

MSDGC

**2017 CAPITAL IMPROVEMENT
PROGRAM BUDGET REPORT**

DRAFT

**Metropolitan Sewer
District of Greater
Cincinnati**

08/15/2016

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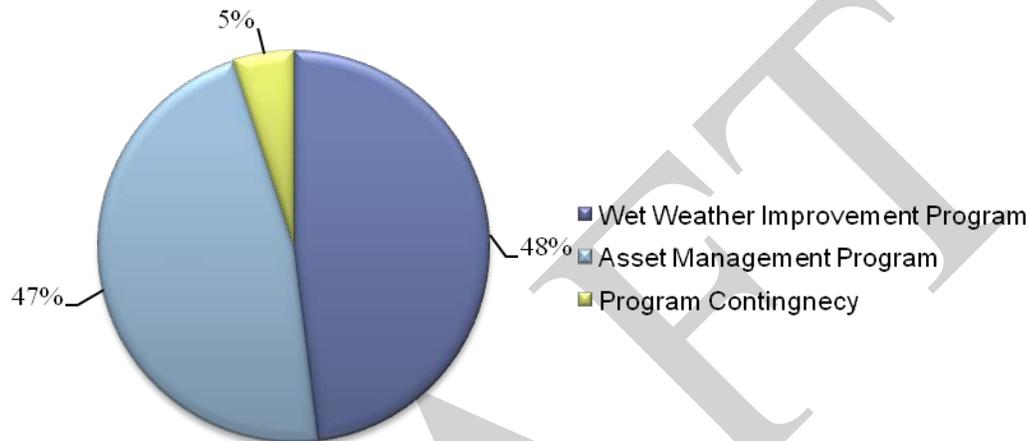
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2017 PROPOSED CAPITAL IMPROVEMENT PLAN

The information contained in this document represents the proposed 2017 Capital Improvement Program (CIP). There are a total of 98 projects totaling \$202,008,776 which includes the Wet Weather Improvement Program (WWIP), Asset Management Program (AM) and Program Contingency as shown in the chart below. Individual project information may be found in either Appendix A or B. Additional detail regarding allowances may be found later in this document.



2017 CIP BASIN SUMMARY

A breakdown of the 2017 CIP projects by Watershed is provided in the following table. Majority of the projects listed as System-Wide represent allowances that will be used to improve infrastructure throughout all watersheds and are discussed in detail under the allowance section. A list of projects within each basin can be found in Appendix B.

TABLE 1 – 2017 CIP SUMMARIZED BY BASIN

Basin	Number of Projects	% of Total number of Projects	2017 Fund Request	% of Total Fund Request
Muddy Creek	6	6%	\$1,335,300	1%
Little Miami	19	19%	\$12,966,923	6%
Mill Creek	41	42%	\$116,687,241	58%
Polk Run	4	4%	\$2,039,300	1%
Sycamore	1	1%	\$444,000	0%
Taylor Creek	12	12%	\$11,796,012	6%
System Wide	15	15%	\$56,740,000	28%
<i>7 Basins</i>	98	100%	\$202,008,776	100%

2017 CIP PROJECT TYPE SUMMARY

The 2017 CIP covers a full range of utility needs as evidenced by the breakdown by project type found in the table below. This year's annual improvement plan will provide improvements to pump stations and facilities, as well as to the following:

- 38,000 Linear Feet of Sanitary Sewer
- 38,200 Linear Feet of Storm Sewer
- 8,900 Linear Feet Combined Sewer
- 3,000 Linear Feet Force Mains

TABLE 2 – 2017 CIP PROJECT TYPE BY BASIN

Type	Number of Projects (Per Basin)	% of Total number of Projects	2017 Fund Request	% of Total Fund Request (Per Basin)
Muddy Creek				
Pump Station Improvement/Elim	2	33%	\$990,000	74%
Sewer Separation	1	17%	\$76,300	6%
Local Sewer	2	33%	\$228,700	17%
Lateral Sewer	1	17%	\$40,300	3%
Total Muddy Creek	6	100%	\$1,335,300	100%
Little Miami				
Pump Station Improvement/Elim	1	5%	\$854,537	7%
Sewer Separation	1	5%	\$1,693,700	13%
SSO Improvement/Elim	2	11%	\$3,039,786	23%
Sewer Replacement	3	16%	\$637,500	5%
CSO Improvement/Elim	2	11%	\$611,700	5%
New Sewer	1	5%	\$5,331,500	41%
Source Control	1	5%	\$300,000	2%
Lateral Sewer	7	37%	\$459,000	4%
Total Little Miami	19	100%	\$12,966,923	100%
Mill Creek				
Pump Station Improvement/Elim	4	10%	\$2,106,823	2%
Sewer Separation	7	17%	\$27,780,833	24%
Sewer Replacement	14	34%	\$4,469,045	4%
Source Control	5	12%	\$39,028,740	33%
Treatment Facility	7	17%	\$43,081,400	37%
Total Mill Creek	41	100%	\$116,687,241	100%
Polk Run				
Treatment Facility	2	50%	\$1,947,000	95%
Lateral Sewer	2	50%	\$92,300	5%
Total Polk Run	4	100%	\$2,039,300	100%
Sycamore				

Type	Number of Projects (Per Basin)	% of Total number of Projects	2017 Fund Request	% of Total Fund Request (Per Basin)
Pump Station Improvement/Elim	1	100%	\$444,000	100%
Total Sycamore	1	100%	\$444,000	100%
Taylor Creek				
Pump Station Improvement/Elim	1	8%	\$702,200	6%
New Sewer	1	8%	\$6,458,400	55%
Local Sewer	5	42%	\$4,255,442	36%
Lateral Sewer	5	42%	\$379,970	3%
Total Taylor Creek	12	100%	\$11,796,012	100%
System Wide				
Treatment Facility	1	7%	\$200,000	0%
Allowance	13	87%	\$46,540,000	82%
Program Contingency	1	7%	\$10,000,000	18%
Total System Wide	15	100%	\$56,740,000	100%

2017 CIP ACTIVITY SUMMARY

The project budgets are presented each year by the type of legislation necessary. Exhibit A represents the appropriations needed to perform preconstruction activities and are available with the approval of the CIP, Exhibit B details the requests for construction performed under “allowance” funding, and Exhibit C requests approval for the programmatic contingency. Additional approval to utilize Exhibit B and Exhibit C appropriations must be in accordance with rules and regulations. All other proposed construction projects budgets must be legislated separately as plans and specifications are finalized.

- 44 Projects for Exhibit A (PDE) \$16,517,500
- 07 Projects for Exhibit B (Construction Allowances) \$35,550,000
- 01 Programmatic Contingency (Exhibit C) \$10,000,000
- 69 Projects proposed for Construction \$139,941,276

TABLE 3 – 2017 CIP BY ACTIVITY*

	WWIP	Asset Management	Total	% of Total
PLANNING	\$589,300	\$5,000,000	\$5,589,300	3%
DESIGN	\$510,400	\$1,282,800	\$1,793,200	1%
PRE_CON_SERV	\$6,346,100	\$491,000	\$6,837,100	4%
MISC_EXPENSE	\$417,300	\$612,500	\$1,029,800	1%
ROW	\$791,500	\$476,600	\$1,268,100	1%
CONSTRUCTION	\$78,890,470	\$75,968,668	\$154,859,138	81%
CON_SERV	\$8,815,601	\$8,753,637	\$17,569,238	9%
INTEREST	\$1,439,900	\$1,623,000	\$3,062,900	2%
	\$97,800,571	\$94,208,205	\$192,008,776	100%

*Table 3 excludes programmatic contingency

2016 LEGISLATION PROJECT DEFERRALS

22 projects requested for 2016 legislation shown in the table below are proposed in the 2017 CIP for a number of reasons including but not limited to, ROW easement appropriation, coordination with internal or external departments and additional design activity.

TABLE 4 – 2016 LEGISLATION PROJECT DEFERRALS

	2016 CIP Fund Request	2017 CIP Fund Request	Variance	Reason
10170176 Stanley Ave Lateral Relocations	\$293,600	\$155,400	(\$138,200)	Easement Appropriation
10220054 Bruestle Avenue Pump Station Elimination	\$988,084	\$702,200	(\$285,884)	Easement Appropriation
10230155 Darwin Avenue Sewer Backup Remediation (HN 3520)	\$199,500	\$76,300	(\$123,200)	Year-End Crossover
10240029 German Cemetery Sewer Replacement	\$1,009,033	\$735,000	(\$274,033)	Easement Appropriation
10240291 Mill Creek WWTP Solids Handling Improvements Phase 1	\$14,359,074	\$19,468,300	\$5,109,226	County Coordination
510240320 Wilder Avenue Sewer Replacement	\$584,118	\$210,000	(\$374,118)	Project Coordination
10240350 McKeone Avenue Sewer Replacement	\$160,156	\$96,700	(\$63,456)	Easement Appropriation
10240380 CSO 005 Water Connection	\$116,589	\$71,000	(\$45,589)	Year-End Crossover
10240430 Berkley Avenue Sewer Replacement	\$751,563	\$728,860	(\$22,703)	Easement Appropriation
10240455 Spring Grove Avenue Sewer Replacement and Rehabilitation	\$685,296	\$550,917	(\$134,379)	Environmental Assessment
10240480 MCWWTP Dewatering Polymer System Replacement	\$0	\$6,641,900	\$6,641,900	County Coordination
10240635 Mill Creek WWTP Plant Influent and Headworks Odor Control	\$1,468,200	\$1,259,000	(\$209,200)	County Coordination
10320058 Kern Drive & Springdale Road Local Sewer	\$1,096,186	\$901,600	(\$194,586)	Easement Appropriation
10320065 Reemelin Road Local Sewer (HNs 3489-3860)	\$1,496,345	\$1,116,100	(\$380,245)	Year-End Crossover
10320070 Crestnoll Lane Local Sewer (HN 3491-3609)	\$1,214,668	\$907,800	(\$306,868)	Year-End Crossover
10320075 Old Blue Rock Road Local Sewer (HN 5240-5327)	\$359,594	\$182,100	(\$177,494)	Year-End Crossover

	2016 CIP Fund Request	2017 CIP Fund Request	Variance	Reason
10330037 Upper Road Local Sewer (HNs 6340-6434)	\$267,843	\$169,900	(\$97,943)	Design Coordination
10430030 Werk Road Sewer Lateral Assessment (HN 6052)	\$42,300	\$40,300	(\$2,000)	Survey Coordination
10440055 E. Galbraith Road Sewer Lateral Assessment (HN 4454)	\$47,400	\$45,400	(\$2,000)	Survey Coordination
10450016 Enyart Road Sewer Lateral Assessment (HN 11328)	\$42,300	\$40,300	(\$2,000)	Survey Coordination
10470025 Woodruff Road Sewer Lateral Assessment (HNs 8145, 8167, 8237)	\$103,800	\$75,000	(\$28,800)	Survey Coordination
11143260 CSO 21 I-75 Reconstruction Coordination	\$3,873,666	\$2,988,600	(\$885,066)	ODOT Coordination
Grand Totals	\$29,159,315	\$37,162,677	\$8,003,362	

It is important to note, two critical projects bulleted below are included in the 2017 CIP that are currently recommended for construction legislation that total \$26,110,200. MSD stands ready to obtain construction approval should the Board not provide authorization in 2016. These critical projects must be included in 2017 construction authorization:

- *10240291 Mill Creek WWTP Solids Handling Improvements Phase 1 - \$19,468,300*
- *10240480 MCWWTP Dewatering Polymer System Replacement - \$6,641,900*

2017 CAPITAL PROGRAM ALLOWANCE DETAIL

The 2017 CIP contains a total of 13 Allowances as summarized in the table below. A detailed description of each proposed allowance and the basis for the 2017 funding request is provided herein.

TABLE 5 – 2017 CIP ALLOWANCE SUMMARY

	Total Funds Requested
10180117 Main Sewer Renewal Program 2017	\$12,000,000
10180217 Manhole Renewal Program 2017	\$1,300,000
10280607 Building Sewer Renewal Program 2017	\$5,000,000
10281317 Prioritized Wastewater Collection System Improvements 2017	\$12,000,000
10280917 Wet Weather Facilities Asset Renewal 2017	\$750,000
10280187 WWT System Asset Renewal 2017	\$2,000,000
10280717 Facilities Asset Management Projects 2017	\$2,500,000
10190317 Home Sewer Treatment System Eliminations 2017	\$290,000
10282017 CIP Project Planning 2017	\$3,300,000
10280237 Hydraulic Modeling 2017	\$715,000
10199017 Wet Weather Program Management and Support Services 2017	\$3,500,000
10280617 Water Quality Program 2017	\$485,000
10199117 Hamilton County Utility Oversight and Coordination 2017	\$2,700,000
Grand Total	\$46,540,000

MAIN SEWER RENEWAL PROGRAM 2017

The Main Sewer Renewal Program allowance was identified in the Consent Decree as the Trenchless Sewer Technology Program. Section IX.B.1. of the Global Consent Decree dated June 9, 2004 identifies sewer relining and manhole rehabilitation capital measures as part of the Long Term Control Plan to reduce infiltration and inflow. Section C.6.b of the Final WWIP states the Sewer Relining (Trenchless Technology) Program

“Conducts internal lining of sewers and external lining of aerial sewers as a cost effective method of rehabilitating structurally deteriorated sewers. This program will include, but not limit itself to, spiral wound pipe, pipe bursting, directional drilling, carbon filament wrapping, and jack and boring. These projects are identified through investigations of the sewer lines and are prioritized based on standardized condition assessment procedure.”

For many years, MSD has used the Main Sewer Renewal Allowance to fund competitively bid fixed-scope main sewer rehabilitation projects. Traditionally, these projects have primarily relied on the use of heat cured-in-place-pipe (CIPP) to cost effectively rehabilitate and extend the remaining useful life of main public sewers in lieu of more expensive open-cut pipe replacement projects. In recent years, MSD has expanded its “trenchless” rehabilitation program to utilize other rehabilitation processes – particularly with large diameter sewers. The 2013 project utilized a cementations spin-cast product to rehabilitate sewers from 60”-108” in diameter. Since these diameter sewers are beyond the practical limits of traditional CIPP technology, the spin-on process provided a cost effective and minimally intrusive method of renewing large diameter pipes. In 2016, MSD’s application of ultra-violet light CIPP bringing additional benefits of faster cure times, stronger liners and reduced environmental and social impacts to the already proven CIPP technology.

TABLE 6 – MAIN SEWER RENEWAL PROGRAM HISTORICAL SPENDING

Year	MSD Labor	Non-MSD Labor	Total Spent
2012	\$223,052	\$4,257,170	\$4,480,222
2013	\$406,761	\$3,119,528	\$3,526,289
2014	\$368,658	\$5,334,041	\$5,702,699
2015	\$372,346	\$1,190,245	\$1,562,591
TOTAL	\$1,370,817	\$13,900,984	\$15,271,801
<i>Average</i>	<i>\$342,704</i>	<i>\$3,475,246</i>	<i>\$3,817,950</i>

Basis for 2017 Main Sewer Renewal Request \$12,000,000

Based upon decades of solid performance and application by MSD to critical assets, relining main sewers using trenchless technology construction methods has proven to be the most cost-effective means of extending main sewer asset life. As highlighted in Appendix D, MSD now uses an integrated framework of business applications to produce a standardized recommendation for main sewer renewal methods and risk-driven priority on an asset-by-asset

basis utilizing standardized condition assessment information. Structural renewal recommendations stored in the GSAM (Gravity Sewer Asset Management layer) include “Full Lining” and “Specialized Lining”, which form the basis for the scope of work to be completed under the Main Sewer Renewal Program allowance.

Moving forward, MSD proposes to increase asset renewal through this Program to programmatically reduce risk associated with aging main sewers in the most cost effective manner. The 2017 request of \$12M represents a concerted effort to move in this direction, and represents MSD’s new annual expenditure goal for this program. The Wastewater Collection Division’s 2017 Operating Budget includes a newly proposed functional work group entitled “Expert Services”. The Expert Services Group will (among other responsibilities) manage the expanded Main Sewer Renewal Program through competitively bid fixed scope projects including prioritized assets identified for “Full Lining” and “Specialized Lining” in the GSAM.

The \$12M annual funding request is based upon a three year goal of rehabilitating all assets that are currently identified as “Full Lining” candidates in the GSAM, with an Extreme or High structural risk in MSD’s Gravity Sewer Risk Model. MSD proposes to achieve this goal by using new internal personnel proposed in the Wastewater Collection Division’s 2017 Personnel Operating Budget, having qualified internal personnel to perform some of the work while expanding lining of prioritized assets with timely support of procurement from both the City and the County.

As more main sewer segments are inspected through MSD’s efforts to perform a standardized Initial Condition Assessment over the next several years, and as other assets are inspected through Planned Condition Assessments, it is anticipated that many more main sewer assets posing relatively high structural risk will be identified as candidates for Lining. This ongoing Condition Assessment/Standardized Evaluation process will inherently change the assets selected for inclusion in fixed-scope renewal contracts in future years, and may affect future funding requests under the Main Sewer Renewal Allowance.

After the three year initial “catch-up” period, MSD proposes to establish a programmatic goal of completing the rehabilitation of all newly categorized Extreme and High Structural Risk main sewer assets within three years from the time that individual assets with these risk classifications are confirmed as candidates for internal rehabilitation. MSD believes that establishing this scheduling goal tied to “Risk Tolerance” is the most cost-effective way to maintain an adequate level of service at an acceptable risk level.

For more details regarding the risk-prioritized assets currently proposed to be rehabilitated over the next three calendar years, please see Appendix E.

MANHOLE RENEWAL PROGRAM 2017

The Manhole Renewal Program allowance was identified in the Consent Decree as the Trenchless Technology Manhole Rehabilitation Allowance. Section IX.B.1. of the Global Consent Decree dated June 9, 2004 identifies sewer relining and manhole rehabilitation capital measures as part of the Long Term Control Plan to reduce infiltration and inflow. Section C.6.c of the Final WWIP states the Manhole Rehabilitation (Trenchless Technology) Program

“provides a cost effective method of rehabilitating structurally deteriorated manholes. Like the Sewer Lining Trenchless Technology Program, manhole rehabilitation projects are identified through investigations and are prioritized based on a standardized condition assessment procedure.”

Previously, MSD has utilized the Manhole Renewal Program Allowance to complete manhole rehabilitation projects prioritized by the lowest cost per generated Equivalent Residential Credit (ERC). The criteria for the generation of ERCs is outlined in the Short Term Adequate Capacity Plan (STACP) included in the Interim Partial Consent Decree on SSOs and the Global Consent Decree. In practice, MSD has found that prioritizing manhole rehabilitation based upon potential ERCs is not the most beneficial use of these allowance funds.

To provide better overall value for funds expended, MSD has modified its focus to addressing the renewal of manholes with significant structural defects with a greater consequence of failure – coupled with opportunities to complete renewals at a lower cost in coordination with the construction projects of other organizations and street rehabilitation projects. In 2016, MSD actively “reached out” to all municipalities, townships, and organizations responsible for street rehabilitation projects within MSD’s service District in an effort to more readily coordinate manhole rehabilitation and adjustment activities as reimbursable line items on their rehabilitation contracts. MSD has used this approach for many years, but is making a greater effort to actively partner with more organizations that have traditionally not worked with MSD on these projects.

As equally important components of this Program, MSD will rehabilitate manholes with structural defects, and replace defective castings and lids based upon standardized condition assessments in areas not included in construction coordination activities.

TABLE 7 – MANHOLE RENEWAL PROGRAM HISTORICAL SPENDING

Year	MSD Labor	Non-MSD Labor	Total Spent
2012	\$6,824	\$486,359	\$493,183
2013	\$1,667	\$955,268	\$956,935
2014	\$0	\$564,258	\$564,258
2015	\$0	\$570,025	\$570,025
TOTAL	\$8,491	\$2,575,910	\$2,584,401
<i>Average</i>	<i>\$2,123</i>	<i>\$643,978</i>	<i>\$646,100</i>

Basis for Trenchless Manhole funding request \$1,300,000

In 2017, MSD will continue with its expanded efforts to coordinate condition assessments and structural renewal of MSD manholes with all municipalities, townships and organizations responsible for street rehabilitation projects with the MSD service district. Costs for individual repairs, adjustments, and casting replacements will vary with the actual contracts awarded by each organization, but MSD anticipates that actual expenditures for 2017 will increase compared to historic average expenditures.

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BUILDING SEWER RENEWAL PROGRAM 2017

The Building Sewer Renewal Program allowance is intended to fund the structural renewal and repair of the portion of privately owned building sewers located within the public right-of-way or within dedicated main sewer easements consistent with Section 2008 of MSD's Rules and Regulations.

This program is necessary to cost effectively extend asset life while protecting and preserving public health and the environment. This program allows MSD to quickly and efficiently restore and maintain interrupted service while mitigating the risk of additional damages or losses. The scope of work for the program will include resolving emergency sewer repairs such as cave-ins, structurally failed building sewers, sewer overflows that may violate permits and regulations, and imminent danger to structures or real property. The scope of this project will also include all planned work associated with inspection port installations and rehabilitation of privately-owned building sewers within the public right-of-way or dedicated public sewer easements.

Basis for 2017 funding request \$5,000,000

Historically, work associated with the repair or rehabilitation of building sewers has been funded using either the Emergency Sewer Allowance or the High Risk Asset Renewal Allowance. As discussed with the County Monitor, MSD proposes to utilize the Building Sewer Renewal Program to fund all work associated with privately owned Building Sewers. This approach will allow MSD to completely separate expenditures on this privately owned asset class from expenditures on publically owned collection system assets; and will readily support the trending and reporting requested by the County.

As discussed in MSD's 2016 submittal, The Case for Building Sewer Asset Management, approximately 75% of the reactive repair projects completed by MSD over the past several years (by number of discrete projects) involve privately owned building sewers. If this allowance is not significantly funded, MSD will be required to complete these reactive building sewer repairs using the 2017 Prioritized Wastewater Collection System Improvement allowance – which will hamper MSD's ability to complete planned projects to reduce risk associated with main sewers, and other publically owned assets comprising the MSD wastewater collection system. In addition, without adequate funding of the Building Sewer Renewal Allowance, MSD will likely be required to reactively complete more repairs to building sewers in lieu of proactively renewing more building sewers at a lower cost prior to failure. Information supporting this analysis has been provided to the County through CR-286, and is further addressed in MSD's answers to questions posed by the Monitor following the submittal of The Case for Building Sewer Asset Management.

Moving forward, MSD proposes to develop and implement an integrated system of business applications to dynamically prioritize and manage the renewal of privately owned building sewers similar to the comprehensive system now being utilized to plan and prioritize work on main gravity sewers through the GSAM.

PRIORITIZED WASTEWATER COLLECTION SYSTEM IMPROVEMENTS 2017

This Prioritized WWC System Improvements allowance will allow the District to respond to sudden, unexpected wastewater collection system failures, complete planned repairs and improvements to high risk utility-owned assets, and complete prioritized system improvements through construction coordination projects to maintain acceptable levels of service at the lowest asset life-cycle cost.

This program represents a consolidation of the former “Emergency Sewer” and “High Risk Asset Renewal” Asset Management allowances. As previously discussed with the County Monitor Team, the two separate allowances have historically been used somewhat interchangeably (with the County’s permission) to fund both reactive and planned work – although the categorization of reactive and planned work was not consistently populated or tracked in MSD’s legacy “Project Tracking” system. As a result, maintaining the two separate allowances provides little benefit in historical tracking and/or trending. To the contrary, continuing to fund planned work from a nominal “Emergency” allowance will inevitably continue to cause great confusion in reporting.

Moving forward, MSD proposes to use the single “Prioritized Wastewater Collection System Improvements” allowance to fund all planned and reactive improvements to publically owned asset classes that comprise the wastewater collection system – excluding work specifically covered in other Consent Decree specified allowances (Main Sewer Renewal and Manhole Renewal) and the structural renewal and/or improvement of Privately-owned Building Sewers (Building Sewer Renewal) consistent with MSD’s Rules and Regulations.

Using this single allowance will not hinder MSD’s ability to classify individual projects as “reactive” or “planned” within its Computerized Maintenance Management System (Cityworks) for performance monitoring and reporting.

TABLE 8 – HIGH RISK ASSET RENEWAL HISTORICAL SPENDING (INCLUSIVE OF BUILDING SEWERS)

Year	MSD Labor	Non-MSD Labor	Total Spent
2012	\$681,505	\$5,141,056	\$5,822,561
2013	\$241,006	\$5,464,664	\$5,705,670
2014	\$896,857	\$4,309,861	\$5,206,718
2015	\$932,473	\$5,426,259	\$6,358,732
TOTAL	\$2,751,841	\$20,341,840	\$23,093,681
<i>Average</i>	<i>\$687,960</i>	<i>\$5,085,460</i>	<i>\$5,773,420</i>

TABLE 9 – EMERGENCY SEWER HISTORICAL SPENDING (INCLUSIVE OF BUILDING SEWERS)

Year	MSD Labor	Non-MSD Labor	Total Spent
2012	\$452,191	\$9,154,828	\$9,607,019
2013	\$391,489	\$8,643,273	\$9,034,762
2014	\$285,539	\$8,038,892	\$8,324,431
2015	\$195,968	\$9,285,662	\$9,481,631
TOTAL	\$1,325,187	\$35,122,655	\$36,447,843
<i>Average</i>	<i>\$331,297</i>	<i>\$8,780,664</i>	<i>\$9,111,961</i>

Basis for 2017 funding request \$12,000,000

MSD now uses an integrated framework of business applications to produce a standardized recommendation for main sewer renewal methods and risk-driven priority on an asset-by-asset basis utilizing standardized condition assessment information. Structural renewal recommendations stored in the GSAM (Gravity Sewer Asset Management layer) include “Point Repair” and “Full Replacement” classifications, which will provide the majority of the individual projects to be completed on an annual basis under the Prioritized Wastewater Collection System Improvements Allowance. Projects involving the repair, replacement, and improvement of other asset classes in the wastewater collection system including (but not limited to) pressurized main sewers, force main appurtenances, mechanical regulators, and odor control systems will also be funded through this allowance.

An analysis of projects currently identified within the GSAM to potentially be completed through this Prioritized Wastewater Collections System Improvement allowance is included in Appendix F. This analysis is based on the standardized PACP condition assessment of 51% of the main sewers in the MSD wastewater collection system. As more main sewer segments are inspected through MSD’s efforts to perform a standardized Initial Condition Assessment over the next several years, and as other assets are inspected through Planned Condition Assessments, it is anticipated that many more main sewer assets posing relatively high structural risk will be identified as candidates for “Point Repair” or “Full Replacement”. This ongoing Condition Assessment/Standardized Evaluation process will inherently reprioritize the assets selected for projects, and will likely affect the magnitude of future annual funding requests under the Prioritized Wastewater Collection System Improvements allowance.

MSD is currently refining custom GIS spatial tools that will further refine discrete point repair and full replacement cost estimates based upon probable construction method, repair depth, shoring requirements, traffic control requirements, and other factors. As these cost estimates are refined, the recommended structural action plan per asset may change in the standardized decision tree – resulting in a different recommended structural action plan for some assets. Setting these refinements aside, it is clear that there is a significant body of planned work to be completed through this Allowance over the coming years to lower the structural risk associated with main public sewers to an acceptable threshold. Successfully achieving this goal will be dependent upon successfully filling the positions proposed in the Wastewater Collection Division’s 2017 Personnel Operating Budget with qualified personnel, and timely support for procurement from both the City and the County.

The funding request for the 2017 Prioritized Wastewater Collection System Improvements is based upon the approximate sum of the average yearly expenditures for the combined Emergency Sewer Repair and High Risk Asset Renewal allowances. This request will represent a significant increase in work completed on high structural risk main sewers if adequate funding is provided in the 2017 Building Sewer Renewal allowance.

If MSD continues to fund reactive Building Sewer Renewal work out of the Prioritized Wastewater Collection System Improvement allowance at the requested funding level, progress towards reduction in risk associated with main sewers in the MSD collection system will be lessened.

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WET WEATHER FACILITIES ASSET RENEWAL 2017

In 2015, the RTC facilities resulted in capturing and reducing over 650 MG of CSO. SSO 700 Storage and Treatment Facility (STF) was activated 28 times storing and treating over 225 MG of inflow - all of this results in a benefit to receiving streams and improves water quality throughout the region. Flows treated through the chemically enhanced high rate settling portion of the SSO 700 STF undergo ultraviolet disinfection prior to discharge to the Mill Creek. Disinfection and treatment of this flow typically reduces fecal coliforms by greater than 90%.

The purpose of the Wet Weather Facilities Asset Renewal allowance is to provide MSD's Watershed Operations (WO) Division a means of addressing unanticipated situations and necessary equipment replacements that are outside of a defined project. Capital for such unanticipated situations will be utilized under this allowance in the same manner as the WWT System Asset Renewal Fund. This allowance serves as an annual "budget" from which smaller expenditures will be made as the need arises. To manage this allowance, MSD will maintain a prioritized list of proposed expenditures that will be updated as needs arise and seek legislative approval according to established thresholds. MSD has developed an "Allowance-BCE" that will be submitted along with an updated risk-based prioritized list use to request approval from the County in order to expend funds for requests that exceed \$100,000. For expenditures below \$100,000 MSD will utilize an internal review process for expediting necessary near term replacements; this information will be reported monthly in the EMAR.

MSD's wet weather facilities that utilize this allowance include real time control (RTC), high rate treatment (HRT), storage, and other operable assets designed to manage wet weather flows. These facilities are maintained to preserve function, operated to optimize performance, and monitored to demonstrate value. Bi-weekly operational status meetings are held for the RTC facilities and for the SSO 700 CEHRT facility in order to review recent performance and to coordinate any necessary maintenance or critical equipment replacement which may be required. Dashboards for wet weather facility performance and availability were developed in late 2015 and these were rolled out in early 2016 to allow monitoring of performance, review of system availability, and also provide specific information related to subsystem component availability. Data for these dashboards would not have been available if it were not provided through the Wet Weather SCADA system which allows them to be continually updated. This information is especially helpful in targeting maintenance activities to ensure optimum system readiness and availability.

Asset management activities have been progressively employed since 2014 for the wet weather facilities managed by Watershed Operations. Reliability Centered Maintenance (RCM) studies have been utilized to identify improved maintenance strategies in order to provide high availability and reliability. Biweekly meetings are held to review operational concerns and to focus required maintenance activities which are implemented through a Computerized Maintenance Management System to implement both scheduled and corrective maintenance activities. Dashboards for wet weather facility performance and availability were developed in 2015. These dashboards were rolled out in early 2016 to allow monitoring of performance, review of system availability, and also provide specific information related to subsystem component availability. Data for these dashboards would not have been available if it were not provided through the Wet Weather SCADA system which allows them to be continually updated. The information presented is current within a day and is especially helpful in targeting maintenance activities to ensure optimum system readiness and availability.

Additionally, an Asset Management System Implementation project has been initiated and has recently been kicked off. This effort will provide MSD with a system to plan for the replacement of treatment plant and Watershed Operation division facility assets. This will allow more accurate forecasting of asset renewal and replacement efforts and will also assist in forecasting CIP projects. This effort is currently split between Operating and Capital funding sources. Only the Operating portions of this effort have been initiated. The remaining Capital effort is awaiting County approval. If approved, this effort is anticipated to be completed by mid-2017.

The CIP Wet Weather Facilities Asset Renewal Allowance Request is based on a predicted annual Renewal and Replacement rate of 2.5% of the facility value annually. This predicted R&R rate is less than 50% of the AWWA median benchmark rate of 5.8% and was chosen due to the relatively young age of these assets and the limited complexity of these systems.

2017 CIP Allowance Request = \$750,000

\$750,000 for Equipment Repairs & Replacements – funding authorized via individual project legislations against this allowance.

Basis for 2017 funding request

The types of emergency situations and equipment repairs/replacements anticipated to be addressed under this allowance include:

- Pumping System Replacements
- Rotating Equipment Replacements
- Electrical Replacements
- On-Site Buried Infrastructure Replacements
- HVAC System Replacements
- Process Equipment Replacements

Benefits resulting from work performed under this allowance

- This allowance will facilitate timely replacement of Watershed Operation division infrastructure and continue to improve the reliability of equipment and processes and extend remaining useful life. Recommendations from preventative maintenance and condition assessment activities can be addressed prior to failure.
- This allowance will provide an immediate funding mechanism to address emergency situations and equipment failures. Examples of past expenditures that would be covered by this allowance include:
 - Replacement of frozen backflow preventer
 - Replacement of failed U/V Disinfection ballasts
 - Replacement of failed raw sewage pump VFD
 - Replacement of coagulant induction mixer

Anticipated funding required for 2017 Wet Weather Facilities Asset Renewal Allowance

High Rate Treatment Facilities:

- SSO 700 CEHRT
- Muddy Creek and Westbourne HRT
- Daly Road HRT

Real Time Control (RTC) Facilities:

- Ross Run RTC
- Lick Run RTC
- Badgeley Run RTC
- Mitchel Avenue RTC

District-Wide

- Multiple Locations

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WWT SYSTEM ASSET RENEWAL 2017

The purpose of the WWT System Asset Renewal allowance is to provide MSD’s Wastewater Treatment (WWT) Division with a means of addressing urgent situations caused by unforeseen as well as predicted, or planned, equipment or process failures. This allowance provides MSD with a rapid means to replace equipment that fails unexpectedly or to address other short-term capital needs that require little or no design, that are needed sooner than the normal CIP project process allows, and/or are of significantly less cost than a typical standalone CIP project. This includes replacement of equipment when impending failure is detected by predictive technologies such as vibration analysis or thermal imaging large motors or pumps in order to prevent catastrophic failure and limit additional damage and cost. Projects that are larger or able to be planned years in advance are to be submitted as standalone CIP projects.

This allowance serves as an annual “budget” from which smaller expenditures will be made as the need arises. To manage this allowance, MSD will maintain a risk-based prioritized list of proposed expenditures that will be updated as needs arise and seek legislative approval according to established thresholds. MSD has developed an “Allowance-BCE” that will be submitted along with an updated risk-based prioritized list use to request approval from the County in order to expend funds for requests that exceed \$100,000. For expenditures below \$100,000 MSD will utilize an internal review process; this information will be reported monthly in the EMAR.

To support of this allowance and the development of asset management CIP’s in general, an Asset Management System Implementation project has been initiated. This effort will provide MSD with a system to plan for the replacement of Wastewater Treatment and Watershed Operation division facility assets. The new system will allow more accurate forecasting of asset renewal and replacement efforts and will also assist in forecasting CIP budgets and scopes. This effort is currently split between Operating and Capital funding sources. Only the Operating portion of this effort has been initiated. The remaining Capital effort is awaiting County approval. If approved, this effort is anticipated to be completed by mid-2017. One deliverable in particular, the 30-year Rehabilitation & Replacement Schedule will track the useful remaining life of individual assets and will be useful in predicting the need for future allowances.

TABLE 10 – WWT ASSET RENEWAL HISTORICAL SPENDING

Year	MSD Labor	Non-MSD Labor	Total Spent
2012	\$85,088	\$4,828,012	\$4,913,100
2013	\$37,687	\$5,436,109	\$5,473,796
2014	\$144	\$2,352,421	\$2,352,565
2015	\$0	\$1,688,790	\$1,688,790
TOTAL	\$122,919	\$14,305,332	\$14,428,251
<i>Average</i>	<i>\$30,730</i>	<i>\$3,576,333</i>	<i>\$3,607,063</i>

2017 CIP Allowance Request \$2,000,000 –

\$200,000 Request is for Equipment and System Rehabilitation & Replacements with individual expenditures approved subject to defined legislative thresholds.

Basis for 2017 funding request

The types of capital expenditures anticipated to be made under this allowance include:

- Pump and pumping system rehabilitation or replacement
- Rotating rehabilitation or replacement
- Electric motor and electrical system rehabilitation or replacement
- Emergency bypass pumping
- Instrumentation replacement
- HVAC System rehabilitation or replacement
- Process Equipment rehabilitation or replacement

The amount of this funding request is based on historical spending as summarized in the table below and includes potential Facilities Asset Management future projects. Future year requests will be made more accurate by utilizing the proposed aforementioned Asset Management System together with historical data. Additional detail regarding the WWT Asset Renewal Program is included in Appendix G.

Benefits resulting from work performed under this allowance

- This allowance will facilitate timely replacement of wastewater treatment infrastructure and will continue to improve the reliability of equipment and processes while extend remaining useful life of system assets. It will utilize data from the MSD maintenance program to prevent catastrophic failure when possible and reduce outages and costs.
- This allowance will provide an immediate and expeditious funding mechanism to address urgent situations caused by unforeseen equipment or process failures. Together with the MSD Facility Asset Management allowance, this allowance is a key part of MSD's long term asset management strategy.

Work anticipated to be performed under 2017 WWT Asset Renewal Allowance

TABLE 11 – LIST OF POTENTIAL WWT ACTIVITIES

Estimated Cost Breakdown of Expenditures*	2017	2014-2016 Average**
Pump Replacements / Refurbishments	\$350,000	\$325,595
Centrifuge Rotating Assembly Refurbishment	\$300,000	\$151,299
HVAC System Replacements and Upgrades	\$125,000	\$99,251
Electrical Equipment Replacement and Upgrades	\$160,000	\$146,941
Generator Replacements	\$93,000	\$84,826
Instrumentation Replacements and Upgrades	\$42,000	\$39,113
Gate and Actuator Replacements / Refurbishments	\$27,000	\$24,788

Estimated Cost Breakdown of Expenditures*	2017	2014-2016 Average**
Process Area Safety and Security Enhancements	\$150,000	\$157,278
Raw Sewage Pump Refurbishment (Mill Creek) ***	\$120,000	\$0
Various Mill Creek Potable Water System Improvements****	\$120,000	\$0
Other Process Equipment Replacements / Upgrades *****	\$523,000	\$370,822
Totals	\$2,000,000	\$1,399,914

*Cost breakdown has been estimated based on historical needs. Due to the nature of this allowance, individual projects are typically not identified until the calendar year in which the expenditure occurs.

**Averages include OTEA for years 2014 and 2015. No OTEA has been used in 2016. The 2016 data used in the average represents encumbrances from only the first two quarters and has been weighted as such.

***The twelve (12) Mill Creek raw sewage pumps have historically been refurbished every 5 years. The pumps were all refurbished during a capital project that ended in 2012 and MSD must resume a refurbishment program. It is planned to refurbish three pumps in 2017, and two in each successive year.

****This cost is based on an in-house study that determined that several valves, expansion joints, and hydrants should be replaced. The nature of these capital expenditures does not lend itself well to a single CIP project.

*****There is an increase in this line item to reflect both increasing costs, a surge in expected end-of-life equipment replacements due to early Phase 1 projects, and an increasing diligence on the part of MSD to capitalize equipment replacement costs whenever possible to reduce the burden on the operating budget.

FACILITIES ASSET MANAGEMENT PROJECTS 2017

The purpose of the Facilities Asset Management Projects allowance is to provide MSD with an expeditious means of addressing infrastructure and other asset failures in advance of catastrophic failure when possible. This allowance utilizes district wide condition reports, field data, studies and other analyses in coordination with in-house engineering to provide MSD with a rapid means to address failing roofs, roadways, other unforeseen capital needs that require little or no design, that are needed sooner than the normal CIP project process allows, and/or are of significantly less cost than a typical standalone CIP project. This allowance differs from the WWT System Asset Renewal allowance in that it extends to all MSD divisions and that the projects are more construction oriented and may require more significant in-house engineering (as opposed to direct equipment refurbishment or replacement).

This allowance serves as an annual “budget” from which smaller expenditures will be made as the need arises. To manage this allowance, MSD will maintain a risk-based prioritized list of proposed expenditures that will be updated as needs arise and seek legislative approval according to established thresholds. MSD has developed an “Allowance-BCE” that will be submitted along with an updated risk-based prioritized list use to request approval from the County in order to expend funds for requests that exceed \$100,000.

To support of this allowance and the development of asset management CIP’s in general, an Asset Management System Implementation project has been initiated. This effort will provide MSD with a system to plan for the replacement of Wastewater Treatment and Watershed Operation division facility assets. The new system will allow more accurate forecasting of asset renewal and replacement efforts and will also assist in forecasting CIP budgets and scopes. This effort is currently split between Operating and Capital funding sources. Only the Operating portion of this effort has been initiated. The remaining Capital effort is awaiting County approval. If approved, this effort is anticipated to be completed by mid-2017. One deliverable in particular, the 30-year Rehabilitation & Replacement Schedule will track the useful remaining life of individual assets and will be useful in predicting the need for future allowances.

2017 CIP Allowance Request = \$2,500,000

\$2,500,000 for Process & Infrastructure Upgrades with individual expenditures approved subject to defined legislative thresholds.

Basis for 2017 funding request

The types of capital expenditures anticipated to be made under this allowance include:

- Building mechanical system refurbishment and upgrades
- Building electrical system rehabilitation or replacement
- Facility buried infrastructure upgrades
- Roofing system replacement and upgrades
- Roadway and facility access upgrades
- Professional services

Benefits resulting from work performed under this allowance

- This allowance will utilize studies such as the 2015 Roof assessment and the planned 2017 Roadway assessment as well as various facility plans, etc. to address immediate but smaller scale capital needs in a systematic manner.
- This allowance will provide an immediate and expeditious funding mechanism to address urgent situations caused by unforeseen system or infrastructure failures, or impending failures. Together with the WWT System Asset Renewal allowance, this allowance is a key part of MSD's long term asset management strategy.

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HOME SEWER TREATMENT SYSTEM ELIMINATIONS 2017

The Home Sewer Treatment System Elimination allowance was identified in the Consent Decree. Section C.6.c of the Final WWIP states the Home Sewage Treatment System (HSTS) Program

“conducts the design, property acquisition and construction of new sanitary sewers to connect properties in built up areas of the MSD service area to eliminate home sewage treatment systems (HSTS).”

These projects improve the water quality of watershed by replacing failing or inadequate home systems. Assessment sewer projects that eliminate household sewage treatment systems are initiated based on MSD Rules and Regulations, Section 1805, which requires either a citizen petition with majority support, declaration of public nuisance by a local Board of Health, or orders from Ohio EPA. HSTS construction projects undergo public review and evaluation as part of proposed legislation and approval by the Board of County Commissioners. This program supports the overall HSTS Elimination program by funding planning and petition services for various local sewer assessment projects and sewer lateral assessment projects in all watersheds. The allowance also funds design of sewer lateral projects. Design and construction of local sewers and construction of all lateral projects are funded through individual legislation.

TABLE 12 – HSTS PROGRAM HISTORICAL SPENDING

Year	MSD Labor	Non-MSD Labor	Total Spent
2012	\$163,076	\$56,905	\$219,981
2013	\$155,528	\$48,368	\$203,896
2014	\$130,978	\$15,021	\$145,999
2015	\$98,178	\$34,381	\$132,559
TOTAL	\$547,760	\$154,675	\$702,435
<i>Average</i>	<i>\$136,940</i>	<i>\$38,669</i>	<i>\$175,609</i>

Basis for 2017 funding request \$290,000

Work under this allowance is performed on an as-needed basis dependent upon petition requests received from property owners or neighborhoods. The current funding request aligns well with historical commitments and has been escalated to account for a backlog of petition requests that have accumulated during the past year in which staffing levels prevented processing of petitions. This allowance is used for planning, design and petition services for HSTS Elimination Program including the following activities.

- Communicate/coordinate/educate/respond to miscellaneous inquiries with/from property owners, Hamilton County staff, Hamilton County Public Health and other stakeholders regarding assessment sewer policy, projects and progress.
- Develop petitions for assessment sewers and sewer lateral assessments.
 - Prepare preliminary plan for assessment sewers and laterals (site visit, concept plan, research sewer availability, review past petition efforts, determine assessment district boundaries, develop property owner data, review local zoning constraints).

- Prepare/provide citizen petitions for assessment sewers.
 - Prepare petition, statement and waivers for sewer lateral assessments.
- Manage citizen petitions (provide petition and flyer to petitioner, respond to property owner questions, tabulate petition vote results, prepare and mail polling ballots, tabulate and document polling results, prepare documentation of petition/polling results for submittal to Board, manage petition meetings with stakeholders).
- Prepare plans/specs/estimate of costs, obtain field investigation data, and obtain easement for sewer lateral assessments.
- Prepare legislative requests for design authorization for local sewer assessment projects (develop design proposal, prepare initial estimate of costs, compose project description and respond to MSD and Hamilton County questions regarding legislative requests).
- Prepare final assessment data and legislation.

Benefits resulting from work performed under this allowance

- Elimination of home sewage treatment systems by providing connection to the public sewer system provides the following benefits: Reduces discharge of pollutants to watersheds Failing or improperly functioning HSTS are a source of pollutants that has been linked to dry weather bacterial exceedances. This allowance will facilitate actions required to ultimately improve local water quality.
- Resolves public health and environmental problems identified by the local health districts.
- Provides improved quality of life for HSTS property owners by eliminating odors and lifestyle restrictions related to limited flow capacity of their HSTS.
- Removes a major impediment to marketability of HSTS properties.
- Creates new sewer district customers.

CIP PROJECT PLANNING 2017

The CIP Project Planning allowance provides the funding necessary for CIP planning efforts which include wastewater collection system, source control opportunities, wastewater treatment and pumping facilities, integrated planning partnerships, and watershed optimization. The allowance also includes planning for the technical evaluations for Phase 2 Consent Decree planning, evaluation and analysis of schedule. This allowance provides a means to prepare an effective prioritization of capital resources and development of comprehensive business case evaluations.

TABLE 13 – CIP PLANNING HISTORICAL SPENDING

Year	MSD Labor	Non-MSD Labor	Total Spent
2012	\$454,991	\$1,435,345	\$1,890,336
2013	\$571,995	\$2,132,872	\$2,704,867
2014	\$607,084	\$839,627	\$1,446,711
2015	\$274,504	\$470,188	\$744,692
TOTAL	\$1,908,574	\$4,878,032	\$6,786,606
Average	\$477,144	\$1,219,508	\$1,696,652

Basis for 2017 funding request \$3,300,000

MSD utilizes both employee staff and professional consultants for preparation of Business Case Evaluations (BCEs) for project nominations received from the Watershed Operations, Wastewater Collection, and Wastewater Treatment Divisions.

The planning activities presented in the following table and described herein provide a representative sampling of necessary activities and evaluations, though there may be more added to this list and some efforts may get re-prioritized. It is not likely that all projects will be initiated during the budget year due to coordination and staffing limitations. As the 2017 CIP budget is developed, MSD cannot anticipate which projects will be dropped from the list. It is reasonable to expect that the list in the table of potential planning projects (below) is tentative and subject to change.

TABLE 14 – LIST OF POTENTIAL CIP PLANNING ACTIVITIES

Phase 2A Capital Program Planning	
Technical Evaluations and Support for Capital Program Prioritization and Planning for Phase 2A - MSD labor and technical support	\$1,135,000
Treatment Plant & Facility Planning Activities *	
Mill Creek WWTP Standby Power Distribution Improvements - Planning effort to address replacement of the standby power distribution system and its relocation to a central plant location. Project to include a new standby engine-generator for remaining portions of the plant except incineration and dewatering processes.	\$70,000
Mill Creek WWTP 4.16 kV and 13.2 kV Loop Improvements - Planning effort to address deficient power distribution equipment.	\$25,000
Sycamore Creek WWTP Facility Plan - Update Facility Plan	\$75,000
Muddy Creek WWTP Facility Plan - Update Facility Plan	\$75,000

Mill Creek WWTP Primary Settling Process Area Improvements - <i>Planning effort to address existing primary settling tank chains & flights and motors. The purpose is to rebuild existing pumps and replace existing pump bases, foundations, and valves.</i>	\$75,000
Taylor Creek WWTP Clarifier Upgrades - <i>Planning effort to address replacement of existing clarifier mechanisms, add density current baffles. Remove existing flocculator units, wiring and controls, and rotating bridge diffusers.</i>	\$50,000
Taylor Creek WWTP RAS Pump Station Upgrades - <i>Planning effort to address replacement of existing pumps with new pumps, valves and piping, including variable frequency drives and small control building to house power and controls.</i>	\$25,000
Taylor Creek WWTP Gate & Valve Motorization - <i>Determine preliminary configuration of electrical components to motorize existing slide gates and existing plug valves throughout the plant.</i>	\$25,000
Taylor Creek WWTP Aeration Basin Improvements & Backup Chemical Feed System - <i>Planning effort to modify aeration tank(s) to provide Enhanced Biological Phosphorus Removal (EBPR) including mechanically mixed anaerobic zones and aerobic zones with floor-mounted fine-bubble diffusers. Project to include a back-up chemical system for phosphorus removal using super tote bulk storage with chemical feed pumps and piping.</i>	\$50,000
Fort Scott Improvements - <i>Planning effort to assess the performance of the existing facility and determine hauling vs on-site treatment.</i>	\$60,000
Sycamore Creek WWTP WAS System Improvements - <i>Planning effort to evaluate modifying the Primary Thickener to accept WAS. Project to address WAS sludge pumping, so that the plant can waste RAS rather than MLSS for better wasting control. Bench testing may be performed as part of this planning effort.</i>	\$75,000
Sycamore Creek WWTP DISC Filter Freeze Protection - <i>Planning effort to provide freeze protection of Sycamore WWTP Disc Filters.</i>	\$5,000
Sycamore Creek WWTP Tank Improvements - <i>Planning effort to address replacement of the Rotating Arms/Spiral Scrapers for all secondary tanks.</i>	\$25,000
Sycamore Creek WWTP High Rate Recirculation Pump Station - <i>Planning effort to evaluate the existing recirculation pump at the HRT and compare performance observed to WWTP process model</i>	\$25,000
Sycamore Creek WWTP Sludge Handling Improvements - <i>Planning effort for the High Rate Treatment Sludge Storage Thickener to address sludge removal pump improvements to allow sludge to be removed from the thickener properly. RAS, WAS, and sump pumping improvements will be evaluated.</i>	\$50,000
Sycamore Creek WWTP Secondary Treatment Pumping Improvements - <i>Planning effort to evaluate the Filter Feed pump process to ensure equipment can handle the range of flow received at the WWTP – including low flow periods.. The existing</i>	\$75,000
Sycamore Creek WWTP Sludge Handling - <i>Planning effort to evaluate the Sludge Storage Tanks & Loading Station.</i>	\$25,000
Polk Run WWTP Effluent Pumping - <i>Planning effort to assess performance of effluent and disinfection scum pumps. Determine optimal replacement strategy.</i>	\$25,000

Mill Creek WWTP South Plant Control Room - Planning effort to evaluate construction of room near south end of plant as an operator room.	\$40,000
Pump Station Planning Activities*	
Bold Face Pump Station Reliability & Service Upgrades - Planning effort to assess the reliability of the pump station and to recommend upgrades for the facility.	\$50,000
Muddy Creek Pump Station Reliability and Service Upgrades - Planning effort to assess the reliability of the pump station and to confirm the scope of work recommended from the West Branch Muddy Creek Planning Bundle includes all Asset Management needs of the station.	\$75,000
Cleves Pump Station - Planning effort to assess the condition and performance of the pump station. Work to identify facility upgrades and equipment replacements. Work to evaluate the Phase 2 WWIP Project for incorporating storage.	\$100,000
Blanchetta #2 Pump Station - Planning effort to address upgrades to improve operation and reliability of the pump station.	\$25,000
Harcourt Estates Pump Stations - Planning effort to evaluate the Harcourt Estates, Rustic Hills, and Forest Hills pump stations to determine upgrades needed for reliable operations compared to the value of station eliminations.	\$25,000
Pleasant Run Pump Stations - Planning effort to address improvements needed at the Pleasant Run West, Pleasant Run Central, and Pleasant Run East Pump Stations.	\$75,000
Wastewater Collection Planning Activities*	
CSO 226 I-75 Relocation - Planning effort to support ODOT I-75 planning in which existing CSO and sewer coordination for protection, replacement, or repair is necessary.	\$25,000
BCEs for WWC projects in planning backlog - Unspecified planning effort for projects not yet nominated by WWC for 2017.	\$75,000
CSO 449 Sewer Separation - Planning effort for separation of flows from the combined sewer upstream of CSO 449 to mitigate localized neighborhood impacts resulting from wet weather events.	\$25,000
CSO/SSO Relocation and Access Drive Improvements - Planning effort is to improve access to overflow structures for field crew inspection that may include access drives, ingress and egress walkways down vegetative or steep creek banks year round, turnouts, staging areas near railroad tracks.	\$25,000
Muddy Creek CSO HW/DW Protection - Planning effort continues providing HW/DW to Ohio River CSOs during high water dry weather situations that are not being addressed after the conclusion of the West Branch Muddy Creek Bundle/East Branch Muddy Creek Interceptor projects	\$25,000
Stout & Penderly Avenue Sewer Capacity Evaluation - Planning effort to evaluate the hydraulic capacity of the combined sewer system upstream of CSO 559 in the City of Wyoming as a result of sewer back up occurrences on Stout Avenue.	\$25,000
Stonebridge Apartments Sewer Repair - Planning effort to evaluate the hydraulic capacity of the sanitary sewers in the vicinity of the Stonebridge Condominiums and the old SSO 1012 (Harwinton Lane).	\$25,000

5053 Ridge Ave Sewer Replacement - Planning effort is to address 18" RCP pipe segment immediately upstream of CSO 671 and the possibility of eliminating CSO 671.	\$25,000
Morrison Avenue Sewer Replacement - Planning effort is to address deformed pipe segments that cannot be lined.	\$25,000
3731 Glenmore Avenue Sewer Evaluation - Planning effort is to address 18" to 36" VCP and brick pipe segments that are in poor structural condition at the intersection of Harrison and Glenmore Avenue and also under adjacent buildings.	\$25,000
Ledgewood Ave Sewer Replacement - Planning effort is to address pipe segments that are broken or deformed that run under or nearly under residences. Some segments that are lining candidates cannot be lined due to capacity issues.	\$25,000
911 McPherson Avenue Sewer Replacement - Planning effort is to address 12" VCP and up to 24" VCP high to very high criticality pipe segments located under or nearly under residences.	\$25,000
Davey Avenue Sewer Replacement - Planning effort is to address 10" VCP and up to 36" VCP/Brick high to very high criticality pipe segments that run under or nearly under residences.	\$25,000
Wasson Ravine Sewer Replacement (Additional Planning) - Planning effort to determine a recommendation for several sewer segments in poor structural condition, some are near or under structures. Pipe diameters range from approximately 6" to 24" in diameter, constructed about 1911 to 1933, with some surcharging with a model 5 year, 24 hour storm.	\$25,000
Paxton Avenue Sewer Evaluation (Additional Planning) - Additional planning is necessary to address County comments and additional challenges determined during design	\$25,000
Aux Mill Creek Interceptor and Channel Repair - Planning effort is to address damaged channelized sidewall sections of the Mill Creek Channel, presently addressed by pressure relief devices installed on manholes in the damaged wall vicinity.	\$25,000
Mandarin Court Sewer Replacement - Planning effort is to address two emergency repairs in 2012 due to hillside erosion and presence of sagging pipe sections.	\$25,000
Preliminary Planning for new ODOT projects - Unspecified planning effort as needed as the result of ODOT projects	\$25,000
Elm Court Sewer Replacement - Planning effort is to address sewer segments located near and under residences on Elm Court and to coordinate recent field findings as the result of the Benson St. Sewer Replacement project.	\$10,000
Thru the Valley - Planning effort to support ODOT I-75 planning in which existing CSO and sewer coordination for protection, replacement, or repair is necessary.	\$5,000
Watershed Operations Planning Activities*	
Flow Monitoring for Capital Projects - Provides for the early start of flow monitoring for planning efforts prior to project legislation to ensure that necessary flow monitoring efforts can start in a timely manner so as not to delay planning.	\$100,000

High Rate Treatment Performance Refinements - <i>Planning effort to address improvements or repairs necessary at HRTs. Several items that are anticipated at the Muddy and Westbourne facility include: relocation/repair of tank ventilation equipment and odor control equipment; screening upgrades to eliminate the need for manned entry and manual cleaning after each event; and an evaluation of hydraulic system leakage.</i>	\$75,000
Mill Creek Interceptor Crossover Automation - <i>Planning effort to support Watershed Operations Division initiative to automate presently manually operated sluice gates that connect the Mill Creek and the Auxiliary Mill Creek Interceptors along with integration into the Wet Weather SCADA system</i>	\$25,000
Real Time Control Projects - <i>Planning effort for evaluating potential opportunities for Storage based RTCs or Dynamic Underflow Control type RTCs in various locations.</i>	\$50,000
CSO 125 (Badgely Run RTC) Improvements - <i>Planning effort to review potential improvements in the CSO 125 drainage basin that would provide potential improvements to the performance of the Badgely Run RTC facility.</i>	\$50,000
CSO 005 (Lick Run RTC) Improvements - <i>Planning effort to review potential improvements in the CSO 005 drainage basin that would provide potential improvements to the performance of the Lick Run RTC facility.</i>	\$75,000
Daly Road CSO Treatment Facility Evaluation - <i>Planning effort to evaluate potential improvements to the Daly Road Facility.</i>	\$50,000
TOTAL	\$3,300,000

* Projects are listed from highest to lowest priority for each functional area.

Justification for the allowance and benefits resulting from work performed include:

This allowance will provide resources and funding for the prioritization of infrastructure capital needs; identification of opportunities for integrated planning and construction coordination (paving, utility construction, transportation, etc.) and analysis evaluation and preparation for Phase 2A negotiation; and technical support needed to facilitate a successful Phase 2A suite of projects and programs. It will result in the technical narrative and supports what the Regulators are looking for in the Phase 2A schedule submittal.

HYDRAULIC MODELING 2017

The Hydraulic Modeling Program allowance will provide hydraulic, hydrologic and treatment process modeling services to be used to support MSD's long-range planning needs, and to meet MSD's SSO and CSO monitoring requirements. Sewer modeling is used to assist in the planning and design process and is required as part of the Global Consent Decree and MSD's CSO NPDES permit. MSD is committed to ensuring its system-wide model meets the latest standards and provides the best available tool for assessing, planning, and designing MSD's infrastructure. Based on the county's preference, several hydraulic modeling support activities that were previously funded out of the capital program allowance are proposed in the 2017 operating budget. Totalling \$442,000, these activities include: BCE Support for CIPs, Initial Flow Monitoring Modeling and Data Quality Review, Phase 2 Mill Creek Model Update for Projected 2018 Improvements.

TABLE 15 – HYDRAULIC MODELING HISTORICAL SPENDING

Year*	MSD Labor	Non-MSD Labor	Total Spent
2015	\$200,935	\$645,615	\$1,846,550
TOTAL	\$200,935	\$645,615	\$1,846,550
<i>Average</i>	<i>\$200,935</i>	<i>\$645,615</i>	<i>\$1,846,550</i>

*Prior to 2015 water quality and flow monitoring were combined allowances

Basis for 2017 funding request \$715,000

- Expand the baseline System-Wide Model if flow or other data is available for areas not previously calibrated. Run the updated System-Wide Model for the 1970 Typical Year and document changes in overflows on an outfall-by-outfall basis.
- Expand the baseline System-Wide Model Refinements for real-time control and implementation of coordinated control.
- Complete the WWTP Process Model for Mill Creek and develop the treatment operator interface controls.
- Develop the Muddy Creek Treatment plant grit and solids handling facilities process model.
- Develop the Indian Creek WWTP process model. The Schreiber Counter-Current Aeration System was converted to a step feed plug flow reactor. A new process model is required to support the upcoming Total Phosphorus studies required to be completed by the end of 2017.
- The following modeling activities provide a representative sampling of needed work. It is not likely that all projects will be initiated in 2017 due to coordination and staffing limitations. However, at this time MSD does not know which projects will be dropped from the list. Modeling activities will be performed using a combination of staff and consultant resources. More detailed descriptions of each task are provided following the table.

The following activities are proposed by MSD to be completed using 2017 Hydraulic Modeling Allowance.

- Expand the Baseline Model for Newly Constructed/Monitored Areas: When areas are newly constructed or monitored in detail for the first time, the upstream limits of the current baseline model must be expanded and calibrated. The 1970 Typical Year model must be updated to include these changes. The change in overflows must be documented on an outfall-by-outfall basis.
- Expand the Model to include RTC and Coordinated Control rules; include developing a new baseline model which reflects the system-wide model for real-time control and implementation of coordinated control.
- WWTP Process Model: Mill Creek: include modeling of the Mill Creek treatment plant processes and develop the treatment operator interface controls.
- WWTP Process Model: Muddy Creek: A new process model for the Muddy Creek Treatment Plant needs to be developed which reflects the recent construction of grit and solids handling facilities.
- WWTP Process and Hydraulic Model: Indian Creek: The Indian Creek WWTP process model was developed in 2013 and includes all relevant processes installed at that time. Most importantly is the Schreiber Counter-Current Aeration System. Since that time the Schreiber system has been converted to a step feed plug flow reactor under the Indian Creek WWTP upgrades project (10210010). These upgrades are scheduled to be completed in 2016. A new existing process model is required to reflect the process change is needed in the near term to support the upcoming Total Phosphorus studies required to be completed by the end of 2017.

MSD staff will coordinate the system-wide model with on-going activities including but not limited to Watershed Operations' use of the system-wide model and the developing Water Quality Program. At the end of the year, if these efforts are not attributable to future capital projects, the cost will be expensed.

MSDGC agrees to utilize this allowance subject to the following criteria

- Work performed will be properly documented with the Annual Capital Reconciliation Report that is issued in draft form to the County every March 30th for the prior year.
- The allowance will be used for expenditures in 2017 only.
- The allowance will not be used for specific capital project work.

WET WEATHER PROGRAM MANAGEMENT & SUPPORT SERVICES 2017

MSD program management efforts have successfully assisted the District – both internal and external – to have access to up to date information as the end of Phase 1 is approached with regard to capital projects and the overall Consent Decree and Asset Management Program. MSD proposes to maintain this level of reporting for transparency of information to the stakeholders of the District to maintain the momentum required to complete Phase 1 of the Wet Weather Improvement Program, streamline the Asset Management Program, and while developing an optimized and affordable schedule for Phase 2 (and future phases) of the Wet Weather Improvement Program. This project funds the Capital Reporting, Document Control and Program Controls (scheduling and estimating) services necessary to carry out the Capital Program. The activities performed under this project include regulatory coordination, compliance reporting, Master CIP coordination, project and program scheduling, project estimating and project controls.

TABLE 17 – PROGRAM MANAGEMENT HISTORICAL SPENDING

Year	MSD Labor	Non-MSD Labor	Total Spent
2013	\$1,581,394	\$11,647,303	\$13,228,697
2014*	\$1,481,606	\$8,047,788	\$9,529,394
2015	\$620,669	\$6,752,437	\$7,373,106
TOTAL	\$3,683,669	\$26,447,528	\$30,131,197
<i>Average</i>	<i>\$1,227,890</i>	<i>\$8,815,843</i>	<i>\$10,043,732</i>

**In 2014, \$1,481,606.25 of MSD labor charges was subsequently moved to the operating budget.*

Basis for 2017 funding request \$3,500,000

The MSD wet weather program management team includes both internal personnel and supplemental outside professional consultants to manage and report on the multiple projects in planning, design, and construction phases. MSD continues to integrate some of the supplemental staff positions with MSD personnel. Due to the size and complexity of the capital program, supplemental staffing provided by external consultants will continue to be utilized for the next several years to ensure all Final WWIP milestones are fully satisfied. A categorization of the activities funded under this allowance is presented in the following table and described herein.

- **MSDGC Labor:** Master Capital Program Management includes MSD staff members. Staff members are serving the following roles: Project Controls Manager, Change Management Coordinator, Document Control Manager, Document Control Specialists and Accountants for Project Costing. MSD staff from across the District provide as-needed services and support to the Master Capital Program Management Division for addressing Consent Decree questions, County coordination, stakeholder education, and a variety of other technical issues associated with MSDGC's Capital Improvement Program.

- Master Capital Program/Enterprise Management: The Master Capital Program Management is a critical function that is responsible and accountable for all aspects of the District's capital program for the next 5 years. The 2017 Program Management and Support Services budget includes Legal assistance for the capital program, cost reporting analyst and expert services for MPMP development and enhancement, affordability analysis for Phase 2 and regulatory support for Phase 2 regulator engagement.
 - Legal Assistance
 - Expert Technical Services
 - Reporting
 - Affordability Analysis

- Program Controls: The Program Controls Team is responsible for the day-to-day oversight, coordination, and reporting of the Capital Program performance and implementation including individual projects' schedule, budget, cash flow, change management activities, and estimating. This group is responsible for administering and updating as necessary MSDGC's Financial Analysis Manual (FAM). Comprehensive monthly, quarterly, and annual reporting is completed by the Program Controls Team.
 - Basin Control Specialists
 - Estimating
 - Estimating Documentation Review
 - Financial Policy Review and Development
 - Change Management Automation

- Document Control: The 2017 PMC budget includes funding for supplemental staff to assist the City with administering and implementing the document control system for all capital projects. In 2014 the City began managing the document control function and provided the majority of administrative specialists. MSDGC will continue to transition all document control positions to the City as more staff become fully trained and vacancies are filled.

WATER QUALITY PROGRAM 2017

The purpose of Water Quality Program allowance is to facilitate implementation of a comprehensive water quality program for MSDGC. Several concurrent planning activities are envisioned to be performed with the funds approved under this allowance. These activities are intended to determine the current water quality conditions in streams, creeks, and rivers; identify potential sources for pollutants of concern; identify how pollutants are transported to water bodies; and continue refining the assumptions used for design of green infrastructure best management practices (BMPs).

All the information collected under the various water quality program initiatives and activities will be crucial for informing the Phase 2 WWIP. As the Defendants (County and City) prepare to submit a schedule to the Consent Decree Regulators for the early Phase 2 projects in June 2017, identifying opportunities for lower cost remedies is a top priority for MSDGC. The Water Quality Program will provide confidence on decision making to develop cost effective strategies and individual projects associated with the affordability of the wet weather improvement program. This approach will result with MSDGC having a transparent and defensible plan for recommending wet weather improvement projects for future phases of the Consent Decrees.

Basis for 2017 funding request \$485,000

- **Water Quality Model Development**: Many utilities around the country are faced with combined overflows (CSOs) and sanitary overflows (SSOs) issues and they often require multi-billion dollar programs to address these wet weather pollution sources. Prioritization on capital improvement projects are often challenging because many sources contribute to the water quality pollution in a given watershed. An important part of MSDGC's Water Quality Program is refining and upgrading existing water quality models to include additional upstream coverage and resolution. The upgraded models will be able to simulate the fate and transport of a suite of pollutants of concerns including E.Coli, species of nitrogen and phosphorus, algae, and dissolved oxygen. Limnotech is currently preparing the models for Little Miami Basin and Muddy Creek Basin and determining what gaps exist in the current models. An overview of the development schedule for the model in each basin is as follows

TABLE 16 – WATER QUALITY MODEL DEVELOPMENT ELEMENTS BY BASIN

Model Development Element	Mill Creek Basin	Little Miami Basin	Muddy Creek Basin
Water Quality Model Construction	<i>Completed</i>	<i>Underway</i>	<i>Underway</i>
Water Quality Sampling for Model Development	<i>Completed</i>	2017	2018
Water Quality Model Calibration	2017	2018	2019
Microbial Source Tracking	<i>Underway</i>	2018	2019

- **Mill Creek Basin Water Quality Model Calibration** - Integration of the SSO 700 IWAP Water Quality Model and the Mill Creek Water Quality Model and calibration of the resulting model.
- **Little Miami Basin Water Quality Sampling for Model Development** – Water quality sampling for model development in the Little Miami Basin during wet-weather events. These sampling points are along the Little Miami River and Duck Creek.

Benefits resulting from work performed under this allowance

- Collection of pertinent data and local field conditions for use in development of a comprehensive water quality model applicable that can be calibrated and verified to facilitate simulation of various alternatives for capital improvement projects.
- Track and Evaluate progress toward linking capital expenditures with CSO reduction and water quality benefits.
- As the water quality model is developed, MSD will be revise the water quality modeling guidelines to provide project managers better tools to better assess and evaluation CSO/SSO and Water Quality benefits of proposed projects.

An overview of how the Water Quality Program budget was assembled is presented in the following table.

TABLE 17 – LIST OF POTENTIAL WATER QUALITY ACTIVITIES

Anticipated 2017 CIP Water Quality Program Activity	2016 Activities	2017 CIP	2018 CIP	2019 CIP
Little Miami Watershed Activities				
Water Quality Sampling for Model Development		✓		
Water Quality Model Construction	Underway			
Water Quality Model Calibration			✓	
Microbial Source Tracking Studies w/USEPA				✓
Muddy Creek Watershed Activities				
Water Quality Sampling for Model Development			✓	
Water Quality Model Construction	Underway			
Water Quality Model Calibration				✓
Mill Creek Watershed Activities				
Water Quality Sampling for Model Development	Completed			
Water Quality Model Construction	Completed			
Water Quality Model Calibration		✓		
Microbial Source Tracking Studies w/USEPA			✓	
TOTALS		\$485,000	\$555,000	\$200,000

The EAC for the water quality model for each basin is provided below. This includes prior costs under 10280614 and 10280615 that could be attributed to one of the water quality models of the three major basins. \$326,238 in prior costs under these project numbers were not directly attributable to one of the three basins or were related to sampling in the Ohio River, and are not included below.

Basin	EAC
Mill Creek	\$1,817,694
Little Miami	\$696,928
Muddy Creek	\$656,928

Little Miami Watershed Activities 2017:

- Water Quality Sampling for Model Development: Sample five wet weather events to characterize of the Little Miami River watershed and stream conditions. The sampling

will be along the main stem of the Little Miami River and will include the Duck Creek. Most of the CSOs sampled are on the Duck Creek. 8-10 in-stream locations and 5-6 CSOs and SSOs will be sampled up to five times over the course of each event. The Little Miami Sampling Plan included the Upper Duck and associated CSOs for use in the development of a watershed evaluation. The tasks are broken down as follows

- Planning, coordination, reporting, project management, up to two false starts.
- CSO/SSO sampling per event.
- In-stream sampling per event.
- Data review per event.
- MSD lab costs (reagents, bottles, staff overtime) for each event.
- Coordination with bio-assessment sampling program.

Mill Creek Watershed Activities 2017:

- Water Quality Model Calibration: The integration of the model with the SSO700 IWAP model and final calibration is planned for 2017.

Questions regarding the content of this document should be submitted to MSDGC Director of Sewers Gerald Checco (Gerald.Checco@cincinnati-oh.gov).

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