

2018 ANNUAL REPORT





The SEMSWA Mission: Providing flood control and stormwater management services to our community.

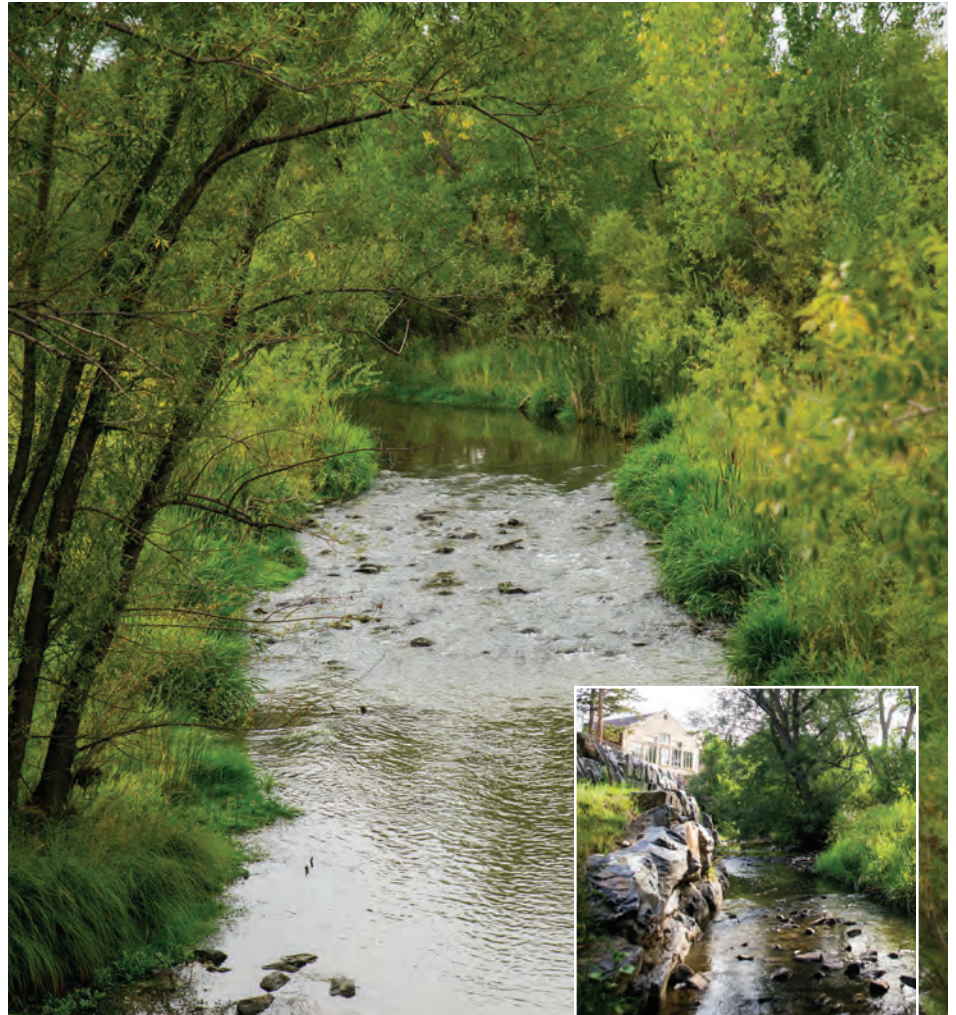
A Message from the Executive Director

Welcome to the Southeast Metro Stormwater Authority's (SEMSWA) annual report of 2018 activities. This report provides items of interest to our ratepayers who own property in neighborhoods, commercial districts, and business parks. We hope these pages highlight for you our efforts to manage stormwater and deliver essential services.

I want to take this opportunity to introduce myself. I'm Paul Danley, and I was selected to be the new Executive Director in November of 2018. I am honored to continue the legacy of excellence established by my predecessor, John McCarty. During my eight years with SEMSWA, I led the Engineering and Construction Division with an emphasis on improving public safety, restoring stream health, and ensuring responsible stormwater management in the rapidly developing areas of our community. As Executive Director, I will continue SEMSWA's work to protect, preserve, and enhance our neighborhoods, community and natural resources through flood control, master planning, stormwater quality, capital construction, maintenance, and education services.

During John's retirement celebration, he recapped SEMSWA's stormwater management responsibilities and accomplishments during his 11-year tenure, and I'd like to share a few. SEMSWA has:

- 92 square miles of service area, encompassing the City of Centennial and unincorporated Arapahoe County as far east as Coal Creek;
- 50 miles of major stream channels and 35 miles of minor tributary channels, with 19 completed master plans that mapped updated floodplain for 27 of our 55 streams;
- 59 combined flood control and water quality ponds;



Stream stabilization projects vary depending on whether the eroded stream is in an urban area that constricts its floodplain or has a more natural wide floodplain available. Cherry Creek, above, can receive a more natural capital construction treatment, while Little Dry Creek, insert, has to stay within a more constrained boulder lined floodplain that protects nearby structures.

- 170 miles of storm pipe, including seven miles of aging Corrugated Metal Pipe (CMP), of which two miles has been rehabilitated through our pipe lining projects;
- 1,020 stormwater outfalls, of which 50 were previously buried for over 20 years under several feet of sediment and debris, and now fully restored; and
- invested a total of more than \$50 million on capital construction projects to improve the stormwater system.

Looking forward, I'm excited for us to take on new opportunities for improved service and to face the challenges that will come, all while celebrating our accomplishments along the way.

Paul Danley, PE

Maintenance and Inspections Division

The Maintenance and Inspections Division crews are responsible for quarterly inspections and routine maintenance of over 100 regional stormwater facilities, almost 9 miles of culverts, and over 4,000 street inlets to ensure adequate storm flow detention and conveyance during rain events. In 2018, almost 90,000 feet of storm pipe, including roadway culverts, were inspected using a robotic camera and closed-circuit TV (CCTV) system. This identified problems that could potentially cause future collapse issues, like sinkholes. Also in 2018, vegetation, trash and debris removal activities along many creeks in the service area west of I-25 removed over 2,400 cubic yards to be recycled or disposed.

In 2018, the Maintenance Division crews instituted a new maintenance strategy to return conveyance capacity to roadway culverts throughout the SEMSWA service area. This "50/50 Vegetation Removal" program focuses on tree, shrub, debris and excess vegetation removal 50-feet upstream and downstream of roadway culvert locations. This helps to minimize the potential for overtopping during flood flows and to ensure storm flows can get into the pipe, through the roadway culvert, and downstream more efficiently during a large storm event.

RIGHT: A routine pipe inspection identified an outfall into Big Dry Creek in need of repair to minimize erosion of the channel banks. **BELOW:** East Toll Gate Creek at Dove Hill subdivision experienced sediment buildup at the Progress Street roadway culvert (1), causing local flooding. Initial work consisted of vegetation management (2 and 3), followed by a maintenance project to re-establish a low flow channel through the culvert (4) to provide unobstructed conveyance for the storm runoff events.



Retrofitting Ponds for Maintenance



The Ladera Pond retrofit replaced boggy areas with healthy vegetation due to an improved outlet structure that allows the pond to drain and the bottom to dry out.

Sub-regional ponds are an integral part of the drainage system, collecting the local flows from surrounding development and public streets, and providing flood flow storage for tributary areas. Two sub-regional ponds were retrofitted in 2018 by the Maintenance Division as part of their Contract Maintenance program. Pond retrofits can occur when a component of the pond is missing because it wasn't required at the time of construction and experience has shown the feature to be critical to optimal function. In other cases, maintenance is too complicated, and therefore not done well or efficiently, so pond improvements need to be made to allow easier and less costly routine maintenance to occur. The issues with the two retrofits, Ladera Pond and Panorama Pond, were unsightly boggy areas with permanent pools of water that did not drain as required, and low-functioning outlet structures. The retrofits improved functionality and enhanced water quality with new trickle channels, better-integrated micropools, and retrofitted orifice plates at the outlet structure.



At the Panorama Pond, a formalized low flow trickle channel improves conveyance of flows, and a functioning outlet structure will detain an appropriate volume of water and allow for the collection of sediment and trash.



AFTER



Reclamation of Willow Creek downstream of Quebec, resulting in a stable channel that can carry base flows and flood flows without erosion and transport of sediment.

Capital Improvement Program (CIP)

As urbanization has taken place in the Willow Creek watershed, base flows and runoff volumes have increased, resulting in degradation and incising of the existing channel and erosion of the channel banks. The severity of the channel erosion has increased over the years, impacting private property, threatening the Willow Creek Trail, and creating a public safety risk due to the high vertical banks. The September 2013 flooding created additional erosion of the channel banks and bed, undermined two existing 21" sanitary sewer crossings, and

eventually caused the loss of numerous trees along the channel banks. To repair this unstable channel, several grade control drop structures were constructed to stop the down-cutting, re-establish a stable channel bed, and protect utility crossings. Channel re-alignment was limited to correcting only severe bend meandering which allowed the channel to keep its natural alignment. In addition, regrading the banks to a shallower slope and restoring the native vegetation helped eliminate the public safety hazard.



Coal Creek @ Gun Club Crossing

This project's goal was to provide a greater capacity for Coal Creek flows crossing under Gun Club Road, a heavily traveled road experiencing frequent flooding, inundation and overtopping due to the limited capacity of the deteriorated and undersized pipe culverts. This was accomplished with a culvert crossing system consisting of four 36-inch reinforced concrete pipes, along with channel improvements consisting of a grade control structure, a clean-out basin downstream of the culvert system, and a shallow low flow channel with benches to help route the base and storm flows.

CIP Projects Completed:

Piney Creek: Reach 6 - Phase 2 Channel Improvements

Cherry Creek: Reach 2 Channel Improvements

Willow Creek: Quebec to Dry Creek Channel Improvements

Unnamed Tributary: Mesa Park Tract B Channel Improvements

Big Dry Creek, Dry Creek @ Adams: Storm Sewer Improvements

Coal Creek: Gun Club Culvert Crossing and Channel Improvements

CIP Projects In Progress:

Big Dry Creek: Easter Ave Crossing and Channel Improvements

Green Acres Tributary: Regional Stormwater Quality Pond

Little Dry Creek: Downstream of Arapahoe Rd. Channel Improvements

Cherry Creek Reach 2 Reclamation

Improvements constructed along Cherry Creek in the Valley Country Club (VCC) included the realignment and lowering of the Caley Outfall to improve drainage conveyance, three grade control structures, and removal of the existing timber golf cart bridge and replacing it with a VCC-funded concrete low water crossing. The project provided a stable channel and reconnected the channel to the floodplain. Benefits include lower sediment loads that protect water quality in the downstream Cherry Creek Reservoir, and a decrease in flooding impacts with the lower elevation deck on the new golf cart crossing.



Cherry Creek channel and golf cart bridge



Reclaimed channel & golf cart low water crossing

Construction Division



Navy Federal Credit Union



Natural Grocers



Olympic Metals

Infill lots in the City along the Arapahoe Road corridor and open land within the County's Dove Valley Business Park provide opportunities for new businesses in the South Metro area.

Land Development Program

Land Development Program staff received 103 new applications in 2018 for development in the City and urban unincorporated Arapahoe County. A sign of continued growth is reflected in the number of Pre-submittal Meetings staff prepared for and attended: 157 pre-submittal meetings in 2018, down from the high of 186 in 2017, but still a significant increase as compared to 105 Pre-Submittal meetings in 2013. Project submittals from an applicant typically include drainage reports, construction documents, and various permit applications reviewed for adherence to criteria. Staff also reviewed seven SEMSWA capital construction

projects as part of the goal of ensuring resilient construction of public infrastructure within regulatory guidelines.

In 2018, the Land Development staff coordinated final close-out approvals and site as-builts for several projects in the City and County. These include infill projects in the City that take advantage of the existing infrastructure, including the Natural Grocers located next to the Starbucks along Arapahoe Road, and Navy Federal Credit Union fronting Walmart on Briarwood Avenue. This developing South Metro area is continuing to see an influx of

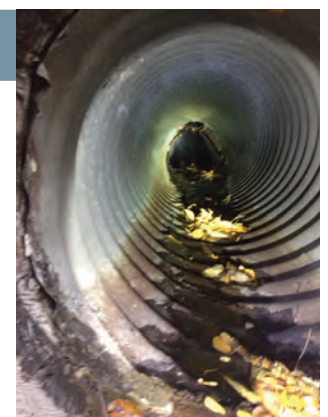
significant development projects that make this a vibrant destination for new businesses. Complimenting the City's infill development, the County has significant open land in Dove Valley for development, and in 2018, Brennan Office & Warehouse, Olympic Metals, and Roadsafe Traffic Systems took advantage and constructed new buildings. SEMSWA's regional system approach to stormwater management in these areas encourages the maximum developable footprint for these owner/developers, while protecting our natural resources.

Cured-in-Place Concrete Program

SEMSWA implemented an annual rehabilitation program in 2015 to address corrugated metal pipe (CMP) storm sewers in critically poor condition using a Cured-in-Place Pipe (CIPP) technology. CIPP is the installation of a resin-impregnated flexible tube, which is inserted into an existing pipe, inflated and cured. The process provides a structurally sound, form fitting, jointless and water-tight new 'pipe within a pipe'. Though the new pipe diameter is slightly smaller than the previous CMP, the new smoother walled and jointless pipe allows for increased performance. Of the more than 41,000 linear feet of CMP inventory located within the SEMSWA Service Area, which includes 350 individual pipe segments, almost 10% were assessed in critical condition. To date, two miles of critical pipe has been rehabilitated with the CIPP program. The CIPP method has historically been used extensively for sanitary sewer, so it is not a new method for extending the life of critical pipe networks. Combining the information about pipe conditions gleaned from both the robotic camera CCTV system and SEMSWA's asset inventory allowed a cost comparison between full replacement with Reinforced Concrete Pipe (RCP) and this much

less disruptive, and lower cost CIPP approach. Staff provided compelling analytical data to SEMSWA's Board of Directors, gaining concurrence with the timely CIPP approach to address critical CMP.

While the CIPP program is managed by the CIP group, the Maintenance and Inspections Division plays a critical role in pre-assessing the pipe system for eventual CIPP lining. During 2018, Maintenance crews verified several utility line intrusion removals and re-videoed pipe identified as critical to verify previous inventories. Crews also removed sediment and debris from several sections of pipe in preparation for the 2019 CIPP Program, including 150 feet of large-arch CMP in Yosemite Avenue just north of County Line Road, and 100 feet of 84-inch CMP in Otero Avenue, also north of County Line and east of Phillips Avenue.



SEMSWA CIP Projects 2018

Completed █
 In Design █

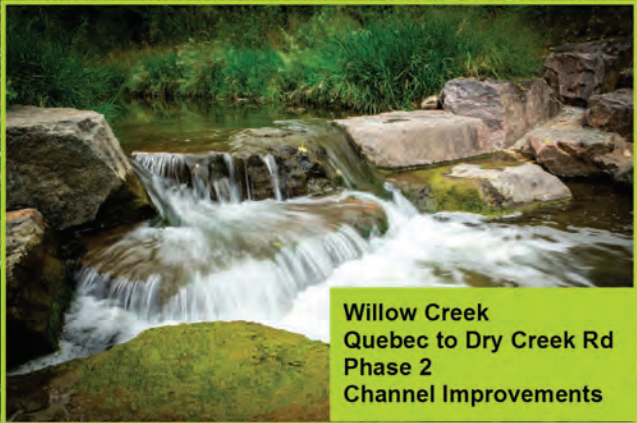


Coal Creek Gun Club Culvert and Channel Improvements

Cherry Creek Iliff to Quebec Channel Improvements

Cherry Creek Iliff Ave Widening Storm Sewer Improvements

West Toll Gate Creek Nameless Trib Mesa Filing 1 Tract B & C Channel Improvements



Willow Creek Quebec to Dry Creek Rd Phase 2 Channel Improvements

Little Dry Creek Downstream of Arapahoe Rd Channel Improvements

Lone Tree Creek S. Tucson Way Outfall Improvements

Piney Creek The Ranches, Phase 2 Channel Improvements

Big Dry Creek Orchard at Franklin Storm Sewer Improvements

Big Dry Creek Easter Ave Channel Improvements

Big Dry Creek Dry Creek at Adams Storm Sewer Improvements

West Spring Creek Channel Improvements

Happy Canyon Creek Green Acres Trib Dove Valley Regional WQ Pond

Cherry Creek Reach 2 Channel Improvements





Floodplain Management Program

Cottonwood Creek Floodplain

SEMSWA regulates City floodplains to a standard recognizing that natural floodplains provide many benefits to citizens, including natural attenuation of flood peaks, water quality enhancement, groundwater recharge, wildlife habitat and movement corridors, and opportunities for recreation. Floodplain management is a comprehensive program of preventative and corrective measures to reduce losses associated with flooding. Floodplain management measures may include land use regulations for new development and redevelopment, installation of flood control projects, flood-proofing homes and businesses, floodplain preservation through easement acquisition, acquisition of flood prone properties, and educational outreach on behalf of the City and County.

In 2018, SEMSWA continued to work with FEMA, the Urban Drainage & Flood Control District (UDFCD), the City of Centennial and Arapahoe County to update the Flood Insurance Rate Maps (FIRMs) by incorporating local flood hazard studies. The mapping is a key step in protecting families, homes, infrastructure, and services against future flood risk. In 2018, SEMSWA provided map information for 20 inquiries requesting assistance in defining floodplain limits on a parcel and what it means to a property owner. If you have any questions about your property in relation to a nearby creek or drainage channel, please call us at 303-858-8844 to receive assistance. Mapping is also available from the FEMA Flood Map Service Center, <https://msc.fema.gov>.

Additional outreach efforts in 2018 provided flood risk information through newsletter articles and direct mailings that reached over 60,000 residents and businesses.

All activities in the floodplain, regardless of impact, need to be permitted so that SEMSWA is aware of the activity, can assess the impact, and review compliance with SEMSWA requirements and City or County Land Use Codes. During 2018, 25 floodplain permits were issued, 23 requests were assessed for floodplain impacts, and 11 requests for modification of a floodplain were reviewed.

Master Planning Program

Master Plans, completed in partnership with UDFCD, are used to guide responsible development by planning for adequate storm drainage infrastructure, and to identify future capital construction projects. Master planning includes the identification of flood hazard areas, classification of regional drainage and stormwater quality improvement opportunities, and recommendations for prioritizing capital construction projects and maintenance efforts. During 2018, the High Line Canal Stormwater & Operations Master Plan was completed, including options for providing local, and potentially, regional water quality treatment.

Master planning for a basin takes various forms, including major drainage way planning, outfall systems planning, alternative analysis, administrative updates, and/or a flood hazard delineation study. Master planning for a basin may take up to three years to fully

complete the planning effort and receive State approval of the flood hazard mapping study. During 2018, five basins, including Cherry Creek, First Creek, SJCD 6100 North, Goldsmith Gulch, and Willow Creek, have studies ongoing. In addition, the Highline Canal continues to be studied. Plans in progress during 2018 include:

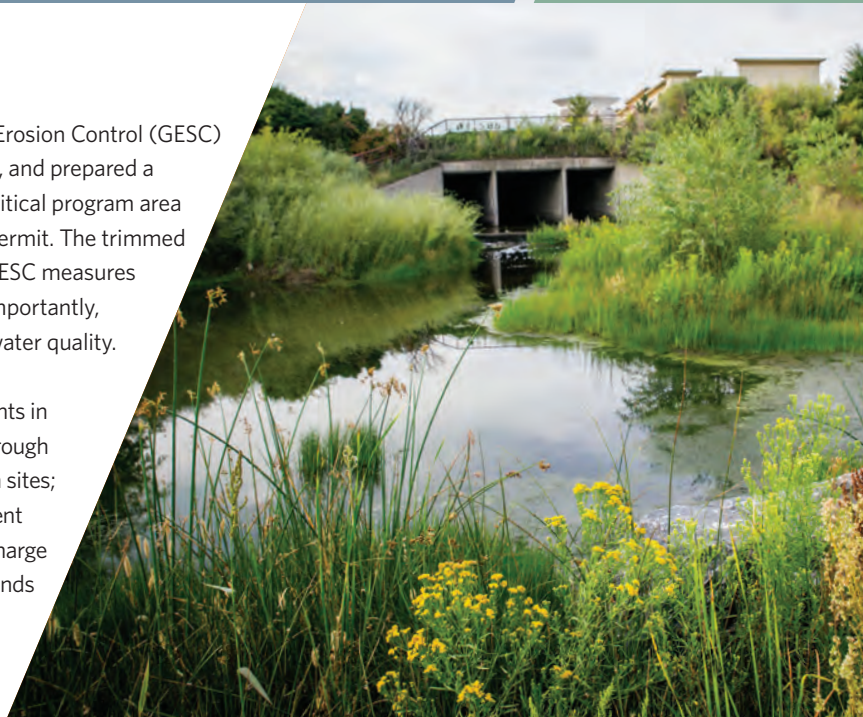
- 💧 SJCD 6100 North, Major Drainageway Plan (MDP) & Flood Hazard Area Delineation (FHAD)
- 💧 First Creek Tributaries (Upstream of I-70) MDP
- 💧 Goldsmith Gulch, MDP & FHAD
- 💧 Willow Creek Tributaries (Upstream of Englewood Dam) MDP & FHAD
- 💧 Cherry Creek Tributaries (Upstream of Cherry Creek Reservoir) MDP & FHAD

Resources Division

During 2018, SEMSWA finalized the updated Grading, Sediment and Erosion Control (GESC) Manual to meet new regulations and streamline permitting processes, and prepared a companion Resource Guide. The GESC criteria assist in regulating a critical program area of SEMSWA's State-issued Municipal Separate Storm Sewer (MS4) Permit. The trimmed 2018 GESC Manual reflects an increased understanding of required GESC measures at land disturbance sites by developers, design engineers and, most importantly, contractors who implement the control measures on behalf of stormwater quality.

In 2018, SEMSWA met the MS4 permit requirements to reduce pollutants in stormwater runoff from residential, commercial, and industrial areas through permitting and inspection of sediment controls at over 210 construction sites; ensuring the proper construction of 17 permanent water quality treatment facilities for new development impervious areas; resolving 29 illicit discharge reports from the public; and sponsoring the safe disposal of 37,000 pounds of household hazardous waste collected via 512 curbside collections.

This Regional Water Quality Pond on Cottonwood Creek constructed by SEMSWA provides water quality treatment for new development in adherence with the MS4 Permit.



Landscaping for Stormwater Quality



A Green Living wall (above) and vegetated swales (below) are two of the infiltration approaches demonstrated, with a path through the demo site to guide visitors to features that promote lot-level control measures.

The SEMSWA office infiltration infrastructure demonstration site continued to be a draw for those interested in maximizing the use of landscaped spaces for pollutant removal and runoff reduction from a site's hardscape areas. In September, SEMSWA hosted a tour for local EPA staff to discuss the challenges of managing nutrients in an urban watershed, upgrades needed to meet new permit limits, and challenges of managing urban non-point sources of pollution in the context of the Cherry Creek Basin. The demo site illustrates the power of lot-level control measures to meet these challenges. In addition, several University of Colorado graduate students visited the demo site when researching their "Green Infrastructure Guide to Downtown Denver" booklet. SEMSWA was one of the agencies noted as promoting green infrastructure and the demo site was one of the highlighted innovative site examples.

Stormwater Quality Public Outreach

In 2018, SEMSWA participated in or sponsored over 16 events that provided an opportunity for the public to learn the role they have in protecting stormwater quality. Also in 2018, over 60,000 residents received our annual stormwater summary mailing insert. Outreach events strengthen the connection between people and their watershed via a combination of public meetings, festivals, classroom & field projects, field tours/workshops, and volunteer events. SEMSWA also sponsored 12 local newspaper ads highlighting stormwater quality.

MS4 Permit Compliance Schedule

SEMSWA met a December 31, 2018 deadline for completing a Program Description Document (PDD) for the purpose of uniformly and consistently implementing the MS4 Permit requirements in the Service Area. SEMSWA has been the MS4 Permit holder on behalf of the City, and has managed the County's MS4 Permit for stormwater discharges to State Waters within the SEMSWA Service Area, since 2008.



During 2018, SEMSWA sponsored and participated in Aurora's Water Festival, Walnut Hills neighborhood National Night Out, and local EPA staff tour of Cherry Creek.

Re-balancing Piney Creek



Reclaimed Piney Creek reach

SEMSWA is excited to report the completion of channel projects necessary to re-balance Piney Creek, a sandy tributary to Cherry Creek. The 2018 work finalized a three-year, \$15 million capital construction effort to restore stream health and safe conveyance of flood flows. The projects mitigate the existing erosion, return flood carrying capacity of the stream, and minimize future sediment transport to the Cherry Creek Reservoir. Over the years, the balance between the natural stream and the development in the vicinity for the creek has shifted. Before the area was developed, the stream was free to meander to maintain and balance its' carrying capacity for storm events. As development occurred, roadways and structures restricted and removed the natural balance it had achieved. Upstream erosion caused by the higher volume of water coming off these new impervious surfaces provided an excess supply of sediment that the

creek did not have the capacity in its channel to carry downstream due to the restrictions. Because the stream environment was out of balance with the load of sediment it had to carry, the flow capacity of the creek was reduced, leading to increased frequency of flooding outside of the natural channel. Flooding along Piney Creek was a regular occurrence, and most recently, very close to several homes in the June 2012, September 2013, and June 2015 major storm events.

In order to correct the flooding problems caused by sediment deposition, two issues were the focus of the expedited three-year capital construction effort: the sediment in the creek had to be removed, and the upstream sediment supply had to be reduced by stabilizing the channel. A sediment survey was conducted that indicated sediment removal would need to be a

regular occurrence while channel improvement projects were constructed, and even into the future after stabilization was completed in order to account for the typical sediment movement in sandy Piney Creek. To address the upstream sediment supply, a Piney Creek Geomorphic Assessment and Conceptual Design Report (Stantec, 2014) was completed that provided a path to the re-balance of Piney Creek. The recommendations in the Report served as guidance during the design and construction of six channel improvement projects during the period 2015 to 2018 that addressed the sediment supply problem and rebalanced the stream: Piney Creek at Liverpool Channel Improvements; Piney Creek at The Ranches (Reach 6) Channel Improvements (Phases 1 & 2); Piney Creek Upstream of Caley Drive Channel Improvements; Piney Creek At Tower Road (Reach 5) Channel Improvements (Phases 1 & 2).



Construction of a grade control structure in Piney Creek to stabilize the stream, resolve the sediment supply problem, and mitigate localized flooding.

Administration Division

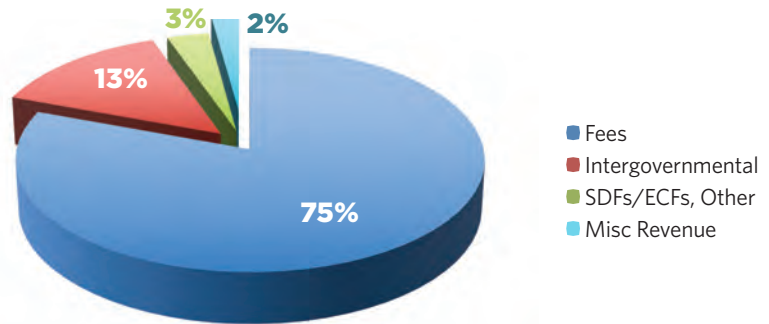
SEMSWA Financials

SEMSWA is a political subdivision and a public corporation of the State, formed pursuant to Section 29-1-204.2 of the Colorado Revised Statutes. SEMSWA is an enterprise activity that is financed by fees based on the amount of runoff each property contributes to the storm sewer system, calculated from the amount of impervious area (e.g. roof, driveway, parking lot) and density.

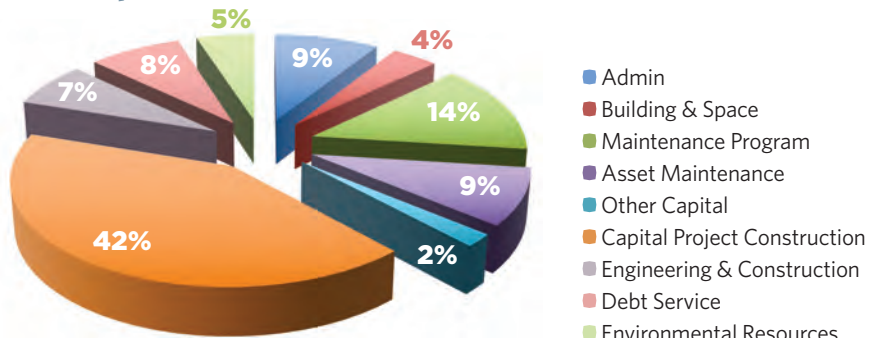
SEMSWA's purpose is to plan, fund, construct, and maintain drainage and flood control facilities within the service area. The SEMSWA Board has set fees to provide sufficient funds to effectively and efficiently convey flood flows, protect water quality, and meet State and Federal regulatory requirements. Property owners can find more information about the fee calculations at www.semswa.org

The charts show 2018 revenue and expenditure percentages. Revenues for 2018 were typical for any given year. Expenditures for 2018 were typical with the exception of the maintenance category that shows an increase resulting from a better understanding of the level of service needed, and the capital construction debt service category showing the initial annual repayment of the loan to complete Piney Creek improvements. Large capital projects rely on funds accumulated over several years, such that expenditures may be higher than revenues for any given year, as was the case in 2018.

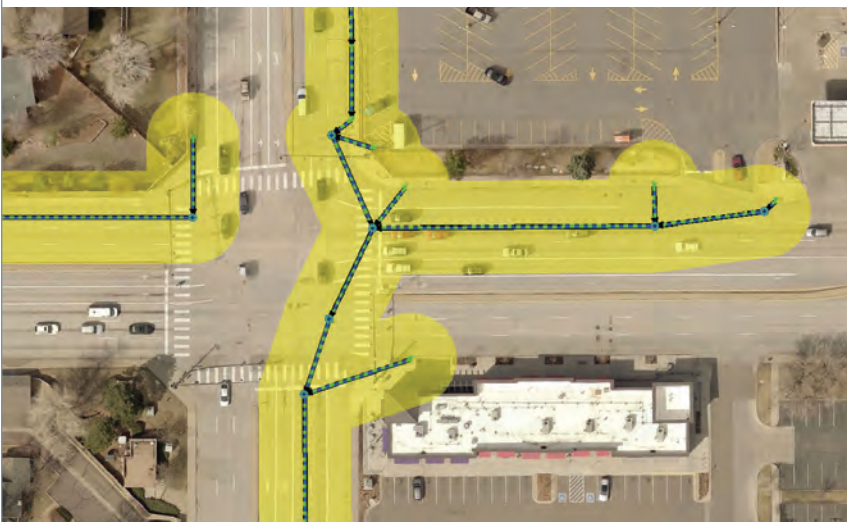
2018 Revenue (\$14,623,728)



2018 Expenditures (\$16,057,179)



GIS/IT Solutions



Storm pipes with 30 ft. buffer, which is our "811 Service Area". Any location within a 150 ft. of this highlighted area will trigger an 811 ticket to SEMSWA. The 30 ft. buffer is a major reduction from the 250 ft. that was the previous requirement.

SEMSWA's GIS/IT group continued data, hardware, and software systems support for the organization, including "enterprise" software administration, mapping stormwater facilities and assets, mobile inspections, maintenance and capital projects support, website administration, and map requests. A highlight accomplishment involved Colorado 811 legislation (SB18-167) and its direct impact on SEMSWA and other stormwater management agencies. SEMSWA's GIS Manager and Executive Director successfully advocated for reduced buffering to minimize the cost implications of complying with the new law. In late 2018, SEMSWA submitted a Tier 1 membership application to Colorado 811, which is proving to better protect stormwater infrastructure related to development activity and utility boring projects in the area, while keeping associated administrative costs under control.

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The completed Willow Creek, Quebec to Dry Creek Channel Improvements project included stream stabilization, bank protection, and a grade control drop structure to protect a sanitary sewer line.

SEMSWA is a legal entity formed through an intergovernmental agreement between Arapahoe County, the City of Centennial, Arapahoe County Water and Wastewater Authority, East Cherry Creek Valley Water and Sanitation District, and the Inverness Water and Sanitation District. The SEMSWA service area covers the City of Centennial and unincorporated Arapahoe County as far east as Coal Creek. SEMSWA, which is also an Enterprise, provides the resources and funding to protect people and property from flooding while also complying with water quality regulations.



SEMSWA 2018 Board Members, Representation, and Contact Information

- Jeff Baker, Arapahoe County, jbaker@arapahoegov.com
- Nancy Sharpe, Arapahoe County, nsharpe@arapahoegov.com
- Ron Lambert, Special Districts, ron@lambertMRE.com
- Bart Miller, Chair, City of Centennial, bart.miller@state.co.us
- Carrie Penalzoza, City of Centennial, cpenalzoza@centennialco.gov
- Ron Weidmann, City of Centennial, rweidmann@centennialco.gov
- Kathleen Conti, Arapahoe County Alternate, kconti@arapahoegov.com
- Matt Sturgeon, City of Centennial Alternate, msturgeon@centennialco.gov

This annual report is an informal compilation of activities to provide a continuing history of our program area achievements.