

# Under The Pavement

## *Streets At SouthGlenn Development Puts Stormwater Management Under Asphalt Parking Lots*

Should credit or blame be placed on the designer of the original enclosed shopping mall, an essential of every modern community in the 1970s? These massive, permanent structures of block and mortar with asphalt parking lots and concrete sidewalks got their birth in the early 1950s as Americans began forsaking the inner city for suburban living. In 1956, Southdale Mall opened in Edina, Minnesota, becoming the first enclosed, climate-controlled, two-story regional shopping mall in America. Southdale's architect, Victor Gruen, is generally recognized as the visionary who not just brought retail outlets together, but in fact created an entire new concept of marketing. For Gruen, that was little compliment, since his true vision was a sense of community – with residences, schools, offices and hospitals – that was far from realized. Yet the public quickly made Southdale a commercial success, and developers followed the “build it and they will come” trend so faithfully that more than 40,000 similar complexes were built across the nation over the next 30 years.

“Big box” retailing and online shopping speeded the decline in popularity of the venerable malls in the 1990s, making them a primary focus of some kind of redevelopment. In many cases, the solution has been complete demolition of all or almost all existing structures and pavement followed by new development of mixed-use communities, not surprisingly much as Gruen had imagined. With acres of impervious pavement and minimal concern for runoff, the old malls greatly con-

tributed to localized street flooding. Redevelopment requires that stormwater management be incorporated throughout the site, something that in most cases was never in place before or was absurdly inefficient by today's standards.

Currently under redevelopment in Colorado is the old Southglenn Mall, which opened in 1974 on 77 acres at University Blvd. and Arapahoe Rd. in unincorporated Arap-

ahoe County. In the 1990s, growth in nearby areas began drawing potential retail sales and tax revenue away from the mall. Overall, the area wasn't conveying a strong identity or an image of quality, so when Chicago-based Walton Street Capital purchased the property in 1999, it immediately began exploring redevelopment options. When City of Centennial was formed in 2001, the Southglenn property was included



*The Streets At SouthGlenn is a mixed-use redevelopment of the former Southglenn Mall by Greenwood Village-based Alberta Development Partners LLC.*





*Fiore & Sons nears completion of excavation of Basin 1. Arapahoe Utilities & Infrastructure has already begun installing the rubber membrane liner and placing rock and StormTech chambers, background.*

in the incorporation. The property was sold to Greenwood Village-based Alberta Development Partners LLC in 2005, and discussions with the City regarding zoning and development requirements for a high-end, mixed-use project got serious. In

November 2005, City Council rezoned the property, created Centennial Urban Redevelopment Authority and proposed formation of Southglenn Metropolitan District after approving a detailed service plan that defined the services the District

would provide and the powers it would have. It would take the property owners to vote Southglenn Metropolitan District into existence, which they did. The service plan allows the District to raise up to \$85 million for public infrastructure improvements through the sale of bonds.

“Metropolitan districts are a common tool in Colorado for financing the public infrastructure portions of large development projects,” explains Tareq Wafaie, a planner with URS Corporation, which has provided planning services to City of Centennial since its incorporation. “Metro districts have the power to impose an additional property tax mill levy within their district, and to sell general obligation bonds secured by the property tax to finance improvements for transportation, flood control, utilities and other needs deemed for the good of the general public.”

Alberta Development Partners was ready to create a modern and lasting mix of retail and residential development that would be a regional shopping destination to many and home to others. The company has a long list of successful similar projects, including Southlands in



*StormTech chambers are placed six inches apart on 2 1/2 feet of 1 1/2-in. rock spread on a nonpermeable rubber liner. Rock is placed and rough graded by wheel loaders and skid steers. Isolator row can be seen wrapped in fabric and with the chamber end cap installed.*



the Denver metro area. Each destination is varied and vibrant with upscale retail and restaurants intertwined with complementing residences all within an outdoor environment of parks and promenades.

Construction is well underway on around 1.1 million sq.-ft. of retail space and 125,000 sq.-ft. of office space, along with 200 for-rent residential units. The Streets at SouthGlenn will be home to the Commons, a block-long park which will feature a grand fountain and fireplace, mature landscaping, lush gardens and a playground. It will be accented by a splendid outdoor café, dedicated pedestrian plazas and promenades featuring European fountains.

“The Streets at SouthGlenn will energize the area by providing distinctive shopping, dining, working, and living experiences,” says Don Provost, principal of Alberta Development Partners. “We’ve brought together leaders in architecture and design to create a regional, mixed-use shopping destination with local culture and universal appeal.”

Stormwater management on the site incorporates the latest in subsurface technology to collect, treat and slowly release runoff. To design the development’s stormwater system, along with its water distribution and sanitary sewer systems, Alberta Development Partners brought in CLC Associates Inc., a Greenwood Village-based company that partnered with the developer on both the Southlands and Northlands development projects over the past few years.



*Kael Blair, project supervisor for Arapahoe Utilities & Infrastructure, center, poses with Jim Heintz, left, and Mark Kaelberer of Advanced Drainage Systems beside one of ten ADS water quality units being installed on The Streets At SouthGlenn.*

“With locations and elevations of the new structures set,” explains CLC Project Engineer Tiffany Watson, P.E., “we began the process of determining drainage patterns on the site. We were able to create low elevation points under parking areas where stormwater collection basins could be installed. Once the basin locations were identified, we designed the collection systems to feed each basin, working with Xcel Energy, Qwest Communications, Comcast and others to avoid conflicts. Each collection basin needed to be able to handle a 10-year storm event.”

Six collection basins of varying capacity were designed for the development. Excavation was performed and rubber membrane liners

were installed at each basin site at varying depths below final pavement elevation. Rock sized between 3/4- and 1 1/2-in.-diameter was placed on the liner at a depth of 12 inches and molded polypropylene chambers were placed side-by-side, six inches apart, as part of StormTech LLC’s subsurface stormwater management system. With the chambers installed, wheel loaders and skid steers placed more rock on the chambers, filling between them and covering them with another 12 inches. Permeable geotextile was placed over the rock to allow water but not sediment into the basin before soil was backfilled and brought to grade and density for asphalt paving. What is created below the parking lot is a 4 1/2-ft.-



*AUI crews set manhole at The Streets At SouthGlenn. At right, SEMSWA Inspector Amber Law checks sediment build-up at one of the site’s temporary detention ponds for erosion control during construction.*





deep water-tight basin that has the capacity to store runoff. While the rock has a void, or storage capacity, of 40 percent, the 2 1/2-ft.-tall chambers have a 100 percent void. Together, each basin can absorb the 10-year storm event and release it downstream at a controlled flow rate.

“The StormTech system is de-

signed to accommodate a wide range of site restraints and install quickly, streamlining basin construction,” explains Mark Kaelberer, Colorado-based sales representative for Advanced Drainage Systems Inc., supplier of the subsurface stormwater management system. “The injection-molded chambers are light yet strong with a corrugated arch design that is proven for structural integrity. The system is ideal for low-rise, wide-span installations such as beneath parking areas, keeping excavation and backfill costs to

a minimum.”

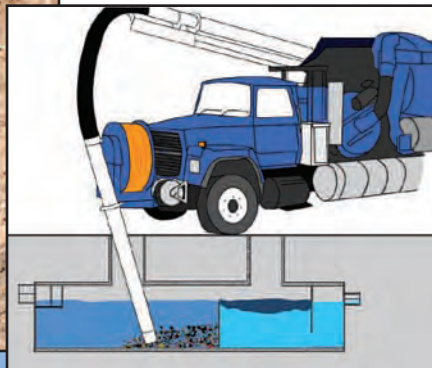
ADS, the world’s largest producer of HDPE corrugated plastic pipe, serves the stormwater drainage industry through a global network of over 42 manufacturing plants and over 30 distribution centers. In addition to pipe, the company manufactures 16 standard HDPE Water Quality Units and provides a complete line of fittings and other accessories, including StormTech® products, Nyloplast® drainage structures and a variety of geotextiles. At South-Glenn, a combination of products were incorporated to complete the development’s stormwater management system.

“Runoff is collected at various points and channeled to one of the six basins,” Kaelberer continues. “Before it enters the basin, it passes through an ADS water quality unit to separate out sediment and oils normally associated with the ‘first flush.’ The water quality units also incorporate the use of a bypass system, which prevents resuspension of captured solids.”

After flow passes through the water quality unit, it enters StormTech’s patented design for enhancing the removal of total suspended solids. Known as the Isolator™ Row, the first row of StormTech chambers is surrounded with filter fabric. Water rises in the Isolator Row and passes through the fabric through perforations in the chamber side-walls as well as through its open bottom. Solids that make it through the water quality unit are captured inside the Isolator Row, protecting the adjacent storage chambers and rock from loss of capacity due to sediment accumulation.

“The Isolator Row is designed to reduce the cost of maintenance by capturing suspended sediment in just one row of the basin,” says Kaelberer. “Maintenance is accomplished through high-pressure jetting of the row, forcing sediment into the adjacent upstream manhole or basin where it can be vacuumed out.”

“The old mall had almost 1.2



*ADS water quality unit is in place adjacent to manhole while AUI crews continue placing RCP.*





Infrastructure development team for *The Streets At SouthGlenn* includes, from left, Bob Christensen, URS Corp., Brett Sollee, Tiffany Watson and Kurt Mahnken, CLC Associates, Tareq Wafaie, URS and Jon Heimbach, Alberta Development Partners.

million square-feet of parking and only four storm sewer inlets," Watson adds. "Flooding on University and Arapahoe was pretty common."

So common in fact that City of Centennial, along with CDOT, will be completely reconstructing the storm sewer infrastructure as part of safety improvements at the intersection of University Blvd. (SH 177) and Arapahoe Rd. (CR 42). Raised medians will improve pedestrian safety as well as vehicle movements into and out of The Streets At SouthGlenn, and while the work is being done, new storm sewer will be installed from Vine St. on the west through the intersection to a new outfall that will discharge into two new detention ponds before reaching Big Dry Creek.

"Roadway drainage at the inter-

section will flow through a new pipe," explains Kurt Kellogg, P.E., with Felsburg Holt & Ullevig, City of Centennial's consulting engineers on the transportation improvement project. "Most of the drainage from The Streets At SouthGlenn development will tie into the new trunkline and outfall into the new ponds in the Big Dry Creek drainage. The western part of the development drains west to Slaughterhouse Gulch, and the City is already underway installing upgrades to those storm sewers. The TIP construction will begin this summer."

The intersection safety improvements have been on the books for several years, but never gained funding. City of Centennial took the lead, accelerating the project due to the private development occur-

ring. With CDOT's participation and oversight, Centennial officials plan to have their project's conclusion coincide with the development's completion in summer 2009.

"The Streets At SouthGlenn is an important project for the City," explains Mike Connor, Assistant City Manager for Centennial. "Citizens are anxious to again have some of the best shopping options in the region nearby, but it will also be much more. The entire area will be rejuvenated and citizens and businesses nearby will hopefully see their property values rise. Just as importantly, the City of Centennial will demonstrate that it is a progressive city that is steadfast in its commitment to responsible economic development." ●

# Infill Developments Pose Greatest Challenges For Runoff Management

Shopping malls – most, if not all – were specifically constructed so that shoppers could avoid the congestion and hassle of “downtown,” with ample, to say the least, parking. As society’s lifestyles and shopping habits have changed over the last decade, many malls have experienced a decline in customer traffic that has resulted in a loss of tenants. The typically large parcels of land become viewed as under-utilized property, and sooner or later are evaluated for redevelopment. When these sites are surrounded by existing development, they are known as “infill” sites, and it is often the surrounding development that places the strictest limitations on the site’s metamorphosis.

“Infill sites present great redevelopment opportunities but usually have unique challenges,” says Kurt Mahnken, P.E., former senior vice president and director of engineering



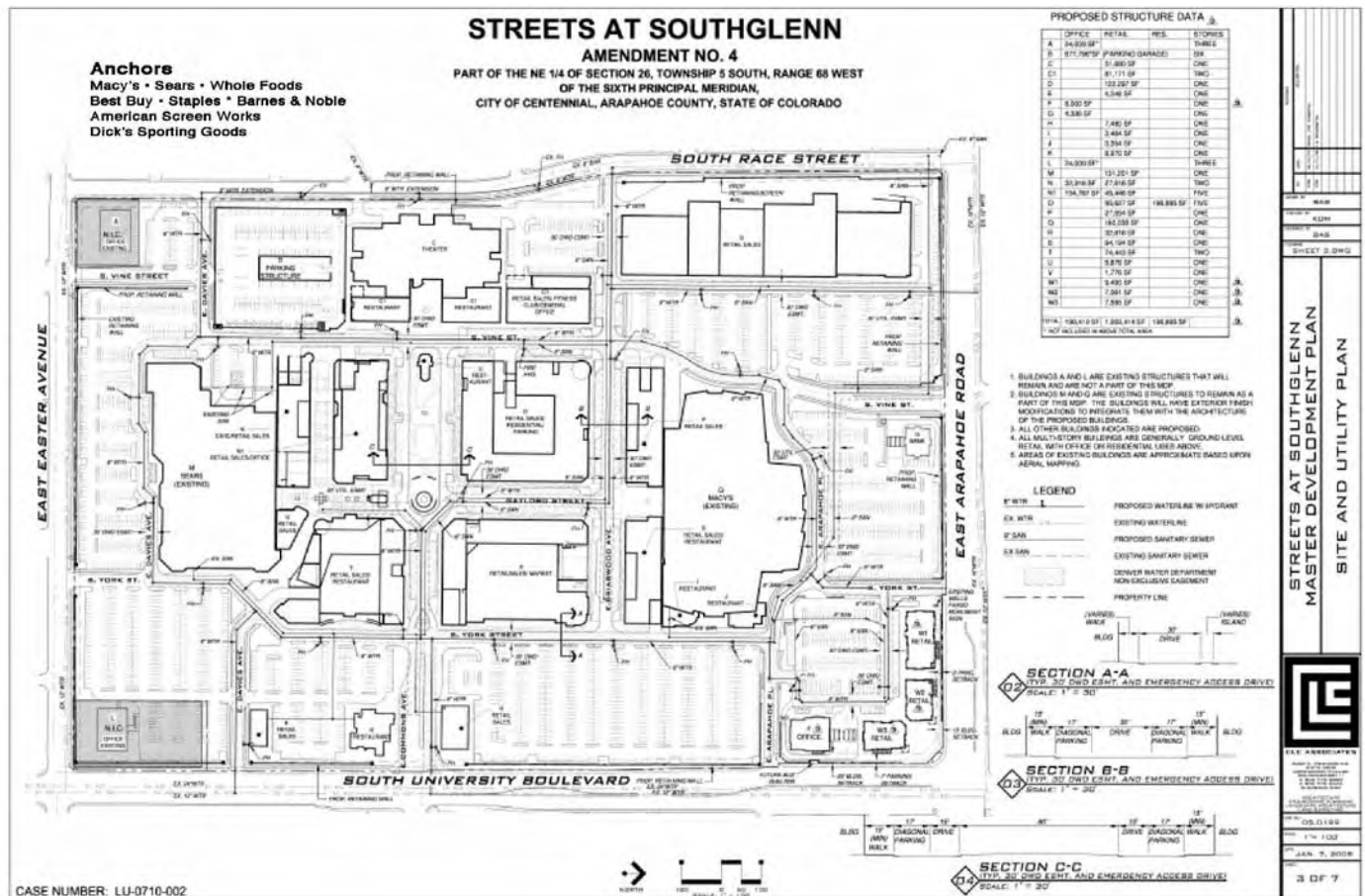
StormTech chambers are installed with rock and a rubber liner to create shallow basins that can store runoff. The rock has a 45 percent void, the chambers have a 100 percent void.

and one of the founding principals of CLC Associates. “Stormwater management can be particularly challenging, as it has been on The Streets At SouthGlenn.”

CLC Associates, based in Greenwood Village and with regional offices in Phoenix, Salt Lake City and Spokane, has been in charge of developing the master plan for

the mixed-use redevelopment of the former Southglenn Mall for the property’s owners, primarily Alberta Development Partners LLC. The two firms have partnered on other recent projects in the Denver area, including Southlands and Northlands. While those projects were/are new construction at the leading edge of development, The Streets At SouthGlenn is, by definition, an infill site, and CLC was challenged to make the new infrastructure work with the existing infrastructure of the surrounding development.

“The Streets At SouthGlenn typifies the complexities of infill development,” Mahnken explains. “Such a large site really needs to be entirely developed at the same time in order to make infrastructure improvements affordable as well as effective. Stormwater runoff is Federally-mandated for quality, and quality is commonly achieved through



CLC Associates created the Master Development Plan for The Streets At SouthGlenn for owners Alberta Development Partners LLC. Both firms are based in Greenwood Village.





Chamber installation is a quick and easy one-at-a-time process.

onsite detention and slow release, but land available for runoff detention is hard to come by. Making such accommodations almost always requires some kind of trade-off.”

Conceivably, trade-offs can affect the economics of a project to the point that the potential return on investment is not worth the risk. CLC’s responsibility was to devise a solution that would be acceptable to all stakeholders. Because the site had minimal stormwater collection and conveyance to begin with, redevelopment would require designing and installing a complete system of stormwater management infrastructure.

“The west half of the property has always drained to the west and the east half to the east,” Mahnken continues, “and we couldn’t change historic runoff patterns. But runoff from the old shopping center traveled overland – there was no real connection to the surrounding storm sewers. So understandably, the existing storm sewers were not large enough to handle the maxi-



imum peak flow that the redevelopment would create because they were not designed to do so in the first place.”

Moreover, there is little change in elevation from the redevelopment to the surrounding stormwater infrastructure. This meant that the depth of detention ponds constructed was limited to maintain gravitational flow off the site, necessitating greater surface area for detention capacity and even less gross leasable area for the developer.

Mahnken and the CLC design team investigated subsurface deten-

tion systems, hoping to keep the basins shallow yet provide enough storage capacity by increasing square footage. They found what they were looking for from Storm-Tech LLC, a Connecticut-based manufacturer that produces a system utilizing polypropylene chambers that is ideal for installation under parking lots.

“We tried to design a customary, conventional, onsite, aboveground system of detention,” says Mahnken, “but the site would not have penciled. We looked at RCP, but the large diameter needed would have



Isolator rows can be seen in these pictures of two different basins. Low flows, including the first flush, are forced into the Isolator Row, which traps sediment as flows to the basin pass through its fabric. Black HDPE pipe seen at left connects to chamber end cap to allow heaviest flows to bypass the Isolator Row and relieve inlet backup. Corrugated metal is set to block the rock so that a light pole and its base can be installed after the parking lot is paved, background at right.





*Non-woven filtering geotextile is placed over the rock-covered chambers, allowing water into the basin but not sediment. Nyloplast drain basin, right, will be capped with a ductile iron grate to create an inlet.*

made detention lower than the discharge point. We were immediately attracted to StormTech's system due to its shallow nature and ease of installation."

Designing the basins to handle the required volume for a 100-year storm event was quickly determined to be a deal breaker, so CLC re-evaluated the realities and proposed a system to City of Centennial that would efficiently control and treat 10-year events.

"By managing 10-year events," Mahnken says, "the system would provide benefit for over 95 percent of all storms. With the 10-year system in place, and with less imperviousness of the new development, runoff volumes from a 100-year storm will certainly be no worse than historically after redevelopment."

The City agreed and accepted the design, as did Alberta. Arapahoe Utilities & Infrastructure Inc. is

installing the stormwater system along with water and sanitary sewer utilities. Excavating contractor Fiore & Sons Inc. is performing sitework, including excavation of the six approximately 4 1/2-ft.-deep detention basins.

"The biggest challenge has been keeping the existing stores open," explains AUI Project Manager Kevin Rabold. "We had to do quite a few temporary relocations to keep the utilities in service. It's certainly not like working in an open field."

ADS provided everything for construction of the detention basins except the liner and rock, including the system chambers and end caps, water quality units, geotextiles and Nyloplast ductile iron grates and PVC basins. Colorado Lining Inc. provided the liner and Lafarge provided 6400-cu.-yds., or 16,000 tons, of rock for the different-sized basins, which combined will provide 240,633-

cu.-ft., or 1.54 million gallons, of storage. A total of 2739 chambers will be used along with 134,000 sq.-ft. of impermeable liner and 260,000 sq.-ft. of non-woven, filtering polypropylene geotextile. AUI is also installing 16,000 feet of 4-in.-diameter PVC and RCP up to 42 inches in diameter, with 80 man-holes and 75 inlets.

"The StormTech system has been simple to install," Rabold adds. "The chambers are really strong and did not deflect at all under the weight of the rock and heavy equipment."

"The City's willingness to partner with the developer is what has made The Streets At SouthGlenn possible," summed up Mahnken, a C.U. graduate with a water resources and land development background who recently retired from the day-to-day operations at CLC but plans to remain closely involved in selected projects. "They were willing and open to meeting weekly to work out technical issues. We have designed the stormwater management system on empirical data, so it will be interesting to really evaluate the overall efficiency of the system, which we have complete faith in. The project should serve as a great example for future stormwater management projects." ●



*Reinforced concrete pipe and manholes await installation at The Streets At SouthGlenn. Firebaugh Precast supplied the manholes and Rinker Materials supplied the RCP.*



## Alberta's Investment In Colorado Quickly Approaching \$1 Billion

Similarities are right there among the many differences. Establishing community is the first objective of all modern mixed-use developments by Greenwood Village-based Alberta Development Partners LLC. How it's achieved is never the same.

"We tell people we're not just building a 'Town Center,'" explains Bryan McFarland, Alberta's principal in charge of development, "we're building the center of town."

The first of Alberta's modern "lifestyle center" developments completed in the Denver metro area, Southlands at E-470 and Smoky Hill Road in Aurora, was constructed in four phases between October 2003 and October 2006. Three more very similar yet very different large, mixed-use/retail developments – The Streets At SouthGlenn, Northlands and Cornerstar – are set for completion over the next few years, clearly showing Alberta Development Partners to be very bullish on its home state.

What the developments have in common is a return to traditional values by restoring a sense of place for shopping and entertainment. Gone are the enclosed malls and their massiveness: massive size, massive imperviousness and massive operational and maintenance costs. By including office and residential space among a full spectrum of retail, a sense of community is fostered. Alberta's developments are planned to create a core where there's never before been one.

"Southlands features a modern main street with a classic movie theatre, premier

retailers and restaurants and unique boutiques," says McFarland. "The Town Square at the north end of Main Street offers a large pop jet fountain, farmer's market and seasonal entertainment, making it a great, casual place to spend time."

A mix of architectural design gives each structure its own identity, helping to draw customers inside, something that was limited to only storefronts in the old malls. Together, the different design elements create a unique overall environment. While the developer can execute the design, it's up to residents in the area to create community by adopting the development as their own.

"We help to 'activate' our developments to bring people together there," McFarland continues. "At Southlands, we subsidize events like 4th of July fireworks and Christmas tree lighting, and provide a venue for events linked with nearby Cherokee Trail High School. This does much more than create one-time traffic for businesses; it helps make Southlands the place to be."

Where each development differs starts with what has to be done just to "pad the site." Relocating utilities, improving vehicle movements and pedestrian safety and

controlling stormwater are development costs that can make or break a project.

On the 300 acres at Southlands, Alberta had to excavate about 4 million cubic-yards of dirt to deliver the pad and create primary detention. At 158-acre Cornerstar, modifying the Cherry Creek floodplain was necessary. For 132-acre Northlands, improvements to Preble Creek involved constructing a 10-ft. by 10-ft. conveyance structure that bisects the entire site to allow the historic storm flow to pass through the site.

The Streets At SouthGlenn is Alberta's first foray into underground stormwater management. How to handle drainage issues on the 77-acre infill site was identified early on as a big challenge, with parameters making going underground the only real economically-viable solution.

"The Streets At SouthGlenn sits on the crest of two basins," explains McFarland. "We could not allow any cross-basin drainage, so creating individual detention structures with discrete outflows was an ideal solution. Our project team linked creative thinking with engineering principles to design not only the most cost-effective solution, but in fact the only solution. It required working with the City of Centennial and the Southeast Metro Stormwater Authority to make it a reality, and we certainly appreciate their cooperation and vision." ●



*Southlands' Main Street offers more than 150 retailers, restaurants and second floor office suites.*









THE STREETS AT  
SOUTHGLENN



ALBERTA  
DEVELOPMENT  
PARTNERS, LLC



City of Centennial



CLC ASSOCIATES



Arapahoe Utilities  
& Infrastructure, Inc.





## Streets At SouthGlenn Project Marks Centennial's Coming Of Age

Colorado's youngest big city, Centennial, has the distinction of being the largest city incorporated in U.S. history. Residents took the matter into their own hands as sections of unincorporated Arapahoe County were being seriously eyeballed for annexation in the late 1990s. The quest for their own city took almost two and a half years, but residents came together and voted to incorporate City of Centennial in September 2000. Everything became official on February 7, 2001, after Centennial's first public officials were elected. Now, beginning its seventh year, the statutory city is taking major steps toward establishing its home-rule charter.

"Centennial is what's known as a Mayor/Council-style statutory city," explains Assistant City Manager Mike Connor. "This classification is the first step in becoming a home-rule city. We've established a solid foundation of government while learning what's important to our citizens when it comes to providing services for the public good. City officials have worked to structure operations that will respond directly to demands, and that is reflected in the draft City Charter that will be voted on by citizens later this year."



*ADS water quality unit is installed in one of the development's subsurface detention basins.*

There have been a lot of changes over the last year and plenty of new faces. Connor himself is looking forward to celebrating one year with the City next month. What has worked for Centennial as it has matured is contracting with others to provide services, with 100 percent cost recovery from use taxes and fees on those services. The City now is well on its way to assuming many of those responsibilities with its own employees.

Naturally, order and revenue are important to a city in its infancy, so it was critical to develop planning operations, set development fees and establish procedures for permitting immediately. URS Corporation was hired to provide land use services and has done so from the City's very first days. URS helped

set a schedule of development and land use fees, understanding that those fees needed to facilitate economic development and not deter it. Specific fees collected would pay for corresponding contracted services.

"URS has done a great job providing planning and urban design services, engineering design review and construction inspection," Connor says. "Their resources are huge. A new city's, of course, are not. There is almost a trend toward privatization of municipal engineering services, but Centennial has always felt an obligation to bring planning and land use services in-house, and we have assumed those responsibilities beginning this year."

When The Streets At SouthGlenn was proposed in 2003, studies began to determine necessary infrastructure improvements in the localized area, spurred by the development but necessary also to improve existing inefficiencies, such as pedestrian safety and traffic management. Utilities were also a primary concern, and for the City, that meant stormwater management. Southglenn Mall was a poster child for storm runoff causing street flooding and that, coupled with more stringent stormwater quality discharge regulations, was seen as an



*StormTech chambers are quickly and easily handled and installed without any extensive training or special equipment.*







*StormTech's system allows basins to be sized to fit specific areas. At SouthGlenn, there are six separate basins.*



important engineering challenge.

"The developer is required to control runoff to its historic levels," Connor explains. "But the City has to be able to accommodate those flows once off the site, which historically has drained to both Slaughterhouse Gulch on the west and Big Dry Creek on the east."

"Since there was virtually no stormwater management on the old development," says Bob Christensen, P.E., senior water resources engineer for URS who has been involved with Centennial since 2006, "existing storm sewers in the streets around the mall were not constructed to handle flows from the property. Runoff eventually made it into the street where inlets were often backed up. Stormwater collection and treatment was mandated on the developer, but the City's infrastructure had to be able to accept the increased volume and convey it safely into a natural drainage out-

fall without significantly increasing flow rates downstream."

Transportation improvements at the intersection of University Blvd. and Arapahoe Road would create additional imperviousness and therefore, runoff, but the street reconstruction would also allow for stormwater conveyance capacity to be upgraded as well. Stormwater improvements designed into the TIP include the construction of two detention ponds to control flows and improve water quality into Big Dry Creek. The project is expected to begin this summer. For drainage from the west portion of the new development, improvements in the Slaughterhouse Gulch drainage are already underway.

While URS' contract with the City expired on December 31 of last year, the firm continues to provide services on The Streets At SouthGlenn project for CURA. Completion of all infrastructure im-

provements around the new development is expected to coincide with the new development's completion.

"The Streets At SouthGlenn is fantastic for Centennial as we move forward," Connor concludes. "The project will maximize land use and revitalize two original anchors, Macy's and Sears, who have remained dedicated to the site during a decade of uncertainty for the area. The only way to really get an urban infill project like this done is to approach it in its entirety, and Alberta Development Partners has been willing to make that investment and has structured its plans accordingly. Common goals for the common good have resulted in cooperation and synergy on The Streets At SouthGlenn. You can't blame us for being excited. This is really going to be a dynamic environment." ●



*Henderson-based Scott Contracting is upgrading storm sewer under Arapahoe Rd. west of Race St. for City of Centennial.*



## With Its Ducks In A Row, SEMSWA Has Energy For Tasks Ahead

They knew the job was daunting when they took it. Implementing stormwater management in a fast-growing urban environment that has previously had few coordinated programs is an immediate battle on many fronts. To get efforts and objectives defined, Southeast Metro Stormwater Authority looked to Urban Drainage and Flood Control District.

“Stormwater must be managed for the common good,” states Monica Bortolini, P.E., SEMSWA’s Floodplain and Master Planning Program manager. “The value of property, health of the environment and quality of life are directly related to how we manage stormwater. UDFCD has championed the cause of urban stormwater since 1969.”

SEMSWA was formed in September 2006 via an Intergovernmental Agreement between City of Centennial, Arapahoe County, Arapahoe County Water and Wastewater Authority, East Cherry Creek Valley Water and Sanitation District and Inverness Water and Sanitation District to protect people and property from flooding, comply

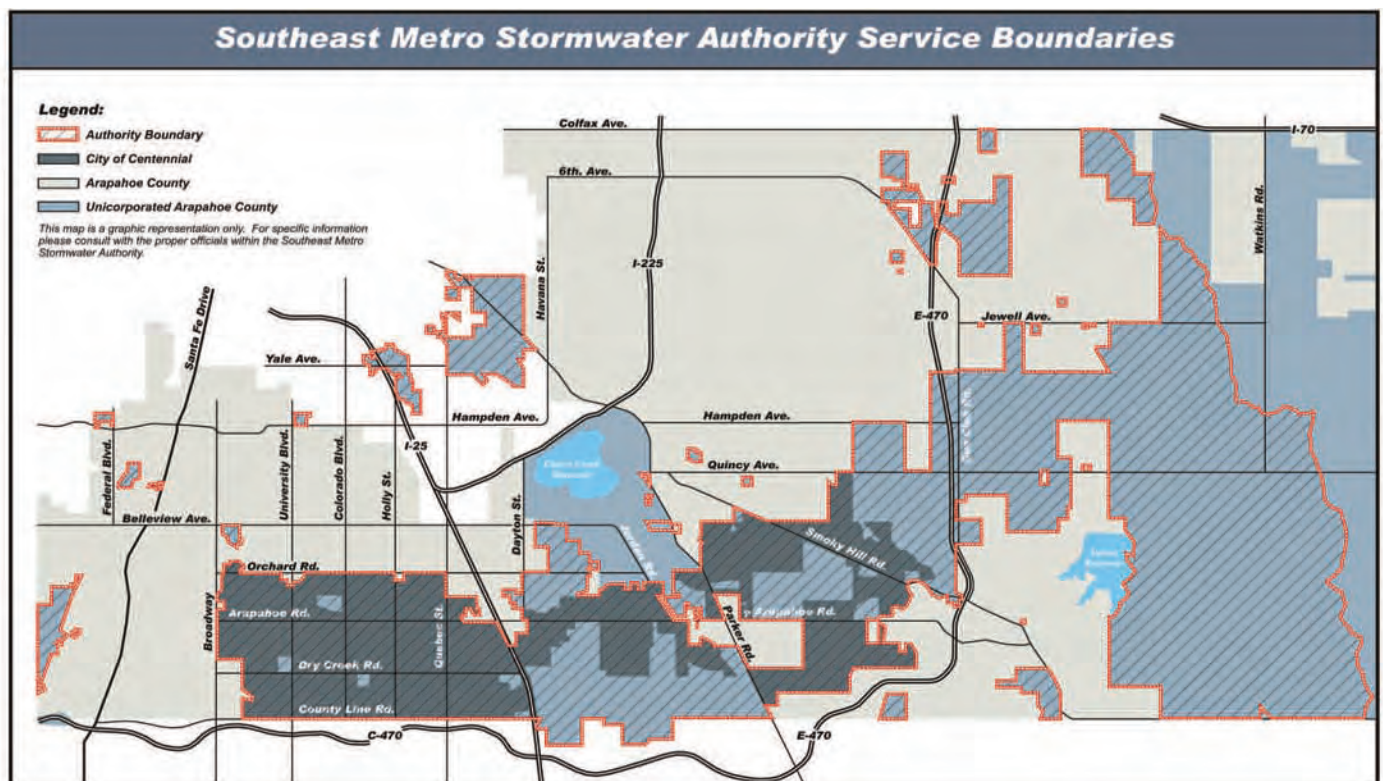
with Federal environmental regulations and provide a funding mechanism so that stormwater services can be performed. Following the organizational set-up of Urban Drainage, SEMSWA established programs with their own budgets to organize and prioritize services provided. To guide implementation of each program, SEMSWA utilizes both City of Centennial and Arapahoe County Storm Drainage Criteria Manuals, adopted in 2007, as well as Urban Drainage’s *Urban Storm Drainage Criteria Manual*, which has been considered successful because the policy, planning and design aspects enable multi-means, multi-purpose efforts that are generally supported by data.

SEMSWA began billing for stormwater services in January 2007. Fees fund efforts to address critical needs in construction, remediation and maintenance of stormwater infrastructure through planning, design, inspection and monitoring. Master plans are being prepared in conjunction with Urban Drainage to ensure that appropriate facilities are constructed for current

and future development in an effort to identify regional solutions to watershed infrastructure needs.

“We’re working to coordinate on the MS4 activities with other agency partners in the IGA,” says Ashley Byerley, Land Development coordinator. “There’s a lot of development currently underway within SEMSWA’s boundaries, including three Federal projects. We’re excited to start bringing permitting and inspection services under the same roof with other stormwater improvements in our service area.”

SEMSWA’s staff, currently totaling 25, is chipping away at a variety of tasks necessary to create the base of knowledge necessary for the Authority to perform its duties. An inventory of infrastructure is being prepared with GIS mapping and evaluation of condition. Floodplains of undeveloped land are being mapped to further facilitate development, instead of waiting for development to come knocking. Drainage problem areas are being identified, alternatives are being evaluated and solutions are being prioritized. ●





# Subsurface Stormwater Systems Are Not All Created Equal



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