are unlikely to be easily drained because of one or more factors including but not limited to any of the following: soil type, topography, land where there is not adequate outlet, a floodway or floodplain, land within 75 feet of each bank of any regulated drain or within 75 feet from the centerline of any regulated tile ditch.

Impaired Waters. Waters that do not or are not expected to meet applicable water quality standards, as included on IDEM's CWA Section 303(d) List of Impaired Waters.

Impervious surface. Surfaces, such as pavement and rooftops, which prevent the infiltration of stormwater into the soil.

Individual building lot. A single parcel of land within a multi-parcel development.

Individual lot operator. A contractor or subcontractor working on an individual lot.

Individual lot owner. A person who has financial control of construction activities for an individual lot.

INDOT. Indiana Department of Transportation. Generally used here to refer to specifications contained in the publication "INDOT Standard Specifications."

Infiltration practices. Any structural BMP designed to facilitate the percolation of run-off through the soil to ground water. Examples include infiltration basins or trenches, dry wells, and porous pavement.

Infiltration. Passage or movement of water into the soil.

Infiltration Bioswales. A depressed earthen area that is designed to promote infiltration.

Inlet. An opening into a storm drain system for the entrance of surface storm water runoff, more completely described as a storm drain inlet.

Intermittent Stream. A stream which carries water a considerable portion of the time, but which ceases to flow occasionally or seasonally because bed seepage and evapotranspiration exceed the available water supply.

Invert. The inside bottom of a culvert or other conduit.

Junction Chamber. A converging section of conduit, usually large enough for a person to enter, used to facilitate the flow from one or more conduits into a main conduit.

Land Surveyor. A person licensed under the laws of the State of Indiana to practice land surveying.

Land-disturbing Activity. Any man-made change of the land surface, including removing vegetative cover that exposes the underlying soil, excavating, filling, transporting and grading.

Larger common plan of development or sale. A plan, undertaken by a single project site owner or a group of project site owners acting in concert, to offer lots for sale or lease; where such land is contiguous, or is known, designated, purchased or advertised as a common unit or by a common name, such land shall be presumed as being offered for sale or lease as part of a larger common plan. The term also includes phased or other construction activity by a single entity for its own use.

Lateral Storm Sewer. A drain that has inlets connected to it but has no other storm drain connected.

Life Cycle Cost. Cost based on the total cost incurred over the system life including research, development, testing, production, construction, operation, and maintenance. Costs are normally determined on present worth or equivalent annual cost basis.

Low Entry Elevation. The elevation in a structure where overbank flooding can enter the structure.

Lowest Adjacent Grade. The elevation of the lowest grade adjacent to a structure, where the soil meets the foundation around the outside of the structure (including structural members such as basement walkout, patios, decks, porches, support posts or piers, and rim of the window well.

Lowest Floor. Refers to the lowest of the following:

1. The top of the basement floor;
2. The top of the garage floor, if the garage is the lowest level of the building;
3. The top of the first floor of buildings constructed on a slab or of buildings elevated on pilings or constructed on a crawl space with permanent openings; or
4. The top of the floor level of any enclosure below an elevated building where the walls of the enclosure provide any resistance to the flow of flood waters unless:
 - a] The walls are designed to automatically equalize the hydrostatic flood forces on the walls

by allowing for the entry and exit of flood waters, by providing a minimum of two opening (in addition to doorways and windows) having a total area of one (1) square foot for every two (2) square feet of enclosed area subject to flooding. The bottom of all such openings shall be no higher than one (1) foot above grade.

b] Such enclosed space shall be usable only for the parking of vehicles or building access.

Low Impact Development. LID is a land planning and engineering design approach with a goal of replicating the pre-development hydrologic regime of urban and developing watersheds. The primary goal of LID is to mimic a site's predevelopment hydrology by reducing the impervious surface, infiltrating, filtering, storing, evaporating, and detaining runoff close to its source.

Major Drainage System. Drainage system carrying runoff from an area of one or more square miles.

Manhole. Storm drain structure through which a person may enter to gain access to an underground storm drain or enclosed structure.

Manning Roughness Coefficient or Manning's "n" Value. A dimensionless coefficient ("n") used in the Manning's equation to account for channel wall frictional losses in steady uniform flow.

Measurable storm event. A precipitation event that results in a total measured precipitation accumulation equal to, or greater than, one-half (0.5) inch of rainfall.

Minimum Control Measure. Minimum measures required by the NPDES Phase II program. The six (6) MCMs are: Public education and outreach, Public participation and involvement, Illicit discharge detection and elimination, Construction site runoff control, Post-construction runoff control, and Pollution prevention and good housekeeping.

Minor Drainage Systems. Drainage system carrying runoff from an area of less than one square mile.

Minor Subdivision. See Subdivision, Minor.

Mulch. A natural or artificial layer of plant residue or other materials covering the land surface which conserves moisture, holds soil in place, aids in establishing plant cover, and minimizes temperature fluctuations.

Multi-Family. Any structure which contains three or more dwelling units. A dwelling unit is any structure, or part of a structure, which is constructed to a house a family.

Municipal Separate Storm Sewers. An MS4 meets all the following criteria: (1) is a conveyance or system of conveyances owned by the state, county, City, or other public entity; (2) discharges to waters of the U.S.; (3) is designed or used for collecting or conveying stormwater; (4) is not a combined sewer; and, (5) is not part of a Publicly Owned Treatment Works (POTW).

Municipal, state, federal, or institutional refueling area. An operating gasoline or diesel fueling area whose primary function is to provide fuel to either municipal, state, federal, or institutional equipment or vehicles.

Mutual Drain. A drain that: (1) Is located on two or more tracts of land that are under different ownership; (2) was established by the mutual consent of all the owners; and (3) was not established under or made subject to any drainage statute.

National Flood Insurance Program (NFIP). The NFIP is a federal program enabling property owners to purchase flood insurance. The Federal Emergency Management Agency administers the NFIP in communities throughout the United States. The NFIP is based on an agreement

between local communities and the Federal government which states that if a community will implement floodplain management measures to reduce future flood risks to new construction and substantially improved structures in flood hazard areas, the Federal government will make flood insurance available within the community as a financial protection against flood losses that do occur.

National Geodetic Vertical Datum of 1929. The nationwide, Federal Elevation datum used to reference topographic elevations to a known value.

National Pollution Discharge Elimination System (NPDES). A permit developed by the U.S. EPA through the Clean Water Act. In Indiana, the permitting process has been delegated to IDEM. This permit covers aspects of municipal stormwater quality.

Natural Drainage. The flow patterns of stormwater run-off over the land in its pre-development state.

Nonagricultural land use. Commercial use of land for the manufacturing and wholesale or retail sale of goods or services, residential or institutional use of land intended primarily to shelter people, highway use of land including lanes, alleys, and streets, and other land uses not included in agricultural land use.

Nonpoint Source Pollution. Pollution that enters a water body from diffuse origins on the watershed and does not result from discernable, confined, or discrete conveyances.

Normal Depth. Depth of flow in an open conduit during uniform flow for the given conditions.

North American Vertical Datum of 1988 (NAVD 1988). The nationwide, Federal Elevation datum used to reference topographic elevations to a known value.

Nutrient(s). (1) A substance necessary for the growth and reproduction of organisms. (2) In water, those substances (chiefly nitrates and phosphates) that promote growth of algae and bacteria.

Off-site. Everything not located at or within a particular site.

Off-site Land Areas. Those areas that by virtue of existing topography naturally shed surface water onto or through the developing property.

100-Year Frequency Flood. See “regulatory flood”.

On-Site. Located within the controlled or urbanized area where runoff originates.

Open Drain. A natural watercourse or constructed open channel that conveys drainage water.

Open Space. Any land area devoid of any disturbed or impervious surfaces created by industrial, commercial, residential, agricultural, or other manmade activities.

Orifice. A device which controls the rate of flow from a detention basin.

Outfall scouring. The deterioration of a streambed or lakebed from an outfall discharge to an extent that the excessive settling of solid material results and suitable aquatic habitat is diminished.

Outfall. The point, location, or structure where a pipe or open drain discharges to a receiving body of water.

Outlet. The point of water disposal from a stream, river, lake, tidewater, or artificial drain.

Overland Flow. Consists of sheet flow, shallow concentrated flow and channel flow.

Peak Discharge (or Peak Flow). The maximum instantaneous flow from a given storm condition at a specific location.

Percolation. The movement of water through soil.

Perennial Stream. A stream that maintains water in its channel throughout the year.

Permanent stabilization. The establishment, at a uniform density of seventy percent (70%)

across the disturbed area, of vegetative cover or permanent non-erosive material that will ensure the resistance of the soil to erosion, sliding, or other movement.

Permeability (soil). The quality of a soil that enables water or air to move through it. Usually expressed in inches per hour or inches per day.

Person. Any individual, partnership, copartnership, firm, company, corporation, association, joint stock company, trust, estate, governmental entity, or any other legal entity; or their legal representatives, agents, or assigns. This definition includes all federal, state, and local governmental entities.

Pervious. Allowing movement of water.

Pesticides. Chemical compounds used for the control of undesirable plants, animals, or insects. The term includes insecticides, herbicides, algicides, rodenticides, nematocides, fungicides, and growth regulators.

pH. A numerical measure of hydrogen ion activity, the neutral point being 7.0. All pH values below 7.0 are acid, and all above 7.0 are alkaline.

Phasing of construction. Sequential development of smaller portions of a large project site, stabilizing each portion before beginning land disturbance on subsequent portions, to minimize exposure of disturbed land to erosion.

Phosphorus (available). Inorganic phosphorus that is readily available for plant growth.

Piping. The formation of "pipes" by underground erosion. Water in the soil carries the fine soil particles away, and a series of eroded tubes or tunnels develop. These openings will grow progressively larger and can cause a dam failure.

Planimetric Data. Horizontal measurements involving distances or dimensions on a diagram, map, Plat of Survey or topographic map. Normally in units of feet.

Plat of Survey. A scaled diagram showing boundaries of a tract of land/or subdivision. This may constitute a legal description of the land and be used in lieu of a written description.

Point Source. Any discernible, confined, and discrete conveyance including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, or container from which pollutants are or maybe discharged (P.L. 92-500, Section 502[14]).

Pollutant. Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, medical wastes, chemical wastes, dissolved and particulate metals, floatables, pesticides, herbicides, fertilizers, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, municipal, agricultural and industrial wastes, animal waste, and certain characteristics of wastewater (e.g., pH, temperature, TSS, turbidity, color, BOD, COD, toxicity, or odor).

Pollutant of concern. Any pollutant that has been documented via analytical data as a cause of impairment in any waterbody.

Porosity. The volume of pore space in soil or rock.

Porous pavement. A type of infiltration practice to improve the quality and reduce the quantity of storm water run-off via the use of manmade, pervious pavement which allows run-off to percolate through the pavement and into underlying soils

Private Drain. A drain that: (1) Is located on land owned by one person or by two or more persons jointly; and (2) was not established under or made subject to any drainage statute.

Professional Engineer. A person licensed under the laws of the State of Indiana to practice

professional engineering.

Programmatic Indicator. Any data collected by an MS4 entity that is used to indicate implementation of one (1) or more minimum control measures.

Project site. The entire area on which construction activity is to be performed.

Project site owner. The person required to submit a stormwater permit application and required to comply with the terms of the ordinance or these Technical Standards, including a developer or a person who has financial and operational control of construction activities, and project plans and specifications, including the ability to make modifications to those plans and specifications.

Probable Maximum Flood. The most severe flood that may be expected from a combination of the most critical meteorological and hydrological conditions that are reasonably possible in the drainage basin. It is used in designing high-risk flood protection works and citing of structures and facilities that shall be subject to almost no risk of flooding. The probable maximum flood is usually much larger than the 100-year flood.

Publicly Owned Treatment Works (POTW). A municipal operation that breaks down and removes contaminants in the wastewater prior to discharging to a stream through primary and/or secondary treatment systems.

Qualified professional. An individual who is trained and experienced in storm water treatment techniques and related fields as may be demonstrated by state registration, professional certification, experience, or completion of coursework that enable the individual to make sound, professional judgments regarding storm water control or treatment and monitoring, pollutant fate and transport, and drainage planning.

Radius of Curvature. Length of radius of a circle used to define a curve.

Rain garden. A vegetative practice used to alter impervious surfaces, such as roofs, into pervious surfaces for absorption and treatment of rainfall.

Rainfall Intensity. The rate at which rain is falling at any given instant, usually expressed in inches per hour.

Reach. Any length of river, channel or storm drain.

Receiving Stream or Receiving Water. The body of water into which runoff or effluent is discharged. The term does not include private drains, unnamed conveyances, retention and detention basins, or constructed wetlands used as treatment.

Recharge. Replenishment of groundwater reservoirs by infiltration and transmission from the outcrop of an aquifer or from permeable soils.

Recurrence Interval. A statistical expression of the average time between floods equaling or exceeding a given magnitude.

Redevelopment. Alterations of a property that change a site or building in such a way that there is disturbances of one (1) acre or more of land. The term does not include such activities as exterior remodeling.

Refueling Area. An operating gasoline or diesel fueling area whose primary function is to provide fuel to equipment or vehicles.

Regional Detention. Stormwater storage with a controlled release rate that is provided for a specific watershed and benefits multiple sites and/or rights-of-way areas.

Regional Pond. A detention/retention basin sized to detain/retain the runoff from the entire watershed, on-site and off-site, tributary to the pond's outlet.

Regulated Area. Area under the stormwater regulatory jurisdiction of the *CBU*.

Regulated Drain. A drain subject to the provisions of the Indiana Drainage Code, I.C.-36-9-27.

Regulatory or 100-Year Flood. The discharge or elevation associated with the 100-year flood as calculated by a method and procedure which is acceptable to and approved by the Indiana Department of Natural Resources and the Federal Emergency Management Agency. The "regulatory flood" is also known as the "base flood".

Regulatory Floodway. See Floodway.

Release Rate - The amount of storm water release from a storm water control facility per unit of time.

Reservoir. A natural or artificially created pond, lake or other space used for storage, regulation or control of water. May be either permanent or temporary. The term is also used in the hydrologic modeling of storage facilities.

Responsible Party. Any person who is the property owner, has possessory interest in the property, and/or any person who has caused a violation.

Retail gasoline outlet. An operating gasoline or diesel fueling facility whose primary function is the resale of fuels. The term applies to facilities that create five thousand (5,000) or more square feet of impervious surfaces, or generate an average daily traffic count of one hundred (100) vehicles per one thousand (1,000) square feet of land area.

Retention basin. A type of storage practice, that has no positive outlet, used to retain storm water run-off for an indefinite amount of time. Runoff from this type of basin is removed only by infiltration through a porous bottom or by evaporation.

Retention. The storage of stormwater to prevent it from leaving the development site. May be temporary or permanent.

Retention Facility. A facility designed to completely retain a specified amount of stormwater runoff without release except by means of evaporation, infiltration or pumping. The volumes are often referred to in units of acre-feet.

Return Period - The average interval of time within which a given rainfall event will be equaled or exceeded once. A flood having a return period of 100 years has a one percent probability of being equaled or exceeded in any one year.

Revetment. Facing of stone or other material, either permanent or temporary, placed along the edge of a stream to stabilize the bank and protect it from the erosive action of the stream. Also see Revetment riprap.

Right-of-Way for a County Drain. The statutory right of way as defined by Indiana Code for a regulated drain.

Riparian habitat. A land area adjacent to a waterbody that supports animal and plant life associated with that waterbody.

Riparian zone. Of, on, or pertaining to the banks of a stream, river, or pond.

Riprap. Broken rock, cobble, or boulders placed on earth surfaces, such as the face of a dam or the bank of a stream, for protection against the action of water (waves). Revetment riprap is material graded such that: (1) no individual piece weighs more than 120 lbs. and (2) 90-100% will pass through a 12-inch sieve, 20-60% through a 6-inch sieve, and not more than 10% through a 12-inch sieve.

River Restoration. Restoring the channel of a stream or ditch to its perceived original, non-

obstructed capacity by means of clearing & snagging, obstruction removal, and inexpensive streambank protection measures. The term "restoration", as noted, does not necessarily imply restoration or improvement of water quality or habitat within the channel or its adjacent area.

Riverine. Relating to, formed by, or resembling a stream (including creeks and rivers).

Runoff Coefficient - A decimal fraction relating the amount of rain which appears as runoff and reaches the storm drain system to the total amount of rain falling. A coefficient of 0.5 implies that 50 percent of the rain falling on a given surface appears as storm water runoff.

Runoff. That portion of precipitation that flows from a drainage area on the land surface, in open channels, or in stormwater conveyance systems.

Sand. (1) Soil particles between 0.05 and 2.0 mm in diameter. (2) A soil textural class inclusive of all soils that are at least 70% sand and 15% or less clay.

Sanitary Backup. The condition where a sanitary sewer reaches capacity and surcharges into the lowest area.

Scour. The clearing and digging action of flowing water.

Sediment. Solid material (both mineral and organic) that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface.

Sediment Forebay. See "Forebay".

Sedimentation. The process that deposits soils, debris and other unconsolidated materials either on the ground surfaces or in bodies of water or watercourses.

Seepage. The passage of water or other fluid through a porous medium, such as the passage of water through an earth embankment or masonry wall.

Sensitive Area. An area with highly erodible soils, wetlands, threatened or endangered species habitat, outstanding waters, impaired waters, recreational waters, and surface drinking water sources. Includes waterbodies in need of priority protection or remediation based on its:

- (1) Providing habitat for threatened or endangered species.
- (2) Usage as a public water supply intake.
- (3) Relevant community value.
- (4) Usage for full body contact recreation.
- (5) Limited use and outstanding State resource water classification as found in 327 IAC. 2-1-11 and 327 IAC. 2-1.5-19.

Sensitive Water. A water body in need of priority protection or remediation base on its:

- providing habitat for threatened or endangered species,
- usage as a public water supply intake,
- relevant community value,
- usage for full body contact recreation,

exceptional use classification as found in 327 IAC 2-1-11(b), outstanding state resource water classification as found in 327 IAC 2-1-2(3) and 327 IAC 2-1.5-19(b).

Settling Basin. An enlargement in the channel of a stream to permit the settling of debris carried in suspension.

Silt Fence. A fence constructed of wood or steel supports and either natural (e.g. burlap) or synthetic fabric stretched across area of non-concentrated flow during site development to trap and retain on-site sediment due to rainfall runoff.

Silt. (1) Soil fraction consisting of particles between 0.002 and 0.05 mm in diameter. (2) A soil textural class indicating more than 80% silt.

Siphon - A closed conduit or portion of which lies above the hydraulic grade line, resulting in a pressure less than atmospheric and requiring a vacuum within the conduit to start flow. A siphon utilizes atmospheric pressure to effect or increase the flow of water through a conduit. An inverted siphon is used to carry storm water flow under an obstruction such as a sanitary sewer.

Site. The entire area included in the legal description of the land on which land disturbing activity is to be performed.

Silvicultural. the practice of controlling the establishment, growth, composition, health, and quality of forests to meet diverse needs and values.

1. Nonpoint activities include source silvicultural activities such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance from which there is natural runoff. Some of these activities (such as stream crossing for roads) may involve the placement of dredged or fill material which may require a CWA section 404 permit and a 401 Water Quality Certification.
2. Point source activities include any discernible, confined and discrete conveyance related to rock crushing, gravel washing, log sorting, or log storage facilities which are operated in connection with silvicultural activities and from which pollutants are discharged into waters of the United States or the State.

Slope. Degree of deviation of a surface from the horizontal, measured as a numerical ratio or percent. Expressed as a ratio, the first number is commonly the horizontal distance (run) and the second is the vertical distance (rise)--e.g., 2:1. However, the preferred method for designation of slopes is to clearly identify the horizontal (H) and vertical (V) components (length (L) and Width (W) components for horizontal angles). Also note that according to international standards (Metric), the slopes are presented as the vertical or width component shown on the numerator--e.g., 1V:2H. Slope expressions in the Ordinance or these Technical Standards follow the common presentation of slopes--e.g., 2:1 with the metric presentation shown in parenthesis--e.g., (1V:2H). Slopes can also be expressed in "percent". Slopes given in percent are always expressed as $(100 * V/H)$ --e.g., a 2:1 (1V:2H) slope is a 50% slope.

Soil and Water Conservation District. A public organization created under state law as a special-purpose district to develop and carry out a program of soil, water, and related resource conservation, use, and development within its boundaries. A subdivision of state government with a local governing body, established under IC 14-32.

Soil. The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

Solid Waste. Any garbage, refuse, debris, or other discarded material.

Special Flood Hazard Area. An area that is inundated during the 100-Year flood.

Spill. The unexpected, unintended, abnormal, or unapproved dumping, leakage, drainage, seepage, discharge, or other loss of petroleum, hazardous substances, extremely hazardous substances, or objectionable substances. The term does not include releases to impervious surfaces when the substance does not migrate off the surface or penetrate the surface and enter the soil.

Spillway - A waterway in or about a hydraulic structure, for the escape of excess water.

Standard Project Flood. A term used by the U.S. Army Corps of Engineers to designate a flood that may be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonable characteristics of the geographical area in which the drainage basin is located, excluding extremely rare combinations. The peak flow for a standard project flood is generally 40 – 60 percent of the probable maximum flood for the same location.

Stilling Basin - A basin used to slow water down or dissipate its energy.

Storage practices. Any structural BMP intended to store or detain stormwater and slowly release it to receiving waters or drainage systems. The term includes detention and retention basins.

Storm drain signing. Any marking procedure that identifies a storm sewer inlet as draining directly to a receiving waterbody so as to avoid dumping pollutants. The procedures can include painted or cast messages and adhesive decals.

Storm Duration. The length of time that water may be stored in any stormwater control facility, computed from the time water first begins to be stored.

Storm Event. An estimate of the expected amount of precipitation within a given period of time. For example, a 10-yr. frequency, 24-hr. duration storm event is a storm that has a 10% probability of occurring in any one year. Precipitation is measured over a 24-hr. period.

Storm Frequency. The time interval between major storms of predetermined intensity and volumes of runoff--e.g., a 5-yr., 10-yr. or 20-yr. storm.

Storm Sewer. A closed conduit for conveying collected storm water, while excluding sewage and industrial wastes. Also called a storm drain.

Stormwater. Water resulting from rain, melting or melted snow, hail, or sleet.

Stormwater Drainage System - All means, natural or man-made, used for conducting storm water to, through or from a drainage area to any of the following: conduits and appurtenant features, canals, channels, ditches, storage facilities, Bioswales, streams, culverts, streets and pumping stations.

Stormwater Facility. All ditches, channels, conduits, levees, ponds, natural and manmade impoundments, wetlands, tiles, Bioswales, sewers and other natural or artificial means of draining surface and subsurface water from land.

Stormwater Pollution Prevention Plan. A plan developed to minimize the impact of storm water pollutants resulting from construction activities.

Stormwater Quality Management Plan. A comprehensive written document that addresses stormwater runoff quality.

Stormwater Quality Measure. A practice, or a combination of practices, to control or minimize pollutants associated with storm water runoff.

Stormwater runoff. The water derived from rains falling within a tributary basin, flowing over the surface of the ground or collected in channels or conduits.

Stormwater. Water resulting from rain, melting or melted snow, hail, or sleet.

Stream Gauging. The quantitative determination of streamflow using gauges, current meters, weirs, or other measuring instruments at selected locations (see Gauging station').

Stream Length. The length of a stream or ditch, expressed in miles, from the confluence of the stream or ditch with the receiving stream to the upstream extremity of the stream or ditch, as indicated by the solid or dashed, blue or purple line depicting the stream or ditch on the most current edition of the seven and one-half (7.2) minute topographic quadrangle map published by

the United States Geological Survey, measured along the meanders of the stream or ditch as depicted on the map.

Stream. See intermittent stream, Perennial stream, Receiving stream.

Streambanks. The usual boundaries (not the flood boundaries) of a stream channel. Right and left banks are named facing downstream.

Strip development. A multi-lot project where building lots front on an existing road.

Structure. Refers to a structure that is principally above ground and is enclosed by walls and a roof. The term includes but is not limited to, a gas or liquid storage tank, a manufactured home or a prefabricated building, and recreational vehicles to be installed on a site for more than 180 days.

Structural Engineer. A person licensed under the laws of the State of Indiana to engage in the designing or supervising of construction, enlargement or alteration of structures or any part thereof.

Structural Floodplain. Management Measures. Those physical or engineering measures employed to modify the way floods behave, (e.g., dams, dikes, levees, channel enlargements and diversions).

Subarea/Sub-basin. Portion of a watershed divided into homogenous drainage units which can be modeled for purposes of determining runoff rates. The subareas/sub-basins have distinct boundaries, as defined by the topography of the area.

Subdivision. Any land that is divided or proposed to be divided into lots, whether contiguous or subject to zoning requirements, for the purpose of sale or lease as part of a larger common plan of development or sale.

Subdivision, Minor. The subdivision of a parent parcel into any combination of not more than three (3) contiguous or non-contiguous new residential, commercial, or industrial building sites. The parcel shall front upon an existing street which is an improved right-of-way maintained by the County or other governmental entity and not involve any new street.

Subsoil. The B horizons of soils with distinct profiles. In soils with weak profile development, the subsoil can be defined as the soil below which roots do not normally grow.

Subsurface Drain. A pervious backfield trench, usually containing stone and perforated pipe, for intercepting groundwater or seepage.

Subwatershed. A watershed subdivision of unspecified size that forms a convenient natural unit. See also Subarea.

Sump Failure. A failure of the sump pump that results in inundation of crawl space or basement.

Sump Pump. A pump that discharges seepage from foundation footing drains.

Surcharge. Backup of water in a sanitary or storm sewer system in excess of the design capacity of the system.

Surface Runoff. Precipitation that flows onto the surfaces of roofs, streets, the ground, etc., and is not absorbed or retained by that surface but collects and runs off.

Suspended Solids. Solids either floating or suspended in water.

Bioswale. An elongated depression in the land surface that is at least seasonally wet, is usually heavily vegetated, and is normally without flowing water. Bioswales conduct stormwater into primary drainage channels and may provide some groundwater recharge.

SWCD. Soil and Water Conservation District

Tailwater. The water surface elevation at the downstream side of a hydraulic structure (i.e. culvert, bridge, weir, dam, etc.).

Temporary Stabilization. The covering of soil to ensure its resistance to erosion, sliding, or other movement. The term includes vegetative cover, anchored mulch, or other non-erosive material applied at a uniform density of seventy percent (70%) across the disturbed area.

Thalweg. The deepest point (or centerline) of a channel.

Tile Drain. Pipe made of perforated plastic, burned clay, concrete, or similar material, laid to a designed grade and depth, to collect and carry excess water from the soil.

Tile Drainage. Land drainage by means of a series of tile lines laid at a specified depth, grade, and spacing.

Time of Concentration (tc). The travel time of a particle of water from the most hydraulically remote point in the contributing area to the point under study. This can be considered the sum of an overland flow time and times of travel in street gutters, storm sewers, drainage channels, and all other drainage ways.

Topographic Map. Graphical portrayal of the topographic features of a land area, showing both the horizontal distances between the features and their elevations above a given datum.

Topography. The representation of a portion of the earth's surface showing natural and man-made features of a given locality such as rivers, streams, ditches, lakes, roads, buildings and most importantly, variations in ground elevations for the terrain of the area.

Topsoil. (1) The dark-colored surface layer, or a horizon, of a soil; when present it ranges in depth from a fraction of an inch to 2-3 ft. (2) Equivalent to the plow layer of cultivated soils. (3) Commonly used to refer to the surface layer(s), enriched in organic matter and having textural and structural characteristics favorable for plant growth.

Total Maximum Daily Load. Method used to establish allowable loadings for specified pollutants in a surface water resource to meet established water quality standards.

Toxicity. The characteristic of being poisonous or harmful to plant or animal life. The relative degree or severity of this characteristic.

TP-40 Rainfall. Design storm rainfall depth data for various durations published by the National Weather Service in their Technical Paper 40 dated 1961.

Trained individual. An individual who is trained and experienced in the principles of storm water quality, including erosion and sediment control as may be demonstrated by state registration, professional certification (such as CESSWI and/or CPESC certification), or other documented and applicable experience or coursework as deemed sufficient by the CBU that enable the individual to make judgments regarding storm water control or treatment and monitoring.

Transition Section. Reaches of the stream of floodway where water flows from a narrow cross-section to a wide cross-section or vice-versa.

Treatment Train. A series of stormwater measures designed to maximize the removal of stormwater pollutants or control the volume of stormwater.

Tributary. Based on the size of the contributing drainage area, a smaller watercourse which flows into a larger watercourse.

Turbidity. (1) Cloudiness of a liquid, caused by suspended solids. (2) A measure of the suspended solids in a liquid.

Underdrain. A small diameter perforated pipe that allows the bottom of a detention basin, channel or Bioswale to drain.

Unified Soil Classification System. A system of classifying soils that is based on their

identification according to particle size, gradation, plasticity index, and liquid limit.

Uniform Flow. A state of steady flow when the mean velocity and cross-sectional area remain constant in all sections of a reach.

Unit Hydrograph. A unit hydrograph is the hydrograph that results from one inch of precipitation excess generated uniformly over the watershed at a uniform rate during a specified period of time.

Urban Drain. A drain defined as “Urban Drain” in Indiana Drainage Code.

Urbanization. The development, change or improvement of any parcel of land consisting of one or more lots for residential, commercial, industrial, institutional, recreational or public utility purposes.

Vegetative practices. Any nonstructural or structural BMP that, with optimal design and good soil conditions, utilizes various forms of vegetation to enhance pollutant removal, maintain and improve natural site hydrology, promote healthier habitats, and increase aesthetic appeal. Examples include grass Bioswales, filter strips, buffer strips, constructed wetlands, and rain gardens.

Vegetative Stabilization. Protection of erodible or sediment producing areas with: permanent seeding (producing long-term vegetative cover), short-term seeding (producing temporary vegetative cover), or sodding (producing areas covered with a turf of perennial sod-forming grass).

Water Course. Any river, stream, creek, brook, branch, natural or man-made drainage way in or into which stormwater runoff or floodwaters flow either regularly or intermittently.

Water Quality. A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

Water Resources. The supply of groundwater and surface water in a given area.

Water Table. (1) The free surface of the groundwater. (2) That surface subject to atmospheric pressure under the ground, generally rising and falling with the season or from other conditions such as water withdrawal.

Waterbody. Any accumulation of water, surface, or underground, natural or artificial.

Watercourse. Any river, stream, creek, brook, branch, natural or man-made drainageway in or into which stormwater runoff or floodwaters flow either continuously or intermittently.

Watershed Area. All land and water within the confines of a drainage divide. See also Watershed.

Watershed. The region drained by or contributing water to a specific point that could be along a stream, lake or other stormwater facilities. Watersheds are often broken down into subareas for the purpose of hydrologic modeling.

Waterway. A naturally existing or manmade open conduit or channel utilized for the conveyance of water.

Weir. A channel-spanning structure for measuring or regulating the flow of water.

Wellhead protection area. Has the meaning set forth at 327 IAC 8-4.1-1(27).

Wet-Bottom Detention Basin (Retention Basin) - A basin designed to retain a permanent pool of water after having provided its planned detention of runoff during a storm event.














Wetlands. Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

APPENDIX B – GREEN INFRASTRUCTURE DETAILS






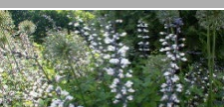



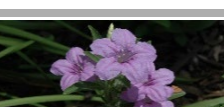
Note: The development of green infrastructure details is currently ongoing. Developers are invited to request sample details or engage in discussions regarding potential green infrastructure configurations with the City of Bloomington Utilities (CBU).

APPENDIX C – PREFERRED SPECIES LIST




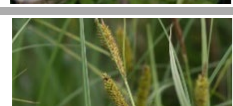
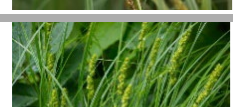

Green Infrastructure Plant List

	Common Name <i>Latin Name</i>	Soil Moisture			Salt Tolerance	Sun Exposure		Plant Height	Plant Width	Bloom Period	Plant Type	Flower Color	Notes
		Wet	Moist	Dry		Sun	Shade						
	Common Milkweed <i>Asclepias syriaca</i>				Medium	█		3-5 ft	1-2 ft	June-Aug	B		Rhizomatous. Can be aggressive.
	Butterfly Milkweed <i>Asclepias tuberosa</i>				None	█	█	1-3 ft	1-2 ft	June- Aug	B		Avoid soils that hold moisture in all seasons to prevent rot. The crown must be planted low enough or will frost heave and winter kill.
	Heath Aster <i>Aster ericoides</i>				Medium	█		1-3 ft	2-3 ft	Sept-Oct	B		Rhizomatous. Tolerates alkaline soils.
	New England Aster <i>Aster novae-angliae</i>				Medium	█		3-5 ft	1-3 ft	Sept-Oct	A		Rhizomatous. Can become aggressive. Older leaves yellow and drop as plant matures. Tends to get powdery mildew.
	Purple Coneflower <i>Echinacea purpurea</i>				Medium	█	█	3-4 ft	1 ft	June-Aug	B		Prefers moist soils.
	Common Boneset <i>Eupatorium perfoliatum</i>				Medium	█		2-4 ft	1-2 ft	July-Sept	A		Prefers organic soils. Tolerates temporary inundation.
	Blue Flag Iris <i>Iris virginica shrevei</i>				Medium	█	█	2-4 ft	1-2 ft	May-July	A		Less flowering in partial shade and dry conditions. Rhizomatous. Slow vegetative spread.
	Marsh Blazing Star <i>Star Liatris spicata</i>				Medium	█		3-5 ft	.5 ft	July-Aug	A		Corm can be divided. Drought tolerant. Excessive shading will cause the flower stems to fall over. Prefers moist soils.
	Great Blue Lobelia <i>Lobelia siphilitica</i>				Medium	█	█	1-3 ft	.5-1 ft	Aug-Sept	A		Plant size and vigor varies based on soil nutrients.
	Monkeyflower <i>Mimulus ringens</i>				Medium	█		2-5 ft	.5-1 ft	July-Sept	A		Rhizomatous. Slow vegetative spread. Plant size varies based on soil fertility.
	Black-Eyed Susan <i>Rudbeckia hirta</i>				Medium	█	█	1-2 ft	.5 ft	June-July	B		Rhizomatous.
	Common Arrowhead <i>Sagittaria latifolia</i>				Medium	█		1-3 ft	1-2 ft	July-Sept	A		Rhizomatous. Can become aggressive. Tolerates highly alkaline soils.
	Grass-Leaved Goldenrod <i>Solidago graminifolia</i>				Medium	█		3-4 ft	1-2 ft	Sept-Oct	A		Prefers organic soils. Dought tolerant. Can become aggressive.
	Grey Goldenrod <i>Solidago nemoralis</i>				Medium	█		1-2 ft	1 ft	Aug-Oct	B		Drough tolerant. Tolerates nutrient poor soils.

Green Infrastructure Plant List

	Common Name <i>Latin Name</i>	Soil Moisture			Salt Tolerance	Sun Exposure		Plant Height	Plant Width	Bloom Period	Plant Type	Flower Color	Notes
		Wet	Moist	Dry		Sun	Shade						
	Stiff Goldenrod <i>Solidago rigida</i>				Medium	1	1	3-4 ft	1-2 ft	Aug-Oct	B	Yellow	Aggressive by seed.
	Ohio Spiderwort <i>Tradescantia ohienis</i>				Medium	1	1	2-4 ft	1-2 ft	May-July	B	Purple	Foliage dies back to ground after flowering. Flowers open only on cloudy days and sunny mornings.
	Hoary Vervain <i>Verbana stricta</i>				Medium	1	1	2-5 ft	.5-1 ft	June-Aug	A	Purple	Drought tolerant. Tolerates nutrient poor soils. Plant size and vigor varies based on soil nutrients.
	Cardinal Flower <i>Lobelia cardinalis</i>				Medium	2	2	1-2 ft	.5 ft	Aug-Sept	A	Red	Short lived. Plant size and vigor varies based on soil nutrients.
	Blue False Indigo <i>Baptisia australis</i>				Medium	2	2	3-5 ft	3-4 ft	May-June	B	Blue	Nitrogen fixing legume. Drought tolerant. Tolerates nutrient poor soils. Intolerant of alkaline soils.
	White False Indigo <i>Baptisia leucantha</i>				Medium	1	1	4-6 ft	3-4 ft	June-July	B	White	Nitrogen fixing legume. Slow to mature. Drought tolerant. Tolerates nutrient poor soils. Intolerant of alkaline soils.
	Sawtooth Sunflower <i>Helianthus grosseserratus</i>				Medium	1	1	1-3 ft	1-2 ft	Aug-Sept	A	Yellow	Rhizomatous. Can become aggressive. Prefers moist organic soils.
	Savanna Blazing Star <i>Liatis scariosa nieuwlandii</i>				Low	2	2	2-3 ft	.5 ft	July-Aug	A	Purple	Nitrogen fixing legume. Drought tolerant. Tolerates nutrient poor soils.
	Wild Lupine <i>Lupinus perennis</i>				Medium	2	2	1-2 ft	1-2 ft	April-May	B	Purple	Nitrogen fixing legume. Slow to mature. Drought tolerant. Tolerates nutrient poor soils. Intolerant of alkaline soils.
	Hairy Wild Petunia <i>Ruellia humilis</i>					2	2	1.5-2ft	1.5-2 ft	May-Oct	A	Purple	Drought tolerant.

Green Infrastructure Plant List

	Common Name <i>Latin Name</i>	Soil Moisture			Salt Tolerance	Sun Exposure		Plant Height	Plant Width	Bloom Period	Plant Type	Flower Texture	Notes
		Wet	Moist	Dry		Sun	Shade						
	Emory's Sedge <i>Carex emoryi</i>				Medium			2-3 ft	2-3 ft	April-May	C	Fine	Rhizomatous and aggressive. Tolerates flowing water. Tolerates alkaline soils.
	Frank's Sedge <i>Carex frankii</i>				Medium			1-2 ft	1-2 ft	June-July	C	Coarse	Rhizomatous. Moderate vegetative growth. Spreads aggressively by seed.
	Porcupine Sedge <i>Carex hystericina</i>				Medium			1-2 ft	1-2 ft	May-June	C	Medium	Rhizomatous. Slow vegetative growth once established. Requires fertile soils.
	Lakebank Sedge <i>Carex lacustris</i>				Medium			2-4 ft	2-4 ft	April-May	C	Coarse	Rhizomatous and aggressive.
	Fox Sedge <i>Carex vulpinoidea</i>				Medium			1-2 ft	1-2 ft	May-July	C	Fine	Bunch type sedge. Can be aggressive with low competition from other plants.
	Yellow Fox Sedge <i>Carex annectens var xanthocarpa</i>				Medium			1-2 ft	1-2 ft	May-June	C	Fine	Bunch type sedge. Can be aggressive with little competition.