

# Large-Scale Stormwater Management eBook

A Collection Of Case Studies That Show  
How to Manage Costs and Keep Your Project  
On Schedule and Under Budget



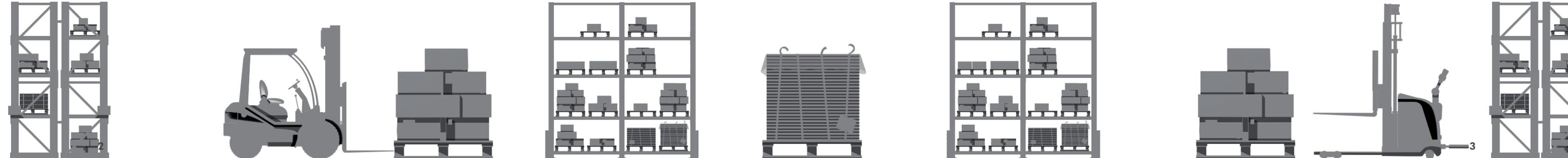
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# Large-Scale Stormwater Management Solutions

E-commerce continues to fuel the demand for large warehouses, data and distribution centers, and other infrastructure to support our nation’s need for a resilient supply chain. These large facilities have one thing in common – the need for stormwater management systems that are much larger than those found on a typical commercial site.

Designing, manufacturing and installing stormwater detention and treatment systems of this size requires expert engineering, planning, and logistical support to manage costs and keep the project on schedule and under budget. When you need a proven, large scale stormwater management system, “Go Big” with Contech.





**UPS Sweetwater | Houston, TX**

Owner: UPS  
 Engineer: Kimley-Horn  
 Contractor: Alston Construction (phase one), Sendero Industries (phase two)  
 Installation: 2019/2020  
 Technical Description: 42,432 LF of 48" ALT2, 29,852 LF of 96" ALT2, 500 LF of 18" ALT2

Growing demand sparked a 44-acre expansion project at a UPS distribution center in Houston, TX. Built in phases, the project consisted of expanded parking areas and the build-out of a 660,739 SF distribution center.

Phase one of the project consisted of an expanded parking area for employees and trucks. Since there was no land available for an above-ground solution, the detention system was placed under

the concrete parking lot. The detention system was constructed from 42,432 LF of 48" corrugated metal pipe (CMP), providing 533,216 cubic feet of storage. The system's design was challenging. There was limited depth, a continually changing parking lot design, obstacles such as light poles and landscaped traffic islands that had to be avoided and multiple inlet locations to the system. Contech Stormwater Design Engineers worked closely with the engineer of record and provided calculations, several design iterations and installation cost estimates to help the engineer better analyze the proposed solution.

Phase two consisted of the build-out of the distribution center. For this system, 29,852 LF of 96" and 500 LF of 18" CMP was used, providing 1,500,525 cubic feet of storage. While the soil in this area allowed for a larger diameter pipe, there were still challenges. Gas lines, water/fire lines, and an existing pump station needed to be avoided. Again, Contech Stormwater Design Engineers worked closely with the engineer of record and provided several design iterations until the final, optimized design was completed.

The flexibility of CMP proved valuable in Phase two. The system needed to be installed in phases, resulting in Contech providing bulkheads and stubs to cap off the detention system until an existing building could be torn down. Once the contractor removed the building, the detention system's last phase was installed and connected to the first section, completing the system.

**Rialto Fulfillment Center - Buildings 1 & 2 | Rialto, CA**

Engineer: Thienes Engineering  
 Contractor: Boudreau Pipeline Corp.  
 Installation: Summer 2020  
 Technical Description: 11,025' of 162" ALT2

A new distribution center complex was built in Rialto, California, to meet the growing demands of online shoppers. The site is over 120 acres and includes two buildings, each with over 1 million square feet of building space. The site also includes parking for 1,000 vehicles, over 900 off-dock trailer stalls, and 100% site concrete paving.

Developing and constructing a stormwater management system for a site of this size was a daunting task. There was initially a large retention basin, but due to the cost of land in southern California, the owner wanted to convert this area to a parking lot to optimize land use. The new direction prompted a shift to subsurface infiltration. Given the available depth, the most economical material to store this enormous amount of stormwater was a large diameter corrugated metal pipe (CMP) solution.

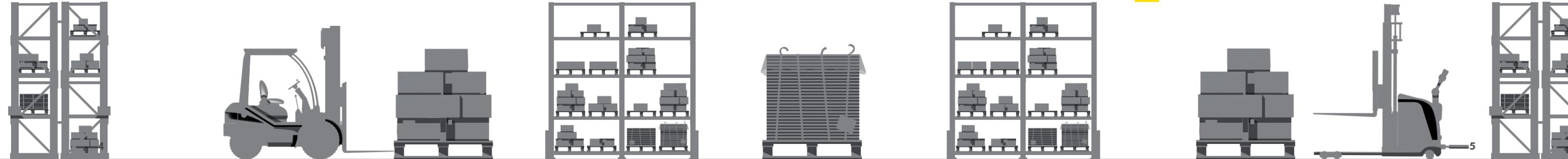
Initially 144" diameter CMP was considered, but through collaboration the team recognized an opportunity to decrease the footprint of the system. Having been manufacturing CMP pipe for nearly 100 years, Contech was able to produce this large diameter pipe while still ensuring its structural integrity.

The hole for the infiltration pit was already excavated, so Contech Stormwater Design Engineers had to fit the volume into the given footprint. Contech worked closely with Thienes and Boudreau throughout the project, providing value engineering estimates and storage calculations for multiple pipe diameters.

A total of 11,100 LF of 162" diameter, perforated CMP was used, providing 1,588,038 CF of storage in the pipe. An additional 1,368,742 CF of storage is provided from the stone backfill. The system was made with 26 runs, ranging from 75' to 698' connected via a 60" manifold.

To meet the storage requirements and reach permeable soils, 10' of rock was used below and 3.5' above the pipe, resulting in the use of 240,000 tons of clean crushed stone.

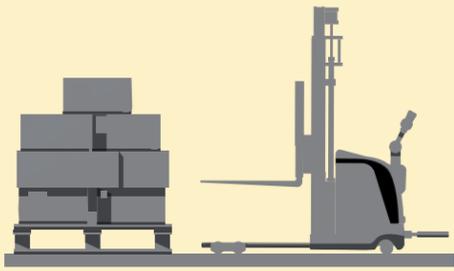
A Contech Project Coordinator worked closely with Boudreau on the staging of the CMP material on-site to facilitate a seamless fabrication/delivery with the installation. The coordinated effort was to ensure enough material was available on-site to meet the 500 LF minimum production goal per day.





### Avion Mixed-Use Development | Burbank, CA

Owner: Overton Moore Properties  
Engineer: Thienes Engineering  
Contractor: GJ Gentry / Western Water Works (Distributor)  
Installation: Summer/Fall 2020  
Technical Description: (2) CDS® HDS units and (44) Filterra® Bioretention Systems



Avion Burbank is a 60-acre master-planned, mixed-use development located in Burbank, CA. With a theme of “Connect. Create. Innovate,” the development seeks to set a new vision for today’s workforce by creating a space that combines creative office, industrial, retail, and lodging in a sustainable campus environment.

The development is immense and includes 17 buildings and 1.25 million square feet of space.

native vegetation, they provide a visible reminder to the occupants of the developer’s commitment to sustainability.

The EOR incorporated two CDS hydrodynamic separators into the drainage system to provide pretreatment for the Filterra systems. After being pretreated by the CDS systems, a pipe manifold from the storm drain distributes flow as evenly as possible throughout multiple Filterra systems allowing each system in the cluster to operate in parallel. This helps prevent any one system from providing a majority of the treatment and maximizes the maintenance interval.



Contech worked closely with the contractor, GJ Gentry, and the distributor, Western Water Works Supply Company, to coordinate the production and delivery of the Filterra systems to meet the aggressive production schedule. As clusters of systems were manufactured, they were shipped and installed at ten units per construction day. Since most of the units were too heavy to ship with the media installed inside the vaults, Contech worked with GJ Gentry to provide the Filterra media the day after delivering the vaults. A Contech Field Representative was on site to guide GJ Gentry during the delivery and installation of the vaults and media. Contech activated the Filterra systems, which included installing the vegetation and mulch, once the site had been stabilized.

“This job was successful with much of the credit going to Contech for staying on schedule and providing terrific customer service to the whole team; Millie and Severson General Contractors, Western Water Works Supply Co., and GJ Gentry General Engineering,” said Bryan Copping, VP, GJ Gentry.

To date, this is Contech’s largest single-phased Filterra project in history.

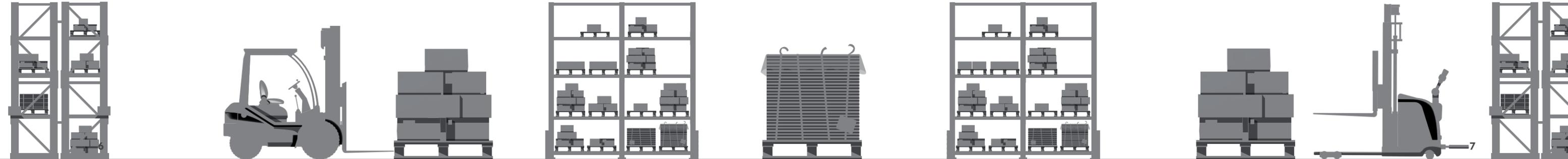
The project developer, Overton Moore Properties (OMP), has a commitment to sustainability in all new projects, with Avion Burbank achieving LEED Silver Core and Silver Design status from the U.S. Green Building Council.

According to the City’s MS4 Permit requirements, a Low Impact Development (LID) Plan was submitted by OMP to the City of Burbank Community Development Director. The LID Plan was required because the project would alter 50 percent or more of the impervious surfaces of a previously existing development that was not subject to post-construction stormwater quality control requirements. Therefore, the project was classified as a “Planning Priority Project” and was required to comply with regulations that call for treatment of all stormwater runoff generated at the site.

The LID Plan was designed to control pollutant loads and runoff volumes to the maximum extent feasible by minimizing impervious surface areas and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use. Since infiltration of stormwater runoff was determined to be infeasible due to groundwater contamination, the LID plan included the use of bioretention, as required by Attachment H of the Los Angeles County MS4 permit.

Given the tremendous amount of runoff needed to be treated, the Engineer of Record (EOR) selected the Filterra Bioretention system. Filterra is an approved alternative to Attachment H of the Los Angeles County MS4 Permit. With its high flow media, Filterra provides a high level of treatment in a much smaller footprint than traditional bioretention. Given the value of land at the development the smaller treatment footprint was a significant benefit to the developer. The smaller footprint will also reduce long-term maintenance costs.

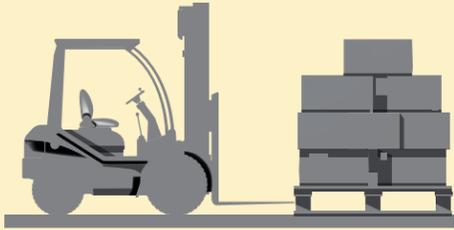
Engineering for the treatment of stormwater from over 1 million square feet of impervious surfaces was a challenge. Stormwater Design Engineers at Contech needed to treat at least 93% of the average annual runoff volume to provide treatment on par with a properly sized conventional biofilter. To accomplish this, engineers utilized clusters of parallel Offline Filterra systems of various sizes (44 units in total) with the largest being 22”x8”. The Filterra systems provide the necessary treatment and enhance the site’s aesthetics. Planted with





### BNSF Alliance Intermodal Facility Expansion | Fort Worth, TX

Owner: BNSF  
Engineer: Transystems Fort Worth  
Contractor: AMES  
Installation: Spring 2020  
Technical Description: 16,023' of ALT2



Centrally located in the United States, the BNSF Alliance Intermodal Facility is one of the world's premier inland ports and offers strategic multi-modal transportation access between the BNSF Railway, the Fort Worth Alliance Airport (the world's first 100% industrial airport), Interstate Highway 35W from Mexico to Canada, and Amazon, FedEx and UPS ground hubs. Fueled by the increase in online commerce, the facility has

all of the pipe within three weeks. Fabrication of the headers and other components took place in early 2020, once the final design was complete. Collaboration between Ames and Contech was key to ensuring all necessary components were onsite when needed, expediting installation.

The use of the MOBILE PIPE mill had additional benefits. It allowed the CMP to be produced in 40' lengths, resulting in fewer connections and reduced installation time. It also eliminated the need for hundreds of truck deliveries at the busy facility, reducing costs and safety concerns.

A high-voltage power line was discovered within the system footprint during installation. The power line could not be moved, and the pipe had already been produced. Contech worked with the engineer and contractor to alter the system's design to avoid the power line using the existing pipe, allowing installation to continue without delay or additional expense.

The project is just one of the many examples of Contech's ability to bring design, manufacturing, and logistical functions together, allowing owners, engineers, and contractors to minimize costs and keep projects on schedule.

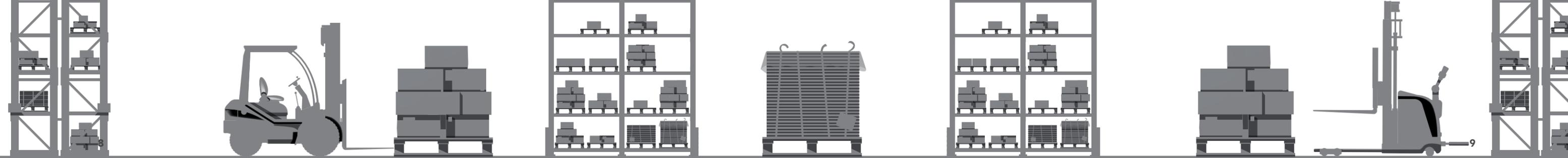
been the center of a multi-year expansion project involving more than 1,200-acres of development.

Contech has been actively involved with the facility's expansion throughout the years, having first provided erosion control and drainage solutions when the site was first expanded in 2007. More recently, Contech has provided A-2000 PVC pipe and slotted drain for stormwater conveyance and geogrid reinforcement for the pavement sections.

The 2019 scope of work included increasing the capacity at the terminal by constructing new parking stalls for 1,300 intermodal containers. The storage requirements were massive, requiring over 680,000 cubic feet of storage. The site did not allow for conventional above-ground storage, so using the Construction Manager/General Contractor (CMGC) Delivery Method, the team from BNSF and Ames Construction conducted a cost and constructability comparison cost of several material options, including HDPE chambers/pipe and concrete solutions. Corrugated metal pipe (CMP) was determined to be the optimal due to its low total installed cost and expediency of lead times.

To accommodate the accelerated timeline, Contech worked with Ames and BNSF through the fall of 2019 to design a detention system made from 16,023 feet of aluminized corrugated metal pipe (CMP). Varying diameter pipes (96", 84", 72", and 60") were utilized to meet grading constraints. Additionally, the system was designed as two separate sub-basins to avoid existing utilities and wetland areas. Two lateral manifold pipes hydraulically connected the two systems.

Designing a system from 60%-90% plans, manufacturing 16,000 feet of CMP, and delivering onsite within 3-4 months was no easy task, but Contech rose to the challenge. Contech developed a cost-effective strategy using our MOBILE PIPE® mill to manufacture the pipe onsite. The MOBILE PIPE mill is a self-supporting factory that can be quickly deployed and put into production. Within weeks of the request, Contech had sourced the steel coils and positioned the MOBILE PIPE mill at the sight. This approach drastically reduced freight costs and expedited the entire manufacturing process. Using the MOBILE PIPE mill, Contech met the production goal and manufactured





### Rivergate Phase V | Portland, OR

Owner: Trammell Crow Company

Engineer: Mackenzie

Contractor: Tapani Inc.

Installation: January 2018

Technical Description: (2) StormFilter Panel Vaults, (1) Peak Diversion StormFilter, (2) StormGate Diversion Vaults



Rivergate Corporate Center is a multi-phase project located at the confluence of the Columbia and Willamette rivers and nine miles northwest of downtown Portland. It is Oregon's primary gateway for international trade.

This phase of the build-out consisted of the design and construction of a distribution and fulfillment center for a large internet retailer and cloud computing company. The facility is

The three vaults were equipped with 184 cartridges filled with Perlite, a form of expanded volcanic rock. Perlite's porous, multi-cellular structure and rough edges make it effective for removing TSS, oil, and grease.

Contech assisted with preliminary design, providing sizing and structure selection guidance to ensure the most cost-effective solution was selected. Contech also provided annual maintenance cost estimates.

The panel-formed vaults arrived at the site in separate pieces, with the base slab on a "super load" truck that occupied two lanes and required escorting cars. The contractor assembled the vaults, with Contech providing on-site field support. Each panel vault was assembled and installed in a matter of hours, with the StormGate manholes and peak diversion vault being installed at later dates. Per the contractor's request, the StormFilter cartridges were delivered and installed several weeks later in order to reduce the risk of construction flow reaching the filters and compromising the longevity of the new media.

With the help of Contech's field support staff, the StormFilter structures were equipped with filters and placed online once the site was stabilized. At that point, the site was fully prepared to treat and convey the stormwater runoff from its drainage basins. Overall, the design and installation was trouble-free and Contech provided a cost-effective and complete stormwater management solution in a timely fashion.

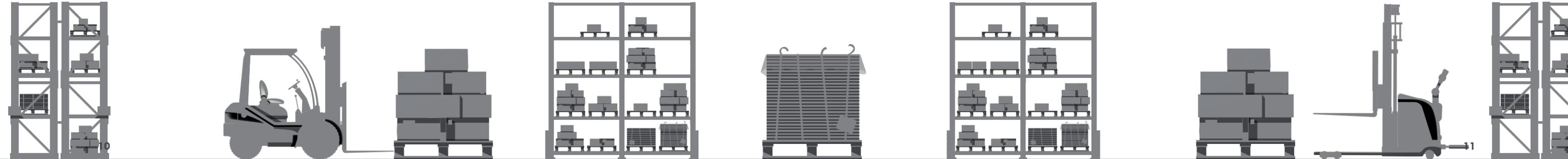
expected to bring 1,000 full-time jobs where workers will coordinate reception and delivery of items from manufacturers to customers. The goal of the new facility is to drastically decrease delivery times to Portland-area customers.

The addition of nearly 43.5 acres of new impervious surface at the site required treatment of stormwater runoff for pollutants, primarily sediment. Engineers at Mackenzie followed the City of Portland's 2016 stormwater management manual standards, which resulted in the requirement to treat for over 6 cfs of total peak design storm flow prior to outfall into the Columbia River.

Contech and Mackenzie worked together to assess the best solution for treatment and determined the Stormwater Management StormFilter was the best option from both a feasibility and cost position. The StormFilter is a stormwater treatment device that uses rechargeable, media-filled cartridges that trap particulates and adsorb pollutants such as dissolved metals, hydrocarbons, nutrients, metals, and other common pollutants found in stormwater runoff.

Two 11'x29.5' panelized vaults with StormFilter cartridges were installed to treat nearly the entire site. Of the 35 acres treated by these vaults, the building roof alone contributes 21 acres to the overall drainage area. The vaults were placed offline using two, 48" StormGate flow control manholes that incorporate an orifice control and an adjustable weir to limit the flow to the filters to the approximate maximum treatment flow rate while diverting excess peak flows around the filter vaults.

On an adjacent site, an 8'x14' Peak Diversion StormFilter was installed to treat another 4.4 acres. The Peak Diversion StormFilter provides treatment and high flow bypass in one precast vault, eliminating the need for an external bypass or junction structure.





### Livonia West Ecommerce Center | Livonia, MI

Owner: Ashley Capital, Amazon.com Inc  
Engineer: WEBB ENGINEERING  
Contractor: Angelo lafrate Construction Company & Oliver / Hatcher Construction  
Installation: March 2017  
Technical Description: (6) Vortechs® Hydrodynamic Separators

The industrial corridor of Livonia, Michigan, is attractive to developers and manufacturers alike for its strategic location and convenient access to M-14, I-96 & I-275 freeways. The Livonia West Commerce Center was the former site of the GM Livonia Spring and Bumper Plant, which had sat empty since the late 1990s and was leveled in 2001. The facility had a variety of environmental hazards associated with the site. Ashley Capital

constructed a new distribution center for large ecommerce company consisting of just over one million square feet and employs over 1,000 people.

Because of the regulations, a stormwater treatment device was needed to treat stormwater flowing at a rate of 130 cubic feet per second. The Contech’s Vortechs hydrodynamic separator was selected due to the durability of the 8,000 psi concrete structure, the shallow footprint, and the assistance Contech provides with design and installation.

Contech provided detailed drawings and installation estimates to help the contractor prepare accurate submittals used in the design and approval phase with regulatory agencies. Contech also assisted with coordinating the material delivery with the contractor to take advantage of just-in-time delivery.

This site was fraught with many disadvantages due to remnants left behind from its previous use. The demolition of the former structures had left many unknown soil and ground conditions buried below the surface. In addition to the environmental challenges, the client had an aggressive nine-month construction schedule. Contech worked quickly to produce detailed drawings and calculations.

Once the final design was completed and approved, installation took place over three weeks using cranes with straps to set the six Vortechs units in position and backfill the units with MDOT Class II Sand. A conveyance system was constructed to allow water to flow through each Vortechs unit at the same flow rate allowing the entire 10-year event could be treated.

Contech reduced the cost of the stormwater treatment system, provided a reliable and durable solution with ease of installation, and supported the contractors throughout the entire installation process. The completed project put the previously contaminated site back into productive use.

### Ecommerce Warehouse | Clay, NY

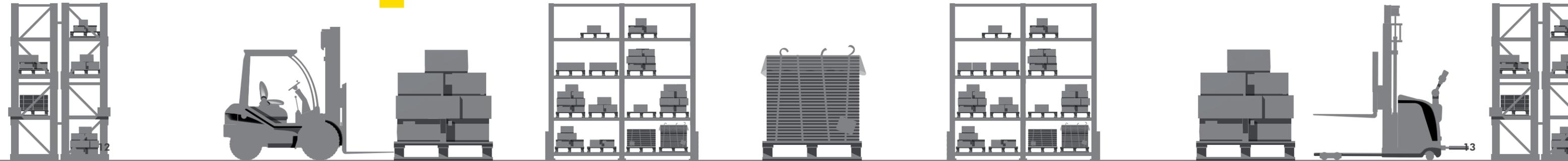
Owner: Langan Engineering  
Engineer: Langan Engineering  
Contractor: Smith Site Development  
Installation: September 2020  
Technical Description: (7) Cascade Separator® units

A massive 3.8 million square foot distribution center was built on 111 acres of land in Clay, NY. The facility is the second-largest building of its kind in the world, where employees will work alongside robots engineered to pick, pack and ship small items like books, electronics and toys.

As this project was considered new development per NYSDEC, it required both pretreatment and treatment of the water quality volume. While there was enough land space for bioretention systems to meet the water quality and runoff reduction requirements, 100% pretreatment was still a necessary part of the permit. Thus the engineer needed to include a manufactured treatment device as part of the overall stormwater management system design.

The biggest challenge was the enormous pretreatment flow of just under 95cfs. A solution was needed to accommodate the high flows and reduce the size and cost of the pretreatment systems for the owners. Contech worked closely with the engineer to propose a solution consisting of seven Cascade Separator units installed at five different locations throughout the site. The Cascade Separator is a hydrodynamic separator (HDS) that uses advanced sediment capture technology to provide the highest sediment removal efficiency of any Contech HDS product. A parallel unit configuration was used in two locations to accommodate the large flows. In addition to system sizing, Contech engineers also analyzed system depth and bypass for peak flows. Using the Cascade Separator, the engineer could substantially reduce the size of the HDS systems needed at the site.

The installation of the Cascade Separators took place over three days in September 2020. A crane set the 10-foot diameter Cascade units, while the 8-foot diameter units were set by an on-site excavator. A Contech Stormwater Field Consultant was present during the installation of each unit to assist the contractors and ensure proper installation.



# The experts you need to solve your stormwater management challenges



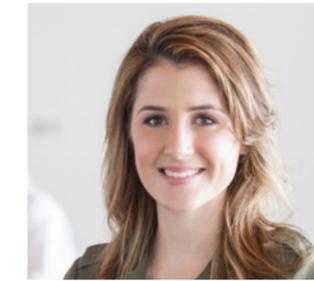
STORMWATER CONSULTANT

I work with you to recommend the best solution to meet permitting requirements



STORMWATER DESIGN ENGINEER

I help develop your final design and deliverables



REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved



SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction

DESIGN

Provides engineers with technically focused recommendations



- Preliminary product recommendations
- Feasibility screening
- Layout assistance
- Cost estimates and options analysis

SPECIFICATION

Helps engineers develop an efficient solution



- Engineering calculations
- Specifications
- Site-specific drawings
- Submittal packages

PERMITTING

Makes sure all recommendations are approved locally



- Product approvals
- Regulatory stakeholder engagement
- Field and lab evaluation
- Project-specific regulatory support

INSTALLATION

Supports contractors and owners through the entire process



- Pricing and value engineering assistance
- Project coordination
- Installation guidance
- Issue resolution
- Customer service

Contech is the leader in stormwater management solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

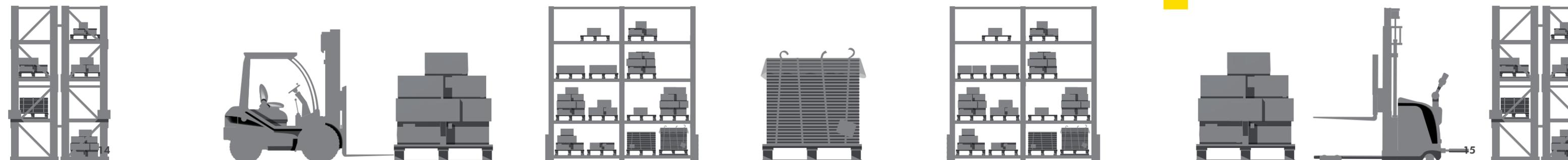
Stormwater management is becoming ever more complex as regulations get more strict with each permit cycle. It's no longer enough to simply move water away from a site — we are now often required to retain and treat it. Traditional methods and BMP's simply aren't enough.

To succeed in this rapidly changing environment, you need a partner to help you navigate the complexities of local, state and federal regulations — who is responsive to your requests and provides innovative solutions that save your clients money and accelerate the design process.

In addition to stormwater expertise, Contech offers a wide range of innovative, flexible product solutions engineered to solve your site's unique challenges and reduce long term maintenance costs.

From traditional BMP's to LID solutions, our ongoing investment in robust laboratory and field evaluations ensure we have a variety of solutions to comply with local regulations so your projects get approved the first time.

With our responsive team of stormwater experts, local regulatory expertise and flexible stormwater management solutions, Contech is the trusted partner you can count on for stormwater management solutions.



# CONTECH<sup>®</sup>

## ENGINEERED SOLUTIONS

### Large-Scale Stormwater Management eBook

#### Dig Deeper

Find all the information you need at [www.ContechES.com](http://www.ContechES.com), including field and laboratory test results, approvals, brochures, design guides, standard details and specifications within the product section of our site.

#### Quick Links

- Stormwater Solutions – [www.ContechES.com/STORMWATER](http://www.ContechES.com/STORMWATER)
- GO BIG Resources – [www.ContechES.com/GOBIG](http://www.ContechES.com/GOBIG)
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If you are ready to begin a project, contact your local representative to get started. Or you can check out our design toolbox for all our online resources at ... [www.ContechES.com/DYO](http://www.ContechES.com/DYO)



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