

**RAIN TO RECREATION:
MAKING THE CASE FOR A STORMWATER CAPITAL RECOVERY FEE**

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ABSTRACT

Lenexa's Rain to Recreation Program has a three-fold mission (1) reduce flooding, (2) improve water quality, preserve the environment and open space and (3) provide for new recreational and educational opportunities in the undeveloped portion of the city. To support the Program's watershed based "systems" approach to stormwater management a diversified funding package included an (1) annual stormwater utility charge per household, (2) a sales tax, (3) limited general revenue initially and (4) a capital "systems development" charge all to be leveraged with other available sources of local, state and federal funding. At the same time the watershed based approach found savings for both public and private parties realized through (1) economies of scale by regionalizing stormwater management facilities, (2) reducing traditional infrastructure and (3) being proactive rather than reactive.

The city's created lakes, joint use facilities and protected stream setback represent the systems approach that the Program applies the Systems Development Charge supporting an aggressive stormwater capital plan. Black & Veatch Corporation estimated the capital investment for these facilities in 2004 at approximately \$61,000,000 and thus prepared a one time capital recovery fee to be collected at the time of building permit. The city to fulfill its mission of improving water quality was at the same time considering adopting a new stormwater quality standards employing a best management practices (BMP) manual. To demonstrate the "win/win" of addressing stormwater quantity regionally and stormwater quality per development, the city and Black and Veatch and team compared the infrastructure savings of nontraditional stormwater "green" infrastructure coupled with savings of regionalization to the cost of the proposed Systems Development Charge.

KEY WORDS

Stormwater, water quality, funding, revenue, best management practices, BMP

INTRODUCTION

The City of Lenexa, Kansas is a rapidly developing suburban community in the Kansas City Metro Area. Home to nearly 45,000 residents, the City encompasses a thirty-four square mile area, approximately two-thirds of which is experiencing development pressure. To accommodate the rapid growth, the city initiated a citizen-driven, long-range community plan in 1996, Lenexa Vision 2020 <http://www.ci.lenexa.ks.us>, in which citizens showed strong interest in a stormwater management program. Lenexa then surveyed its citizens and found that nearly 80 percent had interest in a program that would (1) reduce flooding, (2) improve water quality, preserve the environment and open space and (3) provide for new recreational opportunities in the undeveloped portion of Lenexa. These elements are the foundation of the *Rain to Recreation* program's (Program) mission and can be viewed at www.raintorecreation.org.

Stakeholder (i.e., neighboring communities, state and federal regulators, development community, citizenry etc.) involvement was critical to the formation of the Program and creating the Watershed Management Master Plan (Plan). This study articulated a proactive management and funding strategy to meet the goals of all parties involved. The plan recommended the development of a diversified funding strategy. Reflective of citizen interest, voters went to the polls in August 2000 approving an 1/8-cent sales tax to support the Program by a margin of 3 to 1. The 1/8-cent sales tax was again approved by the same margin in August 2004 to finally expire in 2010. The Program funding strategy includes an (1) annual stormwater utility charge per household, (2) a sales tax, (3) limited general revenue initially and (4) a capital charge all to be leveraged with other available sources of local, state and federal funding.

The Plan also evaluated the cost over a 15-year period for several alternatives and found that the new watershed approach is about 25% less expensive than the traditional stormwater infrastructure approach realized through (1) economies of scale by regionalizing stormwater management facilities, (2) reducing traditional infrastructure and (3) being proactive rather than reactive. Not only the citizenry but the development community has also bought into the watershed approach to stormwater management. As a result of stakeholder meetings that included the Lenexa Economic Development Council (LEDC) and the Homebuilders Association (HBA), the City Council approved in April 2004 the Systems Development Charge, a one time capital development fee, to support the funding of large capital improvement projects such as lakes in western Lenexa.

The Watershed Management Master Plan provided direction for the Program in the form of policies, practices and projects. In conjunction with the Systems Development Charge, a policy endeavor recently completed and also adopted by the City Council in April 2004 was to update the unified development code (UDC) to incorporate low impact development (LID) standards, a process that took several years to complete including a series of stakeholder meetings, inter-department cooperation and Kansas City Metro wide collaboration.

The coupling of the Systems Development Charge with the update of the UDC is the focus of this paper demonstrating to the development community the economic efficiencies of a "systems" approach coupled with the potential development cost savings of LID.

STORMWATER CAPITAL PLAN AND COST RECOVERY

The Plan proposed the construction of five regional retention facilities (i.e., lakes) and numerous joint use detention facilities that may also serve as sports fields. The design of each of these facilities is to be pursued in collaboration with adjacent property owners, residents and developers. Other elements of the Plan included the creation of multi-purpose regional storm water facilities providing not only flood protection but many active and passive recreational opportunities, from bird watching and picnics to soccer. The conservation or restoration of stream corridors will facilitate the expansion of the greenway trail system.

In March 2002, Lenexa was the first municipality in the Kansas City Metropolitan Area to adopt a Stream Setback Ordinance, proving itself a regional leader in watershed protection. Based on the Lenexa Stream Inventory, an environmental evaluation of the streams and adjacent riparian corridors, this ordinance defines streams by environmental rating and stream order to determine setback distances. The ordinance was developed through the collaborative efforts of consultants and various city departments. Application of this ordinance in the developing areas will result in the creation of riparian buffer zones. These greenways will protect the integrity of the watershed, addressing flooding, water and environmental quality issues while providing open space for recreational and educational opportunities and wildlife connectivity.

The lakes, joint use facilities and stream setback represent the “systems” approach that the Program applies the Systems Development Charge supporting an aggressive stormwater capital plan. Black & Veatch Corporation estimated the capital investment for the facilities noted above in 2004 at approximately \$61,000,000. This is the projected total capital cost of all identified off-site improvements necessary to manage the runoff associated with 121.2 million square feet (2,782 acres) of additional impervious area related to future development at full “build-out”. This represents a unit cost of \$0.504 per square foot of new impervious area which, when expressed in terms of the City’s established equivalent dwelling unit (EDU) of 2,750 square feet, yields a calculated Systems Development Charge rate of \$1,386 per EDU. This is the fee rate that the City must charge if it is to fully recover all projected costs from future developments. As such, it also represents the maximum supportable level of fee that can be charged, prior to any subsequent consideration of practical aspects of implementation, potential economic impacts, or political and policy issues. Following consideration of these practical aspects, City administrators decided to propose, and the City Council subsequently approved, a Systems Development Charge rate of \$850 per EDU. The City chose to collect the charge at the time of building permit versus the time of platting since it is at that time when the actual amount of impervious area is known and the number of EDUs calculated. This also clearly defines when and how the charge is to be administered, keeping it as simple as possible for all parties.

STORMWATER BEST MANAGEMENT PRACTICES

Lenexa has been an innovative leader in the realm of stormwater management in the Kansas City metropolitan area. In 2001, Lenexa asked the Kansas City Metro Chapter of the American Public Works Association (APWA) in cooperation with Mid-American Regional Council

(MARC), a regional planning organization, and a host of municipalities to review existing stormwater design standards and specifications in an attempt to fully integrate stormwater quality and quantity management. Black & Veatch Corporation commissioned to bring it all together. Over the course of several years both political and technical committees met to arrive at a technically sound product that could be politically acceptable across nearly 120 cities that makeup the metropolitan area. As a result two products were developed and adopted by APWA in November, 2003; (1) a revised APWA Section 5600 Storm Drainage Systems and Facilities Design Criteria with emphasis on open conveyance and stream protection strategies and (2) Manual of Best Management Practices for Stormwater Quality (BMP Manual) establishing a stormwater quality “level of service” corresponding to the increase in impervious area. www.kcapwa.net/specifications.asp.

The BMP Manual included a section that outlined the procedure for selecting appropriate BMPs for various development scenarios. The procedure is based on the pre-development and post-development Natural resources Conservation Service (NRCS) (formerly the Soil Conservation Service (SCS)) runoff curve numbers (CN) for the site. The difference in these curve numbers corresponds to a water quality Level of service that the post-development site must meet to have a minimal impact on the water quality leaving the site. The table relating the Level of service to the pre-development and post-development curve number difference is illustrated in Table 1. BMPs are assigned a Value Rating number that increases in value as the BMP becomes less engineered and structural. As a result, manufactured BMPS receive the lowest ranking and preserved native areas receive the highest. The Value Ratings for the BMPs that are weighted based on the area of the project site that they serve must equal or exceed the Level of service ranking.

Table 1 Level of Service Values

Change in CN	Impact	Level of Service
17+	High water quality impact	8
7 to 16	Moderate water quality impact	7
4 to 6	Low water quality impact	6
1 to 3	Minimal water quality impact	5
0	No change	4
-7 to -1	Minimal water quality improvement	3
-8 to -17	Low water quality improvement	2
-18 to -21	Moderate water quality improvement	1
-22 +	High water quality improvement	0

The Level of service values show that some level of BMPs must be constructed for all development activities except for the high water quality improvement activities. This idea is based on the understanding that even if the area weighted curve number is reduced by the proposed development, almost any development’s impervious area will have some negative impact to the water quality of the watershed.

MAKING THE CASE

In parallel to the APWA efforts in which Lenexa participated, city staff with the support of Black & Veatch Corporation conducted interdepartmental (Public Works, Planning and Legal departments) meetings to identify opportunities to incorporate the two products as well as other water quality elements including reduced street widths and maximum parking ratios in the city's UDC. Once APWA adopted the products in the fall of 2003, the city rolled out its recommendations for consideration to the LEDC. The LEDC formed a committee to review the products and development implications. At the request of the LEDC committee, the city analyzed the feasibility of implementation of the BMP Manual using existing Lenexa site plans for (1) single family residential, (2) multifamily residential, (3) commercial/retail and (4) warehouse/office as well as cost comparison applying the new BMPs versus the typical infrastructure while demonstrating the landuse efficiencies of a "systems" approach.

Level of Service Calculations

The Woodland Reserve Subdivision is a single family residential development located in western Lenexa. The development was constructed on a forested hillside. The pre-development curve number for the development project site was determined to be 75. Based on the development plans for the site, the post-development curve number for the site was calculated to be 79. This results in a curve number difference of 4. Based on the BMP Manual, the level of service required for the development is also 4.

The Trails is a multi-family residential development located in western Lenexa that was constructed in an area previously disturbed by farming. The pre-development curve number for the development project site was determined to be 74. Based on the development plans for the site, the post-development curve number for the site was calculated to be 88. This results in a curve number difference of 14. Based on the BMP Manual, the Level of service required for the development is 7.

The Point West Shopping Center is a retail shopping center development located in western Lenexa. The development will be constructed adjacent to an existing Kmart store. The development will be constructed on a relatively flat parcel of land that was previously ranch and farm land. The pre-development curve number for the development project site was determined to be 74. Based on the development plans for the site, the post-development curve number for the site was calculated to be 94. This results in a curve number difference of 20. Based on the BMP Manual, the Level of service required for the development is 8.

The office developed proposed for the College Avenue and Renner Boulevard intersection is to be constructed on existing ranch land. The site consists of mildly sloping hills. The pre-development curve number for the development project site was determined to be 74. Based on the development plans for the site, the post-development curve number for the site was calculated to be 98. This results in a curve number difference of 24. Based on the BMP Manual, the level of service required for the development is 8.

BMP Evaluations

BMPs were selected for each of the developments that would meet the required Level of service. As part of this process, construction items that were originally considered part of the development that could be replaced or eliminated with the BMP construction were identified and a cost savings assigned to them.

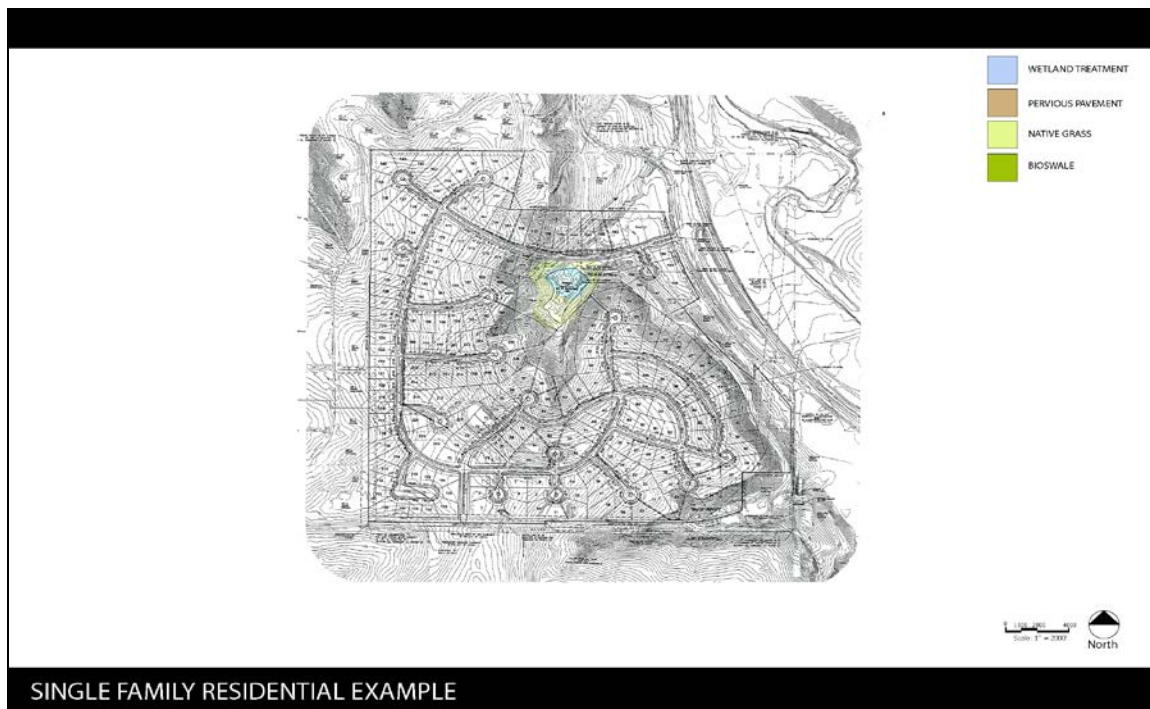
Single Family Residential – Woodland Reserve

It was determined that three types of BMPs were appropriate for the Woodland Reserve single family development. See Figure 1. The BMPs include:

- Native vegetation
- Turf grass
- Reduced impervious area

Based on the area that each of these BMPs served and their respective Value Rankings, the Level of service that could be achieved for the development was calculated to be 5.1, which exceeds the required level of service of 4.

Figure 1 **Single Family Residential – Woodland Reserve**



The total construction cost of the BMPs selected would be approximately \$192,850. As part of the BMP analysis it was determined that construction items in Table 2 could be reduced with minimal additions to enhance existing BMPs to meet the required Level of service. The resulting cost reduction was calculated to be \$118,420.

Table 2 Single Family Residential Cost Reduction

Item	Quantity	Unit	Unit Cost	Cost
Reduced Earthwork	9,680	CY	\$6	\$58,080
Reduced Pavement	7,260	SY	\$9	\$65,340
Added Native Plantings	2	ACRES	\$2,500	-\$5,000
Total Cost Reduction				\$118,420

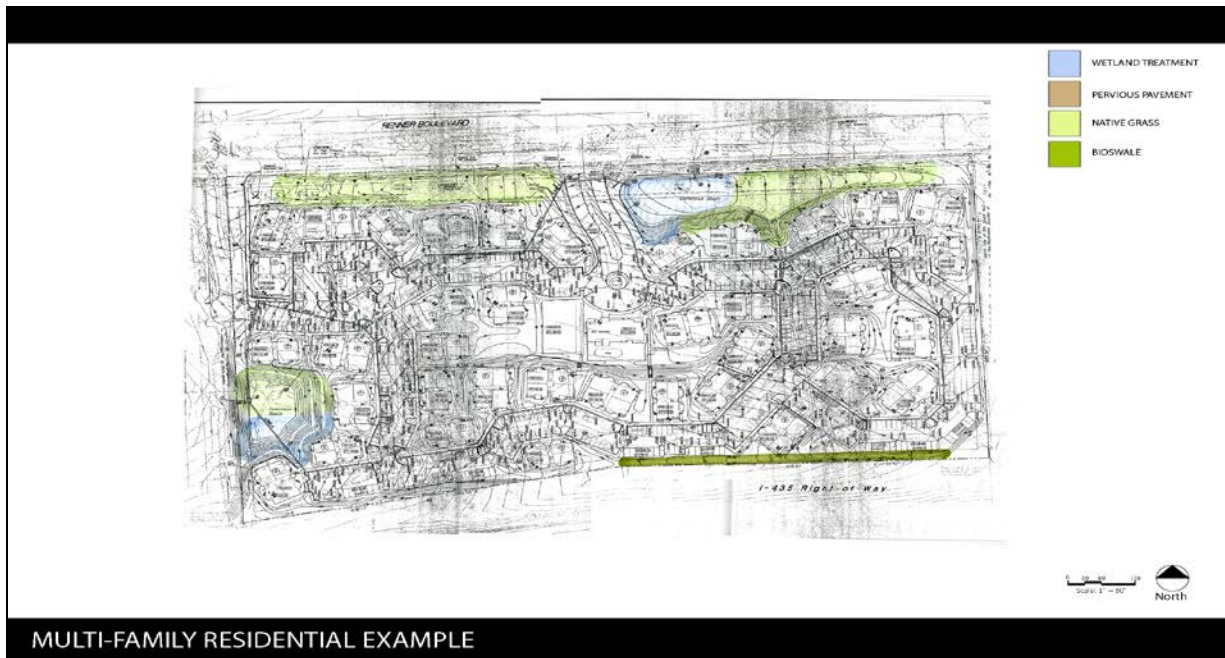
Multi-Family Residential – The Trails

It was determined that two types of BMPs were appropriate for the Woodland Reserve single family development. See Figure 2. The BMPs include:

- Native vegetation
- Bioswales

Based on the area that each of these BMPs served and their respective Value Rankings, the Level of service that could be achieved for the development was calculated to be 8.9 which exceeds the required level of service of 7.

Figure 2 Multi-Family Residential – Trails



The total construction cost of the BMPs selected would be approximately \$90,000. As part of the BMP analysis it was determined that construction items in Table 3 could be reduced with minimal additions to enhance existing BMPs to meet the required Level of service. The resulting cost reduction was calculated to be \$89,043.

Table 3 Multi-Family Residential Cost Reduction

Item	Quantity	Unit	Unit Cost	Cost
Reduced Earthwork	14,439	CY	\$6	\$86,636
Reduced Pavement	823	SY	\$9	\$7,407
Added Native Plantings	2	ACRES	\$2,500	-\$5,000
Total Cost Reduction				\$89,043

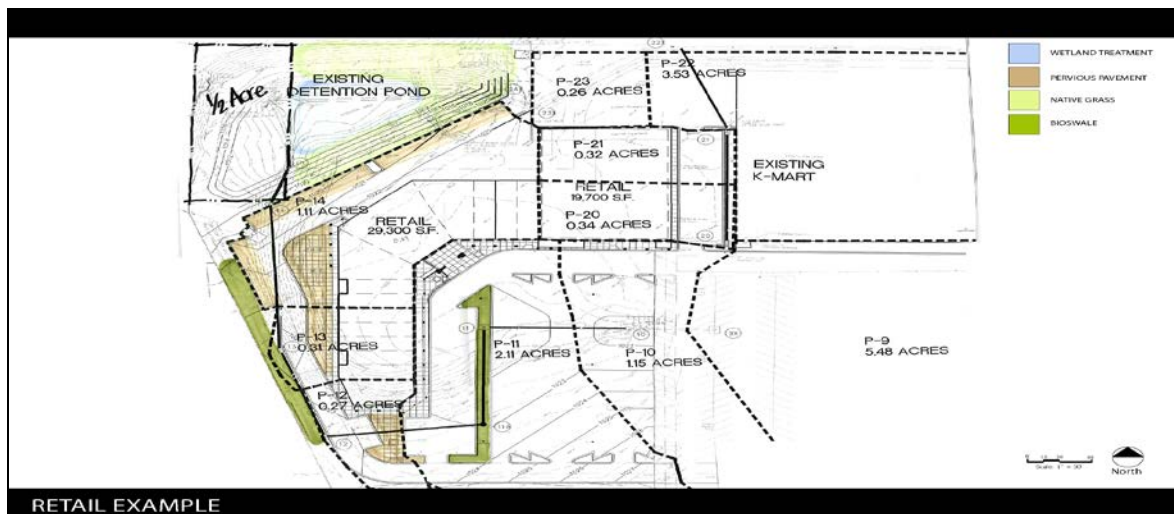
Commercial/Retail – Point West Shopping Center

It was determined that five types of BMPs were appropriate for the Woodland Reserve single family development. See Figure 3. The BMPs include:

- Native vegetation
- Bioswales
- Bioretention cells
- Pervious Pavement
- Reducing the amount of retail space planned

Based on the area that each of these BMPs served and their respective Value Rankings, the Level of service that could be achieved for the development was calculated to be 8.1 which exceeds the required Level of service of 8.

Figure 3 Commercial/Retail – Point West Shopping Center



The total construction cost of the BMPs selected would be approximately \$61,200 with the additional BMPs and enhancements beyond that which were existing are accounted for in Table 4. As part of the BMP analysis it was determined that construction items in Table 4 could be reduced. The resulting cost reduction was calculated to be \$168,898.

Table 4 Commercial/Retail Cost Reduction

Item	Quantity	Unit	Unit Cost	Cost
Reduced Curb & Gutter	490	LF	\$10	\$4,900
Reduced Storm Sewer	490	LF	\$50	\$24,500
Reduced Stormwater Inlets	4	EA	\$2,000	\$8,000
Reduced Grading	1	LS	\$500	\$500
Reduced Land Cost	23,958	SF	\$6	\$143,748
Added Native Plantings	0.5	ACRES	\$2,500	-\$1,250
Porous Pavement*	1,500	SQ YD	\$6	-\$9,000
Bioretention Cell	1	EA	\$2,500	-\$2,500
Total Cost Reduction				\$168,898

*porous pavement cost is the amount added per square yard for pavers instead of asphalt and porous subgrade

Warehouse/Office – College and Renner

It was determined that four types of BMPs were appropriate for the proposed office/warehouse development located at College Avenue and Renner Boulevard. See Figure 4. The BMPs include:

- Native vegetation
- Bioswales
- Bioretention
- Wet Pond

Based on the area that each of these BMPs served and their respective Value Rankings, the Level of service that could be achieved for the development was calculated to be 8.2 which exceeds the required Level of service of 8.

The total construction cost of the BMPs selected would be approximately \$319,025 with additional cost to BMPs already existing noted in Table 5. As part of the BMP analysis it was determined that construction items in Table 2 could be reduced. The resulting cost reduction was calculated to be \$317,483.

Figure 4 Warehouse/Office – College and Renner

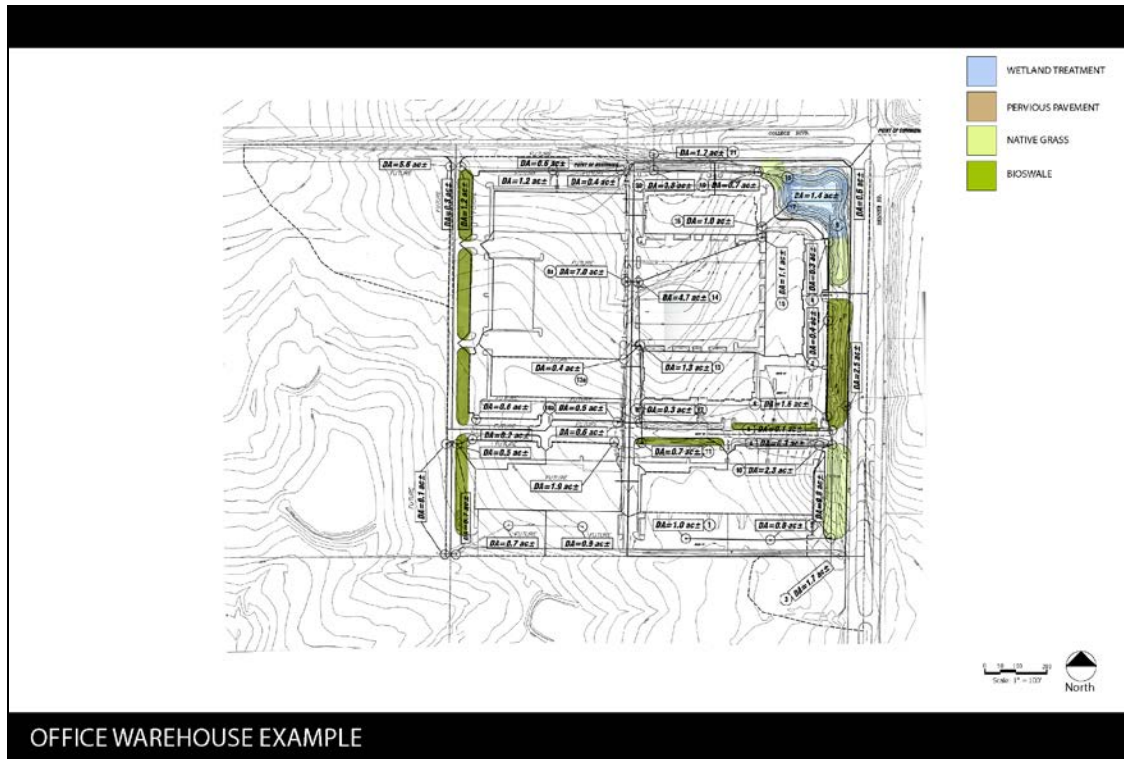


Table 5 Office/Warehouse Cost Reduction

Item	Quantity	Unit	Unit Cost	Cost
Reduced Pavement	2,191	SY	\$9	\$19,715
Reduced Excavation	5,760	CY	\$6	\$34,560
Reduced Storm Sewer	350	EA	\$50	\$17,500
Reduced Catch Basins	3	EA	\$2,000	\$6,000
Reduced Land Cost	42,689	SF	\$6	\$256,133
Bioswales	6	EA	\$2,500	-\$15,000
Added Native Plantings	0.57	ACRES	\$2,500	-\$1,425
Total Cost Reduction				\$317,483

Systems Development Charge Application

The following table demonstrates the application of the Systems Development (Capital) Charge to the existing development types.

Table 6 Net Savings

Development Type	EDUs	Capital Charge	Cost Reductions	Net Savings
Single Family	221	\$187,850	\$118,420	-\$69,430
Multi-Family	100	\$85,000	\$89,043	\$4,043
Commercial/Retail	57	\$48,450	\$168,898	\$120,448
Warehouse/Office	356	\$302,600	\$317,483	\$14,883

Both the Commercial/Retail and Warehouse/Office examples demonstrated significant saving from both the application of BMPs but more importantly the use of the “Systems Approach” to stormwater management. The Multi-Family example demonstrated that BMPs could be applied to Multi-Family developments readily. Single family homeowners, in the example chosen for this analysis, would see an increase of \$314 per home versus the total \$850 for the full cost of the Systems Development Charge if the developer applied stormwater quality BMPs and reduced impervious surface in the residential development.

CONCLUSIONS

The city was able to consistently demonstrate the savings of 10’s to even 100’s of thousands of dollars in site work and infrastructure costs and as a result the LEDC endorsed the products. The Lenexa City Council adopted both APWA products on April 20, 2004, the first municipality in the metropolitan area to do so.

The following is a quote from a Memorandum to the Lenexa City Council dated March 11, 2004 a month prior to the adoption of modifications to the UDC and the Systems Development Charge from the primary author of this paper.

“The findings of the evaluations were encouraging and validate the premise that what is proposed within APWA 5600 and the BMP manual can be met with **little to no impact** to the existing development footprint and will in many cases actually **save the development money** by reducing costs associated with infrastructure (i.e., curbs, inlets, pipes). Many of BMPs can be applied to the current footprint of most developments in areas currently used for other site needs including medians, detention and screening. In addition, the flexibility to reduce the amount of asphalt associated with parking lots and residential streets in addition to the land no longer needed for 100 year detention, given the new systems approach funded in part by the system development charge, there is, in some cases, the **possibility of more developable land** associated with the same site.

These potential infrastructure savings allowed for in the proposed development standards help offset the system development charge. Generally speaking, the **net fiscal impact** of the savings associated with the new development standards and the new system development charge **is neutral**. There will be instances where the overall cost to the development is greater than currently is incurred by the same development today and others where the cost would have been less.”