APPENDIX B. STORM WATER DESIGN & CONSTRUCTION SPECIFICATIONS MANUAL

Dec. 15 2010, Board of Works minutes
Storm Water Design and Construction Specifications Manual Adoption presentation
Storm Water Design and Construction Specifications Manual fact sheet
Internal and external trainings
   March 31, 2011
   April 15, 2011
Board of Public Works
December 15, 2010

A regular meeting of the Board of Public Works of the Consolidated City of Indianapolis, Marion County, Indiana, was held the 15th day of December 2010, in the Public Assembly Room of the City County Building. Chair David Sherman called the meeting to order at 1:00 p.m.

Board members in attendance were: David Sherman  Tony Samuel  Dorothy Henry
Robert Parrin  Cassie Stockamp  Dennis Rosebrough

Absent:
Kenneth Hughes

Staff in attendance was:
Larry Jones  Mike Smith  Allyson Pumphrey
Steve Nielsen  Sue Michael  Nicole Kelsey
John Oakley  Monica Ferguson  Jeff Sirmin
Bob Ransom  Ron Stinson  Ashlee Kilpatrick
Nathan Sheets  Bill Bowman  Sherry Owens
John Hazlett

The Chair diverted from the standard agenda to hear Item 3a, Resolution No. 59, 2010; Item 1, Approval of Minutes was approved subsequently.

ITEM # 1 – APPROVAL OF MINUTES
Upon a motion by Mr. Parrin, seconded by Ms. Henry, the Board voted 6-0 to approve and accept Board Minutes from October 13, 2010.

ITEM # 2 – PUBLIC HEARING RESOLUTION
Public hearing opened.

Resolution No. 66, 2010; Storm Water Design and Construction Specifications Manual Adoption

Staff recommended that the Board of Public Works approve and adopt Resolution No. 66, 2010, for the Revised Storm Water Design and Construction Specifications Manual. The manual, now fifteen years old, has been updated. The manual provides a guidebook of engineering design and construction standards for proper storm water management for those contemplating some form of land alteration within the City of Indianapolis; and also provides a tool for compliance with various components of the National Pollutant Discharge Elimination System NPDES storm water permit. Upon a motion by Mr. Parrin, seconded by Ms. Henry, the Board voted 6-0 to approve and adopt Board Resolution No. 66, 2010.

Public hearing closed.

ITEM # 3 – RESOLUTIONS
a. Resolution No. 59, 2010; Revoking Permission for Certain Fuel Line Rights
Staff recommended that the Board of Public Works approve and adopt Resolution No. 59, 2010, Revoking Permission for Certain Fuel Line Rights. There is an agreement between the City and Progress Laundry Co. Inc., dated February 9, 1950, and recorded February 18, 1950. The Laundry Company no longer exists and the fuel lines have been removed. There is no need for such continued permission; and the city retains the right to revoke or cancel the agreement without any proceedings or notice other than a written order from the Board of Public Works. Mr. Parrin asked how was this piece of information found. Mr. Sirmin replied it was located by a title search. Upon a motion by Mr. Rosebrough, seconded by Ms. Henry, the Board voted 6-0 to approve and adopt Board Resolution No. 59, 2010.

b. Resolution No. 64, 2010; Belmont North Relief Interceptor

Staff recommended that the Board of Public Works approve and adopt Resolution No. 64, 2010, to authorize and accept the donation of six permanent easements form the Department of Parks and Recreation (DPR). Juan Solomon Park, located at 6100 Grandview Drive and Coffin Golf Course, located at 2500 Cold Spring Road are presently owned by the City of Indianapolis for the use and benefit of the DPR. DPR is donating two permanent easements at these properties for the use the Department of Public Works on Project No. SS-24-001. In addition, DPR is donating four easements along 30th Street from Cold Spring Road to White River Parkway West drive and along from 30th Street to 38th Street for use by the Department of Public Works. Upon a motion by Mr. Parrin, seconded by Ms. Stockamp, the Board voted 6-0 to approve and adopt Board Resolution No. 64, 2010.

c. Resolution No. 67, 2010; Approval of an Interlocal Agreement between the Consolidated City of Indianapolis, Marion County, Indiana, and Fishers, Indiana, Related to Improvements to the Intersection of 96th Street and Allisonville Road

Staff recommended that the Board of Public Works approve and adopt Resolution No. 67, 2010, for the approval of an Interlocal Agreement between the Consolidated City of Indianapolis, Marion County, Indiana, and the Town of Fishers, Indiana, related to improvements to the intersection of 96th Street and Allisonville Road. The Town of Fishers, Indiana wishes to make improvements to the intersection of 96th Street and Allisonville Road to improve traffic flow. The design selected by Fishers will prohibit left turns at the intersection and will use Michigan Lefts at new intersections on all four legs of the intersection. This design will require Fishers to acquire a small portion of land with the Consolidated City of Indianapolis and Marion County. Upon a motion by Ms. Henry, seconded by Mr. Parrin, the Board voted 6-0 to approve and adopt Board Resolution No. 67, 2010.

A representative from the Town of Fishers gave a detailed explanation related to the improvements to the intersection of 96th Street and Allisonville Road traffic flow.

ITEM # 4 – BID AWARDS

a. ITB-7809, Crane Service Truck
$0.00 – Bloomington Ford, Inc.

Staff recommended that the Board of Public Works reject the bids of Pearson Ford, Carriage Ford, and H&H Sales as being non-responsive due to material exceptions taken; and approve and authorize the Director to execute an agreement for a two year term with Bloomington Ford, Inc., the overall lowest responsive and responsible bidder with no material exceptions, for Crane Service Trucks. This bid provides for a two year agreement for purchase of crane service trucks with an initial purchase of two units. Upon a motion by Ms. Henry, seconded by Mr. Rosebrough, the Board voted 6-0 to approve the Crane Service Truck Agreement.
b. ST-36-026; Stanley Road from Hatfield Drive to 2,100 Feet North
$696,086.97 – Globe Asphalt Paving, Inc.

Staff recommended that the Board of Public Works award Project No. ST-36-026, Stanley Road from Hatfield Drive to 2,100 Feet North to Globe Asphalt Paving Co., with a corrected Base Bid of $578,149.92 plus add corrected Alternate No. 2 of $97,719.23 and add corrected Alternate No. 4 of $20,217.82 for a total not to exceed amount of $696,086.97 on the basis that it is the lowest responsive and responsible bidder. The base bid includes new construction of Mirabel Road from Stanley Road to Epler Road. Work includes clearing, demolition, grading, storm sewer, pavement replacement, curb, pavement striping and drainage improvements along Epler Road from Mirabel Road to a dead end. Alternate No. 2 includes rehabilitation of the existing Stanley Road from Hatfield Drive to Colonial Road and widening. Work includes milling and base repair to existing pavement, widening and other related items of work. Mr. Parrin asked about the owner of this property. Mr. Smith replied that it is owned by Holladay Properties. Upon a motion by Ms. Henry, seconded by Ms. Stockamp, the Board voted 6-0 to approve the Stanley Road from Hatfield Drive to 2,100 Feet North Project.

c. BL-10-069 and SD-10-070; 63rd Spring Mill Road Project, 64th Whitley Septic Tank Elimination Project, 64th Spring Mill Road Drainage Improvements
$3,652,237.50 – Merryman Excavation, Inc.

Staff recommended that the Board of Public Works award Project No. BL-10-069B, and SD-10-070, 63rd Spring Mill Septic Tank Elimination Project, 64th Whitley Septic Tank Elimination Project and 64th Spring Mill Drainage Improvements to Merryman Excavation, Inc., in the not to exceed amount of $3,652,237.50 on the basis that it is the lowest responsive and responsible bidder. The engineer’s estimate for construction of this project is $4,932,878.00 and the percentage between the low bid and the engineer’s estimate is 25%. This project consists of the installation of approximately 14,000 feet of sanitary sewer; one lift station; low pressure sanitary sewer; hybrid ditch system and associated grading, and seeding and road restoration. Director Sherman asked about the successful project that Merryman had done recently. Mr. Nielsen replied that Merryman effectively completed the Belmont North project, which was ahead of schedule; and that Merryman has performed very well on other projects. Mr. Parrin asked who was the engineer on this project. Mr. Nielsen replied American StructurePoint. Upon a motion by Mr. Rosebrough, seconded by Ms. Stockamp, the Board voted 6-0 to approve the 63rd Spring Mill Road STEP, 64th Whitley Septic Tank Elimination Project, 64th Spring Mill Road Drainage Improvements Project.

d. BL-10-069A; 59th Grandview Septic Tank Elimination Project, 59th Grandview Neighborhood Area Stormwater Improvements
$2,927,986.20 – Merryman Excavation, Inc.

Staff recommended that the Board of Public Works award Project No. BL-10-069A, 59th Grandview Septic Tank Elimination Project, 59th Grandview Neighborhood Area Stormwater Improvements to Merryman Excavation, Inc., in the not to exceed amount of $2,927,986.20 on the basis that it is the lowest responsive and responsible bidder. This project is SRF funded and consists of the installation of sanitary sewers and drainage improvements for approximately 180 homes. It also includes road restoration, seeding and grading. Upon a motion by Ms. Stockamp, seconded by Ms. Henry, the Board voted 6-0 to approve the 59th Grandview Septic Tank Elimination Project, 59th Grandview Neighborhood Area Stormwater Improvements Project.
e. SO-76-001; Sludge Transfer Ferrous Storage System Rehabilitation
$344,300.00 – Bowen Engineering Corporation

Staff recommended that the Board of Public Works award Project No. SO-76-001, Sludge Transfer Ferrous Storage System Rehabilitation to Bowen Engineering Corporation in the base bid lump sum amount of $344,300.00 on the basis that it is the lowest responsive and responsible bid. The engineer’s estimate for construction for this project is $449,265.00 and the percentage difference between the low bid and the engineer’s estimate was 23.4%. There were no bid alternates associated with this bid. This project consists of upgrades to the existing ferrous storage and feed system. Demolition required consists of removing existing concrete block wall, storage tanks, equipment, electrical systems, and plumbing and HVAC systems. Mr. Parrin asked about the age of the system. Mr. Nielsen replied that the system was built in 1988, 1989, so about twenty years old. Mr. Rosebrough asked if the construction would take place at the Southport facility. Mr. Nielsen replied yes. Upon a motion by Ms. Stockamp, seconded by Mr. Rosebrough, the Board voted 6-0 to approve the Sludge Transfer Ferrous Storage System Rehabilitation Project.

f. CS-25-031B; 300 West Fall Creek Siphon and Lift Station
$927,091.00 – Atlas Excavating, Inc.

Staff recommended that the Board of Public Works award Project No. CS-25-031B, 300 West Fall Creek Siphon and Lift Station to Atlas Excavating, Inc., in the not to exceed amount of $927,091.00 on the basis that it is the lowest responsive and responsible bidder. The engineer estimate for construction of this project is $1,107,585.36 and the percentage between the low bid and the engineer’s estimate is 19.5%. This project replaces a sanitary sewer, which is exposed in Fall Creek with a siphon and lift station. Ms. Stockamp asked if Mr. Nielsen was comfortable with this bid. Mr. Nielsen replied yes, with a full time inspector on this project. He stated that staff notified the bond and heat company to make certain that they were satisfied with the performance of this. Director Sherman mentioned that the reason the Board brought this up was because there had been some challenges on the septic system with Atlas; yet, mentioned that Atlas still had not addressed the Park issue. Mr. Nielsen replied that staff has had conversations with Atlas, and they know staff will be paying close attention to this project. Upon a motion by Ms. Stockamp, seconded by Mr. Parrin, the Board voted 6-0 to approve the 300 West Fall Creek Siphon and Lift Station Project.

ITEM # 5 - CHANGE ORDERS

a. CS-11-088B, C/O No. 1; Lift Station 507 Upgrade
$32,650.00 – Bowen Engineering Corporation

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 1 to Bowen Engineering in the increased amount of $32,650.00 for a new contract total not to exceed $4,621,650.00 and an increase of 10 calendar days for Project No. CS-11-088B, Lift Station 507 Upgrade. This change order is for various items described in the work directives as incorporated into this change order. Director Sherman asked who was the project manager on this project. Mr. Nielsen replied Hannum, Wagle & Cline Engineering. Director Sherman asked who from the city is over seeing this project. Mr. Nielsen replied Tim Lawson. Director Sherman stated that he did not want too many more change orders on this project. Mr. Rosebrough asked if staff changed the size of the conduit on the roof. Mr. Nielsen replied no, that staff was trying to do a green roof, which did not match. Upon a motion by Ms. Stockamp, seconded by Ms. Henry, the Board voted 6-0 to approve Change Order No. 1 for Lift Station 507 Upgrade Project.

b. LD-15-012, C/O No. 1; Eagle Creek Dam Improvements
$8,836.00 – Gerig-Ottenweller
Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 1 to Gerig-Ottenweller in the increased amount of $8,836.00 for a new contract total not to exceed $140,636.90 and an increase of 86 calendar days for Project No. LD-15-012, Eagle Creek Dam Improvements. The city requested additional sandblasting and painting on more valves and piping. Upon a motion by Ms. Stockamp, seconded by Ms. Henry, the Board voted 6-0 to approve Change Order No. 1 for Eagle Creek Dam Improvements Project.

c. RS-10-061, C/O No. 1; Resurfacing in Franklin, Perry, and Warren Townships
$112,625.07 – Rieth-Riley Construction

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 1 to Rieth-Riley Construction in the increased amount of $112,625.07 for a new contract total not to exceed $3,502,625.07 and an increase of 5 calendar days for Project No. RS-10-061, Resurfacing in Franklin, Perry, and Warren Townships. This change order adds additional quantities to items 14, 20, 21, 22, and adds items to 2A and 54A to accommodate the paving of Southeastern Avenue and Mimosa Lane from Acton Road to Bloomfield Terrace. Upon a motion by Ms. Stockamp, seconded by Mr. Parrin, the Board voted 6-0 to approve Change Order No. 1 for Resurfacing in Franklin, Perry, and Warren Townships Project.

d. RS-10-202, C/O No. 1, Resurfacing in Center Township
$395,951.10 – Rieth-Riley Construction

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 1 to Rieth-Riley Construction in the increased amount of $395,951.10 for a new contract total not to exceed $4,185,484.95 and no increase of calendar days for Project No. RS-10-202, Resurfacing in Center Township. This change order is to extend quantities for the signalized intersection repair work, and adjust the signal conduit quantity, flowable fill, and common excavation quantities. Upon a motion by Ms. Henry, seconded by Ms. Stockamp, the Board voted 6-0 to approve Change Order No. 1 for Resurfacing in Center Township Project.

e. RS-10-202, C/O No. 2; Resurfacing in Center Township
$62,818.00 – Rieth-Riley Construction

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 2 to Rieth-Riley Construction in the increased amount of $62,818.00 for a new contract total not to exceed $4,248,302.94 and no increase of calendar days for Project No. RS-10-202, Resurfacing in Center Township. This change order is to extend quantities for the fiber optic conduit repair item. Upon a motion by Ms. Stockamp, seconded by Ms. Henry, the Board voted 6-0 to approve Change Order No. 2 for Resurfacing in Center Township Project.

f. RS-10-202, C/O No. 3; Resurfacing in Center Township
$5,197.92 – Rieth-Riley Construction

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 3 to Rieth-Riley Construction in the increased amount of $5,197.92 for a new contract total not to exceed $4,253,500.86 and no increase of calendar days for Project No. RS-10-202, Resurfacing in Center Township. This change order changes the concrete section along the repaired curb line of the Oliver Avenue Bridge over White River. Upon a motion by Ms. Stockamp, seconded by Mr. Parrin, the Board voted 6-0 to approve Change Order No. 3 for Resurfacing in Center Township Project.
g. RS-10-201, C/O No. 1; Resurfacing in Center Township  
$6,867.44 – Calumet Civil Contractors

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 1 to Calumet Civil Contractors in the increased amount of $6,867.44 for a new contract total not to exceed $3,256,166.44 and no increase of calendar days for Project No. RS-10-201, Resurfacing in Center Township. This change order will replace sidewalk along Ohio Street in order to become ADA compliant and remove trip hazards and delaminated sidewalk along the sidewalk areas. Upon a motion by Ms. Stockamp, seconded by Mr. Parrin, the Board voted 6-0 to approve Change Order No. 1 for Resurfacing in Center Township Project.

h. RS-10-201, C/O No. 2; Resurfacing in Center Township  
$34,175.00 – Calumet Civil Contractors

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 2 to Calumet Civil Contractors, in the increased amount of $34,175.00 for a new contract total not to exceed $3,290,341.44 and an increase of 5 calendar days for Project No. RS-10-201, Resurfacing in Center Township. This change order will replace sidewalk along East Street in order to become ADA compliant and remove trip hazards along the sidewalk areas. Upon a motion by Mr. Parrin, seconded by Ms. Stockamp, the Board voted 6-0 to approve Change Order No. 2 for Resurfacing in Center Township Project.

i. BM-16-072, C/O No. 1; Lafayette Road over CSX Railroad Bridge Rehabilitation  
$36,742.91 – Trisler Construction Co., Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 1 to Trisler Construction Co., Inc., in the increased amount of $36,742.91 for a new contract total not to exceed $300,121.31 and an increase of 84 calendar days for Project No. BM-16-072, Lafayette Road over CSX Railroad Bridge Rehabilitation. While doing the planned removal of the laminated concrete on bent 5, the contractor discovered additional deteriorated concrete under the existing bearing rocker pads. After an on-site meeting with the designer and contractor, the designer recommended that the live traffic load be removed, which is the reason for the additional barricades, signs, barrels, and flashing arrow sign. Upon a motion by Ms. Stockamp, seconded by Mr. Parrin, the Board voted 6-0 to approve Change Order No. 1 for Lafayette Road over CSX Railroad Bridge Rehabilitation Project.

j. RS-10-056, C/O No. 1; Resurfacing and Related Items in Center and Washington Townships  
$12,510.00 – Milestone Contractors

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 1 to Milestone Contractors in the increased amount of $12,510.00 for a new contract total not to exceed $3,756,510.00 and no increase of calendar days for Project No. RS-10-056, Resurfacing with Related Items in Center and Washington Townships. This change order provides for an additional 90 construction signs that were not included in the planned quantities. Upon a motion by Ms. Stockamp, seconded by Ms. Henry, the Board voted 6-0 to approve Change Order No. 1 for Resurfacing with Related Items in Center and Washington Townships Project.

k. CW-09-013, C/O No. 3; Indy Access Curb, Sidewalk and Ramps with Related Items in Center, Lawrence,
Washington, and Warren Townships
$8,113.50 – New Beginnings, LLC

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 3 to New Beginnings, LLC in the increased amount of $8,113.50 for a new contract total not to exceed $812,126.75 and an increase of 9 calendar days for Project No. CW-09-013, Indy Access Curb, Sidewalk and Ramps with Related Items in Center, Lawrence, Washington, and Warren Townships. Change order No. 3 is for work directive changes (wdc) 7 through 11. WDC No. 7 consists of relocating the storm sewer to avoid utility conflicts, and other related items. Upon a motion by Mr. Rosebrough, seconded by Ms. Stockamp, the Board voted 6-0 to approve Change Order No. 3 for the Indy Access Curb, Sidewalk and Ramps with Related Items in Center, Lawrence, Washington, and Warren Townships Project.

1. CS-32-005, C/O No. 1; Merrill Street Combined Sewer Rehabilitation
$127,703.00 – Michels Corporation

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 1 to Michels Corporation in the increased amount of $127,703.00 for a new contract total not to exceed $3,409,064.00 and an increase of 2 calendar days for Project No. CS-32-005, Merrill Street Combined Sewer Rehabilitation. This change order consists of adding reconstruction of one manhole, and adjustments to existing pay items. Upon a motion by Mr. Rosebrough, seconded Ms. Henry, the Board voted 6-0 to approve Change Order No. 1 for the Merrill Street Combined Sewer Rehabilitation Project.

m. SS-24-001G, C/O No. 1; Belmont North Relief Interceptor, Section 3
$0.00 – Merryman Excavation, Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 1 to Merryman Excavation, Inc., in the unchanged contract total not to exceed $12,457,863.45 and an increase of 21 calendar days for Project No. SS-24-001G, Belmont North Relief Interceptor, Section 3. This change order incorporates changes as outlined on work directive changes 2, 3, 5, 8 and 9. Upon a motion by Ms. Henry, seconded by Mr. Parrin, the Board voted 6-0 to approve Change Order No. 1 for the Belmont North Relief Interceptor, Section 3 Project.

ITEM # 6 - FINAL CHANGE ORDERS AND ACCEPTANCE

a. LS-01-005; C/O No. 2/FINAL; Lift Station LS-201 Force Main Replacement
$4,885.00 – Veolia Water Indianapolis

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 2/FINAL for Veolia Water Indianapolis in the increased amount of $4,885.00 for a new contract total not to exceed $365,929.45 and no increase of calendar days for Project No. LS-01-005, Lift Station LS-201 Force Main Replacement, and furthermore to accept this project as final. This change order is to adjust the final contract amount due to the addition of an air release valve with structure and deletion of nine (9) L.F. of 8-inch PVC SDR pipe at contract unit prices due to unforeseen existing field conditions. Upon a motion by Ms. Stockamp, seconded by Mr. Parrin, the Board voted 6-0 to approve Final Change Order No. 2 for the Lift Station LS-201 Force Main Replacement Project.

b. LS-00-008; C/O No. 3/FINAL; Lift Station 313 Capacity Upgrade
$(5,008.60) – Thieneman Construction, Inc.
Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 3/FINAL for Thieman Construction, Inc., in the decreased amount of $(5,008.60) for a final contract total of $5,872,598.85 and an increase of 111 calendar days for Project No. LS-00-008, Lift Station 313 Capacity Upgrade, and furthermore to accept this project as final. This change order consists of credits for items in the scope of work that were found to be in good operating condition during construction and replacement of these items was deemed non-beneficial to the project, or were no longer needed due to pipe changes approved in Change Order No. 1. Ms. Stockamp asked why it took staff so long to fix the vibration problem. Mr. Nielsen replied that staff immediately recognized the vibration problem; however, it took time to figure out how to fix the problem. Upon a motion by Ms. Stockamp, seconded by Mr. Parrin, the Board voted 6-0 to approve Final Change Order No. 3 for the Lift Station 313 Capacity Upgrade Project.

c. BL-46-083D; C/O No. 2/FINAL; Meridian/Stop 11 Corridor Septic Tank Elimination Project $(28,526.61) – Atlas Excavating, Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute Change Order No. 2/FINAL for Atlas Excavating, Inc., in the decreased amount of $(28,526.61) for a final contract total of $2,290,821.07 and an increase of 214 calendar days for Project No. BL-46-083D, Meridian/Stop 11 Corridor Septic Tank Elimination Project, and furthermore to accept this project as final. This change order consists of replacing the sanitary sewer to 106 Rose Lane, additional curb ramps, pavement markings, and final quantity adjustments. Upon a motion by Ms. Stockamp, seconded by Mr. Parrin, the Board voted 6-0 to approve Final Change Order No. 2 for the Meridian/Stop 11 Corridor Septic Tank Elimination Project.

ITEM #7 – PROFESSIONAL SERVICE AGREEMENTS

a. BL-41-003D and SD-41-007D, Five Points/Southeastern Avenue Septic Tank Elimination Program and Drainage Improvements
$482,486.00 – Crawford, Murphy & Tilly, Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute the Construction Inspection Services Agreement with Crawford, Murphy & Tilly, Inc., for Project No. BL-41-003D and SD-41-007D, Five Points/Southeastern Avenue Septic Tank Elimination Program and Drainage Improvements project in the amount not to exceed $482,486.00. This project consists of the construction of a sanitary lift station, drainage improvements including installation of storm sewer pipe, structures and hybrid ditches, and resurfacing or reconstruction of local streets. Upon a motion by Mr. Parrin, seconded by Mr. Rosebrough, the Board voted 6-0 to approve the Five Points/Southeastern Avenue Septic Tank Elimination Program and Drainage Improvements Agreement.

b. SS-06-006A, Castleton Relief Sewer, Phase I
$557,578.36 – Commonwealth Engineers, Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute the Construction Inspection Services Agreement with Commonwealth Engineers, Inc., for Project No. SS-06-006A, Castleton Relief Sewer, Phase I in the amount not to exceed $557,578.36. This project consists of the construction of 2,740 feet of sewer by the trenchless sewer installation method. Mr. Rosebrough asked how often does staff request RFQs. Mr. Nielsen replied every quarter, or when needed. Mr. Rosebrough asked who reviews them. Mr. Nielsen replied that a staff team is put together, along with himself, and other senior management. Upon a motion by Ms. Henry, seconded by Ms. Stockamp, the Board voted 6-0 to approve the Castleton Relief Sewer Agreement.
c. SS-00-065, Miscellaneous Small Diameter Sanitary and Combined Sewer Rehabilitation
$245,000.00 – Commonwealth Engineers, Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute a Professional Services Agreement between Commonwealth Engineers, Inc., and the City of Indianapolis for Project No. SS-00-065, Miscellaneous Small Diameter Sanitary and Combined Sewer Rehabilitation for an amount not to exceed $245,000.00. This scope of work consists of the assessment of various small diameter sewers and manholes, and design engineering services to repair or rehabilitate the various small diameter sewers and manholes throughout Marion County. Upon a motion by Ms. Stockamp, seconded by Mr. Parrin, the Board voted 6-0 to approve the Miscellaneous Small Diameter Sanitary and Combined Sewer Rehabilitation Agreement.

d. BL-10-069A and SD-10-070, 59th Grandview Septic Tank Elimination Project and 59th Grandview Neighborhood Area Stormwater Improvements
$285,406.00 – Cripe Architects & Engineers

Staff recommended that the Board of Public Works approve and authorize the Director to execute an Agreement with Cripe Architects & Engineers for BL-10-069A and SD-10-070, 59th/Grandview Septic Tank Elimination Project 59th/Grandview Neighborhood Area Stormwater Improvement for an amount not to exceed $285,406.00. This project consists of the installation of sanitary sewers and drainage improvements for approximately 180 homes. Upon a motion by Ms. Stockamp, seconded by Mr. Parrin, the Board voted 6-0 to approve the 59th Grandview Septic Tank Elimination Project and 59th Grandview Neighborhood Area Stormwater Improvements Agreement.

e. BL-10-069C and SD-10-070, 63rd Spring Mill Septic Tank Elimination Project and 63rd Spring Mill Drainage Improvements
$363,836.00 – Cripe Architects & Engineers

Staff recommended that the Board of Public Works approve and authorize the Director to execute the Construction Inspection Services Agreement with Cripe Architects and Engineers for Project No. BL-10-069C and SD-10-070, 63rd Spring Mill Septic Tank Elimination Project and 63rd Spring Mill Drainage Improvements in the amount not to exceed $363,836.00. This project consists of the installation of approximately 14,000 feet of sanitary sewer, one lift station, low pressure sanitary sewer, hybrid ditch system and associated grading, and seeding and road restoration. Upon a motion by Ms. Stockamp, seconded by Ms. Henry, the Board voted 6-0 to approve the 63rd Spring Mill Septic Tank Elimination Project and 63rd Spring Mill Drainage Improvements Agreement.

f. SO-76-001, Southport Sludge Transfer Ferrous Storage System Rehabilitation
$45,000.00 – Butler Fairman & Seufert, Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute a Professional Services Agreement between Butler Fairman & Seufert, Inc., and the City of Indianapolis for Project No. SO-76-001, Southport Sludge Transfer Ferrous Storage System Rehabilitation in the amount not to exceed $45,000.00. This project consists of upgrading the existing ferrous storage and feed system to include removing concrete block walls, storage tanks, equipment, and electrical /HVAC/ plumbing systems. Upon a motion by Mr. Parrin, seconded by Ms. Henry, the Board voted 6-0 to approve the Southport Sludge Transfer Ferrous Storage System Rehabilitation Agreement.
g. WT-05-003, Roof Replacements  
$391,180.00 – Keystone Construction Corporation

Staff recommended that the Board of Public Works approve and authorize the Director to execute a Professional Services Agreement between Keystone Construction Corporation and the City of Indianapolis for Project No. WT-05-003, Roof Replacements for an amount not to exceed $391,180.00. This agreement provides for the detailed design and preparation of construction drawings and specifications for the complete tear off and replacement of nine roofs located at the AWT facilities, including the design of the façade replacement and green roof for the Belmont Administration Building. Upon a motion by Ms. Stockamp, seconded by Ms. Henry, the Board voted 6-0 to approve the Roof Replacement Agreement.

h. ENG-10-027, As-Needed Traffic Engineering Services  
$50,000.00 – PB Americas, Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute a Professional Services Agreement with PB Americas, Inc., for As-Needed Traffic Engineering Services in an amount not to exceed $50,000.00. This project will allow staff to request traffic signal design and inspection, intersection analysis, and traffic signal programming as well as additional traffic engineering services. Upon a motion by Ms. Stockamp, seconded by Mr. Parrin, the Board voted 6-0 to approve the As-Needed Traffic Engineering Services Agreement.

i. ENG-10-28, As-Needed Traffic Engineering Services  
$50,000.00 – Infrastructure Engineering, Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute a Professional Services Agreement with Infrastructure Engineering, Inc., for As-Needed Traffic Engineering Services in the amount not to exceed $50,000.00. This project will allow staff to request traffic signal design and inspection, intersection analysis, and traffic signal programming as well as additional traffic engineering services. Upon a motion by Ms. Henry, seconded by Ms. Stockamp, the Board voted 6-0 to approve the As-Needed Traffic Engineering Services Agreement.

The Chair diverted from the standard agenda to hear Item 7m, EPA Sustainable Skylines Grant Activities, and Item 7l Illinois Street and Capitol Avenue Bike Lanes; Items 7j and 7k were heard toward the end of the agenda.

j. Consulting Services Related to Urban Conservationist Position  
$53,000.00 – Empower Results, LLC

Staff recommended that the Board of Public Works approve and authorize the Director to execute a contract for a Professional Services Agreement with Empower Results, LLC, for the Urban Conservationist position with the Office of Sustainability, for a total not to exceed amount of $53,000.00 expiring on December 31, 2011. This consultant is responsible for providing information; technical assistance; and encouraging landowners; and users in planning and applying natural resource conservation measures for non-agricultural land users. Empower will also be responsible for the administration of the rain garden and native planting programs. Mr. Rosebrough asked whether or not staff was going through an employment service as opposed to hiring someone. Ms. Pumphrey stated that Empower was selected out of five responses; and that Empower is an education outreach firm here in Indianapolis. She replied that Empower is a WBE firm that provides wet weather education programs that is involved in water shed community groups, neighborhood associates, and
private land owners. Mr. Rosebrough stated with the level of expertise as something as new as rain garden, he was surprised that staff only received five responses. Ms. Pumphrey stated that the Office of Sustainability put together a RFQ for the services of the Urban Conservationist position, which staff received five applications. She mentioned that the submissions were based on general capability of the company; project schedule and the control capability; project staffing plan; resumes; experience of the city’s wet weather programs; green infrastructure, and other types of rain garden outreach. Mr. Rosebrough asked about the principal. Ms. Pumphrey replied Jill Hoffman. Mr. Rosebrough asked if it was a one person shop. Ms. Pumphrey replied that Ms. Hoffman listed five individuals on her personnel. Upon a motion by Mr. Rosebrough, seconded by Mr. Parrin, the Board voted 6-0 to approve the Consulting Services Related to Urban Conservationist Position Agreement.

k. Marketing/Educational/Public Relation Services Related to EPA Large Sports Venue Recycling Enhancement Grant
$35,000.00 – Julie L. Rhodes Consulting

Staff recommended that the Board of Public Works approve and authorize the Director to execute a Professional Services Agreement with Julie L. Rhodes Consulting. This agreement is funded by an Environmental Protection Agency, grant awarded in October 2010 in a not to exceed amount of $35,000.00. The consultant will be working with the Office of Sustainability in designing and developing an education and outreach campaign to improve the visitor’s awareness of the recycling programs and increase the amount of recyclables collected at both facilities. Mr. Parrin asked if goals were established. Ms. Kilpatrick replied with this part of the grant, staff will survey all visitors as they are walking into the facility to find the awareness. As the education campaign is developed and implemented, staff hopes to see the number increase by 15%. Upon a motion by Mr. Parrin, seconded by Mr. Samuel, the Board voted 6-0 to approve the Marketing/Educational/Public Relation Services Related to EPA Large Sports Venue Recycling Enhancement Grant Agreement.

l. ST-25-160, Illinois Street and Capitol Avenue Bike Lanes
$39,100.00 – R.W. Armstrong & Associates

Staff recommended that the Board of Public Works approve and authorize the Director to execute a Professional Services Agreement with R.W. Armstrong & Associates, Project No. ST-25-160, Illinois Street/Capitol Avenue Bike Lanes in the hourly not to exceed amount of $39,100.00. The inspection consultant and their team will be responsible for the construction observation and inspection, design, spot location survey, environmental reports, historical documentation, and right of way coordination in accordance with federal and state requirements associated with the Federal Transportation Enhancement grant. Upon a motion by Ms. Stockamp, seconded by Ms. Henry, the Board voted 6-0 to approve the Illinois Street and Capitol Avenue Bike Lanes Agreement.

m. EPA Sustainable Skylines Grant Activities
$32,445.00 – Keep Indianapolis Beautiful

Staff recommended that the Board of Public Works approve and authorize the Director to execute a Professional Services Agreement in the amount of $32,445.00 with Keep Indianapolis Beautiful for activities related to the Sustainable Skylines Program funded through an EPA grant. The city’s Office of Sustainability was awarded grant funds through EPA’s Sustainable Skylines Program, which promotes best practices in air and water quality, with an emphasis on innovative projects with a public education component. The city was one of three cities in the nation awarded this funding. A total of $32,445.00 in grant funds will be used for
KIB to implement the following 3 activities: Rain Garden Educational Program; Near Eastside Tree Planting Program; Rain Garden/Rain Barrel Workshops. Upon a motion by Ms. Stockamp, seconded by Ms. Henry, the Board voted 6-0 to approve the EPA Sustainable Skylines Grant Activities Agreement.

Ms. Stockamp left at 2:45.

ITEM # 8 – PROFESSIONAL SERVICE AMENDMENTS

a. Analytical Laboratory Services, Amendment No. 2
   $130,000.00 – ESG Laboratories, Inc.

   Staff recommended that the Board of Public Works approve and authorize the Director to execute Amendment No. 2 to the Contractual Agreement with ESG Laboratories, Inc., for Analytical Laboratory Services. The primary duties of the analytical laboratories will be to provide laboratory analysis of environmental samples collected by the City of Indianapolis and or its various departments. As an annual contract, the analytical laboratory services will be available for use by all City/County Departments and agencies. Each agency or department will be responsible for obtaining funding for their projects. Upon a motion by Mr. Rosebrough, seconded by Ms. Henry, the Board voted 5-0 to approve Amendment No. 2 to the Analytical Laboratory Services Agreement.

b. Analytical Laboratory Services, Amendment No. 2
   $130,000.00 – Heritage Environmental Services, LLC

   Staff recommended that the Board of Public Works approve and authorize the Director to execute Amendment No. 2 to the Contractual Agreement with Heritage Environmental Services, LLC, for Analytical Laboratory Services. The primary duties of the analytical laboratories will be to provide laboratory analysis of environmental samples collected by the City of Indianapolis and or its various departments. As an annual contract, the Analytical Laboratory Services will be available for use by all City/County Departments and agencies. Each agency or department will be responsible for obtaining funding for their projects. Upon a motion by Mr. Rosebrough, seconded by Ms. Henry, the Board voted 5-0 to approve Amendment No. 2 to the Analytical Laboratory Services Agreement.

c. BM-19-069, Emerson Avenue over Massachusetts Avenue & CSX, Amendment No. 1
   $5,600.00 – Beam Longest & Neff, LLC

   Staff recommended that the Board of Public Works approve and authorize the Director to execute Amendment No. 1 with Beam, Longest & Neff, LLC for Project No. BM-19-069, Emerson Avenue over Massachusetts Avenue & CSX increasing the total contract amount by $5,600.00 for a total contract amount not to exceed $553,800.00. The original agreement included a fee for a Phase I environmental assessment, which is a record search for sites that might included hazardous materials. The project survey has identified two former gas station sites within the project limits. Upon a motion by Mr. Parrin, seconded by Ms. Henry, the Board voted 5-0 to approve Amendment No. 1 to the Emerson Avenue over Massachusetts Avenue & CSX Agreement.

d. ENG-08-017, As-Needed Transportation and Structural Engineering Services, Amendment No. 2
   $0.00 – Janssen and Spaans Engineering, Inc.

   Staff recommended that the Board of Public Works approve and authorize the Director to execute Amendment No. 2 with Janssen and Spaans Engineering, Inc., extending the expiration date for this As-
Needed Agreement until December 31, 2011. This agreement for structural engineering services is scheduled to expire on December 31, 2010. This amendment will extend the expiration date to December 31, 2011, with no increase in the total contract amount of $700,000.00. Upon a motion by Mr. Parrin, seconded by Ms. Henry, the Board voted 5-0 to approve Amendment No. 2 to the As-Needed Transportation and Structural Engineering Services Agreement.

e. SY-00-200, High Hazard Dams Emergency Response Plans, Amendment No. 2
$0.00 – Christopher B. Burke Engineering, Ltd.

Staff recommended that the Board of Public Works approve and authorize the Director to execute Amendment No. 2 between Christopher B. Burke Engineering, Ltd. and the City of Indianapolis for Project No. SY-00-200, High Hazard Dams Emergency Response Plans. This agreement will extend the schedule to 731 days, until December 31, 2012. There will be no additional cost associated with this amendment. Upon a motion by Ms. Henry, seconded by Mr. Parrin, the Board voted 5-0 to approve Amendment No. 2 to the High Hazard Dams Emergency Response Plans Agreement.

f. ENG-09-006, On-Call Laboratory and Field Testing Engineering Services, Amendment No. 2
$75,000.00 – TesTech, Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute Amendment No. 2 to the Professional Service Agreement dated March 24, 2009, with TesTech, Inc., for Project No. ENG-09-006, On-Call Laboratory and Field Testing Engineering Services in the increased amount of $75,000.00 for a total of $150,000.00. This amendment extends TesTech’s laboratory and field testing agreement for one year utilizing established 2010 rates for field and laboratory technicians and specific tests that are performed. Upon a motion by Mr. Rosebrough, seconded by Ms. Henry, the Board voted 5-0 to approve Amendment No. 2 to the On-Call Laboratory and Field Testing Engineering Services Agreement.

g. SD-00-145, On-Call Drainage Planning, Design and Inspection Engineering Services, Amendment No. 2
$0.00 – ms consultant, inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute Amendment No. 2 to the Professional Service Agreement dated August 27, 2008, with ms consultant, inc., for Project No. SD-00-145, On-Call Drainage Planning, Design and Inspection Engineering Services for an extension of 730 calendar days and no increase in compensation. This agreement provides for an extension through December 31, 2012 (730 calendar days). Upon a motion by Ms. Henry, seconded by Mr. Parrin, the Board voted 5-0 to approve Amendment No. 2 to the On-Call Drainage Planning, Design and Inspection Engineering Services Agreement.

h. BL-46-004, Homecroft Phase I Areas C & D Septic Tank Elimination Program, Amendment No. 2
$15,058.12 – Bernardin Lochmueller & Associates, Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute Amendment No. 2 to the Professional Service Agreement dated August 26, 2009, with Bernardin, Lochmueller & Associate, Inc., for Project No. BL-46-004 C/D, Homecroft Phase I Areas C & D Septic Tank Elimination Program in the increased amount of $15,058.12 for an amount not to exceed $390,128.47. This amendment adds hours to the project for final completion. Upon a motion by Mr. Parrin, seconded by Mr. Samuel, the Board voted 5-0 to approve Amendment No. 2 to the Homecroft Phase I Areas C & D Septic Tank Elimination Program Agreement.
i. SD-18-003B, Norwaldo Phase II Storm Water Improvements Project, Amendment No. 2
$250,415.00 – AMEC Earth & Environmental

Staff recommended that the Board of Public Works approve and authorize the Director to execute Amendment No. 2 to the Professional Service Agreement dated October 29, 2008, with AMEC Earth and Environmental and the City of Indianapolis for Department of Public Works Project No. SD-18-003B, for an extension of 188 calendar days and for an increased of $250,415.00 for a total contract of $771,708.00. This amendment provides for a change to the scope and to a more green and sustainable design; adding public outreach to allow for the public to input on this green infrastructure. Upon a motion by Ms. Henry, seconded by Mr. Parrin, the Board voted 5-0 to approve Amendment No. 2 to the Norwaldo Phase II Storm Water Improvements Project Agreement.

j. ENG-06-014, As-Needed Engineering Services, Amendment No. 4
$325,000.00 – Christopher B. Burke Engineering, Ltd.

Staff recommended that the Board of Public Works approve and authorize the Director to execute Amendment No. 4 to the Professional Service Agreement dated September 27, 2006, with Christopher B. Burke Engineering, Ltd., for Project No. ENG-06-014, As-Needed Engineering Services for an increased amount of $325,000.00 for a total contract amount of $2,465,000.00. This amendment will provide for the additional as-needed services for the design and permitting of the existing levee around Southport AWT Plant; provides extension of the levee to protect the deep tunnel pump station from 100-year flood of White River; provide for the continuation of technical certification efforts for the Indianapolis Local Flood Protection Project as part of the overall Levee Certification Program; and provides for the design of storm drainage relocation to resolve IPALCO and ATT conflict along Lennington Avenue. Upon a motion by Mr. Parrin, seconded by Mr. Samuel, the Board voted 5-0 to approve Amendment No. 4 to the As-Needed Engineering Services Agreement.

k. BL-10-069, Grandview Corridor Phase II Septic Tank Elimination Project, Amendment No. 4
$91,381.00 – American Structurepoint, Inc.

Staff recommended that the Board of Public Works approve and authorize the Director to execute Professional Services Amendment No. 4 for Design Services with American Structurepoint, Inc., for Project No. BL-10-069, Grandview Corridor Phase II Septic Tank Elimination Project for an increased amount of $91,381.00 for a total contract amount not to exceed $1,951,647.00. This amendment will allow for the redesign of the gravity sewer on Spring Mill Road as well as drainage improvements on 64th Street; revise 3 sets of specs to CSI format; rebid the 59th Grandview portion of this project, and increase funds for the construction phase services. Upon a motion by Mr. Rosebrough, seconded by Mr. Parrin, the Board voted 5-0 to approve Amendment No. 4 to the Grandview Corridor Phase II Septic Tank Elimination Project.

The Chair went back to hear Items 7j and 7k for approval of those items.

There being no further business the meeting of the Board of Public Works was adjourned at 3:10 p.m.

David Sherman, Chair
Kimberly A. Frye, Recording Secretary
Updates to the Indianapolis Storm Water Design and Construction Specifications Manual

John K. Oakley
Assistant Administrator
Indianapolis Department of Public Works (DPW)
Wednesday, December 15, 2010

Overview

• Introduction to the Storm Water Manual
• Updating the Storm Water Manual
  – The process
  – The revisions
    • Detention analysis
    • Storm water quantity and quality
    • Operations & Maintenance
    • Floatable control
• Implementation of revisions
Introduction to the Storm Water Manual

• Last revised 2001
• Purpose: Serves as a guide for engineering design and construction standards in Indianapolis and Marion County...
  – For proper storm water management
  – For those considering some form of land alteration
• Allows for consistent plan review, quality installation and functionality of storm water infrastructure

The Update Process
Stakeholder Meetings

• Internal stakeholders
  – DPW
  – Department of Code Enforcement
  – Environmental Resources and Management Compliance (ERMC)

• Meetings (2005-2008)
  – Addressed technical issues, clarifications and impact of existing and proposed storm water standards

The Update Process

Stakeholder Meetings

- **External stakeholders**
  - Builders Association of Greater Indianapolis (BAGI)
  - Indiana Construction Association Inc. (ICA)
  - Metropolitan Indianapolis Board of Realtors (MIBOR)
  - Indiana Bar Association
  - Indiana Society of Professional Land Surveyors
  - Indianapolis DOW/Water
  - Comcast
  - Time Warner
  - Indiana Department of Environmental Management (IDEM)
  - Marion County Health Department (MCHD)
  - American Society of Civil Engineers (ASCE)
  - American Council of Engineering Companies (ACEC)
  - Industrial Dischargers Advisory Committee (IDAC)
  - Citizen Energy Group (CEG)
  - ADS Pipe

- Four meetings (2007-2008)
- Comments given due consideration while finalizing manual

The Updated Manual

Substantial Changes

- **Detention analysis is required on all future development sites**
  - Requirement included in Drainage and Sediment Control Design Standards—Adopted April 14, 1980
    - Developers could waive requirement with proof that runoff would not substantially impact downstream properties
  - Updated storm water manual removes option to waive detention analysis
  - Less frequent flooding and erosion problems can benefit downstream system and property
The Updated Manual
Substantial Changes

• **Consistent water quantity/quality requirements**
  – Current manual requirements
    • Quantity: Detention is necessary when imperviousness on a project site increases by ½ acre
    • Quality: Best Management Practices (BMPs) installation is required when more than ½ acre of land is disturbed
  – Updated storm water manual states that both detention and water quality controls are required if ½ acre or more of land is disturbed
  – Benefit to downstream property owners outweighs the additional design and construction fees

The Updated Manual
Substantial Changes

• **Operations & Maintenance (O & M) Manual**
  – Introduced in 2001 to provide guidance on operating and maintaining structural storm water BMPs
  – Updated storm water manual includes:
    • A single O & M manual for all storm water infrastructure that will be placed on a development site
    • Requirement that an O & M agreement be recorded to ensure future property owners are aware of O & M requirements
  – Provides for ongoing operation and maintenance of the system
The Updated Manual
Substantial Changes

• **Floatable (floating debris) control**
  – National Pollutant Discharge Elimination System (NPDES) storm water permit requires the city to prohibit certain floatables to the maximum extent possible
  – Updated storm water manual requires control of all floatables at the downstream most runoff control point on a newly developed or redeveloped property
  – Removes floatables and gross pollutants from system

Implementation Process

• **December 2010**
  – Dec. 4: Published public notice of hearing
  – Dec. 15: Presentation for adoption

• **January, February, March 2010**
  – Internal stakeholder orientation and training
  – External stakeholder orientation and training
    • Design community
    • Construction community
    • Development community
Questions?
BACKGROUND

After a multi-year public and internal process, on Feb. 2, 2011, the revised Storm Water Design and Construction Specifications Manual (Manual) was approved. Originally developed 15 years ago, the Manual is a set of regulations of engineering design and construction standards for proper storm water management for those contemplating development or other land alteration within the City of Indianapolis. In 2001, the Manual was revised to provide a tool for compliance with the City’s National Pollution Discharge Elimination System (NPDES) storm water permit, including water-quality requirements. The Manual allows for consistent plan review and provides for quality installation and functionality of storm water infrastructure. The process used in the update and revision of the Manual included input from both internal and external stakeholder groups that use the Manual. The updated Manual goes into effect on June 1, 2011.

PURPOSE OF THE MANUAL

The Manual provides regulations covering engineering design and construction standards for proper storm water management for those engineers, builders, contractors, land planners and property owners contemplating some form of land alteration within the City of Indianapolis. The following are included in the Manual: departmental policies relating to storm water management, flood control and storm water runoff quality; submittal requirements and procedures for issuance of a storm water permit; and procedures for inspection, testing and final acceptance of storm water facilities. The Manual also:

• Provides consistency in project evaluation and design
• Consolidates current departmental standards and policies
• Provides a clear explanation of what is required for storm water management plan submittals and project reviews
• Ensures consistency in review of storm water permit applications and land-alteration plans by staff
• Improves the ability of contractors to properly and consistently install storm water facilities according to the approved storm water management plan
• Minimizes the impacts of new development and redevelopment on existing storm water infrastructure
• Clarifies state storm water, erosion- and sediment-control requirements within Marion County
• Clarifies how storm water structures must be designed, constructed and maintained

The revisions were necessary to guarantee the level of service expected by the community, while not adding unreasonable costs to development or excessive enforcement for City departments.

REVISIONS TO THE MANUAL

A number of revisions to the Manual are simple administrative changes and corrections of typographical errors. In addition, some technical standards were revised and/or added to formalize revisions that were previously approved by the Department or that have become necessary in order to comply with current state and federal regulations. There are four significant areas of revisions to the Manual, including:

• Operation & Maintenance (O&M) Manual:
  Chapters 102.06 - The concept of an O&M manual that provides guidance for operating and maintaining required structural storm water quality best management practices (BMPs) was introduced in October 2001 with the adoption of Chapter 700 of the Manual. The revised standards require that

  Continued on next page.
the developer’s site designer provide a single O&M manual for all storm water infrastructure that will be placed on a development site and that the O&M agreement be recorded with the property to ensure that future owners are aware of the existence of the manual and the maintenance requirements for the storm water facilities on that property.

• **Floatable Control:**
  Chapter 104.02 - As required under the City’s NPDES storm water permit, the City prohibits, to the maximum extent practicable, the discharge of certain floatable materials (floating debris) to waters of the State of Indiana. To comply, the City requires the control of all floatable materials from the discharges from sites of new development and redevelopment. The new requirement mandates floatable control at the downstream-most runoff control point on the property.

• **Consistent Water Quality and Quantity Requirements:**
  Chapters 104.02 and 201.06 - The previous version of these chapters required detention when the amount of imperviousness on the project site increases by one half (½) acre. This number contradicted the current water quality standards in Chapter 700 of the Manual that require installation of storm water quality BMPs whenever more than one-half (½) acre of land is disturbed, without reference to the change in impervious surface. The new standard states that both detention and water quality controls are required if one half (½) acre or more of land is disturbed. This change does not affect individual one- and two-family residential lots.

• **Detention Analysis Required on Future Development Sites:**
  Chapter 201.06 - Detention of storm water runoff has been required since the original City of Indianapolis Drainage and Sediment Control Design Standards for Public Improvement were adopted on April 14, 1980. In the past, developers have been allowed a waiver. This option has been removed from the Manual, and all future developments will be required to perform a detention analysis.

For more information, contact: Department of Public Works Engineering Division, (317) 327-2561.
**Date:** March 31, 2011  
**Time:** 8 a.m. – 12 p.m.  
**Location:** Vonnegut Conference Room, 1200 S. Madison  
**Meeting:** Storm Water Standards Revisions Training  
**File Code:**  

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Meeting: Storm Water Standards Revisions Training

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Date: March 31, 2011

Time: 1 p.m. – 5 p.m.

Location: Vonnegut Conference Room, 1200 S. Madison

Meeting: Storm Water Standards Revisions Training

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### Meeting Details

**Date:** March 31, 2011  
**Time:** 1 p.m. – 5 p.m.  
**Location:** Vonnegut Conference Room, 1200 S. Madison  
**Meeting:** Storm Water Standards Revisions Training  
**File Code:**

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DEPARTMENTS OF PUBLIC WORKS AND CODE ENFORCEMENT
MARCH 31, 2011

Agenda

• Introduction
  — John Oakley, DPW
  — Matt Kline, DCE
• Background — John Oakley, DPW
• Plan for Implementation — John Oakley, DPW
• How Revisions Fit into Existing Standards
  — Brad Dove, RebuildIndy
  — Frank Stewart, RebuildIndy

Agenda continued

• Storm Water Design and Constructions Specifications Manual Revisions Overview
  — Chapters 100 – 300
  — Questions and Answers
  — Break
  — Chapters 400 – 700
  — Chapter 561, Storm Water and Sediment Control
  — Questions and Answers
  — Break
• Conclusion

What it is / What it is not

• This training is to discuss revisions to the Storm Water Design and Constructions Specifications Manual and their application only.
• This is not a full training course on how to use the Storm Water Design and Constructions Specifications Manual.
  — You need some familiarity with the manual

Background

• Indianapolis Storm Water Design and Construction Specifications Manual has:
  — Been in use since 1995
  — Updated only once with the addition of water quality standards (2001)
  — Has gone through internal and stakeholder review and input process
• Updates needed to comply with regulatory changes

Timeline

• 2007 – Stakeholder discussions held
• December, 2010 – Approved by the Board of Public Works
• February, 2011 – Became effective following no action by the City-County Council
• April – May, 2011 – Outreach and Training
• June 1, 2011 – New Manual Goes into Effect
New slide.

mmassonn, 3/29/2011
Manual Revisions

• This presentation includes various fonts and color designations based on the printed version of the manual.
• Red Font – highlights the changes within each section of the manual.
• Black Font – Shows existing text.
• Emphasis was added in some sections via underlining and/or italics.
• Not all changes, i.e. text, spelling, etc. are included in this presentation.

Hypothetical Redevelopment Project

Conditions:
• Commercial Site
• 1.5 acres
• Located in larger masterplanned development, originally started in the 1980’s
• Served by existing detention pond and storm sewers
• 2004, site expanded parking area by 0.47 acres
• 2011, owners want to construct building expansion with additional parking, total proposed is 0.60 acres (0.49 acres of additional impervious surface)

Chapter 100
Policy and Procedures

Section 101.02, Applicability
Improvements to an existing developed site that is not developed to current storm water design standards and disturbs => 1/2 acre will be required to comply with the current storm water regulations for storm water quantity and quality, at twice the area disturbed within the existing contributing drainage area at the proposed site work and owned by the project/property owner. For example if a property owner wants to add 1 acre of parking and plans to disturb 1.5 acres to do it, he would be required to mitigate 3 acres of development within the same watershed to meet the current storm water regulations. If there was only an additional .75 acres of existing contributing drainage area upstream of the disturbed area, the owner would be required to mitigate 2.25 acres of development.

Chapter 100 – Policy and Procedures

Section 101.04, Updating
Changes to the manual will be posted on the City’s website as they are produced. Notification of the changes will be emailed to the DPW listserver registrants and posted on the City website.

Note: Listserver not up and running yet.
This is a retrofit program!

mmassonn, 3/29/2011
**Chapter 100 – Policy and Procedures**

**Section 101.05, Definitions and Abbreviations, BMP**

BMP, GENERAL: Best management practice can refer to a structural measure (wetland, pond, sand filter, etc.) or non-structural measure (restrictive zoning, reduced impervious areas, etc.). BMPs are designed for the benefit of water quality and quantity control. For the purposes of this chapter, BMPs refer to structural water quality BMPs.

BMP, MANUFACTURED: Manufactured BMPs are wholly or partially prefabricated and delivered to a construction site for incorporation into the drainage system. Water quality inlets, cartridge filter systems, and hydrodynamic separators are examples of manufactured BMPs.

BMP, NATURAL: Natural BMPs are practices that utilize the natural infiltration and filtering processes of water flowing through vegetation, sand, soil, or other media to remove suspended and/or dissolved pollutants from runoff. Examples include biofilters, rain gardens, vegetated swales.

BMP, NON-STRUCTURAL: Non-structural BMPs are comprised of a wide range of activities and/or practices that control or reduce pollutants at their sources. Practices can include the use of natural processes, such as increased infiltration and bio-filtration, good housekeeping practices such as street sweeping or catch basin cleaning, or reduction of directly connected impervious areas. Activity-based BMPs include public education, outreach, and involvement activities, such as drain marking and creek sweeps, zoning and regulation.

BMP, STRUCTURAL: Structural BMP, for the purposes of this manual, are BMPs that are built on site. Detention ponds, artificial wetlands, sand filters, and bio-filters are examples of structural BMPs.

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**Chapter 100 – Policy and Procedures**

**Section 101.05, Definitions and Abbreviations, Contributing Drainage Area**

Contributing drainage area refers to the total area that contributes runoff upstream of a point of interest, such as a development site.

**Section 101.05, Definitions and Abbreviations, Land Disturbance**

Any manmade change of the land surface, including: removal of vegetative cover that exposes the underlying soil, excavating, filling, transporting, and grading.

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**Chapter 100 – Policy and Procedures**

**Section 102.02, Plan Submittal and Approval Process**

5. Operation and Maintenance Manual for all detention, storm water, and water quality structures.

Note: No longer applicable only to WQ units.

**Section 102.02, Plan Submittal and Approval Process**

The zoning of any properties for which drainage permits are applied must be consistent with the proposed land use before drainage permits will be approved.

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**Chapter 100 – Policy and Procedures**

**Section 102.03, Plan Submittal and Approval Process**

On-site land alteration, including clear cutting, stump removal, grading, and filling, shall not commence prior to approval of a drainage permit and installation of all sedimentation and erosion control devices required by the approved permit.

---

**Chapter 100 – Policy and Procedures**

**Section 102.03, Plan Submittal and Approval Process**

Cover Sheet: A cover sheet shall be provided, including location and vicinity map. A map that indicates the location and vicinity of the proposed land alteration shall be included in the storm water plan. It shall reference a nearby major roadway intersection. The cover sheet shall also include site address, as assigned by DMD, the DMD Compliance Information Block and a storm water structure summary table. The summary table shall provide each proposed pipe size and respective length with the number of proposed structures.

Note: The compliance block should now reference the Department of Code Enforcement (DCE).
Chapter 100 – Policy and Procedures

• Section 102.03, Plan Submittal and Approval Process

Existing and proposed storm water facilities: The storm water plan shall show the locations of all existing and proposed storm water facilities. 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 either on the State of Indiana's coordinate system or latitude and longitude. Indiana's State Plane Coordinate System shall be used to identify the location of the outlet of each BMP included in the plan. The storm water plan shall show the direction of flow, elevation of inverts, gradient, materials and size of existing and proposed storm drains.

Note: It is recommended that a table be provided on the cover sheet with the coordinates of each BMP.

• Section 102.03, Plan Submittal and Approval Process

For all Class 1 pipe (within the R/W or conveying runoff from more than one parcel), a plan and profile shall be submitted. Storm drain plan and profile: The plan shall be shown on the upper portion of the drawing. The plan, generally, shall be drawn on a scale that is clear and legible and not greater than one (1) inch equals fifty (50) feet. The plan shall show appropriate right-of-way and easement limits with instrument numbers, as applicable. 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.

• Section 102.03, Plan Submittal and Approval Process

The location of the predominant soil types on the site shall be described by a registered land surveyor or professional engineer. The description may be determined by the NRCS (Natural Resources Conservation Service, formerly the Soil Conservation Service, or SCS) County Soil Survey or an equivalent publication or as determined by a certified professional soil scientist.

Note: Part of the Plan Sheets!

• Section 102.04, Technical Information Report

Each page and attachment of the TIR should be numbered and dated.

• Section 102.04, Technical Information Report

Drainage area calculations including both the gross and impervious area for each drainage basin/subbasin.

• Section 102.04, Technical Information Report

An explanation of computer models used, where applicable, with information from input and output data.

• Section 102.06, Operations and Maintenance Manual

An operations and maintenance (O&M) manual for all private infrastructure, including but not limited to pipes, ponds, ditches, and BMPs (when required), shall be submitted for the final plan approval and permit process. The manual will become a maintenance guide for the drainage infrastructure once development is complete. The final O&M manual will be provided to the City in both hard copy and digital formats. The O&M manual maintenance agreement along with a site map showing the BMP locations shall be recorded with the final plan.
Chapter 100 – Policy and Procedures

• Section 102.06, Operations and Maintenance Manual

Site drawings (8½” by 11” or 11” by 17”), showing both plan and cross-section views, showing the infrastructure and applicable features, including dimensions, easements, outlet works, forebays, signage, etc., as well as an overall site map of the development showing all structures.

Note: This has already been occurring, but now can be cited.

Chapter 100 – Policy and Procedures

• Section 102.06, Operations and Maintenance Manual

Guidance on sediment and trash removal, both narrative and graphical, describing when sediment removal should occur in order to insure that BMPs and other infrastructure remain effective as water quality and/or quantity control devices;

• Section 103.04, Drainage Fees

The following schedule of fees is current as of May 1, 2007. Changes to this fee schedule will be posted on the City’s website.

Chapter 100 – Policy and Procedures

• Section 103.05, Testing

Forty-two (42) inch diameter and smaller reinforced concrete and corrugated metal pipe may be required to be inspected through closed circuit television viewing (CCTV) by the Department's representative as described herein. In those instances where CCTV is a required part of the storm water permit approval, this televised viewing shall be completed in conformance with these minimum guidelines.

Note: See Manual, extensive changes!

Chapter 100 – Policy and Procedures

• Section 103.05, Testing

All storm sewers using flexible pipe shall be tested for deflection by means of a go/no-go mandrel gage or other methods as approved by the Department.

Note: See Manual, extensive changes!

Chapter 100 – Policy and Procedures

• Section 103.07, Record Drawings

As part of the final acceptance process, record drawings of the storm water facilities must be submitted to the Department, as set forth herein, for the following types of developments:

• all platted subdivisions
• industrial and commercial sites one acre and larger
• all public infrastructure

Note: As-built contours must be shown for ponds.

Chapter 100 – Policy and Procedures

• Section 103.07, Record Drawings

Record drawings shall be certified by a Professional Engineer or Land Surveyor registered in the State of Indiana, and provide the following information:

• Horizontal alignment of storm drain pipes, culverts, BMPs, streets, and storm drain structures, to a minimum accuracy of ± two (2) feet. All BMPs will be located by Indiana State Plane Coordinates.

• The as-built survey of all detention / retention facilities as well as as-built profile of all drainage conveyances (ditches, swales, etc).

Note: As-built contours must be shown for ponds.

• A tag reference to the operations and maintenance manual as required for storm water structures will be included.
Chapter 100 – Policy and Procedures

• Section 104.02, Storm Water Quality
For the purposes of this requirement, TSS are defined as particles that will pass through a 125 micron screen. Larger particles are considered to be part of the total solid load of the storm water runoff.

• Section 104.02, Storm Water Quality
For the purposes of all projects, including commercial, industrial, residential, transportation, recreation, etc., if the cumulative disturbed area is less than ½ acre, the development will be exempt from requirements for on-site BMPs. The cumulative total disturbed area will be evaluated based on City records of permit activity from October 1, 2001.

Chapter 100 – Policy and Procedures

• Section 104.02, Storm Water Quality
Hypothetical Example:
Proposed disturbance is 0.60 acres. The developments since 2001 included a total disturbance of 0.49 acres. The total cumulative is 1.07 acres (0.47 acres in 2004 and 0.60 acres in 2011). Therefore, the site must comply with water quality for 1.07 acres minimum.

Since the mitigation requirement is greater than the cumulative water quality requirements, a minimum of 1.20 acres must be addressed for water quality.

Chapter 100 – Policy and Procedures

• Section 104.03, Redevelopment Guidelines
When properties are redeveloped they are subject to the same policies and design standards as are applied to new development projects; including storm water permitting, detention, sediment and erosion control, and water quality management requirements.

Note: This section provides in-depth guidance pointing to green infrastructure.

Chapter 200 – Hydrology

• Section 201.03, Hydrologic Method
The same hydrologic method should be used for pre-developed runoff peak determination as will be used for post-developed detention calculations.

• Section 201.03, Hydrologic Method
Rational Method may be used for peak runoff estimations when the total watershed area tributary to the design point is five (5) acres or less and with no existing depressional storage, provided analysis of "regional" detention/retention (D/R) facilities is not a required part of the computational procedure.
Chapter 200 – Hydrology

• Section 201.03, Hydrologic Method
  USGS Regression equations are not applicable for projects within Marion County.

• Section 201.03, Hydrologic Method
  Hydrograph generation and flood routing procedures shall be required when:
  1. The total watershed area tributary to the design point is greater than five (5) acres or less than 5 acres with existing depressional storage;
  2. Multi-basin analysis must be performed (multi-basin analysis can be required due to drainage patterns as well as land use (cover) changes and changes in soil types).

Chapter 200 – Hydrology

• Section 201.04, Design Storm Frequencies
  Table 201.01
  Driveway Culverts 10 year (1, 5)
  Note: Added to table for clarification

• Section 201.04, Design Storm Frequencies
  5. Driveway culverts for in-fill development in residential areas sites are exempt from this requirement because inspectors examine the proposed culvert with respect to adjacent upstream and downstream driveway culverts. However, the Department reserves the right to require the analysis of any culvert.

Chapter 200 – Hydrology

• Section 201.06, When Downstream Conveyance Analysis and Detention/Retention not Required
  2. Approved fill areas which do not increase the amount of impervious area on-site to be more than a total of 0.5 acres, provided the existing runoff patterns and flow capacity of the property will not be altered by the filling operations. The 0.5 acre threshold for analysis and detention will be determined as the cumulative amount of impervious area for all tracts, phases, and / or sections of the site.

• Section 201.06, When Downstream Conveyance Analysis and Detention/Retention not Required
  3. Improvements to existing commercial buildings, provided the total impervious area on-site, including roof tops, sidewalks, drives and parking lots, is not increased to be more than a total of 0.5 acres with no alteration to existing storm water facilities. The 0.5 acre threshold for analysis and detention will be determined as the cumulative amount of impervious area for all tracts, phases, and / or sections of the building addition. The cumulative total will be evaluated based on review of permit records from October 1, 2001.
  Note: Now all improvements not just additions and the cumulative increase are to be considered.
  Note: Existing storm water infrastructure may need to be evaluated for impact from proposed improvements.

• Section 201.06, When Downstream Conveyance Analysis and Detention/Retention not Required
  HOWEVER!!!
  Section 561-333 Requires:
  “A drainage facility shall be provided which allows drainage of water runoff from each upper watershed area and from each portion of the parcel to a place or places adequate to receive it.”
  In addition, Section 561-336 Requires:
  “As to drainage facilities located downstream of the parcel, the drainage system within the parcel shall be designed such that there will be no increase in peak discharge or runoff rates as a result of the development unless such downstream facilities are sufficient to accept...”

• Section 201.06, When Downstream Conveyance Analysis and Detention/Retention not Required
  Note: 561 overrides the design manual and downstream facility capacity should always be considered.
  Example:
  0.499 acre parking lot on existing building. While the manual does not REQUIRE detention, the receiving facility must be adequate to accept the increased runoff and facilities downstream must have capacity for the entire upstream watershed in the proposed development state.
Chapter 200 – Hydrology

**Section 201.06**

Hypothetical Example:

Although the increase in impervious area is less than 0.50 acres, since the site is in a masterplanned area within existing detention, the site must document compliance with the existing detention parameters.

If the existing ponds lack adequate capacity, detention may be required to be addressed, i.e. onsite detention or expanding the existing ponds.

Since the development has a conveyance system (swales / pipes) from the site to the detention, the conveyance system must also be analyzed for capacity. If pipes lack adequate capacity, on-site mitigation may be required.

**OLD Section 201.07, Downstream Analysis Requirements**

Downstream analysis also known as "Beat the Peak" has been completely deleted. The analysis frequently did not account for all the facilities that impacted timing of the upstream flow such as detention ponds and existing storm sewer systems.

Chapter 200 – Hydrology

**Section 202.02, Rainfall Distribution**

Staff has determined that Huff rainfall distributions most accurately reflect rainfall conditions in Indianapolis. The appropriate Huff storm distribution's fifty percent (50%) probability curve or column shall be used for hydrograph computations, as is applicable for the design methodology. Figure 202-2 and Table 202-3 can be referenced for the appropriate distribution.

1st, 2nd, and 3rd Huff Rainfall distributions should be applied as appropriate.

1st – 0 up to and including 6hr
2nd – 6.1 up to and including 12hr
3rd – 12.1 up to and including 24hr

Chapter 200 – Hydrology

**Section 203.03, Overland Flow Time**

Overland flow in urbanized basins occurs from the backs of lots to the street, across and within parking lots and grass belts, and within park areas. Overland flow over plane surfaces for distances of less than 100 lineal feet may be calculated using Manning’s kinematic solution (Overton and Meadows 1976) to compute Tt.

Chapter 200 – Hydrology

**Section 203.04, Shallow Concentrated Flow**

After a maximum of 100 feet, overland flow will normally become shallow concentrated flow.

Chapter 300

Hydraulics
Chapter 300 – Hydraulics

Section 305.02, The Requirement for Detention/Retention

STEP 1: Is detention/retention required according to 201.06? If it is not the designer skips any consideration of downstream analysis or detention / retention. If detention/retention is required the designer proceed to step 2. The downstream analysis must assess each outflow point from the site separately.

Note: In this paragraph the downstream analysis refers to the old “beat the peak” analysis, which is no longer allowed, and not the downstream capacity analysis.

Chapter 300 – Hydraulics

Section 201.06, REVIEW

Analysis of the downstream storm water conveyance system or the provision of detention/retention will not be required for the following:

1. Downstream facilities which after completion of the land development will not be accepting runoff from the developing property.
2. Approved fill areas which do not increase the amount of impervious area on-site to be more than a total of 0.5 acres, provided the existing runoff patterns and flow capacity of the property will not be altered by the filling operations. The 0.5 acre threshold for analysis and detention will be determined as the cumulative...
3. Improvements to existing commercial buildings, provided the total impervious area on-site, including roof tops, sidewalks, drives and parking lots, is not increased to be more than a total of 0.5 acres with no alteration to existing storm water facilities. The 0.5 acre threshold for analysis and detention will be determined as the cumulative....

Chapter 300 – Hydraulics

Section 305.02, The Requirement for Detention/Retention

STEP 2: Are any individual potential detention/retention sites draining areas less than 5 acres total including off-site drainage? If so the designer has the option as to whether or not to perform downstream analysis. There may be good reasons to avoid downstream analysis in favor of increased detention design. If “NO” the designer performs an oversized detention/retention design and proceeds with the design. If “YES” the designer goes to Step 3

STEP 3: The designer performs a downstream capacity analysis for the storm frequencies required for the storm water facilities encountered downstream. This will normally require the 10-, 25- and 100-year storms.

Chapter 300 – Hydraulics

Section 305.02, The Requirement for Detention/Retention

STEP 4: The designer next performs the pre / post development discharge analysis described in Section 302.03. If the flows “PASS” the designer does not need to provide detention/retention, mitigation or site design modification.

STEP 5: If the site ‘FAILS’ the flow test or if there is inadequate downstream capacity for the post-development discharge the designer performs one or a combination of detention/retention design, downstream storm water facility mitigation and/or site modification.

Step 5 is the key step to keep in mind.

Chapter 300 – Hydraulics

Section 302.03, Minimum Performance Level of Detention/Retention Facilities

The minimum hydraulic performance levels and accepted design methodologies for detention/retention basins shall conform to the following:

\[
Q_{x\text{2e}} = 0.5 Q_{x\text{2p}} \\
Q_{x\text{10e}} = 0.5 Q_{x\text{10p}} \\
Q_{x\text{25p}} = 0.75 Q_{x\text{10e}} \\
Q_{x\text{100p}} = Q_{x\text{10e}}
\]

where:

- \(Q_{x\text{2e}}\) = 2 year discharge rate, existing conditions
- \(Q_{x\text{2p}}\) = 2 year discharge rate, developed conditions
- \(Q_{x\text{10e}}\) = 10 year discharge rate, existing conditions
- \(Q_{x\text{10p}}\) = 10 year discharge rate, developed conditions
- \(Q_{x\text{25p}}\) = 25 year discharge rate, developed conditions
- \(Q_{x\text{100p}}\) = 100 year discharge rate, developed conditions
Chapter 300 – Hydraulics

Section 302.03, Minimum Performance Level of Detention/Retention Facilities

Local basins are those which have a total land area contributing flow to the detention/retention basin, including on-site and off-site areas, of less than five (5) acres. Local basin designs in which the designer elects to over design the detention basin in lieu of performing downstream analysis, may be designed using the Modified Rational Method as set forth herein. All other detention/retention designs shall use runoff hydrographs and routing techniques.

Local basins can be designed by the Modified Rational Method, ALL other detention basins must be designed using hydrograph methods.

Regional basins are those which have a total land area contributing flow to the basin, including on-site and off-site areas, of five (5) acres or larger. In addition to the discharge rate requirements above, the following velocity requirements shall apply for regional basins:

where:

- $V_{2e}$ = 2 year velocity, existing conditions
- $V_{10e}$ = 10 year velocity, existing conditions
- $V_{2p}$ = 2 year velocity, developed conditions
- $V_{10p}$ = 10 year velocity, developed conditions
- $V_{25p}$ = 25 year velocity, developed conditions
- $V_{100p}$ = 100 year velocity, developed conditions

All regional detention/retention designs shall use runoff hydrographs and routing techniques.

When computing the discharges for detention/retention basin design the entire upstream area that contributes runoff to the design point must be included in the computations. Areas that are bypassed for all levels of flow are the only allowable reductions in drainage area.

For local basins, an increased level of detention/retention may be used in lieu of the downstream analysis described in Chapter 200, sections 201.05 through 201.06. If this option is selected, the design shall conform to the requirements for a local basin plus:

- The storm water runoff from all impervious area on the site shall be routed through the detention/retention facility, unless otherwise approved.

Minor collector swales located within residential or commercial developments, or collector swales located within open land uses such as agricultural fields, golf courses, and parks and recreation areas, as examples, will not be considered acceptable outfalls for a detention/retention providing this level of runoff control, unless a low flow system with an underdrain is installed downstream to convey trickle flows from these basins.

Chapter 300 – Hydraulics

Section 302.04, Increased Detention/Retention In Lieu Of Downstream Analysis

Notes:
- $C_i$ factors shown in the table should be used for pre-development conditions regardless of the existing surface types.
- Required detention volume should be based on the volume after the adjustment using the Huff Storm Factor (Equation 302.04)
Chapter 300 – Hydraulics

• Section 302.06, Bypassing Flow
When storm water detention/retention is required, all parts of the developing site should drain through the detention/retention basin, unless otherwise approved. Upstream drainage areas may be bypassed and therefore not considered in the computations as long as the conditions set in Section 302.03 are met.

• Section 302.07, Detention/Retention Facility Design
The flow path from all inlets in a dry detention basin to the outlet of the basin shall be provided with an under-drain system.

Chapter 300 – Hydraulics

• Section 302.07, Detention/Retention Facility Design
All wet detention/retention facilities shall have a safety bench/shelf at the normal pool level. The safety bench shall have a minimum width of ten (10) feet and a slope no steeper than 4 (horizontal) to 1 (vertical).

If a retaining wall adjoins the normal pool of a wet detention pond the wall shall have either steps or a ladder incorporated into the construction at the center of the wall span.

Chapter 300 – Hydraulics

• Section 302.08, Design of Detention/Retention Facility Emergency Spillways
Many types of emergency spillways are allowable provided adequate provision is made for the discharge of the flow through the facility and a minimum freeboard of one-foot (1) is provided for larger regional ponds above the maximum anticipated flow depth through the emergency spillway. All emergency spillways shall outlet to an easement containing a channel with acceptable capacity.

All calculations, easement delineation, and cross sections for the emergency spillway are to be submitted for review.

Chapter 300 – Hydraulics

• Section 303.02, Easements/Minimum Flood Protection Elevations
Collector Swales
Surface water collector swales within the rear yard and side yard areas of residential subdivisions, on all non-residential parcels, and for all bypassed flow conveyances shall be constructed within a drainage easement possessing a minimum width of twenty (20) feet. For residential properties the drainage swale should be generally constructed approximately in the middle of the easement.

Note: Now all swales must have easements, previously only swales serving greater than 5 acres had easements.
Chapter 300 – Hydraulics

• Section 303.03, Grading and Depth of Open Channels / Swales

The rock used in side-slope rip-rap shall be no smaller than 6 inches.

Section 303.03, Grading and Depth of Open Channels / Swales

Minor drainage collector swales in rear yards and between homes shall possess a maximum channel length of 400 lineal feet and no off-site water, unless subsurface tile is also provided. The required channel slope and invert treatment for minor drainage collector swales shall be as follows: swales shall be grass lined; subsurface drainage tile shall be required if the channel slope is less than 2.0%; and, the minimum channel slope shall be 0.3%.

For basement residential lots a “tee” should be provided in the rear lot line’s subsurface drain for the purpose of discharging sump pump water directly into the drain.

Chapter 300 – Hydraulics

• Section 303.04, Grading and Depth of Open Channels / Swales

Concrete is no longer acceptable for swale invert treatment.

Chapter 300 – Hydraulics

• Section 305.03, Design of Open Channels Using Manning's Equation

The use of Manning's equation shall be considered acceptable for determination of storm drain pipe sizes when the design discharge is ninety percent (90%) or less of the capacity of a commercially available pipe as computed by Manning's equation. The storm drain system must be capable of passing the 10-year storm event with free water surface elevations below the crown of the pipe.

Design computations of storm drain pipe systems using the Rational Formula and Manning’s equation shall be submitted with the storm water permit application on the Storm Drain Flow Tabulation Form provided by Figure 305-1 or by suitable computer program output listing giving similar information. Typical Manning's “n” values for standard storm drain materials are provided in Table 305-1. Head loss computations shall be submitted with the storm water permit application on the form provided by Figure 305-2.

HOWEVER !!:

Section 102.04 of the manual states:

1. Design Calculations. Design calculations are required as part of the storm water plan and shall, at a minimum, specifically include:

d. Storm drain flow and hydraulic grade line computations as described in Section 305.03 and 305.04. A Storm Drain Flow Tabulation Form has been provided on page A3-14. A Headloss Calculation Sheet has been provided on page A3-16. A form to assist with completion of culvert ratings has been provided on page A3-7.

Note: The use of a manufactured BMP (SQU) also requires that HGL calculations be completed for the pipes upstream and downstream of the SQU.

HGL is above the crown of pipe and rim elevation.
HGL is above the crown of pipe.
HGL for all pipes above the crown of pipe.
Chapter 300 – Hydraulics

• Section 305.03, Design of Open Channels Using Manning’s Equation

Proper operations and maintenance practices for all storm drain and inlet structures and their appurtenances will be identified in the Operations and Maintenance Manual, as required in Section 102.06.

• Section 305.06, Non-Gravity Flow Systems

3. An indemnification of the City relative to the non gravity-flow design.

Note: A standard Indemnification Agreement is available on the City’s website.

Chapter 300 – Hydraulics

• Section 305.08, Gutterline Hydraulic Evaluation

Inlets in roadway gutter lines must be spaced to prevent flow from entering public road intersections. In addition, inlets should be spaced intermittently in residential street gutter lines to allow one lane (based on the lane width of the road) of traffic to remain open during the 100-year storm event. Multi-lane facilities may have one travel lane on each side of the roadway flooded during the 100-year storm event. The design storm for all of the conditions is the 10-year storm event.

Note: required one travel lane does not include curb and gutter, i.e. 30’ b-b curb roadway with 2’ curb and gutter on each side would require a 13’ open travel lane (30’ - 4’ = 26’ / 2 = 13’)

Chapter 400

Storm Sewer Pipe and Open Culvert Materials

• Section 401.07, Portland Cement Pervious Concrete Pavement (also known as PCPC)

Portland Cement Pervious Concrete Pavement shall be constructed in full conformance with those guidelines set forth below. The Department of Public Works shall maintain a list of the approved products for these facilities.

Accepted Locations for use

Use of PCPC within the existing or proposed public right-of-way or in other areas maintained by the City of Indianapolis shall not be allowed unless approved in writing by DPW.

PCPC may be used on private property as an alternate pavement material and an alternate for traditional piping and detention system.

Chapter 400

Storm Sewer Pipe and Open Culvert Materials

• Section 401.07, Portland Cement Pervious Concrete Pavement (also known as PCPC) (Con’t)

Design Guidelines

All PCPC facilities acting as a detention facility shall be designed with a positive gravity outfall or a certification from a licensed geotechnical engineer stating:

that the permeability of the surrounding soils will dissipate water at a rate required for the detention facility designed,

that no adverse impact to any subsurface systems (including septic systems) will be experienced, and,

that the PCPC detention facility will not be subject to ground water surcharge during any time of the year.

Use as a detention facility in “Well-Head Protection Areas” must have positive outfalls and an impermeable lining.

BREAK
If the system is designed to use the storage volume of the stone
surrounding the structure, a 40 percent porosity factor shall be
utilized for the surrounding washed #8 stone.

All storm water shall be routed through a Storm Water Best
Management Practice (BMP), also described as Storm Water Quality
Unit (SQU), meeting City Standards. These units are approved to be
downstream of the PCPC.

No storm water shall be routed through the detention facility until
the Storm Water Best Management Practice (BMP) is installed and
fully functional and all construction erosion control for disturbed
areas are installed to ensure no sediment build-up in the
underground detention storage facility. The erosion control methods
and BMP's must be inspected after each rain event and repaired or
cleaned where necessary. The O&M Manual for all BMP's or SQU's
located prior to the underground detention storage facility require
the BMP's to be inspected (4) times per year and cleaned as
necessary to ensure maximum performance relative to sediment
removal.

The owner shall be responsible for maintenance.

When PCPC is used as part or all of a detention system, the owner’s
engineer is required to submit an Operation & Maintenance Manual
during the permitting/approval process describing the maintenance
frequency and methods. Annual cleaning is required after the last
snowfall or by April 30th of each year.

The city has the right to inspect the system and to require replacement
if it fails or is a threat to public safety. PCPC is considered to be failing if
water can be seen standing on it or in it (within the concrete pavement
section), unless the storm event is above a 100-year event. If
maintenance does not correct the problem, full or partial replacement
may be required.

The selected pipe material (from the above list) should be identified
on the submitted plans.

Note: Confirmation the pipe material must be given on the plans.

MANUFACTURED WYES, TEES, ELBOWS, OR ADAPTERS WILL NOT BE
ACCEPTED FOR USE IN PLACE OF PRECAST STORM SEWER
MANHOLES AND BOX INLETS UNLESS PREVIOUSLY APPROVED BY THE
DEPARTMENT.

PRECAST MANHOLES AND BOX INLETS WILL BE REQUIRED WITHIN
HDPE STORM SEWER SYSTEMS AT CHANGES IN GRADE, ALIGNMENT,
SIZE, AND PIPE MATERIAL TYPE, AS OUTLINED WITHIN CHAPTER 500
OF THIS MANUAL UNLESS PREVIOUSLY APPROVED BY THE
DEPARTMENT.

PRECAST MANHOLES AND/OR BOX INLETS WILL BE REQUIRED WITHIN
PVC STORM SEWER SYSTEMS AT ALL CHANGES IN GRADE,
ALIGNMENT, SIZE, AND PIPE MATERIAL TYPE, AS OUTLINED WITHIN
CHAPTER 500 OF THIS MANUAL MANUFACTURED WYES, TEES,
ELBOWS, OR ADAPTERS WILL NOT BE ACCEPTED FOR USE IN PLACE
OF MANHOLE OR BOX INLET STRUCTURES UNLESS PREVIOUSLY
APPROVED BY THE DEPARTMENT.
Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

• Section 403.09, High Impact Polypropylene or High-Density Polyethylene Plastic Facilities

All underground detention facilities shall be designed with a positive gravity outfall or a certification from a licensed geotechnical engineer;

- that the permeability of the surrounding soils will dissipate water at a rate required for the detention facility designed,
- that no adverse impact to any subsurface systems (including septic systems) will be experienced,
- and that the underground detention facility will not be subject to ground water surcharge during any time of the year.

Any facility that allows exfiltration within a “Well-Head Protection Areas” needs prior approval from the Department of Public Works Office of Environmental Services.

• Section 403.09, High Impact Polypropylene or High-Density Polyethylene Plastic Facilities (Con’t)

If the system is designed to use the storage volume of the stone surrounding the structure, a 40 percent porosity factor shall be utilized for the surrounding washed #8 stone.

All storm water shall be routed through a Storm Water Best Management Practice (BMP) meeting City Standards.

No storm water shall be routed through the detention facility until the Storm Water Best Management Practice (BMP) is installed and fully functional and all construction erosion control for disturbed areas are installed to ensure no sediment build-up in the underground detention storage facility. The erosion control methods and BMP’s must be inspected after each rain event and repaired or cleaned where necessary. The O&M Manual for all BMP’s located prior to the underground detention storage facility require the BMP’s to be inspected (4) times per year and cleaned as necessary to ensure maximum performance relative to sediment removal.

Note: BMP’s are required upstream of the detention facility with the exception of the PCPC systems.

• Chapter 400

Hypothetical Example:

If the conveyance system lacks adequate capacity, on-site mitigation may be required. Since additional parking is proposed, systems such as the PCPC system (Section 401.07) or an alternative underground system may be utilized in the design.

Additional methods, i.e. parking lot detention and/or green designs (to be discussed later) may also be explored.

• Section 404.06, Bench Walls

Bench walls shall be shaped and formed for a clean transition with proper hydraulics to allow the smooth conveyance of flows through the manhole or box inlet. The bench wall shall form a defined channel, to a minimum height of 80 percent of the inside diameter of the inlet and outlet pipes to form a “U” shaped channel, constructed at a minimum ½-inch per foot slope to the manhole wall.

Where a flow channel is constructed as an integral part of the pre-cast base, it shall be shaped and formed as described above, with the exception that the bottom of the flow channel may be formed from the bottom of inlet and outlet pipes if the pipe wall thickness is not greater than one (1) inch.

For cast-in-place flow channels, the bottom invert of all pipes entering a manhole shall be at least three (3) inches above the top of the base slab to the outlet invert so the finished sewer channel may be installed and shaped.

• Section 404.07, Manhole Precast Adjusting Rings

A water tight seal shall be provided between the precast manhole and riser ring, each adjoining riser ring, and between the riser ring and casing by the use of either two (2) rows of ½ inch extrudable preformed gasket material, non-asphaltic mastic, or trowelable grade butyl rubber, as shown in Figure 400-05 of the Standard Details.

Concrete adjusting rings shall conform to ASTM C 478 and be free from voids, cracks, and other defects. The adjusting ring shall be from the same manufacturer as the manhole cone section to assure compatibility and a watertight seal per Figure 400-05.
Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

• Section 404.08, Precast Concrete Box Inlets and Precast Spacers

For precast concrete box inlets, the adjustment of casting frame and grate shall be accomplished using precast concrete spacers of a minimal nominal thickness of six (6) inches. The maximum number of spacers allowed shall be four (4). A watertight seal shall be provided between each component of the precast box inlet and precast concrete spacers by use of non-asphaltic mastic, or trowelable grade butyl rubber.

• Section 404.09, Box Inlet and Manhole Dimensions

Steps shall conform to the requirements of ASTM C 478 and be manufactured using steel rods encased in polypropylene plastic. Steps shall be factory installed when the manhole is manufactured.

• Old Section 405.03 – Slotted Drains - Deleted.

Chapter 500
Installation of Storm Water Facilities

Chapter 500 – Installation of Storm Water Facilities

• Section 501.12, Trench Installations

All PVC and HDPE pipes to be installed with perforations that are meant to infiltrate or exfiltrate must use #8 stone as bedding and backfill material. All approved storm systems can use class I bedding and backfill materials with the following compaction requirements. INDOT Classification No.5, No.8, and No 9 must be at least hand tamped or walked into place. INDOT Classification No.53 must be mechanically compacted to 95% Proctor.

• Section 501.14, Bedding and Backfill Materials

CMH Bedding

Class I material shall be shovel sliced or otherwise carefully placed and mechanically compacted to ensure proper compaction and complete filling of all voids.

RCP Bedding

Class II material shall be shovel sliced or otherwise carefully placed and mechanically compacted from three (3) to six (6) inches (based upon pipe diameter) below the pipe barrel, to 1/6th the outside pipe diameter (Bc).
**Chapter 500 – Installation of Storm Water Facilities**

- **Section 501.14**, Bedding and Backfill Materials (Cont’)

  PVC - Bedding and Initial Backfill

  Plastic pipe conduits (PVC and HDPE) shall be provided with No. 8 crushed stone or approved Class I granular bedding material shovel sliced or otherwise carefully placed and **mechanically compacted** from four (4) to six (6) inches (based upon pipe diameter) below the pipe barrel, to a minimum of twelve (12) inches above the crown of the pipe.

**Chapter 600 – Erosion and Sediment Control**

- **Section 602.02**, Requirements

  Land alterations which disturb 1 or more acres - Rule 5 (327 IAC 15-5), and all non-single-family residential land disturbing activities, - Chapter 561 and these regulations

  Land alterations which disturb less than 1 acre - all single-family residential land disturbing activity less than one acre shall employ, at a minimum, perimeter type erosion and sediment control practices. Gravel access drives may also be required at the discretion of the Director or his representative. Perimeter erosion control shall be employed outside of completed easement areas. Established easement areas are not to be disturbed during construction process.

- **Section 603.03**, General Criteria for Erosion and Sediment Control Practices

  Vegetative Control - Disturbed areas which are at finish grade shall be permanently seeded within seven (7) days. Vegetation must be established within one-hundred and eighty (180) days with 90% coverage or reseeded. At the discretion of the Director: barren areas to be rough graded and left undisturbed for more than thirty (30) days shall be established with temporary vegetation; and dormant seeding will be required during seasonal periods (October through February) for those barren areas to be left undisturbed for one-hundred and twenty (120) days or longer.

- **Section 603.05**, Access Drives and Parking Areas

  Stone based construction access drives and parking areas, with a minimum size of 20’ x 50’ in width and length, must be placed at all ingress and egress points used by vehicles to enter and leave the perimeters of a subdivision or commercial site.

  Note: Developments which include paved entrances to be used for construction ingress/egress should provide maintenance notes on the plans.

**Chapter 700 – Water Quality**
This chapter provides design criteria and information for storm water quality best management practices, or BMPs that are required in order for newly developed or re-developed properties to comply with the City’s policies for managing the quality of storm water runoff found in Section 104.02.

The City of Indianapolis has adopted a countywide storm water runoff quality policy (Section 104.02) based on the control of total suspended solids and floatables in storm water runoff. In addition, designers may be required to include the control of fecal bacteria or pollutants that are associated with a specific land use, such as hydrocarbons that are associated with retail gasoline outlets, in their designs. The water quality design requirements are as follows:

TSS. BMPs must be capable of removing 80% of the TSS load from post-construction runoff. For the purposes of this requirement, TSS is defined as particles smaller than 125 microns in diameter. Larger material is considered to be part of the total solids load of the storm water runoff.

Floatables. BMPs shall incorporate floatables control. The goal of this requirement is to capture floating debris and remove it as part of the routine maintenance of the BMPs. Stand alone BMPs must include floatables control. For BMP systems, or treatment trains, at least one of the components of the BMP system, located after the last inflow point to the system, must provide control of floatables.

In order to meet the TSS removal goals, performance based BMPs must be designed to treat the first flush runoff. The first flush runoff volume is estimated by computation of the water quality volume (WQv), which represents the runoff volume from a storm of one inch depth over the drainage area.

The design process for an innovative BMP that is approved for use in the City of Indianapolis may be based on design flow capacity, on design volume, or other testing procedures approved by the City.

The following performance criteria must be met by the proposed new BMPs. The BMPs:
- Must meet the 80% TSS removal rate;
- Must meet the floatable removal requirement;
- May be required to reduce fecal bacteria;
- May be required to control hydrocarbons or other land use-specific pollutants in storm water runoff; and,
- Must have a low to medium maintenance requirement to be considered by the City for use on public projects.

Each BMP (a single practice or combination of practices that meet the treatment goal) on a site must be identified in the operations and maintenance plan as specified in Section 102.06.

The number of BMPs on a site will be determined as follows: for each distinct drainage area that requires a storm water quality control measure either a single BMP or a treatment train (system of 2 or 3 BMPs) will be required. Each BMP system treating a single drainage area is deemed to be one BMP for inspection purposes.
Chapter 700 – Water Quality

Section 702.01, Storm Water Ponds

- Design the pond with a minimum length to width ratio of 3:1 (preferably expanding outward toward the outlet), measured from the pond inlet to the pond outlet. Irregular shorelines for larger ponds provide visual variety. This length to width ratio must be met for each inlet to the pond. Note: Pond inlet should be considered the forebay outlet.

- When designing the BMP for the contributing drainage area, assume that the entire upstream watershed is fully developed. When designing the BMP for the effective drainage area where offsite areas bypass the BMP, the design shall only consider the drainage from the site. Again, assume that the entire upstream watershed from the site is fully developed.

- A wet storm water pond is characterized by a permanent wet pool. The designer must evaluate both the soils and the hydrology of the site to insure that the pond will maintain a permanent wet pool. (Note: Chapter 300 allows dry detention ponds, however, little water quality benefit is provided from dry detention ponds.)

Section 702.01, Storm Water Ponds (Con't)

- If orifices are utilized for drawdown purposes for stages above the permanent pool the orifices are to be protected against clogging by use of screening or other means. If the outlet diameter is less (less) than 2 inches then the minimum orifice diameter allowed is 2 inches.

- Tall plantings in the aquatic bench are desirable as a means to keep waterfowl from the site. Waterfowl are bacteria sources and are to be discouraged from inhabiting wet ponds. Long, narrow, irregularly shaped ponds with tall plantings are encouraged in order to minimize attractiveness of the pond to waterfowl.

- Provide trash racks, filters, hoods or other debris control. The debris control should meet the minimum floatable capture requirements.

Chapter 700 – Water Quality

Section 702.02, Storm Water Ponds

- Design and install an emergency drain (i.e. sluice gate or drawdown pipe) capable of draining within 24 hours. Where topographical limitations prevent the use of a sluice gate or drawdown pipe, the design should indicate a pump may need to be used to draw down the pond and the pump rate specified to meet the 24 hr drawdown period.

- Emergency spillway designed to pass 1.25 times the peak inlet flow rate and peak flow velocity from the 100-year storm event for the entire contributing drainage area (unless bypassed), assuming post-development conditions (see Section 302.08).

- Provide trash racks, filters, hoods or other debris control. The debris control should meet the minimum floatable capture requirements.

Chapter 700 – Water Quality

Section 702.02, Storm Water Wetlands

- The wetland must be designed for an extended detention time of 48 hours for the WLQ. The orifices used for extended detention will be vulnerable to blockage from plant material or other debris that will enter the basin with storm water runoff. Therefore, some form of protection against blockage must be installed (such as some type of non-corrodbile wire mesh or a stone-protected filter fabric).

- The minimum orifice size allowable will be 2 inches for the outlet control structure.

Chapter 700 – Water Quality

Section 702.03, Bioretention

Bioretention: Intended use for drainage areas 5 acres or less, however if hydraulic and hydrologic design criteria are met, sites may be designed to manage multiple 5 acre watersheds.

Micro-bioretention: Intended to be versatile and can be adapted for use anywhere there is landscaping. Contributing drainage area < 20,000 ft²

Rain garden: Typically used to treat runoff from small impervious areas like rooftops, driveways, and sidewalks. Rain gardens can also be used in retrofitting and redevelopment applications and in series where existing slopes require energy dissipation. Contributing drainage area < 10,000 ft²

Bioretention areas are engineered facilities in which runoff is conveyed as sheet flow to the “treatment area,” consisting of a pretreatment area, including a sediment forebay, ponding area containing vegetation with a planting soil bed, organic/mulch layer and gravel and perforated pipe underdrain system. The filtered runoff is typically collected and returned to the conveyance system, though it can be infiltrated into the in-situ soils in areas with porous soils (½ inch/hour), though infiltration may not be permitted in Wellfield Zoning Districts or hotspot locations. If no perforated pipe underdrain system is used, a geotechnical investigation, soil infiltration testing, and a hotspot investigation must be completed.

- Design components should include: Energy dissipation to reduce velocities and spread flow into the bioretention ponding area. Inflow diversion or an overflow structure to carry flows greater than designed hydraulic capacity.

Note: Read entire section.
**Chapter 700 – Water Quality**

**Section 702.03, Bioretention (Cont’d)**

**Site and Design Considerations**

The following design and site considerations must be incorporated into the BMP plan including bioretention areas:

- The drainage area (contributing or effective) must be 5 acres or less, though 0.5 to 2 acres is preferred. Alternative designs can vary by location but NOT hydraulic/hydrologic design considerations.
- The planting soil bed must be at least 2 feet deep.
- Pretreatment, including forebay, design for pre-treatment must follow the requirements outlined in Section 702.06.

**Site and Design Considerations (Cont’d)**

- The underdrain collection system must be equipped with a 6 inch perforated PVC pipe in an 8-inch gravel layer. The pipe must have 3/8-inch perforations, spaced on 6-inch centers with a minimum of 4 holes per row, or equivalent. The pipe is spaced at a maximum of 10 feet on center, and a minimum grade of 0.5% must be maintained. A permeable filter fabric or a gravel lens (3/4-1/4 inch, crushed rock 2 to 3 inches deep), is placed between the gravel layer and the planting soil bed.
- The depth from the bottom of the bioretention facility to the documented seasonally high water table must be a minimum of 2 feet. The seasonal high water table must be field determined by a soil scientist or geo-technical investigation.

**Runoff captured by facility must have energy dissipation to prevent erosion of the organic or mulch layer. Velocities entering the mulch layer must be less than or equal to 1.5 ft/s.**

**All components of the BMP must be located within an easement. Access to the BMP must be located within the easement.**

**Chapter 700 – Water Quality**

**Section 702.03b, Micro-Bioretention**

NOTE: SEE NEW SECTION!

The following items should be addressed to ensure proper maintenance and long-term performance of micro-bioretention practices:

- The top few inches of filter media should be removed and replaced when water ponds for more than 24 hours. Silts and sediment should be removed from the surface of the filter bed when accumulation exceeds one inch.
- Where practices are used to treat areas with higher concentrations of heavy metals (e.g., parking lots, roads), mulch should be replaced annually. Otherwise, the top two to three inches should be replaced as necessary.
- Occasional pruning and replacement of dead vegetation is necessary. If specific plants are not surviving, more appropriate species should be used. Watering may be required during prolonged dry periods.

**Note:** See Green Infrastructure Supplemental document for a sample O & M Manual.

**Chapter 700 – Water Quality**

**Section 702.03c, Rain Gardens**

NOTE: SEE NEW SECTION!

The following items should be addressed to ensure proper maintenance and long-term performance of rain gardens:

- Privately owned practices must have a maintenance plan and shall be protected by easement, deed restriction, ordinance, or other legal measures preventing its neglect, adverse alteration, and removal.
- The top few inches of the planting soil should be removed and replaced when water ponds for more than 48 hours. Silts and sediment should be removed from the surface of the bed as needed.
- Where practices are used to treat areas with higher concentrations of heavy metals (e.g., parking lots, roads), mulch should be replaced annually. Otherwise, the top two to three inches should be replaced as necessary.

**Maintenance Criteria:** The following items should be addressed to ensure proper maintenance and long-term performance of rain gardens:

- The maximum design flow depth is 1 foot, for all storm events, with a ponding depth of 18 inches at the end of the channel. Note: This includes the 100-yr event.
- Underlying soils shall have a high permeability (fc > 0.5 inches per hour). Seasonally high water table must be greater than 3 feet below the bottom of the swale. The seasonal high water table must be determined by a practicing soil scientist of geo-technical investigation.
- The underdrain must have a minimum of 2 feet of planting soil above the crown.
- The planting soil should be removed or replanted when ponding time exceeds 36 hours.
Chapter 700 – Water Quality

•Section 702.07, Catch Basin Inserts

Reminder – Still must be approved by the City.

Chapter 700 – Water Quality

Hypothetical Example:

Since our site is required to mitigate a minimum of 1.20 acres to comply with water quality requirements, Chapter 700 should be explored for applicable alternatives.

It should be noted that portions of the existing site may be required to be modified to meet the 1.20 acre mitigation requirement. Since parking is included, landscape islands may be added or modified to meet water quality requirements. Manufactured BMP’s may be installed on existing or proposed pipe systems.

An O&M Manual would be required for the site. In some cases easements may be required on existing pipe systems.

Chapter 700 – Water Quality

Hypothetical Example:

• The project submittal should include a technical report with all pages numbered and dated.
• The narrative should clearly indicate the detention and water quality requirements with mitigation breakdown.
• All calculations applicable to the project should be included (pipes, water quality, etc.).
• Since a masterplan is involved, copies of the applicable portions of the masterplan should be included (calculations, basin maps, etc.). Also a comparison of the proposed site curve number to the approved masterplan curve number should be provided.
• The plans should include all infrastructure information on the title sheet, including state plane coordinates for the water quality BMP.
• An O&M Manual will be required addressing the site infrastructure, including existing infrastructure previously installed.

Marion County
Code of Ordinances
Chapter 561
Drainage and Sediment Control

Section 561

•Section 561.111, Professional Certification

— 5 acres – PE, LS, Architect
— > 5 and <, PE, LS

•Section 561.211, Responsibilities

— R/W, accepted easement – City
— Private Property even with easement – Property Owner
— Private Facilities in R/W – Property Owner
— Legal Drains – Property Owner
— Private Driveways, Culvert, Bridges, Pipes – Property Owner even if in R/W or easement

Section 561

•Section 561.271, Variance

(a) The administrator of the bureau of license and permit services, after consultation with the engineering division of the department of public works, shall have the power to modify or waive any minimum drainage standard found in Article III of this chapter or any regulations promulgated by the board of public works pursuant to Article III of this chapter. The administrator may, but is not required to, grant such a modification or waiver if an applicant for a drainage permit makes a substantial showing:

(1) That a minimum drainage standard regulation is infeasible or unreasonably burdensome; and

(2) That an alternate plan submitted by the applicant will achieve the same objective and purpose as compliance with minimum drainage standards and regulations.

(b) The request for a variance together with supporting information shall be made in writing to the administrator who shall make a decision within twenty (20) days and file a copy of his or her decision with the board of public works.
QUESTIONS?
**Date:** April 15, 2011  
**Time:** 1 p.m. – 5 p.m.  
**Location:** Vonnegut Conference Room, 1200 S. Madison  
**Meeting:** Storm Water Design and Constructions Specification Manual Revisions Training  
**File Code:**

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**Location:** Vonnegut Conference Room, 1200 S. Madison  
**Meeting:** Storm Water Design and Constructions Specification Manual Revisions Training  
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Join the Indianapolis Departments of Public Works and Code Enforcement for a training session on updates to the City’s Storm Water Design and Construction Specifications Manual that go into effect on June 1, 2011.

The Storm Water Standards Training is scheduled for:
Friday, Apr. 15, 2011 | 1:00 – 5:00 p.m.
Department of Code Enforcement, Vonnegut Conference Room
1200 S. Madison Avenue, Indianapolis

The City’s Storm Water Design and Construction Specifications Manual has been revised. It provides regulations for engineering design and construction standards for proper storm water management for those contemplating development or other land alternation within the City of Indianapolis. The manual also provides a tool for compliance with the City’s National Pollution Discharge Elimination System (NPDES) storm water permit.

To RSVP and for questions, contact julie.rhodes@indy.gov

All DPW meeting locations are accessible to persons with disabilities. If special accommodations are needed, please call (317) 327-8744.

Agenda

- Introduction
  - John Oakley, DPW
  - Matt Kline, DCE
- Background — John Oakley, DPW
- Plan for Implementation — John Oakley, DPW
- How Revisions Fit into Existing Standards
  - Brad Dove, RebuildIndy
  - Frank Stewart, RebuildIndy

Purpose of Training

- This training is to discuss revisions to the Storm Water Design and Constructions Specifications Manual and their application only.
- This is not a full training course on how to use the Storm Water Design and Construction Specifications Manual.
  - You need some familiarity with the manual

Timeline

- 2007 – Stakeholder discussions began
- December, 2010 – Approved by the Board of Public Works
- February, 2011 – Became effective following no action by the City-County Council
- April – May, 2011 – Outreach and Training
- June 1, 2011 – New Manual Implementation

Background

- Indianapolis Storm Water Design and Construction Specifications Manual has:
  - Been in use since 1995
  - Been updated only once with the addition of water quality standards (2001)
  - Has gone through internal and stakeholder review and input process
- Updates needed to comply with regulatory changes

Agenda continued

- Storm Water Design and Constructions Specifications Manual Revisions Overview
  - Chapters 100 – 300
  - Questions and Answers
  - Break
  - Chapters 400 – 700
  - Chapter 561, Storm Water and Sediment Control
  - Questions and Answers
- Conclusion
Manual Revisions

- This presentation includes various fonts and color designations based on the printed version of the manual.
- Red Font – Highlights the changes within each section of the manual.
- Black Font – Shows existing text.
- Emphasis was added in some sections via underlining and/or italics.
- Not all changes, i.e. text, spelling, etc. are included in this presentation.

Hypothetical Redevelopment Project

Conditions:
- Commercial Site
- 1.5 acres
- Located in larger masterplanned development, originally started in the 1980's
- Served by existing detention pond and storm sewers
- 2004 - site expanded parking area by 0.47 acres
- 2011 - owners want to construct building expansion with additional parking, total proposed is 0.60 acres (0.49 acres of additional impervious surface)

Chapter 100 – Policy and Procedures

Section 101.02, Applicability

Improvements to an existing developed site that is not developed to current storm water design standards and disturbs => 1/2 acre will be required to comply with the current storm water regulations for storm water quantity and quality, at twice the area disturbed within the existing contributing drainage area at the proposed site work and owned by the project/property owner. For example, if a property owner wants to add 1 acre of parking and plans to disturb 1.5 acres to do it, he would be required to mitigate 3 acres of development within the same watershed to meet the current storm water regulations. If there was only an additional .75 acres of existing contributing drainage area upstream of the disturbed area, the owner would be required to mitigate 2.25 acres of development.

Hypothetical Example:
Site is disturbing 0.60 acres, therefore the owner must mitigate a total of 1.2 acres of development within the watershed to current storm water standards.

Due to site being within a masterplanned area that includes water quantity management within the ponds, it is assumed that the current quantity standards are met. Note: the engineer must document that the proposed improvements are in compliance with the masterplan.

However, water quality has not been constructed therefore the site must mitigate 1.2 acres of area.

Chapter 100 – Policy and Procedures

Section 101.04, Updating

Changes to the manual will be posted on the City’s website as they are produced. Notification of the changes will be emailed to the DPW listserver registrants and posted on the City website.

Note: Listserver not up and running yet.
Chapter 100 – Policy and Procedures

• Section 101.05, Definitions and Abbreviations, BMP

BMP, GENERAL: Best management practice can refer to a structural measure (wetland, pond, sand filter, etc.) or non-structural measure (restrictive zoning, reduced impervious areas, etc.). BMPs are designed for the benefit of water quality and quantity control. For the purposes of this chapter, BMPs refer to structural water quality BMPs.

BMP, MANUFACTURED: Manufactured BMPs are wholly or partially prefabricated and delivered to a construction site for incorporation into the drainage system. Water quality inlets, cartridge filter systems, and hydrodynamic separators are examples of manufactured BMPs.

BMP, NATURAL: Natural BMPs are practices that utilize the natural infiltration and filtering processes of water flowing through vegetation, sand, soil, or other media to remove suspended and or dissolved pollutants from runoff. Examples include biofilters, rain gardens, vegetated swales.

Chapter 100 – Policy and Procedures

• Section 101.05, Definitions and Abbreviations, Contributing Drainage Area

Contributing drainage area refers to the total area that contributes runoff upstream of a point of interest, such as a development site.

• Section 101.05, Definitions and Abbreviations, Land Disturbance

Any manmade change of the land surface, including: removal of vegetative cover that exposes the underlying soil, excavating, filling, transporting, and grading.

Chapter 100 – Policy and Procedures

• Section 102.02, Plan Submittal and Approval Process

5. Operation and Maintenance Manual for all detention, storm water, and water quality structures.

Note: No longer applicable only to WQ units.

• Section 102.02, Plan Submittal and Approval Process

The zoning of any properties for which drainage permits are applied must be consistent with the proposed land use before drainage permits will be approved.

Note: Engineer should document the zoning designation and provide zoning commitments of the site to the reviewer. Technical review will not be completed until this is submitted.

Chapter 100 – Policy and Procedures

• Section 102.03, Plan Submittal and Approval Process

Cover Sheet: A cover sheet shall be provided, including location and vicinity map. A map that indicates the location and vicinity of the proposed land alteration shall be included in the storm water plan. It shall reference a nearby major roadway intersection. The cover sheet shall also include site address, as assigned by DMD, the DMD Compliance Information Block and a storm water structure summary table. The summary table shall provide each proposed pipe size and respective length with the number of proposed structures.

Note: The cover sheet (title sheet) should include the compliance block referencing the Department of Code Enforcement (DCE).
Chapter 100 – Policy and Procedures

Section 102.03, Plan Submittal and Approval Process

Existing and proposed storm water facilities: The storm water plan shall show the locations of all existing and proposed storm water facilities. 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 either on the State of Indiana’s coordinate system or latitude and longitude. Indiana’s State Plane Coordinate System shall be used to identify the location of the outlet of each BMP included in the plan. The storm water plan shall show the direction of flow, elevation of inverts, gradient, materials and size of existing and proposed storm drains.

Note: It is recommended that a table be provided on the cover/title sheet with the coordinates of each BMP. The BMP’s may be located in State Plane coordinates with an error of +, - 1 ft.

Chapter 100 – Policy and Procedures

Section 102.03, Plan Submittal and Approval Process

For all Class 1 pipe (within the R/W or conveying runoff from more than one parcel), a plan and profile shall be submitted. Storm drain plan and profile: The plan shall be shown on the upper portion of the drawing. The plan, generally, shall be drawn on a scale that is clear and legible and not greater than one (1) inch equals fifty (50) feet. The plan shall show appropriate right-of-way and easement limits with instrument numbers, as applicable. 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.

Chapter 100 – Policy and Procedures

Section 102.03, Plan Submittal and Approval Process

The location of the predominant soil types on the site shall be described by a registered land surveyor or professional engineer. The description may be determined by the NRCS (Natural Resources Conservation Service, formerly the Soil Conservation Service, or SCS) County Soil Survey or an equivalent publication or as determined by a certified professional soil scientist.

Note: A map must be included as part of the Plan Sheets!

Chapter 100 – Policy and Procedures

Section 102.03, Plan Submittal and Approval Process

Obligation to Observe. For land alterations that are not to be inspected and tested by the City’s inspection program, storm water plans submitted under this section to the Department must include a “Certificate of Obligation to Observe” signed by a registered professional engaged in storm drainage design and by the Owner. The certificate shall be as presented on page A1-9. If for any reason the registered professional becomes uninvolved in the project prior to its completion, the Department of Metropolitan Development must be notified and a new registered professional must be retained by the Owner and both a new “Certificate of Obligation to Observe” and a new “Certificate of Sufficiency of Plan” document must be executed.

Note: Section 103.03 specifies the criteria for construction observation services.

Chapter 100 – Policy and Procedures

Section 102.04, Technical Information Report

Each page and attachment of the TIR should be numbered and dated.

Section 102.04, Technical Information Report

Drainage area calculations including both the gross and impervious area for each drainage basin/subbasin.

Section 102.04, Technical Information Report

An explanation of computer models used, where applicable, with information from input and output data.

Chapter 100 – Policy and Procedures

Section 102.06, Operations and Maintenance Manual

An operations and maintenance (O&M) manual for all infrastructure, including but not limited to pipes, ponds, ditches, and BMPs (when required), shall be submitted for the final plan approval and permit process. The manual will become a maintenance guide for the drainage infrastructure once development is complete. The final O&M manual will be provided to the City in both hard copy and digital formats. The O&M manual maintenance agreement along with a site map showing the BMP locations shall be recorded with the final plat.

Note: O&M Manual required for all infrastructure.

Note: An O&M Maintenance Agreement will be developed.
Chapter 100 – Policy and Procedures

- Section 102.06, Operations and Maintenance Manual
  Site drawings (8½” by 11” or 11” by 17”), showing both plan and cross-section views, showing the infrastructure and applicable features, including dimensions, easements, outlet works, forebays, signage, etc., as well as an overall site map of the development showing all structures.

Notes:
The use of 11 x 17 sheets has already been occurring, but now can be cited.
With the inclusion of all storm water infrastructure in the O & M Manual, all structures need to be shown in the O & M Manual. Multiple sheets may be required for legibility.

- Section 103.04, Drainage Fees
  The following schedule of fees is current as of May 1, 2007. Changes to this fee schedule will be posted on the Department of Code Enforcement website.

Chapter 100 – Policy and Procedures

- Section 103.05, Testing
  All storm sewers using flexible pipe shall be tested for deflection by means of a go/no go mandrel gage or other methods as approved by the Department.

Note: See Manual, extensive changes!

- Section 103.07, Record Drawings
  As part of the final acceptance process, record drawings of the storm water facilities must be submitted to the Department, as set forth herein, for the following types of developments:

  • all platted subdivisions
  • industrial and commercial sites one acre and larger
  • all public infrastructure

Note: Previous manual stated 5 acres and larger.

Chapter 100 – Policy and Procedures

- Section 102.06, Operations and Maintenance Manual
  Guidance on sediment and trash removal, both narrative and graphical, describing when sediment removal should occur in order to insure that BMPs and other infrastructure remain effective as water quality and/or quantity control devices;

- Section 103.04, Drainage Fees
  The following schedule of fees is current as of May 1, 2007. Changes to this fee schedule will be posted on the Department of Code Enforcement website.

Chapter 100 – Policy and Procedures

- Section 103.05, Testing
  Forty-two (42) inch diameter and smaller reinforced concrete and corrugated metal pipe may be required to be inspected through closed circuit television viewing (CCTV) by the Department’s representative as described herein. In those instances where CCTV is a required part of the storm water permit approval, this televised viewing shall be completed in conformance with these minimum guidelines.

Note: Televising may be required on a case-by-case basis and should be coordinated with the Department of Code Enforcement. Generally, if visual inspection or lamping reveals sufficient defects, the Department will require CCTV.

Chapter 100 – Policy and Procedures

- Section 103.07, Record Drawings
  Record drawings shall be certified by a Professional Engineer or Land Surveyor registered in the State of Indiana, and provide the following information:

  • Horizontal alignment of storm drain pipes, culverts, BMPs, streets, and storm drain structures, to a minimum accuracy of +/- two (2) feet. All BMPs will be located by Indiana State Plane Coordinates.
  • The as-built survey of all detention / retention facilities as well as as-built profile of all drainage conveyances (ditches, swales, etc).

Note: As-built contours must be shown for ponds.

• A tag reference to the operations and maintenance manual as required for storm water structures will be included.
Chapter 100 – Policy and Procedures

• Section 103.07, Record Drawings (con’t)

Sample Tag Note:

This site includes an Operations and Maintenance (O&M) Manual for all storm water infrastructure. Contact the Department of Code Enforcement for a copy of the manual.

• Section 104.02, Storm Water Quality

For the purposes of this requirement, TSS are defined as particles that will pass through a 125 micron screen. Larger particles are considered to be part of the total solid load of the storm water runoff.

• Section 104.02, Storm Water Quality

Floatables: The narrative standards in Section 1.B.3 of the City’s NPDES Storm Water Permit (No. IN040001) state that certain categories of floatables, or floating debris are not permitted in storm water discharges. The policy for floatable control in Indianapolis is that the drainage from all areas of new development and redevelopment will be designed to so as to capture and retain floating material. Individual components of the storm water control system do not have to comply with this policy, but the final discharge from the development site must.

Chapter 100 – Policy and Procedures

• Section 104.02, Storm Water Quality

For the purposes of all projects, including commercial, industrial, residential, transportation, recreation, etc., if the cumulative disturbed area is less than ½ acre, the development will be exempt from requirements for on-site BMPs. The cumulative total disturbed area will be evaluated based on City records of permit activity from October 1, 2001.

Note: A site history should be provided in the Technical Information Report (TIR). The site history can be a separate section of the report. The history must also include a description of all previous projects since October 1, 2001, the disturbed area of each project and applicable permit numbers.

• Section 104.02, Storm Water Quality

Hypothetical Example:

Proposed disturbance is 0.60 acres. The developments since 2001 included a total disturbance of 0.49 acres. The total cumulative is 1.09 acres (0.49 acres in 2004 and 0.60 acres in 2011). Therefore, the site must comply with water quality for 1.09 acres minimum.

Since the mitigation requirement is greater than the cumulative water quality requirements, a minimum of 1.20 acres must be addressed for water quality.

Note: Again, the site history report in narrative should address the previous disturbances.

Chapter 100 – Policy and Procedures

• Section 104.03, Redevelopment Guidelines

When properties are redeveloped they are subject to the same policies and design standards as are applied to new development projects; including storm water permitting, detention, sediment and erosion control, and water quality management requirements.

Note: This section provides in-depth guidance pointing to green infrastructure.

Chapter 200

Hydrology
Chapter 200 – Hydrology

• Section 201.03, Hydrologic Method

The same hydrologic method should be used for pre-developed runoff peak determination as will be used the post-developed detention calculations.

• Section 201.03, Hydrologic Method

Rational Method may be used for peak runoff estimations when the total watershed area tributary to the design point is five (5) acres or less and with no existing depressional storage, provided analysis of "regional" detention/retention (D/R) facilities is not a required part of the computational procedure.

Note: Area reduced from 200 to 5 acres.

Chapter 200 – Hydrology

• Section 201.04, Design Storm Frequencies

Table 201.01

| Driveway Culverts | 10 year (1, 5) |

Note: Added to table for clarification

• Section 201.04, Design Storm Frequencies

5. Driveway culverts for in-fill development in residential areas sites are exempt from this requirement because inspectors examine the proposed culvert with respect to adjacent upstream and downstream driveway culverts. However, the Department reserves the right to require the analysis of any culvert.

Chapter 200 – Hydrology

• Section 201.06, When Downstream Conveyance Analysis and Detention/Retention not Required

1. The part of the storm water facility situated within the parcel shall drain adequately each and every part of the parcel and shall be sufficient to accept the present water runoff from developed and undeveloped areas upstream.

2. Approved fill areas which do not increase the amount of impervious area on-site to be more than a total of 0.5 acres, provided the existing runoff patterns and flow capacity of the property will not be altered by the filling operations. The 0.5 acre threshold for analysis and detention will be determined as the cumulative amount of impervious area for all tracts, phases, and / or sections of the building addition.

Note: Now all improvements not just additions and the cumulative increase are to be considered.

Note: Existing storm water infrastructure may still need to be evaluated for impact from proposed improvements based on Chapter 561.
Chapter 200 – Hydrology

• Section 201.06, When Downstream Conveyance Analysis and Detention/Retention not Required

HOWEVER!!!

Section 561-333 Requires:

“A drainage facility shall be provided which allows drainage of water runoff from each upper watershed area and from each portion of the parcel to a place or places adequate to receive it.”

In addition, Section 561-336 Requires:

“As to drainage facilities located downstream of the parcel, the drainage system within the parcel shall be designed such that there will be no increase in peak discharge or runoff rates as a result of the development unless such downstream facilities are sufficient to accept…

Chapter 200 – Hydrology

• Section 201.06, When Downstream Conveyance Analysis and Detention/Retention not Required

Note: 561 overrides the design manual and downstream facility capacity should always be considered.

Example:

0.499 acre parking lot on existing building. While the manual does not REQUIRE detention, the receiving facility must be adequate to accept the increased runoff and facilities downstream must have capacity for the entire upstream watershed in the proposed development state.

Chapter 200 – Hydrology

• OLD Section 201.07, Downstream Analysis Requirements

Downstream analysis also known as “Beat the Peak” has been completely deleted!!

Variations in the methods used and the approach were inconsistent. The analysis frequently did not account for all the facilities that impacted timing of the upstream flow such as detention ponds and existing storm sewer systems.

Chapter 200 – Hydrology

• Section 202.02, Rainfall Distribution

Staff has determined that Huff rainfall distributions most accurately reflect rainfall conditions in Indianapolis. The appropriate Huff storm distribution’s fifty percent (50%) probability curve or column shall be used for hydrograph computations, as is applicable for the design methodology. Figure 202-2 and Table 202-3 can be referenced for the appropriate distribution.

1st, 2nd, and 3rd Huff Rainfall distributions should be applied as appropriate.

1st – 0 up to and including 4hr
2nd – 6.1 up to and including 12hr
3rd – 12.1 up to and including 24hr

Chapter 200 – Hydrology

• Section 203.03, Overland Flow Time

Overland flow in urbanized basins occurs from the backs of lots to the street, across and within parking lots and grass belts, and within park areas. Overland flow over plane surfaces for distances of less than 100 lineal feet may be calculated using Manning’s kinematic solution (Overton and Meadows 1976) to compute Tt.

Note: Although the worksheet currently indicates 300 feet for sheet flow, a maximum of 100 feet shall be used.

• Section 203.04, Shallow Concentrated Flow

After a maximum of 100 feet, overland flow will normally become shallow concentrated flow.
Chapter 200 – Hydrology

• Old Section 204.03, Regression Equations - DELETED

• Section 205.03, NRCS (SCS) Curve Numbers

When two soils types are listed (e.g. drained / undrained) drained soil conditions should be used for the pre-developed / allowable release rate calculations and undrained conditions shall be assumed in the post-developed model for soils unaffected by the proposed construction.

Agricultural soils shall assume crops in good condition for the pre-developed / allowable release rate and bare with no cover for the post-developed model for soils unaffected by the proposed construction.

Chapter 300 – Hydraulics

• Section 305.02, The Requirement for Detention/Retention (current)

STEP 1: Is detention/retention required according to 201.06? If it is not the designer skips any consideration of downstream analysis or detention / retention. If detention/retention is required the designer proceed to step 2. The downstream analysis must assess each outflow point from the site separately.

Note: In this paragraph the downstream analysis refers to the old “beat the peak” analysis, which is no longer allowed, and not the downstream capacity analysis.

Chapter 300 – Hydraulics

• Section 201.06, REVIEW

Analysis of the downstream storm water conveyance system or the provision of detention/retention will not be required for the following:

1. Downstream facilities which after completion of the land development will not be accepting runoff from the developing property.
2. Approved fill areas which do not increase the amount of impervious area on-site to be more than a total of 0.5 acres, provided the existing runoff patterns and flow capacity of the property will not be altered by the filling operations. The 0.5 acre threshold for analysis and detention will be determined as the cumulative...
3. Improvements to existing commercial buildings, provided the total impervious area on-site, including roof tops, sidewalks, drives and parking lots, is not increased to be more than a total of 0.5 acres with no alteration to existing storm water facilities. The 0.5 acre threshold for analysis and detention will be determined as the cumulative .......
Chapter 300 – Hydraulics

• Section 305.02, The Requirement for Detention/Retention (current)

STEP 4: The designer next performs the pre/post development discharge analysis described in Section 302.03. If the flows "PASS" the designer does not need to provide detention/retention, mitigation or site design modification.

STEP 5: If the site "FAILS" the flow test or if there is inadequate downstream capacity for the post-development discharge the designer performs one or a combination of detention/retention design, downstream storm water facility mitigation and/or site modification.

Step 5 is the key step to keep in mind.

Chapter 300 – Hydraulics

• Section 305.02, The Requirement for Detention/Retention (proposed)

STEP 1: Is detention/retention exempt according to 201.06? If so, the designer proceeds to Step 3. Otherwise, proceed to Step 2.

STEP 2: The designer next performs the pre/post development discharge analysis described in Section 302.03. If there is no increase in runoff, the designer proceeds to Step 3. If there is an increase, the designer proceeds to Step 4.

Chapter 300 – Hydraulics

• Section 305.02, The Requirement for Detention/Retention (proposed)

STEP 3: Are the downstream facilities adequate to accept the proposed peak runoff flow (i.e. what is the available capacity of the downstream facilities)? The designer performs a downstream capacity analysis for the storm frequencies required for the storm water facilities encountered downstream. This will normally require the 10-, 25- and 100-year storms. This analysis may include the first detention pond downstream and/or the first 15 inch or larger pipe downstream.

If the downstream facilities have adequate capacity for the proposed flow and are exempt from 201.06, then the designer does not need to provide detention/mitigation.

If the downstream facilities are not adequate for the proposed flow, the designer proceeds to Step 8.

Chapter 300 – Hydraulics

• Section 305.02, The Requirement for Detention/Retention (proposed)

STEP 4: Are any individual potential detention/retention sites draining areas less than 5 acres total including off-site drainage? If "Yes" the designer may elect to perform an oversized detention/retention design and proceeds with Step 5. If "NO" the designer goes to Step 6.

Chapter 300 – Hydraulics

• Section 305.02, The Requirement for Detention/Retention (proposed)

STEP 5: If the designer wants to over design for detention, the designer must use the Modified Rational method as outlined in Section 302.05.

STEP 6: If the site is greater than 5 acres or the designer elects not to over design the detention basin then a downstream capacity analysis should be completed as described in Step 3. After completion of the downstream capacity the designer proceeds to Step 7.

Chapter 300 – Hydraulics

• Section 305.02, The Requirement for Detention/Retention (proposed)

STEP 7: The site design should be completed by designing the detention to meet the detention requirements and/or mitigate downstream restrictions.
Section 302.03, Minimum Performance Level of Detention/Retention Facilities

The minimum hydraulic performance levels and accepted design methodologies for detention/retention basins shall conform to the following:

\[ Q_{2p} = 0.5 Q_{2e} \]
\[ Q_{10p} = 0.5 Q_{10e} \]
\[ Q_{25p} = 0.75 Q_{10e} \]
\[ Q_{100p} = Q_{10e} \]

where:

- \( Q_{2e} \) = 2 year discharge rate, existing conditions
- \( Q_{10e} \) = 10 year discharge rate, existing conditions
- \( Q_{2p} \) = 2 year discharge rate, developed conditions
- \( Q_{10p} \) = 10 year discharge rate, developed conditions
- \( Q_{25p} \) = 25 year discharge rate, developed conditions
- \( Q_{100p} \) = 100 year discharge rate, developed conditions

Local basins are those which have a total land area contributing flow to the detention/retention basin, including on-site and off-site areas, of less than five (5) acres. Local basin designs in which the designer elects to overdesign the detention basin in lieu of performing downstream analysis, may be designed using the Modified Rational Method as set forth herein. All other detention/retention designs shall use runoff hydrographs and routing techniques.

Regional basins are those which have a total land area contributing flow to the basin, including on-site and off-site areas, of five (5) acres or larger. In addition to the discharge rate requirements above, the following velocity requirements shall apply for regional basins:

\[ V_{2p} = V_{2e} \]
\[ V_{10p} = V_{10e} \]
\[ V_{25p} = V_{10e} \]
\[ V_{100p} = V_{10e} \]

where:

- \( V_{2e} \) = 2 year velocity, existing conditions
- \( V_{10e} \) = 10 year velocity, existing conditions
- \( V_{2p} \) = 2 year velocity, developed conditions
- \( V_{10p} \) = 10 year velocity, developed conditions
- \( V_{25p} \) = 25 year velocity, developed conditions
- \( V_{100p} \) = 100 year velocity, developed conditions

All regional detention/retention designs shall use runoff hydrographs and routing techniques.

When computing the discharges for detention/retention basin design the entire upstream area that contributes runoff to the design point must be included in the computations. Areas that are bypassed for all levels of flow are the only allowable reductions in drainage area.

For local basins, an increased level of detention/retention may be used in lieu of the downstream analysis described in Chapter 200, sections 203.05 through 201.06. If this option is selected, the design shall conform to the requirements for a local basin plus:

The storm water runoff from all impervious area on the site shall be routed through the detention/retention facility, unless otherwise approved.
• Section 302.05, Modified Rational Method

Notes:
• Cr factors shown in the table should be used for pre-development conditions regardless of the existing surface types.
• Required detention volume should be based on the volume after the adjustment using the Huff Storm Factor (Equation 302.04)

• Section 302.06, Bypassing Flow

When storm water detention/retention is required, all parts of the developing site should drain through the detention/retention basin, unless otherwise approved. Upstream drainage areas may be bypassed and therefore not considered in the computations as long as the conditions set in Section 302.03 are met.

Note: This is for all design storm events.

• Section 302.07, Detention/Retention Facility Design

The flow path from all inlets in a dry detention basin to the outlet of the basin shall be provided with an under-drain system.

• Section 302.07, Detention/Retention Facility Design

All wet detention/retention facilities shall have a safety bench/shelf at the normal pool level. The safety bench shall have a minimum width of ten (10) feet and a slope no steeper than 4 (horizontal) to 1 (vertical).

If a retaining wall adjoins the normal pool of a wet detention pond the wall shall have either steps or a ladder incorporated into the construction at the center of the wall span.

• Section 302.07, Detention/Retention Facility Design

When retention facilities are designed information must be provided on the plans that supports the ability of the structure to retain water, including the soil types on the site and a geologist’s report showing how the site will infiltrate water.

• Section 302.08, Design of Detention/Retention Facility Emergency Spillways

Many types of emergency spillways are allowable provided adequate provision is made for the discharge of the flow through the facility and a minimum freeboard of one-foot (1) is provided for larger regional ponds above the maximum anticipated flow depth through the emergency spillway. All emergency spillways shall outlet to an easement containing a channel with acceptable capacity.

All calculations, easement delineation, and cross sections for the emergency spillway are to be submitted for review.

• Section 302.11, Easements

All detention/retention basins shall be constructed within a storm water easement either platted or legally described and recorded as a perpetual storm water easement a minimum of twenty (20) feet horizontally outside of the design 100-year flood water elevation of the basin.

• Section 302.11, Easements

All emergency spillways will have an easement that extends from the crown of the emergency spillway structure to the point where the spillway enters the downstream drainage system.

• Section 303.02, Easements/Minimum Flood Protection Elevations

Collector Swales

Surface water collector swales within the rear yard and side yard areas of residential subdivisions, on all non-residential parcels, and for all bypassed flow conveyances shall be constructed within a drainage easement possessing a minimum width of twenty (20) feet. For residential properties the drainage swale should be generally constructed approximately in the middle of the easement.

Note: Now all swales must have easements, previously only swales serving greater than 5 acres had easements.
Chapter 300 – Hydraulics

• Section 303.02, Easements/Minimum Flood Protection Elevations

Structures to be constructed that are not located in a flood control district regulated by the Flood Control Districts Zoning Ordinance of Marion County, Indiana, shall conform with the following requirements:

The first finished floor of new structure to be constructed adjacent to a surface drainage feature which drains areas between 150 and 640 acres shall be located at an elevation at least two feet above the maximum 100-year water surface elevation. The 100-year water surface elevation may be established through the use of a single cross-section analysis.

Note: As usual, 2 foot FPG for area >640 acres.

Chapter 300 – Hydraulics

• Section 303.03, Grading and Depth of Open Channels / Swales

Concrete is no longer acceptable for swale invert treatment.

Chapter 300 – Hydraulics

• Section 303.04, Grading and Depth of Open Channels / Swales

Concrete is no longer acceptable for swale invert treatment.

Chapter 300 – Hydraulics

• Section 305.03, Design of Open Channels Using Manning’s Equation

The use of Manning’s equation shall be considered acceptable for determination of storm drain pipe sizes when the design discharge is ninety percent (90%) or less of the capacity of a commercially available pipe as computed by Manning’s equation. The storm drain system must be capable of passing the 10-year storm event with free water surface elevations below the crown of the pipe.

Design computations of storm drain pipe systems using the Rational Formula and Manning’s equation shall be submitted with the storm water permit application on the Storm Drain Flow Tabulation Form provided by Figure 305-1 or by suitable computer program output listing giving similar information. Typical Manning’s “n” values for standard storm drain materials are provided in Table 305-1. Head loss computations shall be submitted with the storm water permit application on the form provided by Figure 305-2.

• Section 305.03, Design of Open Channels Using Manning’s Equation (Con’t)

HOWEVER:

Section 102.04 of the manual states:

1. Design Calculations. Design calculations are required as part of the storm water plan and shall, at a minimum, specifically include:

   d. Storm drain flow and hydraulic grade line computations as described in Section 305.03 and 305.04. A Storm Drain Flow Tabulation Form has been provided on page A3-14. A Headloss Calculation Sheet has been provided on page A3-16. A form to assist with completion of culvert ratings has been provided on page A3-7.

Note: The use of a manufactured BMP (SQU) also requires that HGL calculations be completed for the pipes upstream and downstream of the SQU.

• Section 305.03, Design of Open Channels Using Manning’s Equation (Con’t)

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Note: The use of a manufactured BMP (SQU) also requires that HGL calculations be completed for the pipes upstream and downstream of the SQU.
HGL is above the crown of pipe and rim elevation

Invert = 763.42
Crown = 764.67
HGL = 768.70
Rim = 767.14

HGL for all pipes above the crown of pipe.

Chapter 300 – Hydraulics

- Section 305.03, Design of Open Channels Using Manning’s Equation

Proper operations and maintenance practices for all storm drain and inlet structures and their appurtenances will be identified in the Operations and Maintenance Manual, as required in Section 102.06.

- Section 305.06, Non-Gravity Flow Systems

3. An indemnification of the City relative to the non gravity-flow design.

Note: A standard Indemnification Agreement is available on the City’s website.

Chapter 300 – Hydraulics

- Section 305.08, Gutterline Hydraulic Evaluation

Inlets in roadway gutter lines must be spaced to prevent flow from entering public road intersections. In addition, inlets should be spaced intermittently in residential street gutter lines to allow one lane (based on the lane width of the road) of traffic to remain open during the 100-year storm event. Multi-lane facilities may have one travel lane on each side of the roadway flooded during the 100-year storm event. The design storm for all of the conditions is the 10-year storm event.

Note: required one travel lane does not include curb and gutter, i.e. 30’ b-b curb roadway with 2’ curb and gutter on each side would require a 13’ open travel lane (30’ - 4’ = 26’ / 2 = 13’)

QUESTIONS?

Chapter 400
Storm Sewer Pipe and Open Culvert Materials
Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

• Section 401.07, Portland Cement Pervious Concrete Pavement (also known as PCPC)

Portland Cement Pervious Concrete Pavement shall be constructed in full conformance with those guidelines set forth below. The Department of Public Works shall maintain a list of the approved products for these facilities.

Accepted Locations for use

Use of PCPC within the existing or proposed public right-of-way or in other areas maintained by the City of Indianapolis shall not be allowed unless approved in writing by DPW.

PCPC may be used on private property as an alternate pavement material and an alternate for traditional piping and detention system.

Design Guidelines

All PCPC facilities acting as a detention facility shall be designed with a positive gravity outfall or a certification from a licensed geotechnical engineer stating:

- that the permeability of the surrounding soils will dissipate water at a rate required for the detention facility designed,
- that no adverse impact to any subsurface systems (including septic systems) will be experienced, and,
- that the PCPC detention facility will not be subject to groundwater surcharge during any time of the year.

Use as a detention facility in “Well-Head Protection Areas” must have positive outfalls and an impermeable lining.

Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

• Section 401.07, Portland Cement Pervious Concrete Pavement (also known as PCPC) (Con't)

If the system is designed to use the storage volume of the stone surrounding the structure, a 40 percent porosity factor shall be utilized for the surrounding washed #8 stone.

All storm water shall be routed through a Storm Water Best Management Practice (BMP), also described as Storm Water Quality Unit (SQU), meeting City Standards. These units are approved to be downstream of the PCPC.

No storm water shall be routed through the detention facility until the Storm Water Best Management Practice (BMP) is installed and fully functional and all construction erosion control for disturbed areas are installed to ensure no sediment build-up in the underground detention storage facility. The erosion control methods and BMP’s must be inspected after each rain event and repaired or cleaned where necessary. The O&M Manual for all BMP’s or SQU’s located prior to the underground detention storage facility require the BMP’s to be inspected (4) times per year and cleaned as necessary to ensure maximum performance relative to sediment removal.

Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

• Section 401.07, Portland Cement Pervious Concrete Pavement (also known as PCPC) (Con’t)

Maintenance

The owner shall be responsible for maintenance.

When PCPC is used as part or all of a detention system the owner’s engineer is required to submit an Operation & Maintenance Manual during the permitting/approval process describing the maintenance frequency and methods. Annual cleaning is required after the last snowfall or by April 30th of each year.

The city has the right to inspect the system and to require replacement if it fails or is a threat to public safety. PCPC is considered to be failing if water can be seen standing on it or in it (within the concrete pavement section), unless the storm event is above a 100-year event. If maintenance does not correct the problem, full or partial replacement may be required.

Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

• Section 401.07, Portland Cement Pervious Concrete Pavement (also known as PCPC) (Con’t)

No Major changes, except:

The selected pipe material (from the above list) should be identified on the submitted plans.

Note: Confirmation the pipe material must be given on the plans.
Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

• Section 403.05, High Density Polyethylene Pipe (HDPE)

Manufactured Wyes, Tees, Elbows, or Adapters will not be accepted for use in place of precast storm sewer manholes and box inlets unless previously approved by the department.

Precast manholes and box inlets will be required within HDPE storm sewer systems at changes in grade, alignment, size, and pipe material type, as outlined within chapter 500 of this manual unless previously approved by the department.

Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

• Section 403.06, Polyvinyl Chloride Pipe (PVC)

Precast manholes and/or box inlets will be required within PVC storm sewer systems at all changes in grade, alignment, size, and pipe material type, as outlined within chapter 500 of this manual unless previously approved by the department.

Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

• Section 403.09, High Impact Polypropylene or High-Density Polyethylene Plastic Facilities

All underground detention facilities shall be designed with a positive gravity outfall or a certification from a licensed geotechnical engineer;

- That the permeability of the surrounding soils will dissipate water at a rate required for the detention facility designed;
- That no adverse impact to any subsurface systems (including septic systems) will be experienced;
- And that the underground detention facility will not be subject to ground water surcharge during any time of the year.

Any facility that allows exfiltration within a “Well-Head Protection Areas” needs prior approval from the Department of Public Works Office of Environmental Services.

Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

• Section 403.09, High Impact Polypropylene or High-Density Polyethylene Plastic Facilities (Con’t)

Note: BMP’s are required upstream of the detention facility with the exception of the PCPC systems.

Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

• Section 403.09, High Impact Polypropylene or High-Density Polyethylene Plastic Facilities (Con’t)

Note: BMP’s are required upstream of the detention facility with the exception of the PCPC systems.

Hypothetical Example:

If the conveyance system lacks adequate capacity, on-site mitigation may be required. Since additional parking is proposed, systems such as the PCPC system (Section 401.07) or an alternative underground system may be utilized in the design.

Additional methods, i.e. parking lot detention and/or green designs (to be discussed later) may also be explored.
Chapter 400 – Storm Sewer Pipe and Open Culvert Materials

Section 404.06, Bench Walls
Bench walls shall be shaped and formed for a clean transition with proper hydraulics to allow the smooth conveyance of flows through the manhole or box inlet. The bench wall shall form a defined channel, to a minimum height of 80 percent of the inside diameter of the inlet and outlet pipes to form a "U" shaped channel, constructed at a minimum ½-inch per foot slope to the manhole wall.

Where a flow channel is constructed as an integral part of the pre-cast base, it shall be shaped and formed as described above, with the exception that the bottom of the flow channel may be formed from the bottom of inlet and outlet pipes if the pipe wall thickness is not greater than one (1) inch.

For cast-in-place flow channels, the bottom invert of all pipes entering a manhole shall be at least three (3) inches above the top of the base slab to the outlet invert so the finished sewer channel may be installed and shaped.

Section 404.07, Manhole Precast Adjusting Rings
A water tight seal shall be provided between the precast manhole and riser ring, each adjoining riser ring, and between the riser ring and casting by the use of either two (2) rows of ½ inch extrudable preformed gasket material, non-asphaltic mastic, or trowelable grade butyl rubber, as shown in Figure 400-05 of the Standard Details.

Concrete adjusting rings shall conform to ASTM C 478 and be free from voids, cracks, and other defects. The adjusting ring shall be from the same manufacturer as the manhole cone section to assure compatibility and a watertight seal per Figure 400-05.

Section 404.08, Precast Concrete Box Inlets and Precast Spacers
For precast concrete box inlets, the adjustment of casting frame and grate shall be accomplished using precast concrete spacers of a minimal nominal thickness of six (6) inches. The maximum number of spacers allowed shall be four (4). A water tight seal shall be provided between each component of the precast box inlet and precast concrete spacers by use of non-asphaltic mastic, or trowelable grade butyl rubber.

Section 404.09, Box Inlet and Manhole Dimensions
Steps shall conform to the requirements of ASTM C 478 and be manufactured using steel rods encased in polypropylene plastic. Steps shall be factory installed when the manhole is manufactured.

Old Section 405.03 – Slotted Drains - Deleted.

Section 405.03, Rejection of Castings
All storm water inlets and catch basins shall have the words "No Dumping, Drains to Stream", or similarly approved message, cast in raised or recessed letters at a minimum of 1" in height. In addition, a symbol of a fish shall also be cast with the letters.

Section 406.02, General Requirements
SUBSURFACE TILE SYSTEMS ARE REQUIRED TO BE PROVIDED WITH A "Y" CLEANOUT CONNECTOR AT A MINIMUM INTERVAL OF 400 FEET.

Minimum size - The minimum size for all subsurface drains will be 6".

End Treatment - All subsurface tile that drains to an open ditch or swale must provide animal guards as per Section 503-07.

Section 406.03, Accepted Materials
Polyethylene pipe under this specification may be provided as a corrugated single wall, or double walled with a corrugated outer wall and smooth inner wall. All public infrastructure using HDPE must use double wall pipe. All public infrastructure using PVC should meet ASTM 3034 specifications, at a minimum.

Chapter 500
Installation of Storm Water Facilities
Chapter 500 – Installation of Storm Water Facilities

• Section 501.12, Trench Installations

All PVC and HDPE pipes to be installed with perforations that are meant to infiltrate or exfiltrate must use #8 stone as bedding and backfill material. All approved storm systems can use class 1 bedding and backfill materials with the following compaction requirements. INDOT Classification No.5, No.8, and No 9 must be at least hand tamped or walked into place. INDOT Classification No.53 must be mechanically compacted to 95% Proctor.

Chapter 500 – Installation of Storm Water Facilities

• Section 501.14, Bedding and Backfill Materials

CMP Bedding
Class I material shall be shovel sliced or otherwise carefully placed and mechanically compacted to ensure proper compaction and complete filling of all voids.

RCP Bedding
Class II material shall be shovel sliced or otherwise carefully placed and mechanically compacted from three (3) to six (6) inches (based upon pipe diameter) below the pipe barrel, to 1/6th the outside pipe diameter (Bc).

Chapter 500 – Installation of Storm Water Facilities

• Section 501.14, Bedding and Backfill Materials (Con’t)

PVC - Bedding and Initial Backfill
Plastic Pipe conduits (PVC and HDPE) shall be provided with No. 8 crushed stone or approved Class I granular bedding material shovel sliced or otherwise carefully placed and mechanically compacted from four (4) to six (6) inches (based upon pipe diameter) below the pipe barrel, to a minimum of twelve (12) inches above the crown of the pipe.

Chapter 600

Erosion and Sediment Control

• Section 602.02, Requirements

Land alterations which disturb 1 or more acres - Rule 5 (327 IAC 15-5), and all non-single-family residential land disturbing activities, - Chapter 561 and these regulations

Land alterations which disturb less than 1 acre - all single-family residential land disturbing activity less than one acre shall employ, at a minimum, perimeter type erosion and sediment control practices. Gravel access drives may also be required at the discretion of the Director or his representative.

Perimeter erosion control shall be employed outside of completed easement areas. Established easement areas are not to be disturbed during construction process.

Chapter 600

Erosion and Sediment Control

• Section 602.02, Requirements

Land alterations which must comply with Rule 5 (327 IAC 15-5) requirements should include tables on the plans which address Sections A, B and C of the Rule 5 plan review checklist.
• Section 602.02, Requirements

Land alterations which must comply with Rule 5 (327 IAC 15-5) requirements should include tables on the plans which address Sections A, B and C of the Rule 5 plan review checklist.

Chapter 600 – Erosion and Sediment Control

• Section 603.03, General Criteria for Erosion and Sediment Control Practices

Vegetative Control - Disturbed areas which are at finish grade shall be permanently seeded within seven (7) days. Vegetation must be established within one-hundred and eighty (180) days with 90% coverage or reseeded. At the discretion of the Director: barren areas to be rough graded and left undisturbed for more than thirty (30) days shall be established with temporary vegetation; and dormant seeding will be required during seasonal periods (October through February) for those barren areas to be left undisturbed for one-hundred and twenty (120) days or longer.

Note: 90% coverage / density

Chapter 600 – Erosion and Sediment Control

• Section 603.05, Access Drives and Parking Areas

Stone based construction access drives and parking areas, with a minimum size of 20' x 50' in width and length, must be placed at all ingress and egress points used by vehicles to enter and leave the perimeters of a subdivision or commercial site.

Note: Developments which include paved entrances to be used for construction ingress/egress should provide maintenance notes on the plans.

Chapter 700 – Water Quality

• Section 701.01, Section Description

This chapter provides design criteria and information for storm water quality best management practices, or BMPs that are required in order for newly developed or re-developed properties to comply with the City’s policies for managing the quality of storm water runoff found in Section 104.02.

Chapter 700 – Water Quality

• Section 701.03, Storm Water Quality Control Requirements

The City of Indianapolis has adopted a countywide storm water runoff quality policy (Section 104.02) based on the control of total suspended solids and floatables in storm water runoff. In addition, designers may be required to include the control of fecal bacteria or pollutants that are associated with a specific land use, such as hydro-carbons that are associated with retail gasoline outlets, in their designs. The water quality design requirements are as follows; TSS. BMPs must be capable of removing 80% of the TSS load from post-construction runoff. For the purposes of this requirement, TSS is defined as particles smaller than 225 microns in diameter. Larger material is considered to be part of the total solids load of the storm water runoff.
Chapter 700 – Water Quality

• Section 701.03, Storm Water Quality Control Requirements (Con’t)

Floatables. BMPs shall incorporate floatables control. The goal of this requirement is to capture floating debris and remove it as part of the routine maintenance of the BMPs. Stand alone BMPs must include floatables control. For BMP systems, or treatment trains, at least one of the components of the BMP system, located after the last inflow point to the system, must provide control of floatables.

Note: It is recommended that submerged outlets be considered whenever possible to minimize potential blockage, i.e. negative slope pipe, hood (Snout), etc. Screens tend to plug easily and if used must be included in the O&M Manual for frequent cleaning.

Chapter 700 – Water Quality

• Section 701.04, Storm Water Quality Design Methods

Performance Based

- In order to meet the TSS removal goals, performance based BMPs must be designed to treat the first flush runoff. The first flush runoff volume is estimated by computation of the water quality volume (WQv), which represents the runoff volume from a storm of one inch depth over the drainage area.

Proprietary Design

- The design process for an innovative BMP that is approved for use in the City of Indianapolis may be based on design flow capacity, on design volume, or other testing procedures approved by the City

Note: In general, volume based vs. flow based.

Chapter 700 – Water Quality

• Section 701.05, Inspection and Maintenance

The following materials must be submitted in support of the application to approve a new BMP or process for use in the City of Indianapolis:

Narrative …, Detailed description of the maintenance procedures, Detailed drawings of the practice or unit, Detailed description of the practice or unit’s testing procedures, and Results of all tests.

The following performance criteria must be met by the proposed new BMPs.

The BMPs:

- Must meet the 80% TSS removal rate;
- Must meet the floatable removal requirement;
- May be required to reduce fecal bacteria;
- May be required to control hydrocarbons or other land use-specific pollutants in storm water runoff; and,
- Must have a low to medium maintenance requirement to be considered by the City for use on public projects.

Chapter 700 – Water Quality

• Section 702.01, Storm Water Ponds

- Design the pond with a minimum length to width ratio of 3:1 (preferably expanding outward toward the outlet), measured from the pond inlet to the pond outlet. Irregular shorelines for larger ponds provide visual variety. This length to width ratio must be met for each inlet to the pond.

Note: Field changes of BMP’s must be resubmitted for approval by DCE. Re-submittal must include updated plans, water quality calculations and O&M Manual.

Note: Pond inlet should be considered the forebay outlet.

- When designing the BMP for the contributing drainage area, assume that the entire upstream watershed is fully developed. When designing the BMP for the effective drainage area where offsite areas bypass the BMP, the design shall only consider the drainage from the site. Again, assume that the entire upstream watershed from the site is fully developed.

- A wet storm water pond is characterized by a permanent wet pool. The designer must evaluate both the soils and the hydrology of the site to insure that the pond will maintain a permanent wet pool. (Note: Chapter 300 allows dry detention ponds, however, little water quality benefit is provided from dry detention ponds.)
Chapter 700 – Water Quality

• Section 702.01, Storm Water Ponds (Con’t)

- Design and install an emergency drain (i.e. sluice gate or drawdown pipe) capable of draining within 24 hours. Where topographical limitations prevent the use of a sluice gate or drawdown pipe, the design should indicate a pump may need to be used to draw down the pond and the pump rate specified to meet the 24-hr drawdown period.

- Emergency spillway designed to pass 1.25 times the peak inlet flow rate and peak flow velocity from the 100-year storm event for the entire contributing drainage area (unless bypassed), assuming post-development conditions (see Section 302.08).

- Provide trash racks, filters, hoods or other debris control. The debris control should meet the minimum floatable capture requirements.

• Section 702.02, Storm Water Wetlands

- The wetland must be designed for an extended detention time of 48 hours for the WQ. The orifices used for extended detention will be vulnerable to blockage from plant material or other debris that will enter the basin with storm water runoff. Therefore, some form of protection against blockage must be installed (such as some type of non-corrodible wire mesh or a stone-protected filter fabric).

- The minimum orifice size allowable will be 2 inches for the outlet control structure.

• Section 702.03, Bioretention

- Bioretention areas are engineered facilities in which runoff is conveyed as sheet flow to the "treatment area," consisting of a pretreatment area, including a sediment forebay, ponding area containing vegetation with a planting soil bed, organic/mulch layer and gravel and perforated pipe underdrain system. The filtered runoff is typically collected and returned to the conveyance system, though it can be infiltrated into the in-situ soils in areas with porous soils (>1"/hour), though infiltration may not be permitted in Wetfield Zoning Districts or hotspot locations. If no perforated pipe underdrain system is used, a geotechnical investigation, soil infiltration testing, and a hotspot investigation must be completed.

- Design components should include: Energy dissipation to reduce velocities and spread flow into the bioretention ponding area. Inflow diversion or an overflow structure to carry flows greater than designed hydrologic capacity.

  Note: Read entire section.
Chapter 700 – Water Quality

Section 702.03, Bioretention (Con’t)

Site and Design Considerations (Con’t)

- The underdrain collection system must be equipped with a 6 inch perforated PVC pipe in an 8-inch gravel layer. The pipe must have 3/8-inch perforations, spaced on 6-inch centers with a minimum of 4 holes per row, or equivalent. The pipe is spaced at a maximum of 10 feet on center, and a minimum grade of 0.5% must be maintained. A permeable filter fabric or a gravel lens (3/4-1/4 inch, crushed rock 2 to 3 inches deep), is placed between the gravel layer and the planting soil bed.

- The depth from the bottom of the bioretention facility to the documented seasonally high water table must be a minimum of 2 feet. The seasonal high water table must be field determined by a soil scientist or geo-technical investigation.

Chapter 700 – Water Quality

Section 702.03b, Micro-Bioretention

NOTE: SEE NEW SECTION!

The following items should be addressed to ensure proper maintenance and long-term performance of micro-bioretention practices:

The top few inches of filter media should be removed and replaced when water ponds for more than 24 hours. Silts and sediment should be removed from the surface of the filter bed when accumulation exceeds one inch.

Where practices are used to treat areas with higher concentrations of heavy metals (e.g., parking lots, roads), mulch should be replaced annually. Otherwise, the top two to three inches should be replaced as necessary.

Occasional pruning and replacement of dead vegetation is necessary. If specific plants are not surviving, more appropriate species should be used. Watering may be required during prolonged dry periods.

Note: See Green Infrastructure Supplemental document for a sample O & M Manual.

Chapter 700 – Water Quality

Section 702.05, Water Quality Swales

- The maximum design flow depth is 1 foot, for all storm events, with a ponding depth of 18 inches at the end of the channel.

Note: This includes the 100-yr event.

- Underlying soils shall have a high permeability [fc > 0.5 inches per hour]. Seasonally high water table must be greater than 3 feet below the bottom of the swale. The seasonal high water table must be determined by a practicing soil scientist of geo-technical investigation.

- The underdrain must have a minimum of 2 feet of planting soil above the crown.

- The planting soil should be removed or replanted when ponding time exceeds 36 hours.

Chapter 700 – Water Quality

Section 702.07, Catch Basin Inserts

Reminder – Still must be approved by the City.
Hypothetical Example:

Since our site is required to mitigate a minimum of 1.20 acres to comply with water quality requirements, Chapter 700 should be explored for applicable alternatives.

It should be noted that portions of the existing site may be required to be modified to meet the 1.20 acre mitigation requirement. Since parking is included, landscape islands may be added or modified to meet water quality requirements. Manufactured BMP’s may be installed on existing or proposed pipe systems.

An O&M Manual would be required for the site. In some cases easements may be required on existing pipe systems.

The project submittal should include a technical report with all pages numbered and dated.

The narrative should clearly indicate the detention and water quality requirements with mitigation breakdown.

All calculations applicable to the project should be included (pipes, water quality, etc.)

Since a masterplan is involved, copies of the applicable portions of the masterplan should be included (calculations, basin maps, etc.). Also a comparison of the proposed site curve number to the approved masterplan curve number should be provided.

The plans should include all infrastructure information on the title sheet, including state plane coordinates for the water quality BMP.

An O&M Manual will be required addressing the site infrastructure, including existing infrastructure previously installed.

Marion County Code of Ordinances
Chapter 561 Drainage and Sediment Control

Section 561.271, Variance

(a) The administrator of the bureau of license and permit services, after consultation with the engineering division of the department of public works, shall have the power to modify or waive any minimum drainage standard found in Article III of this chapter or any regulations promulgated by the board of public works pursuant to Article III of this chapter. The administrator may, but is not required to, grant such a modification or waiver if an applicant for a drainage permit makes a substantial showing:

1. That a minimum drainage standard regulation is infeasible or unreasonably burdensome; and

2. That an alternate plan submitted by the applicant will achieve the same objective and purpose as compliance with minimum drainage standards and regulations.

(b) The request for a variance together with supporting information shall be made in writing to the administrator who shall make a decision within twenty (20) days and file a copy of his or her decision with the board of public works.