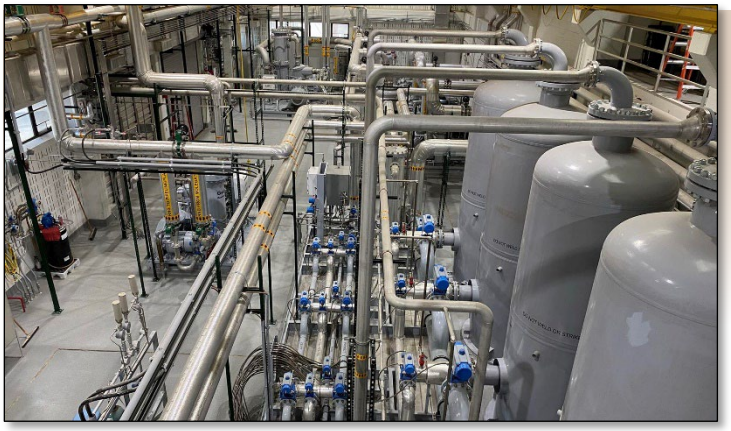
ACEC Missouri

2022 Engineering Excellence Awards

Grand Conceptor Award



CDM Smith Inc., Kansas City

PROJECT TITLE:

Co-Digestion to Renewable Gas (RNG) Pipeline Injection at the Des Moines, Iowa, Water Reclamation Facility

CLIENT/OWNER:

Des Moines Metropolitan Wastewater Reclamation Authority

The Water Reclamation Authority (WRA), located in Des Moines, Iowa, has one of the largest co-digestion programs in the country. The WRA recently sought to improve the performance of its existing anaerobic digesters while reducing maintenance costs and maximizing digester gas utilization. To meet these goals, CDM Smith was engaged by the WRA to develop a Bioenergy Master Plan (BMP) that evaluated various digestion and biogas production improvement alternatives. Based on this evaluation, CDM Smith provided design and construction services for the upgrade of the WRA's six anaerobic digesters, modifications to the organic waste receiving station, and the installation of a new biogas treatment system that converts biogas into renewable natural gas (RNG). Because they were producing a significant amount of renewable fuel in the digesters, the WRA reviewed the benefits of converting the biogas into RNG, taking advantage of the Renewable Fuels Standards (RFS) Program biofuels market that permits municipalities to sell RNG to local natural gas pipeline companies. The WRA recognized a huge opportunity to sell its biogas, with the original goal of offsetting operation & maintenance (O&M) costs and potentially generating net revenue for WRA and its member communities, resulting in positive impacts on sewer rates.

Initially, CDM Smith prepared a unique and dynamic Bioenergy Model that incorporated several variables, such as digester kinetics, gas production data, financial parameters, and environmental attributes that would allow the WRA to predict a rate of return on its investment. Following CDM Smith's review of three different gas treatment technologies, the model was able to show a preliminary payback period of four to five years. Through a paired comparison matrix selection process, the WRA staff ultimately selected the Pressure Swing Adsorption (PSA) system, manufactured by the Guild Associates out of Dublin, Ohio. Another goal of the project was to maximize the use of existing facilities to the extent feasible. CDM Smith was able to design the biogas system to fit inside an existing building that housed three aging gas-driven engine generators, reuse an existing gas sphere to store out-of-spec biogas, and enhance the existing heated water loop system by tying a new heat recovery system installed with the new thermal oxidizing unit.

CDM Smith led the design of a biogas conditioning and injection system to convert about 2,250 scfm of biogas produced at the facility into a high-quality biomethane product that is injected into the MidAmerican Energy Company's local natural gas pipeline. Net revenue generated by this arrangement is approximately $3.5M annually, resulting in a 4.5-year payback period. This project demonstrates how the recovery of a waste resource—such as biogas from the WRF—is environmentally resilient, economical for its ratepayers, and supports the sustainability initiatives and financial goals set by the WRA.

Grand Awards

Bartlett & West, Inc., Jefferson City

PROJECT TITLE:

Interstate 70 – Mineola Hill Climbing Lanes

CLIENT/OWNER:

Missouri Department of Transportation

Bartlett & West's design of the Climbing Lanes at Mineola Hill along Interstate 70 will have an enormously positive impact on the region and nation. Along Interstate 70 west of St. Louis is a sweeping valley with long steep highway grades on either end that caused heavily laden semi-truck traffic to slow to single digit speeds. This contrasted with commuter traffic in smaller, more nimble vehicles that could maintain the 70-mph design speed. The conflicting speeds caused numerous wrecks and fatal accidents as vehicles climbed out of the valley. Interstate traffic would be backed up for hours, and without a viable detour, it wasn't uncommon for traffic jams to extend 10 to 20 miles in length. Those backups subsequently resulted in inattentive drivers rear-ending stopped traffic causing further accidents and fatalities.

The standard design used by highway engineers is to construct climbing lanes to the right of traffic that allows truck traffic to move off the main lanes of traffic. The design at Mineola Hill by Bartlett & West turned that thought on its head. They argued that inside climbing lanes for the nimbler small vehicle traffic was a better option. This allows heavy truck traffic to stay in their lane without a need to worry about merging into an oncoming speeding car. In its place, the faster traffic has the option to move to an open left lane and then merge back into the slower traffic at the top of the valley.

This design is modelled to have a 42% decrease in accidents in the project corridor, saving the lives of future I-70 motorists. There are people who will make it safely to work, home to their family events and not miss a child's sports game because of Bartlett & West and this project.

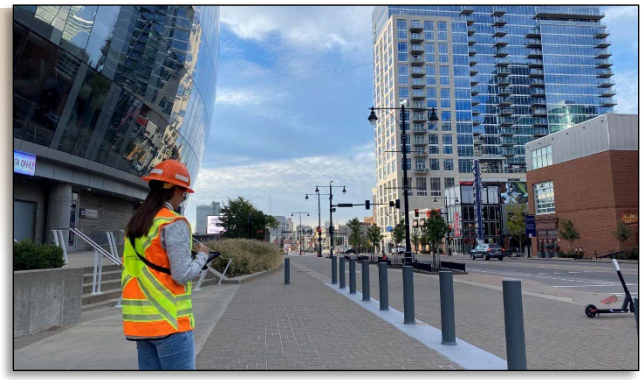
Bartlett & West, Inc., Jefferson City

PROJECT TITLE:

Using Smart Technologies to Assess KCMO's Sidewalks

CLIENT/OWNER:

City of Kansas City, MO



The City of Kansas City, Missouri maintains an extensive network of sidewalks and made a commitment to the residents of Kansas City, Missouri, to inspect every sidewalk at least twice over the next 20 years. The Sidewalk Inspection Project has completed the first phase of the overall program and is moving into phase 2. The goal of the project was to inspect and deliver sidewalk damage point locations that met KCMO's out-of-repair criteria. This critical information about the sidewalk network was georeferenced to KCMO's Cartograph Sidewalk Maintenance Repair System. This information will be used to conduct risk assessments and allow KCMO to make smarter decisions about how to allocate resources in the best interest of the community.

KCMO has a policy to support the use of "green solutions" or enhanced sustainability measures that considers environmental quality, social equity, and economic vitality. During the pilot phase of this project Bartlett & West evaluated different technologies to meet KCMO's commitment to green solutions. Esri's Arc Collector coupled with mobile smart devices provided a fit for this project and helped achieve the goals of KCMO.
The City maintains approximately 2,400 miles of roadway, in which many roadways have sidewalks on both sides of the road. This project allowed Bartlett & West, and subconsultants HG Consultants and VSM Engineering to inspect 271 centerline miles of sidewalk and collect over 52,000 data point meeting KCMO's out-of-repair criteria.

The project was successfully delivered in late September 2020. The City is contracting with the same team for continuation of the project into phase 2.

CDG Engineers, Inc., St. Louis

PROJECT TITLE:

Laclede's Landing Improvement Project

CLIENT/OWNER:

Land Clearance for Redevelopment Authority

The Laclede's Landing Improvement Project is worthy of an Engineering Excellence Award because the historic significance of the area required a unique perspective on the design and construction. Every part of the design impacted every other part of the design, no matter how small, i.e., changing the slope on the gutter line in one area impacted the cross-slope on the sidewalk which in turn impacted the ADA accessible route and also impacted the entrance to an establishment. The attention to detail was at a high level during this design.

Maintaining the historic St. Louis Riverfront feel by sustainably reusing the cobblestones, providing "historic" LED lighting, and yet incorporating ADA accessible routes and improvements throughout the entire project length where no ADA improvements existed before is highly commendable.

CDM Smith Inc., Kansas City

PROJECT TITLE:

Target Green West Marlborough Green Infrastructure

CLIENT/OWNER:

City of Kansas City, MO

CDM Smith was selected to design and implement a variety of stormwater infrastructure improvements to meet Federal Consent Decree requirements associated with combined sewer overflows in the City's Marlborough neighborhood. The final solution not only reduced combined sewer overflows but mitigated historical downstream flooding in the neighborhood with a much-needed centralized wetland detention facility with enough storage capacity to accommodate a 100-year storm event. The solution also delivered a variety of community and landscaping enhancements that provided the neighborhood with a new identity and encouraged community activity, well-being, and economic growth.

The City's vision was to cost-effectively connect solutions with long-term community improvements that would assist in developing a framework to revitalize the Marlborough neighborhood. CDM Smith transformed the City's concepts into real-world improvements in a manner that went beyond the project's initial goals through effective planning and value engineering efforts. As a result, project scope was able to expand to include additional flood mitigation improvements to further improve the community's safety. Key highlights include strategic sewer separation of 75 acres of the watershed and a wetland detention facility for increased protection from the 100-year storm event relieving downstream neighborhoods from flooding while also delivering desired community enhancements within a maintainable and useable park-like setting.

CDM Smith was able to successfully address and resolve a wide variety of complex problems while meeting strict criteria by applying strategic and effective engineering principles. This approach was able to successfully meet the combined sewer overflow reduction goals, strict Federal Consent Decree requirements, City expectations, and the needs of a diverse group of stakeholders with vastly different objectives and goals. CDM Smith's approach promoted collaboration and flexibility from the outset to create a win-win scenario for all parties.

CDM Smith was responsible for project management and both preliminary and final design services that included developing construction drawings and specifications for the infrastructure solutions. Additional responsibilities included landscape architecture, traditional stormwater infrastructure, construction sequencing plan, easement plan, and utility relocations in a heavy corridor. CDM Smith also created an O&M manual and provided construction administration support, which included a resident project representative who oversaw activities during construction and warranty-period inspections. CDM Smith and the City were ultimately able to transform the underutilized lot into an invigorated park established on sound green infrastructure principles and applications with effective hydraulic structures, while stimulating public interest and education for current and future generations.

Crawford, Murphy & Tilly, Inc., Springfield

PROJECT TITLE:

Webster County US Highway 60 Rail Study

CLIENT/OWNER:

Webster County, MO

The US Highway 60 & BNSF Railway Corridor Study was unique in that it investigated both roadway and rail elements and conditions along a corridor in Webster County. The project team used a comprehensive safety model that it had developed in partnership with MoDOT for the study of multi-modal corridors. The model has been recognized by the Federal Highway Administration (FHWA) as a national Best Practice for multi-modal safety analysis and was customized for this study.

Stakeholder participation was critical for gaining a comprehensive understanding of project conditions and developing optimal solutions to address safety and mobility concerns.

The Master Plan presented to the client proposes $133M in roadway and rail improvements, with an estimated 1.53 return on investement. In less than two years since the study commenced, over $18.5M of funding has been secured towards project implementation.

HNTB Corporation, Kansas City

PROJECT TITLE:

CID Green Infrastructure Project

CLIENT/OWNER:

City of Kansas City, MO

This sustainable green infrastructure development is located in one of Kansas City's oldest areas, the Central Industrial District (CID), or what is more commonly known as the Historic West Bottoms. It is located just west of downtown Kansas City near the Kansas and Missouri River floodplains. The CID is defined in three primary districts: the Riverview District, Warehouse District, and Stockyards District, and project components were constructed in each district.

This project helps protect the community's environment by reducing the amount of stormwater entering our combined sewer system, which will reduce combined sewer overflows. It features multiple green infrastructure elements, including bioretention basins, gravel infiltration basins, stormwater tree planters, a permeable paver system and a dry-well infiltration system. The purpose of these nature-based solutions is to collect, treat and infiltrate stormwater runoff and achieve a higher level of combined sewer overflow control downstream.

The variety of solutions for this demonstration project will bring long-lasting value to the engineering profession and will be built upon as projects continue in the City. The project team worked with KC Stem Alliance, a collaborative network of educators, business partners and affiliates that inspires interest in STEM careers, to expose students to the design and construction of the project on-site. The team also held public meetings and coordinated with project stakeholders regarding project updates and impacts. As part of the City's $2.3 billion Smart Sewer program, the public ribbon cutting ceremony doubled as the 10-year Anniversary of the Kansas City Smart Sewer Program.

The social, economic and environmental solutions for the project offered many benefits to the community. The project improved pedestrian access, provided flexible, multi-use event space, created eight acres of public green space, and reduced the impacts of sanitary sewer overflow while serving as an economic driver to the area.

Adding to the project's complexities were adverse weather, construction in a high-traffic area in the oldest part of Kansas City, and proximity to the Kansas and Missouri Rivers. The project team overcame and embraced these obstacles. Overall, the project provided the CID with a successful green infrastructure solution that met the project goals to reduce overflows of the downstream combined sewer system, while also providing aesthetic, social and economic enhancements to the community.

Small Firm Award

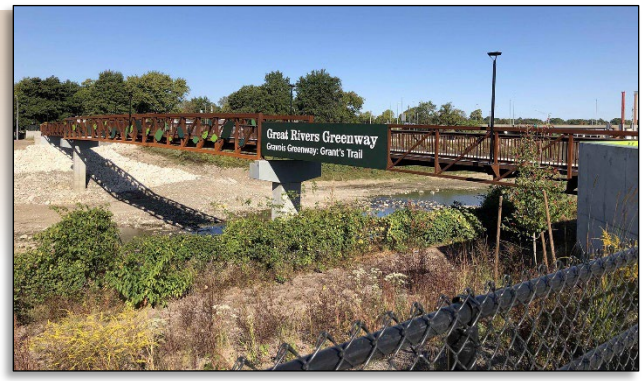
Reitz & Jens, Inc., St. Louis

PROJECT TITLE:

Gravois Greenway to River des Peres Greenway

CLIENT/OWNER:

Great Rivers Greenway



The 2-mile-long Gravois Greenway extension of Grant's Trail from Orlando's to River des Peres Greenway filled a gap in the regional greenway system that is being developed by Great Rivers Greenway (GRG), who has completed more than 128 miles of greenways in the St. Louis metropolitan region. This project was the last section required to complete 21.5 miles of interconnected greenways which provide connections to neighborhoods, businesses, historic sites, schools, libraries, transit locations and other destinations along its route.

From the alignment studies that began in 2012, to the phased construction that was completed in October 2020, Reitz & Jens, Inc, as part of the design team led by DGRE Studios, provided the engineering and construction phase services required meet the many unique and complex challenges encountered on this project. The project includes as a 12-foot-wide asphalt trail that connects the existing Grant's Trail in St. Louis County to the River des Peres Greenway in the City of St. Louis and has many amenities including connections to surrounding neighborhoods; a new trailhead with restroom and playground; two bridges; a recycling hub; and connections to nature including a boardwalk over a restored wetland, pollinator gardens and habitat restoration areas. Extensive communication and coordination were required to complete this project that is adjacent to multiple private properties, spans multiple watersheds, required approval by multiple permitting agencies, and will be operated and maintained by both St. Louis City and County.

Throughout this project Great Rivers Greenway has developed public/private partnerships and emphasized public outreach and input to maximize the project's social and economic impacts in a sustainable way. The project is expected to eliminate almost 1,400 vehicle trips daily. Republic Recycling has developed a recycling hub on the trail for greenway users and the boardwalk allows greenway users to learn about and view a restored wetland. Neighborhood connections will allow safe access to the greenway from adjacent residential and commercial areas. Since being opened, between 5,000 and 12,000 walkers, runners, and bikers have used this new greenway every week during the warmer months, with the highest number of people using the greenway during the Covid-19 restricted summer of 2020.

Honor Awards

Burns & McDonnell, Chesterfield

PROJECT TITLE:

Gravois Trunk Sanitary Storage Facility (Pardee Lane and Pardee Road)

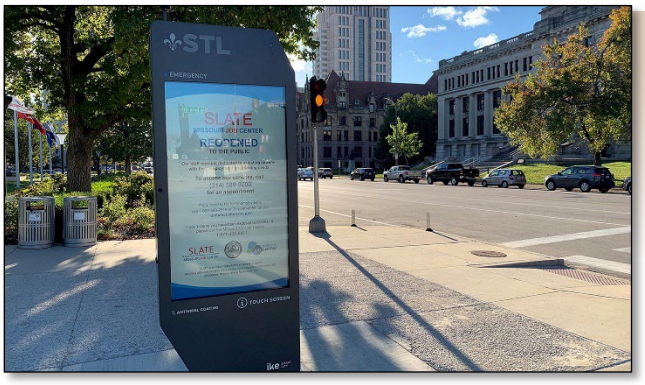
CLIENT/OWNER:

Metropolitan St. Louis Sewer District (MSD)

The Gravois Trunk Sanitary Storage Facility is a wet-weather sanitary storage facility that will allow MSD to eliminate two significant Constructed Sanitary Sewer Overflow (SSO) Outfalls into Gravois Creek. This project achieved MSD's goals by capturing wet-weather sewage during rainfall events, alleviating sewage backups into basements, eliminating overflows to Gravois Creek, and complying to consent decree requirements. Removing the outfalls improves water quality and public health and avoids replacing the downstream Gravois Creek Trunk Sewer and the associated impacts to Gravois Creek and disturbances to properties along the trunk sewer alignment. The new storage facility will store wet-weather sewage during rainfall events until the downstream trunk sewer and the Lemay WWTP have capacity.

The storage facility consists of dual partially buried circular concrete storage tanks (8.0 MG total capacity), an influent pump station (54 MGD capacity), a service water cistern for tank and wet well wash-down, a robust diversion structure with internal weir walls, a dewatering control vault, an odor control system, a control building, consolidation sewers/force mains/dewatering lines/yard piping, and ancillary items such as plumbing, electrical duct banks, instrumentation, and SCADA system.

Burns & McDonnell began conceptual design of the storage facility in June 2014 and managed design of the project until the construction contract was awarded in September 2018. Final Completion of the project was reached in June 2021, allowing MSD to meet their Consent Decree commitments to eliminate Constructed SSO Outfalls BP-588 and BP-599 by December 2023 and December 2033.



CBB, St. Louis

PROJECT TITLE:

Traffic Management Enhancements Phase 3

CLIENT/OWNER:

City of St. Louis, Board of Public Service

This project's innovation was to holistically combine three distinct components: (1) Downtown Multimodal Study and Downtown Signal Timing Plan (2) Fiber Optic Network and ITS Plan, and (3) Real-time Traffic Information Center Operations to achieve the overall goal of enhancing multimodal transportation safety and efficiency.

The downtown multimodal study entailed the development of a transportation planning framework toward a robust multimodal system in downtown St. Louis. The plan developed a hierarchy of streets by mode: walking, biking, transit, and vehicular access. The plan was adopted by the City's Planning Commission in December 2018. CBB designed and implemented system updates to the downtown network, including ITS devices, traffic monitoring cameras, and a more connected fiber network. Strategically placed throughout the city, these cameras will assist with enhanced traffic operations. CBB provided traffic information center design, upgrades, and staffing, to monitor operations, and make necessary changes due to any special events or unplanned circumstances. As a result of these efforts, a vastly upgraded ATMS system with nearly all the signal controllers online, is available to efficiently manage the City's signal system.

The construction of this project was substantially completed in May of 2021 and is currently being utilized by the city. With multiple project components that needed to fit with each other, this was indeed a complex project to manage and successfully deliver. CBB's contributions exceeded the City's expectations and needs during the entire design and implementation process of this successful engineering project. The outcomes of this project have already started to come to fruition, and we are excited to continue to see them do so.

Crawford, Murphy & Tilly, Inc., Springfield

PROJECT TITLE:

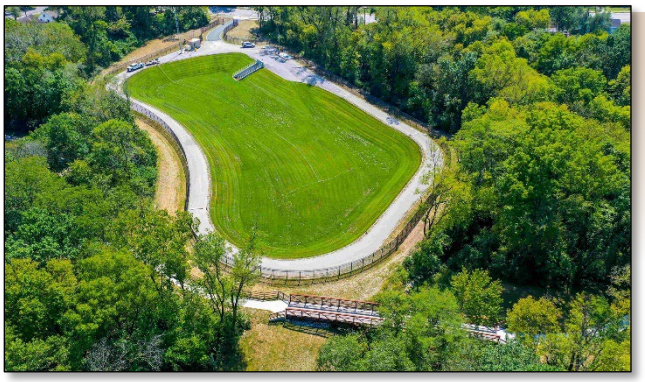
Stratmann Pump Station Replacement

CLIENT/OWNER:

Missouri American Water Company

Replacing the nearly 100-year-old Stratmann Pump Station was a major priority for Missouri American Water and critical for maintaining a high level of service to the over 1.5 million St. Louis County residents who rely on it for their drinking water. The client turned to CMT initially to provide facility planning and preliminary studies for replacing the aging facility. The engineering consultant was then selected again to lead the design for a $15 million Design-Build project that resulted in a state-of-the-art, 70 MGD pump station.

The design features the use of six indetically-sized pumps that can be operated in different configurations to meet any water demand, while providing more efficient operation and extending their service life. Operation and energy efficiency, sustainablity, and resiliency were built into the facility, along with aesthetic enhancements.



George Butler Associates, Inc., Lenexa, Kansas

PROJECT TITLE:
Trolley Trail Basin

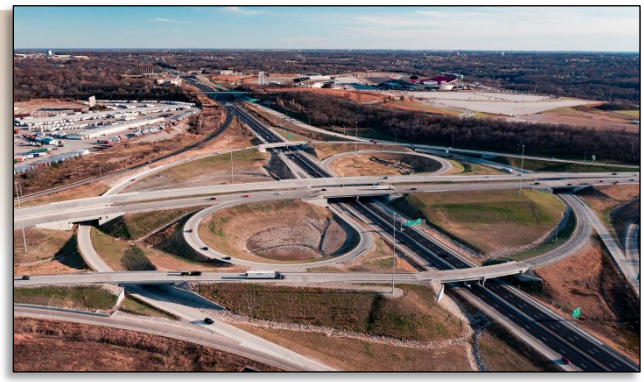
CLIENT/OWNER:
KC Water

The Trolley Trail Basin Project in Kansas City, Missouri began life as a relief sewer and morphed into an environmental improvement project that benefited soil and water systems while simultaneously meeting the original Consent Decree requirements. The design team rose to the challenge of finding an alternative to a relief sewer that would better meet the discharge requirements. The use of a 3-million-gallon earthen storage basin to retain peak flows during wet weather events proved to be a solution that could provide additional benefit to the downstream sewer system beyond the requirements of the Consent Decree, further reducing surcharging on the interceptor. The unexpected discovery of an unregulated, abandoned landfill from the 1950's further complicated design and construction of the proposed storage basin. The City's bold decision to undertake the work, coupled with the design team's careful consideration of multiple agency requirements and design to exceed all requirements, resulted in a project with benefits to the environment and the public. The Trolley Trail Basin Project successfully removed 51,000 tons of landfill material for proper disposal, succeeded in the requirement to greatly reduce sewer overflows to the creek, and improved a neighborhood park and trail system.

HDR Engineering, Inc., Kansas City

PROJECT TITLE:
I-435 / I-70 Partial Turbine Interchange

CLIENT/OWNER:
Missouri Department of Transportation



The I-435 / I-70 Interchange Project has addressed a significant transportation infrastructure issue that has been a concern for MoDOT for decades. Multiple ideas and geometries have been envisioned for the interchange for decades, but all had constructability or costs that created implementation concerns. The partial turbine interchange proposed and designed by HDR was successful in finally getting this important interchange reconstructed. The project removed aging CIP box bridges that could not be easily maintained or replaced, addressed the operational and safety issues in the corridor, addressed stormwater overtopping issues and provided a durable and easy to maintain interchange for the future within existing right of way.

Horner & Shifrin, Inc., St. Louis

PROJECT TITLE:
Saline Creek Wastewater Treatment Facility Upgrades

CLIENT/OWNER:
Northeast Public Sewer District

The NPSD Saline Creek Wastewater Treatment Facility Upgrades project merits consideration by ACEC for the Waste and Storm Water category. The project allowed for the application of typical water treatment technologies to a new application in sludge stabilization to produce an economically efficient process with positive impacts the main sewage treatment process processes at the facility. The project has avoided future costs to its rate payers by optimizing the existing plant process and avoiding a large plant addition. The new sludge treatment process is sustainable, uses no coagulant or polymers to thicken the sludge, uses very simple mechanical equipment to reduce the water volume, and improves the environment by more efficiently recycling nutrients to beneficial reuse in land application rather than discharging them to the waterways which can result in excessive algae growth and eutrophication.

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