STORM WATER MANAGEMENT FACILITIES REPORT: OPERATIONS AND MAINTENANCE FOR

QuikTrip Store #0662S

955 Bryan Road
O'Fallon, Mo. 63366

PREPARED BY:

HEIDEMAN | ASSOCIATES, INC.
A Zak Company

240 Larkin Williams Industrial Court
Fenton, Missouri 63026
P 636.492.3200
F 636.492.3202

HAI #161105
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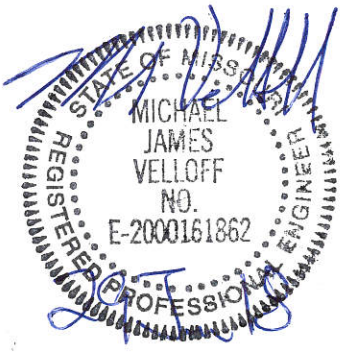

QuikTrip #662S
955 Bryan Road
Storm Water Management Facilities Report: Operations and Maintenance

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SECTION 1

Stormwater Management Description / Site Data

PROJECT SITE DATA:

Location: 955 Bryan Road
O'Fallon, MO 63366

Contact: QuikTrip Corporation, Gwen Keen (Real Estate Project Manager)
2255 Bluestone Drive, St. Charles, Missouri 63303
(636) 627-0003

Locator Number: 2-0057-8997-00-0001.000000000

Area of Parcel: 3.18 acres:

Total Disturbed Area: 3.63 acres

Existing Site: Impervious Area ..... 1.66 ac. x 3.85 = 6.39 c.f.s.
Pervious Area ..... 1.52 ac. x 1.87 = 2.84 c.f.s.
Total Existing Runoff .....9.23 c.f.s.

Proposed Site: Impervious Area..... 1.62 ac. x 3.85 = 6.24 c.f.s.
Pervious Area ..... 1.56 ac. x 1.87 = 2.92 c.f.s.
Total Proposed Runoff.....9.16 c.f.s.

Differential Runoff: .....9.16 c.f.s. – 9.23 c.f.s. = -0.07 c.f.s.

Watershed: Belleau Creek
Flood Protection (Qp): .....15yr./20min. differential runoff = -0.07 c.f.s.

Channel Protection (CPv):..... Overall development is less than 5 acres.

PROJECT DESCRIPTION:

QuikTrip Corporation will tear down their existing facility to construct a 4,840 square convenient store and gas station located at 955 Bryan Road in O'Fallon Missouri. The site generally slopes to Bryan Road and is collected in a piped system. The proposed site drainage will maintain the existing drainage pattern. The site currently has detention pipe installed. The proposed condition will provide detention to the lastest standards in a grass basin. The total disturbed area associated with these improvements will be 3.63 acres. Water quality collected will be addressed for 1.89 acres by the installation of an off-line Contech CDS Water Quality unit.

SECTION 2

Maintenance & Operations Plan

MAINTENANCE AND OPERATION PLAN

The owner has recorded a "Maintenance Agreement" between the owner and the City of O'Fallon, Missouri. This agreement states that the owner agrees to maintain the stormwater management facilities located on this property and sets forth penalties that may occur if this maintenance is not performed. The contact information for the responsible party is as follows:

QUIKTRIP CORPORATION
2255 Bluestone Drive
St. Charles, Missouri 63303
636-627-0003

The responsible party will maintain all private stormwater facilities in good working order. Minimum maintenance of the private facilities shall include routine inspection, maintenance and removal of sediment, debris, oil and foreign material from the storm sewers, inlets, hydrodynamic separator units so that the operation and capacity of the stormwater facilities continue to function properly. The party responsible for maintenance must evaluate the plan for effectiveness at least annually and revise as necessary.

To ensure the maintenance of privately owned stormwater management facilities, the city requires an Annual BMP Maintenance Report to be submitted to the Engineering Department for these facilities. The Annual Report should provide documentation that maintenance was performed in accordance with the Stormwater Management Facilities Report submitted for your development and approved by the city for the above referenced project. The Annual Report typically consists of a completed inspection checklist and/or maintenance log, narrative description of corrective action measures taken, photographs and any other documentation appropriate for demonstrating compliance with BMP Maintenance Agreement and your Facilities Report.

The annual BMP Maintenance Report should be submitted to the city before March 31st of each year. A city inspector will also periodically inspect the BMP. The Annual Report should be sent to:

City of O'Fallon
Engineering Department
100 North Main Street
O'Fallon, MO 63366

GENERAL:

The hydrodynamic separator unit(s) components expected to receive and/or trap debris and sediment must be inspected for clogging and excessive debris and sediment accumulation at least four times annually as well as after every storm exceeding 1 inch of rainfall. Such components may include outfall structure, cleanouts, and downstream storm sewer structure.

When cleaning a BMP, standing "clear, unpolluted water" can be decanted and discharged to the storm system. Water that has become turbid during cleaning should be either (1) pumped and hauled to an acceptable wastewater disposal facility or (2) Treated by filtration, such as pumped through a bag filter, and discharged to the sanitary sewer system.

A special discharge permit from the city is not required for discharging to the sanitary system if the total volume is less than 10,000 gallons. The flow rate pumped into the sanitary system shall not exceed 50 g.p.m.

Definitions:

Clear Water: Water that has settled its solids for 24 hours and can be pumped out of the BMP without re-suspending the solids.

Unpolluted water: Defined by the city as meaning "any water that may be discharged under NPDES regulations into waters of the State without having to be authorized by a NPDES permit and which will not cause any violations of State or Federal Water Quality Standards."

Hazardous Waste

The following general guidance is based on the Federal Regulation, 40 CFR 262.11 – Hazardous Waste Determination. (Note: Regulations are subject to change in the future and this is offered only as general information available at this time.) The generator of the waste should determine if the waste is special waste using the following method:

1. Determine if the waste is excluded from being hazardous waste per 10 CSR 25-4.261 (2)(A) and 40 CFR 261.4.
2. Determine if the waste is listed as a hazardous waste per 10 CSR 25-4.261(2)(D) and 40 CFR 261, subpart D.
3. Determine if the waste is a characteristic hazardous waste (i.e. ignitable, corrosive, reactive or toxic). Consider the materials used or the processes used to generate the waste based on this knowledge, determine the appropriate testing and analyze in accordance with 10 CSR 25-4.261(2)© and 40 CFR 261, subpart C.

Testing for hazardous waste characteristics requires sampling at the point of generation. If the analyses detect any property characteristic of hazardous waste, you must manage the waste as a hazardous waste. It is very important to understand that hazardous waste remains a hazardous waste when diluted or stabilized, unless it is specifically excluded from the definition of hazardous waste after the process (40 CFR 261.3). You may not dilute hazardous waste solely for the purpose of rendering it non-hazardous, unless dilution is warranted in an emergency response situation or where the dilution is part of a hazardous waste treatment process regulated or exempted under 10 CSR 25-7 or 10 CSR 25-9. You may not dispose of regulated hazardous wastes in any sanitary, demolition or utility waste landfill in Missouri.

The following table lists typical properties of characteristic hazardous waste. This is not a complete listing, but only a guideline to determine if a waste may be a characteristic hazardous waste.

Ignitability:

Catches fire easily through friction, absorption or moisture or spontaneous chemical changes.

Corrosiveness:

pH<2.0 pr pH>12.5

Reactivity:

Wastes that are normally unstable, react violently with water, can explode or release poisonous gases.

Toxicity:

TCLP, EPA Method 1311, any contaminates listed in Table 1 or 40 CFR 261.24 equal or greater than the listed concentration.

Once the waste is determined to be non-hazardous and contains no free liquids, you must request approval from the owner/operator to dispose of the special waste at the landfill by filling out and signing the generator's portion of the Special Waste Disposal Request Form. You must also identify health hazards associated with the material, as well as any special shipping, handling or safety requirements. For example, note whether the material should be transported in covered containers or whether it is a respiratory hazard. The Material Safety Data Sheet, if one exists for the material, lists some of this information. The completed Special Waste Disposal Request Form, along with appropriate test results and other pertinent information are then sent to the receiving landfill for the landfill owner or operator's review and signature prior to acceptance and disposal of the waste. Until the landfill accepts the waste for disposal, it is the owner's responsibility to manage the waste in an environmentally sound manner. Free liquids must have pollutant components removed to or

below regulatory thresholds before the free liquid may be discharged to the environment, or pretreatment/treatment facility, where allowable by the local authority or jurisdiction. Do not discharge the liquids or liquid slurry, captured by the cleaning and maintenance process, into any storm or sanitary structures.

Approved wastes shall be disposed of at the West Lake Quarry & Material Company landfill located at 13550 St. Charles Rock Road, Bridgeton, MO 63044, or approved equivalent.

CONSTRUCTION:

* CONSTRUCTION SITE RUNOFF SHALL NOT FLOW INTO THE WATER QUALITY BMP(s). ALL STORMWATER FLOW TO THE WATER QUALITY BMP(s) SHALL BE DIVERTED, PLUGGED, OR DISCONNECTED UNTIL THE CONSTRUCTION SITE IS STABLE AND THE CITY DEDICATION INSPECTOR PROVIDES APPROVAL TO PLACE THE BMP(s) ONLINE.

The BMP is susceptible to clogging and subsequent failure if significant sediment loads are allowed to enter the facility. Therefore, using water quality basin sites for construction sediment control is prohibited. Temporary diversion swales or sediment basin upstream of the sand filter shall be utilized.

O&M PLAN REVISIONS

Property owner should reference city's website or contact city's Division of Environmental Compliance for current guidance on procedures for O&M Plan revisions.

Minor revisions may include, but are not limited to, a change in property owner, change in specifics of O&M schedule, change in maintenance procedures or contact. Minor revisions shall be submitted to the city. These minor revisions are not subject to the city's development review process. Major revisions are changes that will alter the stormwater BMP's design or operation from the original approved Design Report (i.e. BMP type, location, capacity, or other structural components), specifically the operation or performance of the system is being altered by a maintenance activity or repair. Major revisions are subject to the city's development review process and shall be submitted to the city.

STRUCTURAL COMPONENTS:

All structural components must be inspected for cracking, subsidence, erosion, and deterioration at least once annually.

CONTECH CDS UNITS:

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, i.e., unstable soils or heavy winter sanding will cause the treatment chamber to fill more quickly but regular sweeping will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant deposition and transport may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall) however more frequent inspections may be necessary in equipment wash down areas and in climates where winter sanding operations may lead to rapid accumulations. It is useful and often required as part of a permit to keep a record of each inspection. A simple inspection and maintenance form for doing so is available at www.contechstormwater.com.

The CDS system should be cleaned when the sediment has accumulated to a depth of three feet in the treatment chamber. This determination can be made by taking two measurements with a stadia rod or similar measuring device; one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the distance given in Table 2, the CDS Unit should be maintained to ensure effective treatment.

Cleaning

Cleaning of the CDS Unit should be done during dry weather conditions when no flow is entering the system. Cleanout of the CDS Unit with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. Simply remove the manhole cover and insert the vacuum hose into the sump. All pollutants can be removed from this one access point from the surface with no requirements for Confined Space Entry. In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use adsorbent pads, which solidify the oils. These are usually much easier to remove from the unit individually, and less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Floating trash can be netted out if you wish to separate it from the other pollutants. Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure proper safety precautions. If anyone physically enters the unit, Confined Space Entry procedures need to be followed.

Disposal of all material removed from the CDS Unit should be done is accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

MAINTENANCE SCHEDULE:

MAINTENANCE ITEM:	MAINTENANCE SCHEDULE:	CORRECTIVE MEASURES:
Contech CDS	Spring and Fall and after major rainfall events.	Replace missing or displaced rock. Remove sediment when 1/3 of barrier height is reached.
Cleanout	Annually.	Replace/repair any damaged piping or cover.
Outfall Structure(s) & Piping	Annually. When basin drain time exceeds 72 hours.	Access outfall piping thru downstream storm structure or cleanout. Remove sediment and debris from outfall piping with mechanical rooter equipment.
Downstream Storm Structure(s)	Annually. When basin drain time exceeds 72 hours.	Inspect downstream storm structures to ensure proper drainage and conveyance of underdrain flow.

MAINTENANCE CHECKLIST:

Annually

☐ Inspect Cleanout(s)

Corrective Action Taken: _____

_____

_____

_____

Inspected By:_____ Date:_____

☐ Inspect Outfall Structure(s) & Piping

Corrective Action Taken: _____

_____

_____

_____

Inspected By:_____ Date:_____

Inspect Downstream Storm Sewer Structure(s)

Corrective Action Taken: _____

_____

_____

_____

Inspected By:_____ Date:_____

Inspect Hydrodynamic Separator Structure(s)

Corrective Action Taken: _____

_____

_____

_____

Inspected By:_____ Date:_____

When Basin Drain Time Exceeds 72-hours

☐ Inspect Outfall Structure(s) & Piping

Corrective Action Taken: _____

_____

_____

_____

Inspected By:_____ Date:_____

☐ Inspect Downstream Storm Sewer Structure(s)

Corrective Action Taken: _____

_____

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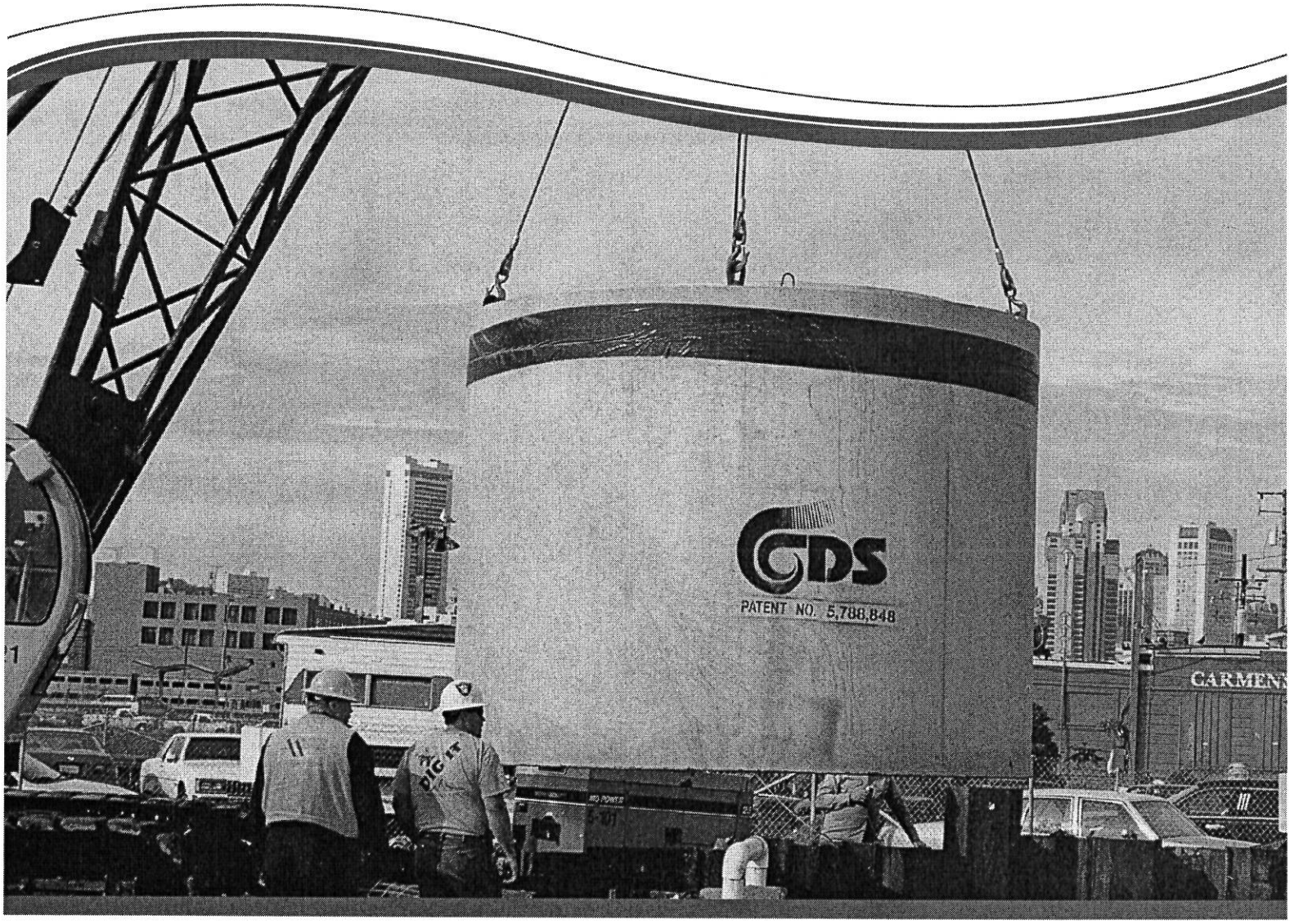
_____

Inspected By:_____ Date:_____

CONTECH®
ENGINEERED SOLUTIONS

CDS Guide
Operation, Design, Performance and Maintenance



CDS®

Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, and minimize the re-suspension and release of previously trapped pollutants. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs (1416 L/s). Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs (28.3 to 8495 L/s). The pollutant removal capacity of the CDS system has been proven in lab and field testing.

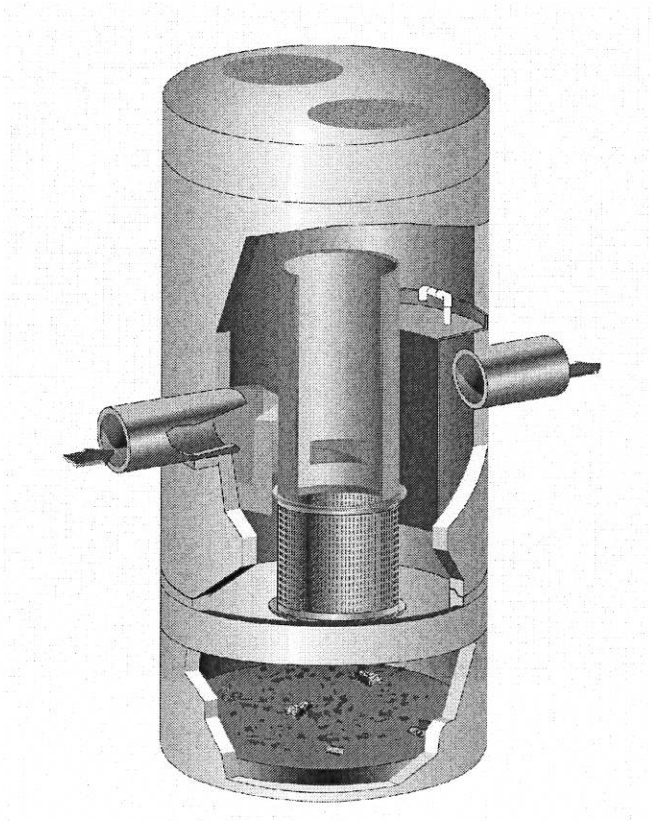
Operation Overview

Stormwater enters the diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated.

Swirl concentration and screen deflection force floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.

Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During the flow events exceeding the treatment design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants are retained in the separation cylinder.



Design Basics

There are three primary methods of sizing a CDS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow rate for a defined particle size. The Rational Rainfall Method™ or the and Probabilistic Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically in the Unites States, CDS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a gradation with an average particle size (d50) of 125 microns (μm). For some regulatory environments, CDS systems can also be designed to achieve an 80% annual solids load reduction based on an average particle size (d50) of 75 microns (μm) or 50 microns (μm).

Water Quality Flow Rate Method

In some cases, regulations require that a specific treatment rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval, e.g. the six-month storm, or a water quality depth, e.g. 1/2-inch (13 mm) of rainfall.

The CDS is designed to treat all flows up to the WQQ. At influent rates higher than the WQQ, the diversion weir will direct most flow exceeding the WQQ around the separation chamber. This allows removal efficiency to remain relatively constant in the separation chamber and eliminates the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the CDS will remove a specific gradation of sediment at a specific removal efficiency. Therefore the treatment flow rate is variable, based on the gradation and removal efficiency specified by the design engineer.

Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate removal efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes, or hourly, and recorded in 0.01-inch increments. Depths were recorded hourly with 1-mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS system are

determined. Performance efficiency curve determined from full scale laboratory tests on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Probabilistic Rational Method

The Probabilistic Rational Method is a sizing program Contech developed to estimate a net annual sediment load reduction for a particular CDS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics.

The Probabilistic Method is an extension of the Rational Method used to estimate peak discharge rates generated by storm events of varying statistical return frequencies (e.g. 2-year storm event). Under the Rational Method, an adjustment factor is used to adjust the runoff coefficient estimated for the 10-year event, correlating a known hydrologic parameter with the target storm event. The rainfall intensities vary depending on the return frequency of the storm event under consideration. In general, these two frequency dependent parameters (rainfall intensity and runoff coefficient) increase as the return frequency increases while the drainage area remains constant.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Method. Since most sites are relatively small and highly impervious, the Rational Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS are determined. Performance efficiency curve on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Treatment Flow Rate

The inlet throat area is sized to ensure that the WQQ passes through the separation chamber at a water surface elevation equal to the crest of the diversion weir. The diversion weir bypasses excessive flows around the separation chamber, thus preventing re-suspension or re-entrainment of previously captured particles.

Hydraulic Capacity

The hydraulic capacity of a CDS system is determined by the length and height of the diversion weir and by the maximum allowable head in the system. Typical configurations allow hydraulic capacities of up to ten times the treatment flow rate. The crest of the diversion weir may be lowered and the inlet throat may be widened to increase the capacity of the system at a given water surface elevation. The unit is designed to meet project specific hydraulic requirements.

Performance

Full-Scale Laboratory Test Results

A full-scale CDS system (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This CDS unit was evaluated under controlled laboratory conditions of influent flow rate and addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSDs) of the test materials were analyzed using standard method "Gradation ASTM D-422 "Standard Test Method for Particle-Size Analysis of Soils" by a certified laboratory.

UF Sediment is a mixture of three different products produced by the U.S. Silica Company: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation (d50 = 20 to 30 μm) covering a wide size range (Coefficient of Uniformity, C averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer d50 (d50 for NJDEP is approximately 50 μm) (NJDEP, 2003).

The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size (d50) of 106 microns. The PSDs for the test material are shown in Figure 1.

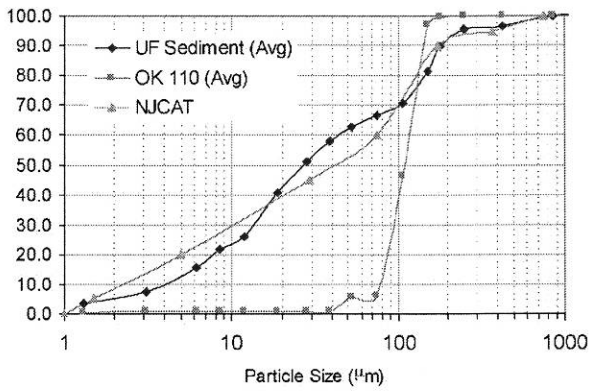


Figure 1. Particle size distributions

Tests were conducted to quantify the performance of a specific CDS unit (1.1 cfs (31.3-L/s) design capacity) at various flow rates, ranging from 1% up to 125% of the treatment design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations of approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC) testing using ASTM D3977-97 "Standard Test Methods for Determining Sediment Concentration in Water Samples", and particle size distribution analysis.

Results and Modeling

Based on the data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve representative of the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect

to SSC removal for any particle size gradation, assuming the particles are inorganic sandy-silt. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand) as a function of operating rate.

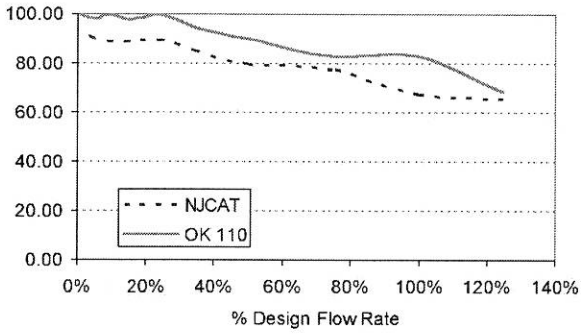


Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size (d50) of 125 microns (e.g. Washington State Department of Ecology — WASDOE - 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). The model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at the design (100%) flow rate, for this particle size distribution (d50 = 125 μm).

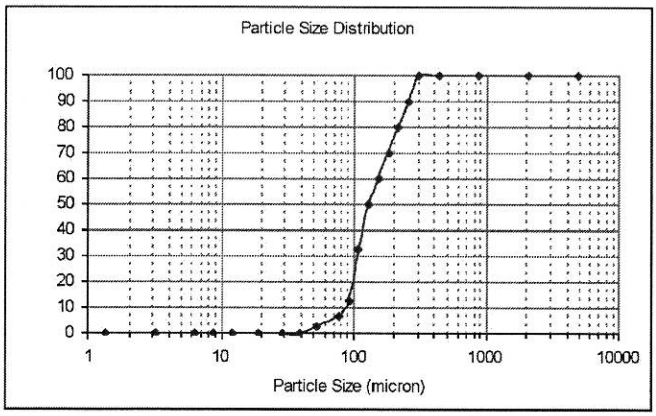


Figure 3. WASDOE PSD

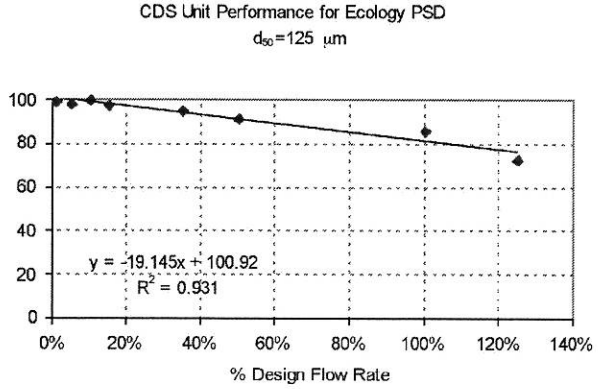


Figure 4. Modeled performance for WASDOE PSD.

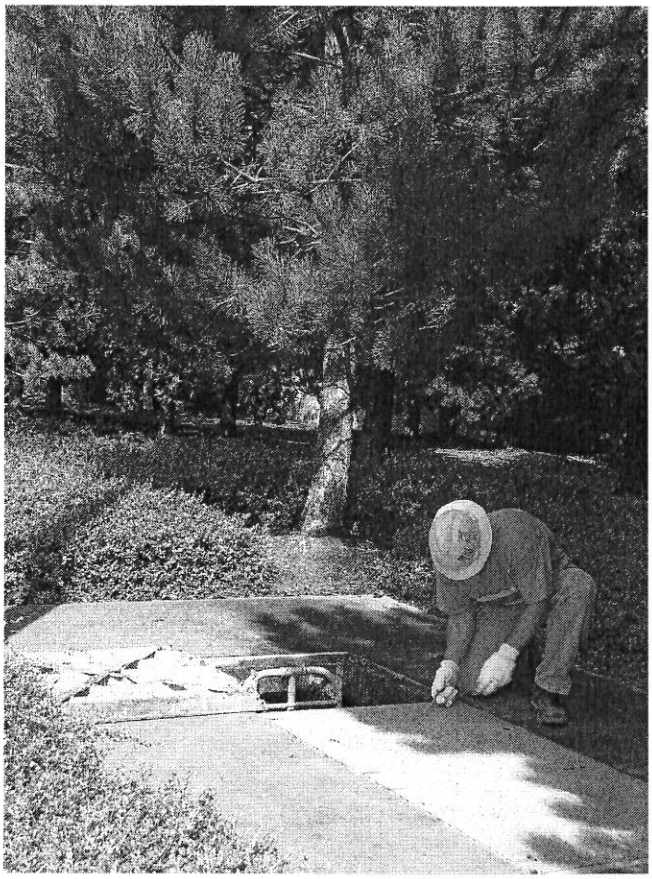
Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified



during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

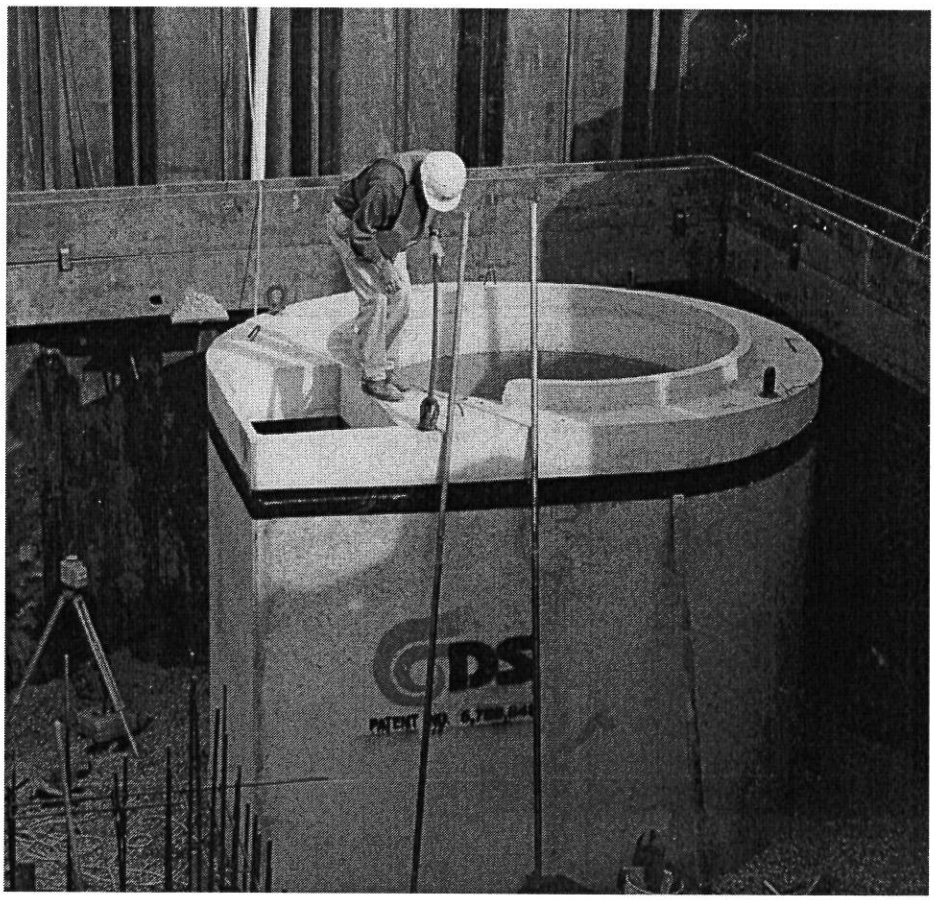
In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be cleaned to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	yd3	m3
CDS2015-4	4	1.2	3.0	0.9	0.5	0.4
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Note: To avoid underestimating the volume of sediment in the chamber, carefully lower the measuring device to the top of the sediment pile. Finer silty particles at the top of the pile may be more difficult to feel with a measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.



CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than eighteen inches the system should be cleaned out. **Note: To avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

Support

- Drawings and specifications are available at www.ContechES.com/urbangreen.
- Site-specific design support is available from our engineers.

CONTECH®
ENGINEERED SOLUTIONS
800.925.5240
www.ContechES.com/urbangreen

Contech Engineered Solutions provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater products. For information on other Contech division offerings, visit www.ContechES.com or call 800.338.1122

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; related foreign patents or other patents pending.

CONTECH®
CONSTRUCTION PRODUCTS INC.

CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

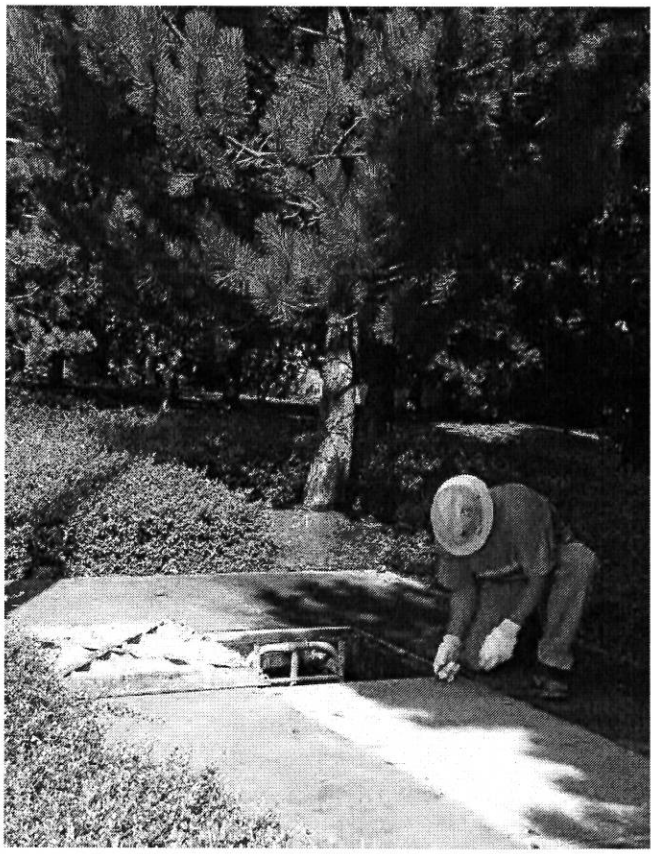
The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	yd3	m3
CDS2015-4	4	1.2	3.0	0.9	0.5	0.4
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

CONTECH Construction Products Inc. provides site solutions for the civil engineering industry. CONTECH's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other CONTECH division offerings, visit contech-cpi.com or call 800.338.1122

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; 7,517,450 related foreign patents or other patents pending.

CONTECH CONSTRUCTION PRODUCTS INC.
800.925.5240
contechstormwater.com

CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than eighteen inches the system should be cleaned out. **Note: To avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

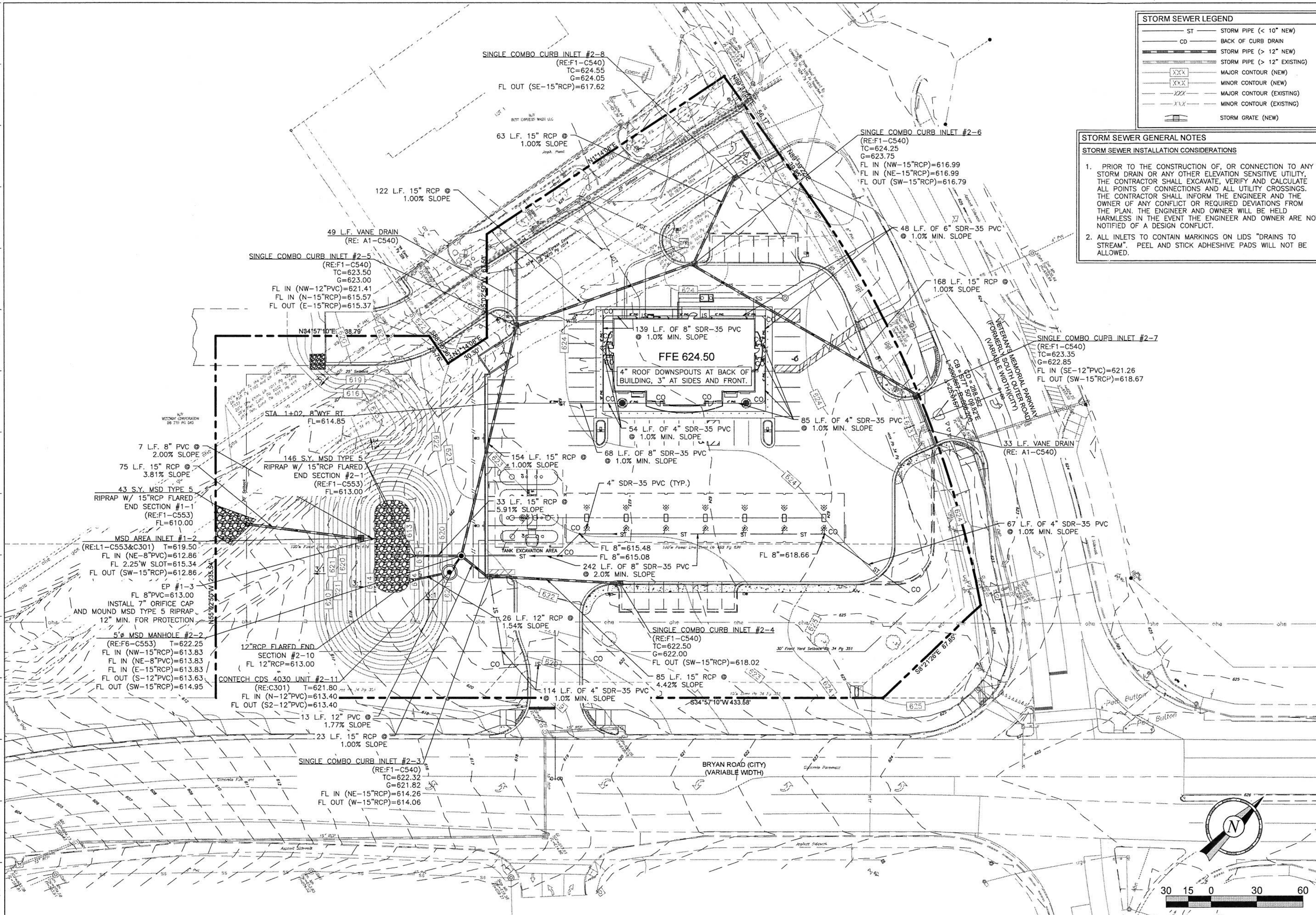
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SECTION 3

Supporting Data

EXHIBIT A

WQ Facilities Construction Plans



SINGLE COMBO CURB INLET #2-8
(RE:F1-C540)
TC=624.55
G=624.05
FL OUT (SE-15"RCP)=617.62
63 L.F. 15" RCP @ 1.00% SLOPE
122 L.F. 15" RCP @ 1.00% SLOPE
49 L.F. VANE DRAIN (RE: A1-C540)
SINGLE COMBO CURB INLET #2-5
(RE:F1-C540)
TC=623.50
G=623.00
FL IN (NW-12"PVC)=621.41
FL IN (N-15"RCP)=615.57
FL OUT (E-15"RCP)=615.37
N84°57'10"E 38.79'
STA. 1+02, 8"WYE RT.
FL=614.85
7 L.F. 8" PVC @ 2.00% SLOPE
75 L.F. 15" RCP @ 3.81% SLOPE
43 S.Y. MSD TYPE 5 RIPRAP W/ 15"RCP FLARED END SECTION #1-1
(RE:F1-C553)
FL=610.00
146 S.Y. MSD TYPE 5 RIPRAP W/ 15"RCP FLARED END SECTION #2-1
(RE:F1-C553)
FL=613.00
MSD AREA INLET #1-2
(RE:L1-C553&C301) T=619.50
FL IN (NE-8"PVC)=612.86
FL 2.25'W SLOT=615.34
FL OUT (SW-15"RCP)=612.86
EP #1-3
FL 8"PVC=613.00
INSTALL 7" ORIFICE CAP AND MOUND MSD TYPE 5 RIPRAP 12" MIN. FOR PROTECTION
5'ø MSD MANHOLE #2-2
(RE:F6-C553) T=622.25
FL IN (NW-15"RCP)=613.83
FL IN (NE-8"PVC)=613.83
FL IN (E-15"RCP)=613.83
FL IN (S-12"PVC)=613.63
FL OUT (SW-15"RCP)=614.95
12"RCP FLARED END SECTION #2-10
FL 12"RCP=613.00
CONTECH CDS 4030 UNIT #2-11
(RE:C301) T=621.80
FL IN (N-12"PVC)=613.40
FL OUT (S2-12"PVC)=613.40
13 L.F. 12" PVC @ 1.77% SLOPE
23 L.F. 15" RCP @ 1.00% SLOPE
SINGLE COMBO CURB INLET #2-3
(RE:F1-C540)
TC=622.32
G=621.82
FL IN (NE-15"RCP)=614.26
FL OUT (W-15"RCP)=614.06
139 L.F. OF 8" SDR-35 PVC @ 1.0% MIN. SLOPE
FFE 624.50
4" ROOF DOWNSPOUTS AT BACK OF BUILDING, 3" AT SIDES AND FRONT.
54 L.F. OF 4" SDR-35 PVC @ 1.0% MIN. SLOPE
68 L.F. OF 8" SDR-35 PVC @ 1.0% MIN. SLOPE
85 L.F. OF 4" SDR-35 PVC @ 1.0% MIN. SLOPE
154 L.F. 15" RCP @ 1.00% SLOPE
4" SDR-35 PVC (TYP.)
33 L.F. 15" RCP @ 5.91% SLOPE
TANK EXCAVATION AREA
FL 8"=615.48
FL 8"=615.08
FL 8"=618.66
242 L.F. OF 8" SDR-35 PVC @ 2.0% MIN. SLOPE
26 L.F. 12" RCP @ 1.54% SLOPE
SINGLE COMBO CURB INLET #2-4
(RE:F1-C540)
TC=622.50
G=622.00
FL OUT (SW-15"RCP)=618.02
85 L.F. 15" RCP @ 4.42% SLOPE
114 L.F. OF 4" SDR-35 PVC @ 1.0% MIN. SLOPE
S34°57'10"W 433.58'
SINGLE COMBO CURB INLET #2-6
(RE:F1-C540)
TC=624.25
G=623.75
FL IN (NW-15"RCP)=616.99
FL IN (NE-15"RCP)=616.99
FL OUT (SW-15"RCP)=616.79
48 L.F. OF 6" SDR-35 PVC @ 1.0% MIN. SLOPE
168 L.F. 15" RCP @ 1.00% SLOPE
SINGLE COMBO CURB INLET #2-7
(RE:F1-C540)
TC=623.35
G=622.85
FL IN (SE-12"PVC)=621.26
FL OUT (SW-15"RCP)=618.67
33 L.F. VANE DRAIN (RE: A1-C540)
67 L.F. OF 4" SDR-35 PVC @ 1.0% MIN. SLOPE
VETERAN'S MEMORIAL PARKWAY (FORMERLY SOUTH OUTER ROAD) (VARIABLE WIDTH)(CITY)
S8°21'26"E 87.85'
BRYAN ROAD (CITY) (VARIABLE WIDTH)
30 15 0 30 60

STORM SEWER LEGEND

Symbol	Description
ST	STORM PIPE (< 10" NEW)
CO	BACK OF CURB DRAIN
	STORM PIPE (> 12" NEW)
	STORM PIPE (> 12" EXISTING)
XXX	MAJOR CONTOUR (NEW)
XXX	MINOR CONTOUR (NEW)
XXX	MAJOR CONTOUR (EXISTING)
XXX	MINOR CONTOUR (EXISTING)
	STORM GRATE (NEW)

STORM SEWER GENERAL NOTES

STORM SEWER INSTALLATION CONSIDERATIONS

1. PRIOR TO THE CONSTRUCTION OF, OR CONNECTION TO ANY STORM DRAIN OR ANY OTHER ELEVATION SENSITIVE UTILITY, THE CONTRACTOR SHALL EXCAVATE, VERIFY AND CALCULATE ALL POINTS OF CONNECTIONS AND ALL UTILITY CROSSINGS. THE CONTRACTOR SHALL INFORM THE ENGINEER AND THE OWNER OF ANY CONFLICT OR REQUIRED DEVIATIONS FROM THE PLAN. THE ENGINEER AND OWNER WILL BE HELD HARMLESS IN THE EVENT THE ENGINEER AND OWNER ARE NOT NOTIFIED OF A DESIGN CONFLICT.
2. ALL INLETS TO CONTAIN MARKINGS ON LIDS "DRAINS TO STREAM". PEEL AND STICK ADHESIVE PADS WILL NOT BE ALLOWED.

STATE OF MISSOURI
MICHAEL JAMES VELLOFF
NO. E-2000161862
REGISTERED PROFESSIONAL ENGINEER

PROJECT NO.:161105

NAME: MICHAEL J. VELLOFF
LICENSE NUMBER: E-2000161862
DISCIPLINE: CIVIL
CORPORATION AUTHORITY NUMBER: 001194

THE SEAL OF MICHAEL J. VELLOFF ON THIS DRAWING APPLIES ONLY TO THE CIVIL/SITE ENGINEERING SHOWN. IT DOES NOT APPLY, NOR IS ANY RESPONSIBILITY TAKEN FOR ENVIRONMENTAL, GEOTECHNICAL (INCLUDING BUT NOT LIMITED TO SLOPE STABILITY), STRUCTURAL, HVAC, PLUMBING, ELECTRICAL, FIRE PROTECTION, TRAFFIC ENGINEERING, SURVEYING (BOUNDARY AND TOPOGRAPHIC), OR ARCHITECTURAL (BUILDING OR LANDSCAPE).

QuikTrip No. 0662

955 BRYAN ROAD
O'FALLAN, MO 63366

QT

PROTOTYPE: P-92-02
DIVISION: 06
VERSION: 001
DESIGNED BY: RKF
DRAWN BY: RKF
REVIEWED BY: MJV

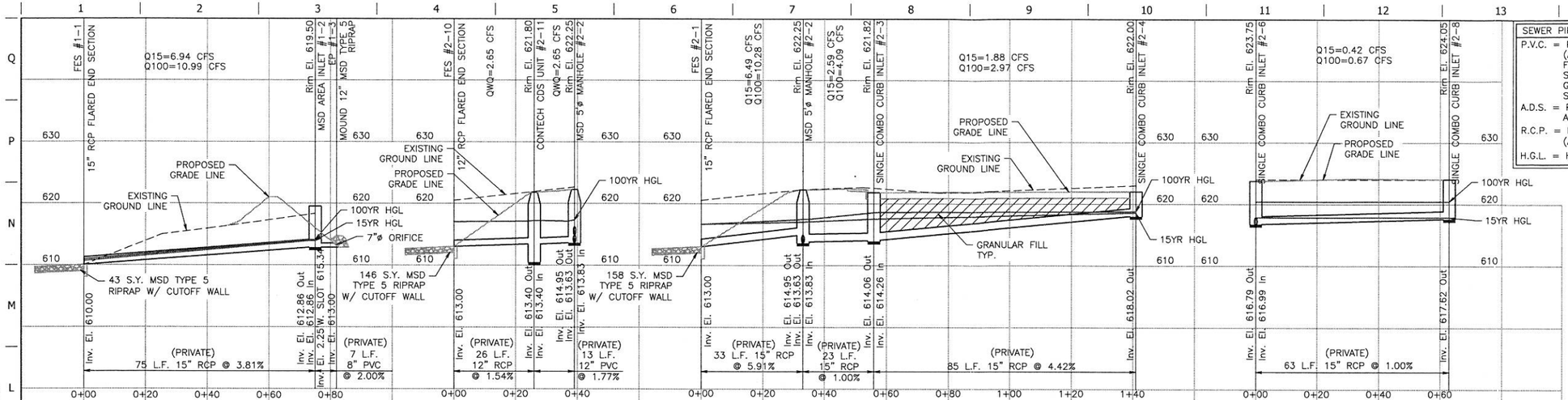
REV	DATE	DESCRIPTION

ORIGINAL ISSUE DATE: 02/02/17

SHEET TITLE:
STORM SEWER PLAN

SHEET NUMBER:
C120

FILE LOCATION:K:\161105 - QuikTrip #662 - Bryan Road and Veterans Memorial Parkway\Civil\06-0662 Civil.dwg TAB NAME:C120 Storm USER:rkfryer SAVED:1/25/2018 1:20 PM PLOTTED:1/26/2018 6:09 AM



SEWER PIPE SPECIFICATIONS:

P.V.C. = POLYVINYL CHLORIDE PIPE (ASTM D-3034, WALL THICKNESS SDR 35) FITTINGS: P.V.C., ASTM D-3034 SOLVENT CEMENT: ASTM D-2855 GASKETS AND SEALS: ELASTOMERIC, STANDARD TO THE MANUFACTURER

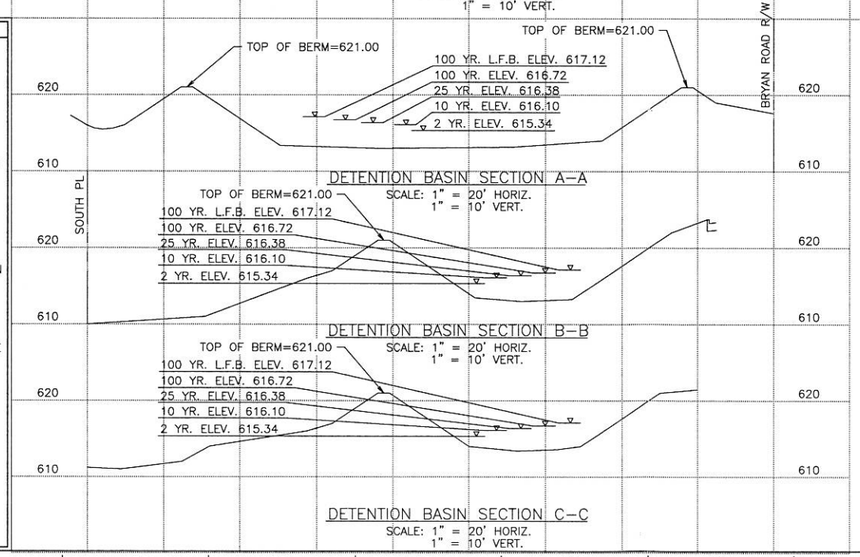
A.D.S. = POLYPROPYLENE (ASTM F-2736 FOR 12"-30" ASTM F-2764 FOR 30"-60")(SANITITE HP)

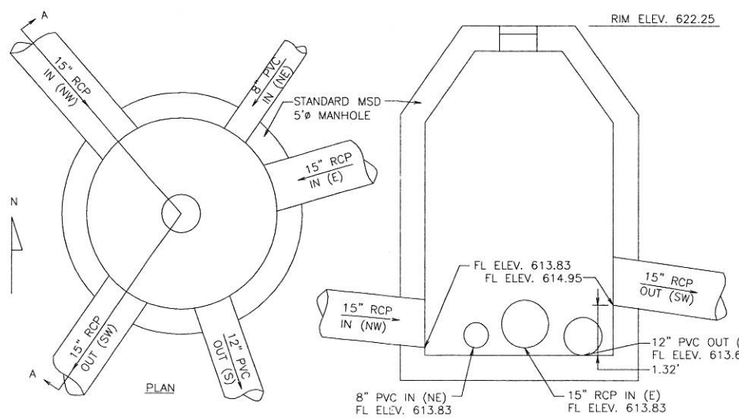
R.C.P. = REINFORCED CONCRETE PIPE, CLASS V (ASTM C-76)

H.G.L. = HYDRAULIC GRADE LINE

STORM SEWER PROFILE GENERAL NOTES

1. PRIOR TO THE CONSTRUCTION OF, OR CONNECTION TO ANY STORM DRAIN OR ANY OTHER ELEVATION SENSITIVE UTILITY, THE CONTRACTOR SHALL EXCAVATE, VERIFY AND CALCULATE ALL POINTS OF CONNECTIONS AND ALL UTILITY CROSSINGS. THE CONTRACTOR SHALL INFORM THE ENGINEER AND THE OWNER OF ANY CONFLICT OR REQUIRED DEVIATIONS FROM THE PLAN. THE ENGINEER AND OWNER WILL BE HELD HARMLESS IN THE EVENT THE ENGINEER AND OWNER ARE NOT NOTIFIED OF A DESIGN CONFLICT.
2. CONTRACTOR SHALL INSTALL NEW PIPE USING VERTICAL SHORING METHODS ACCEPTABLE TO OSHA LAWS AND REGULATIONS.
3. FOR SEWER PIPE (STORM, SANITARY AND COMBINED) WITH A DESIGN GRADE LESS THAN ONE PERCENT (1%), VERIFICATION OF THE PIPE GRADE WILL BE REQUIRED FOR EACH INSTALLED REACH OF SEWER, PRIOR TO ANY SURFACE RESTORATION OR INSTALLATION OF ANY SURFACE IMPROVEMENTS. THE CONTRACTOR'S FIELD SUPERVISOR WILL BE REQUIRED TO PROVIDE DAILY DOCUMENTATION VERIFYING THAT THE AS-BUILT PIPE GRADE MEETS THE DESIGN GRADE THROUGH THE SUBMITTAL OF SIGNED CUT SHEETS TO THE DISTRICT INSPECTOR UPON REQUEST.
4. THE CONTRACTOR WILL BE REQUIRED TO REMOVE AND REPLACE ANY SEWER REACH HAVING AN AS-BUILT GRADE FLATTER THAN THE DESIGN GRADE BY MORE THAN 0.1%. SEWERS WITH GRADES GREATER THAN THE DESIGN GRADE MAY BE LEFT IN PLACE PROVIDED NO OTHER SEWER GRADE IS REDUCED BY THIS VARIANCE IN THE AS-BUILT GRADE.
5. CITY ALSO RESERVES THE RIGHT TO REQUIRE THE CONTRACTOR TO REMOVE AND REPLACE ANY SEWER (AT ANY TIME PRIOR TO CONSTRUCTION APPROVAL) FOR WHICH THE AS-BUILT GRADE DOES NOT COMPLY WITH THE GRADE TOLERANCE STATED IN THE ABOVE PARAGRAPHS.
6. FIELD SURVEYED VERIFICATION MUST BE MADE UNDER THE DIRECTION OF THE LICENSED LAND SURVEYOR OR REGISTERED ENGINEER. THE SEWER CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COST ASSOCIATED WITH THE FIELD VERIFICATION OF THE SEWER GRADE, OR REMOVAL AND REPLACEMENT OF THE SEWER PIPE OR ASSOCIATED APPURTENANCES.
7. TBR&R - THE REMOVAL AND REPLACEMENT, OR REHABILITATION OF THE EXISTING STRUCTURES WILL BE DETERMINED BY THE CITY FIELD INSPECTOR. IF THE STRUCTURE IS DETERMINED TO REMAIN IN PLACE THEN THE TOP SHALL BE ADJUSTED TO GRADE IF NEEDED.
8. ALL INLETS TO CONTAIN MARKINGS ON LIDS "DRAINS TO STREAM". PEEL AND STICK ADHESIVE PADS WILL NOT BE ALLOWED.
9. ALL PIPE CONNECTONS TO CONTAIN A-LOK FITTINGS. NO GROUT CONNECTIONS ALLOWED.





NOTES:
1. THE CONTRACTOR MUST VERIFY THE RELATIONSHIP BETWEEN THE INVERT OF THE FLOW SPLITTER PIPE AND THE INVERT OF THE OVERFLOW PIPE PRIOR TO BACKFILLING AROUND THE STRUCTURE. NOTIFY THE DESIGN ENGINEER IMMEDIATELY IF THERE IS A DISCREPANCY.

FLOW SPLITTER STRUCTURE
MANHOLE #2-2
SCALE: 1/2" = 1'-0"

STATE OF MISSOURI
MICHAEL JAMES VELLOFF
NO. E-2000161862
REGISTERED PROFESSIONAL ENGINEER

PROJECT NO.:161105

NAME: MICHAEL J. VELLOFF
LICENSE NUMBER: E-2000161862
DISCIPLINE: CIVIL
CORPORATION AUTHORITY NUMBER: 001194

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QuikTrip No. 0662

955 BRYAN ROAD
O'FALLAN, MO 63366

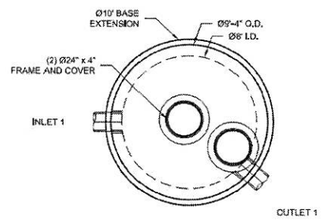
PROTOTYPE: P-92-02
DIVISION: 06
VERSION: 001
DESIGNED BY: RKF
DRAWN BY: RKF
REVIEWED BY: MJV

REV	DATE	DESCRIPTION
		ORIGINAL ISSUE DATE: 02/02/17

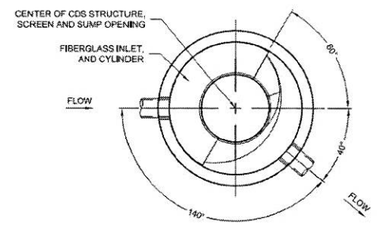
SHEET TITLE:
STORM SEWER PROFILES

SHEET NUMBER:
C300

FILE LOCATION:K:\161105 - QuikTrip #662 - Bryan Road and Veterans Memorial Parkway\Civil\06-0662 Civil.dwg TAB NAME:C300 Storm Profiles USER:rkfryer SAVED:1/25/2018 1:20 PM PLOTTED:1/26/2018 6:10 AM



PLAN VIEW



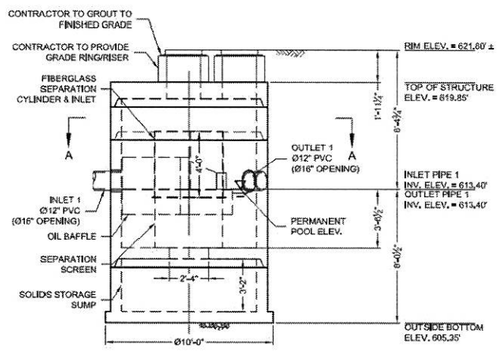
SECTION A-A

MATERIAL LIST (PROVIDED BY CONTECH)

COUNT	DESCRIPTION	INSTALLED BY
1	FIBERGLASS INLET AND CYLINDER	CONTECH
1	2400 micron, 4' O.D. x 3.04' SEP. SCREEN	CONTECH
1	SEALANT FOR JOINTS (BY PRECASTER)	CONTRACTOR
2	Ø24" x 4" FRAME & COVER, EJ#41600389, OR EQUIV.	CONTRACTOR

SITE DESIGN DATA

WATER QUALITY FLOW RATE	2.65 CFS
PEAK FLOW RATE	N/A CFS
RETURN PERIOD OF PEAK FLOW	N/A YRS



ELEVATION VIEW

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE, www.ContechES.com
3. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO –NONE– LOAD RATING, ASSUMING EARTH COVER OF 0' - 2', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
6. CDS STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

STRUCTURE WEIGHT
APPROXIMATE HEAVIEST PICK = 27000 LBS.
STRUCTURE IS DELIVERED IN 4 PIECES

MAX FOOTPRINT = Ø10'

CONTECH PROPOSAL DRAWING

KIEN LAYOUT 1A 4030-8-FGS 1165 / KIEN10

MARK	DATE	REVISION DESCRIPTION	BY

CDS4030-8-C - 553285-10
QUIK TRIP #662
OFALLON, MO
for SYSTEM: #2-11

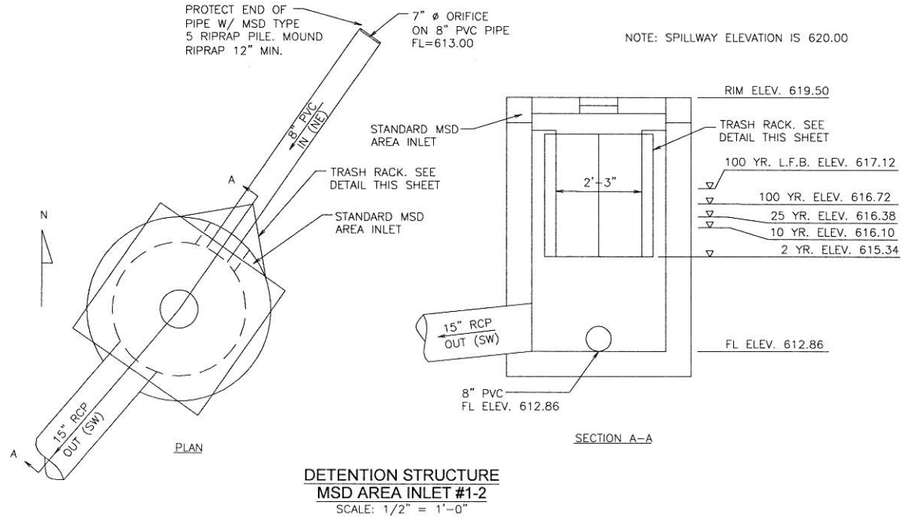
CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
800-338-1122 513-645-7000 513-645-7993 FAX
9025 Centre Pointe Drive, Suite 400, West Chester, OH 45069

CDS

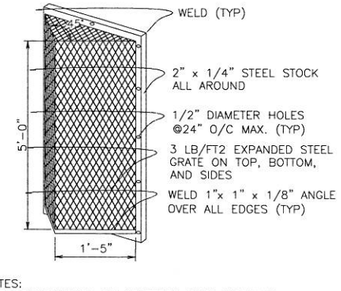
DATE	11/17/16
SCALES	3/16" = 1'-0"
DESIGNED	CMF
DRAWN	CMF
CHECKED	JXXX
APPROVED	—
PROJECT No.	553285
RESUBMIT No.	10
SHEET	1 OF 1

Project Name QuikTrip#662
Location: O'Fallon MO
Project No.: 161105
Structure No. 2-11
Prepared For: QuikTrip Corp
Prepared By: RKF

Drainage Area	1.89 acre	Impervious Area	1.53 acre
	82,329 ft²		66,647 ft²
	1.89 acre		1.53 acre
	0.0029533 mi²		0.0023906 mi²
% Impervious	81.0%	% Impervious Over-ride	0
P	1.14 in		
Rv	0.779 volumetric runoff coefficient		
Qa	0.69 watershed inches		
WQV	6,069.4 ft3		
	0.140 acre-ft		
CN	97.6		
Tc	5 min		
	0.08 hr		
Rainfall Type	II		
Potential Abstraction, "S"	0.25 inches		
Initial Abstraction, "Ia"	0.05 inches		
Treatment System	Vortechs		
Micron Rating	110		
qu	1010.41		
WQF	2.65 cfs		



DETENTION STRUCTURE
MSD AREA INLET #1-2
SCALE: 1/2" = 1'-0"



NOTES:
1. TRASH RAKE TO BE CENTERED OVER OPENING.
2. STEEL TO COMFORM TO ASTM A-36.
3. ALL SURFACES TO BE COATED WITH ZRC COLD GALVANIZING COMPOUND AFTER WELDING.
4. TRASH RACK TO BE FASTENED TO THE WALL WITH 1/2" MASONARY ANCHORS. TRASH RACK TO BE REMOVABLE.

TRASH RACK DETAIL
N.T.S.

STATE OF MISSOURI
REGISTERED PROFESSIONAL ENGINEER
MICHAEL JAMES VELLOFF
NO. E-2000161862

PROJECT NO.:161105

NAME: MICHAEL J. VELLOFF
LICENSE NUMBER: E-2000161862
DISCIPLINE: CIVIL
CORPORATION AUTHORITY NUMBER: 001194

THE SEAL OF MICHAEL J. VELLOFF ON THIS DRAWING APPLIES ONLY TO THE CIVIL/SITE ENGINEERING SHOWN. IT DOES NOT APPLY, NOR IS ANY RESPONSIBILITY TAKEN FOR ENVIRONMENTAL, GEOTECHNICAL (INCLUDING BUT NOT LIMITED TO SLOPE STABILITY), STRUCTURAL, HVAC, PLUMBING, ELECTRICAL, FIRE PROTECTION, TRAFFIC ENGINEERING, SURVEYING (BOUNDARY AND TOPOGRAPHIC), OR ARCHITECTURAL (BUILDING OR LANDSCAPE).

QuikTrip No. 0662

955 BRYAN ROAD
O'FALLAN, MO 63366

PROTOTYPE: P-92-02	
DIVISION: 06	
VERSION: 001	
DESIGNED BY: RKF	
DRAWN BY: RKF	
REVIEWED BY: MJV	

REV	DATE	DESCRIPTION
		ORIGINAL ISSUE DATE: 02/02/17

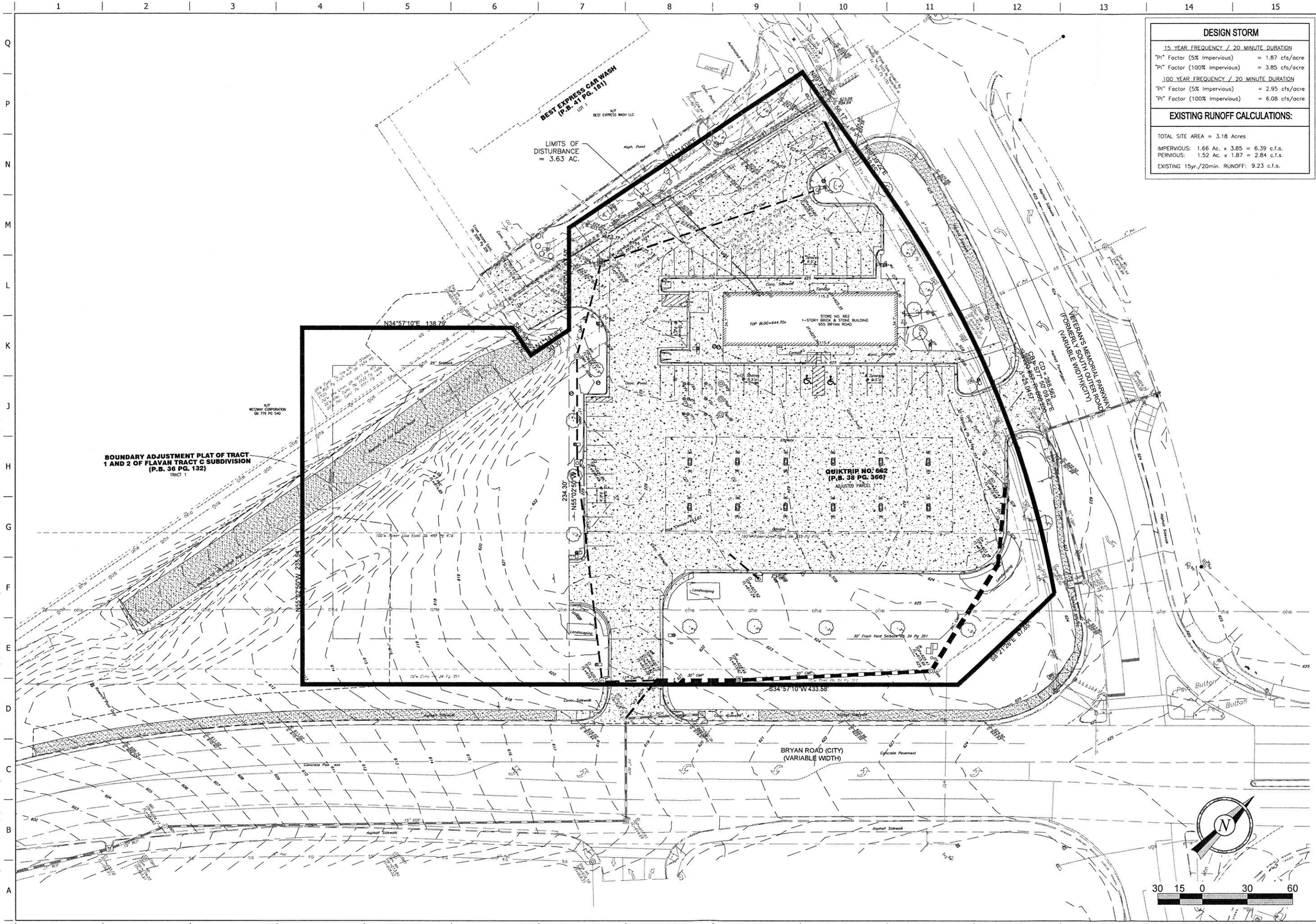
SHEET TITLE:
WATER QUALITY DETAILS

SHEET NUMBER:
C301

FILE LOCATION:K:\161105 - QuikTrip #662 - Bryan Road and Veterans Memorial Parkway\Civil\06-0662 Civil.dwg TAB NAME:C301 Water Quality Details USER:rkryer SAVED:1/25/2018 1:20 PM PLOTTED:1/26/2018 6:11 AM

EXHIBIT B

Pre-Developed Drainage Area Map



DESIGN STORM	
15 YEAR FREQUENCY / 20 MINUTE DURATION	
"PI" Factor (5% Impervious)	= 1.87 cfs/acre
"PI" Factor (100% Impervious)	= 3.85 cfs/acre
100 YEAR FREQUENCY / 20 MINUTE DURATION	
"PI" Factor (5% Impervious)	= 2.95 cfs/acre
"PI" Factor (100% Impervious)	= 6.08 cfs/acre

EXISTING RUNOFF CALCULATIONS:

TOTAL SITE AREA = 3.18 Acres

IMPERVIOUS: 1.66 Ac. x 3.85 = 6.39 c.f.s.
PERVIOUS: 1.52 Ac. x 1.87 = 2.84 c.f.s.

EXISTING 15yr./20min. RUNOFF: 9.23 c.f.s.

STATE OF MISSOURI
MICHAEL JAMES VELLOFF
NO. E-2000161862
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QuikTrip No. 0662

955 BRYAN ROAD
O'FALLAN, MO 63366

PROTOTYPE:	P-92-02
DIVISION:	06
VERSION:	001
DESIGNED BY:	RKF
DRAWN BY:	RKF
REVIEWED BY:	MJV

REV	DATE	DESCRIPTION
		ORIGINAL ISSUE DATE: 02/02/17

SHEET TITLE:
PRE-DEVELOPED DRAINAGE MAP

SHEET NUMBER:
C400

FILE LOCATION:K:\161105 - QuikTrip #662 - Bryan Road and Veterans Memorial Parkway\Civil\06-0662 Civil.dwg TAB NAME:C400 Pre Dev Map USER:rkfryer SAVED:1/25/2018 1:20 PM PLOTTED:1/26/2018 6:12 AM

FILE LOCATION:K:\161105 - QuikTrip #662 - Bryan Road and Veterans Memorial Parkway\Civil\06-0662 Civil.dwg TAB NAME:C402 Pre Det Dev Map USER:rkfryer SAVED:1/25/2018 1:20 PM PLOTTED:1/26/2018 6:13 AM

STATE OF MISSOURI
MICHAEL JAMES VELLOFF
NO. E-2000161862
REGISTERED PROFESSIONAL ENGINEER

PROJECT NO.:161105

NAME: MICHAEL J. VELLOFF
LICENSE NUMBER: E-2000161862
DISCIPLINE: CIVIL
CORPORATION AUTHORITY NUMBER: 001194

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QuikTrip No. 0662

955 BRYAN ROAD
O'FALLAN, MO 63366

PROTOTYPE:	P-92-02
DIVISION:	06
VERSION:	001
DESIGNED BY:	RKF
DRAWN BY:	RKF
REVIEWED BY:	MJV

REV	DATE	DESCRIPTION
		ORIGINAL ISSUE DATE: 02/02/17

SHEET TITLE:
PRE-DEVELOPED DETENTION DRAINAGE MAP

SHEET NUMBER:
C402

EXHIBIT C

Post-Developed Drainage Area Map

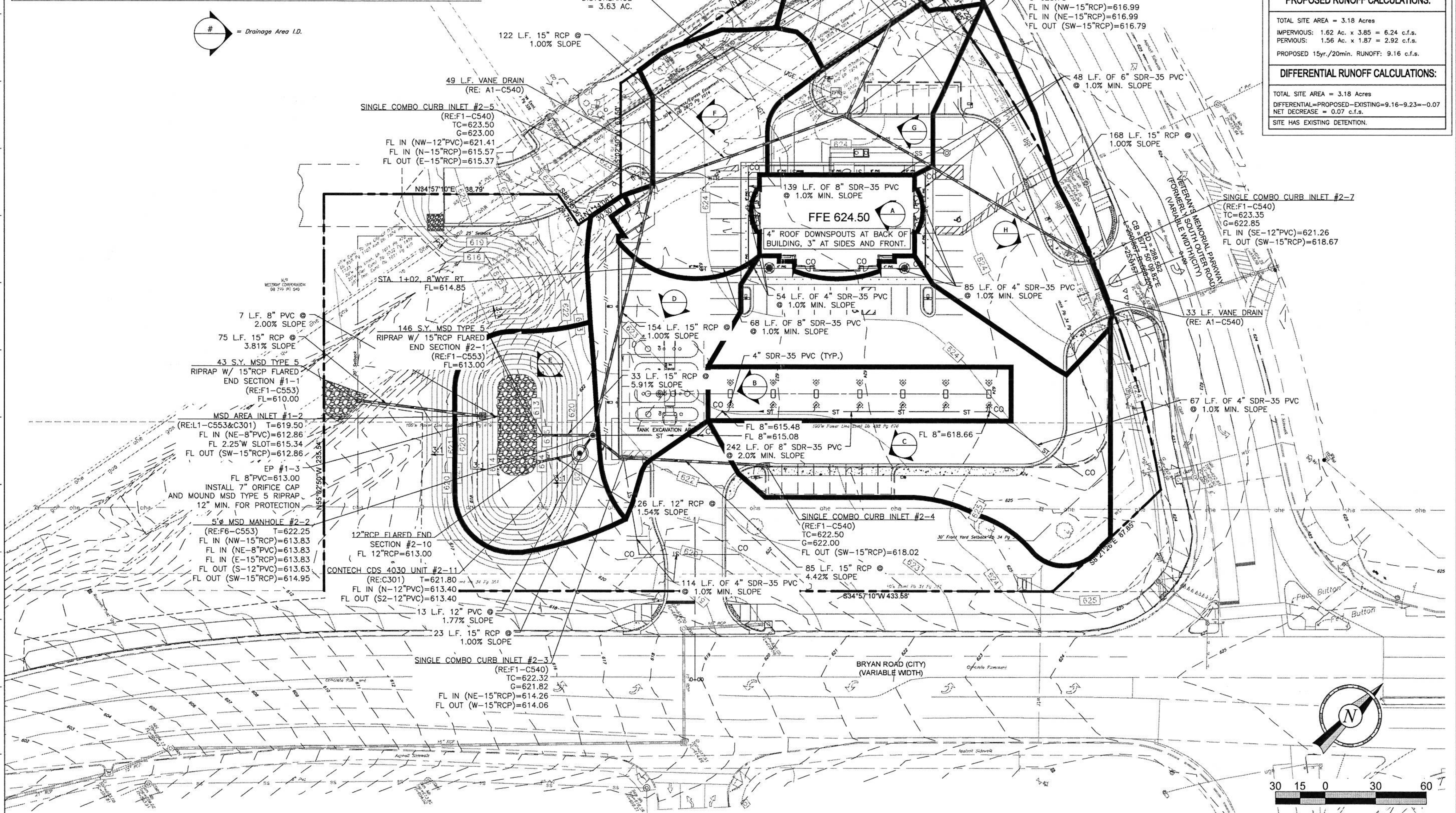
PROPOSED STORM SEWER RUNOFF TABLE

I.D.	TO STRUCTURE NO.	Total Area (ac.)	Impervious Area (ac.)	Pervious Area (ac.)	15Yr./20Min. Composite PI Factor (cfs/ac.)	15Yr./20Min. Total Q (cfs)	100Yr./20Min. Composite PI Factor (cfs/ac.)	100Yr./20Min. Total Q (cfs)
A	CI 2–5	0.12	0.12	0.000	3.850	0.462	6.080	0.730
B	MH 2–2	0.13	0.13	0.000	3.850	0.501	6.080	0.790
C	CI 2–4	0.54	0.44	0.100	3.483	1.881	5.500	2.970
D	CI 2–3	0.22	0.15	0.070	3.220	0.708	5.084	1.119
E	GI 1–2	0.24	0.00	0.240	1.870	0.449	2.950	0.708
F	CI 2–5	0.25	0.23	0.020	3.692	0.923	5.830	1.457
G	CI 2–6	0.18	0.11	0.070	3.080	0.554	4.863	0.875
H	CI 2–7	0.32	0.23	0.090	3.293	1.054	5.200	1.664
I	CI 2–8	0.13	0.09	0.040	3.241	0.421	5.117	0.665

(See Stormwater Management Facilities Report for Calculations)

NOTE: IMPERVIOUS AREAS FOR FUTURE PARKING BUILDOUT INCLUDED IN RUNOFF.

(#) = *Drainage Area I.D.*



SINGLE COMBO CURB INLET #2–8
(RE:F1–C540)
TC=624.55
G=624.05
FL OUT (SE–15"RCP)=617.62
63 L.F. 15" RCP @ 1.00% SLOPE
LIMITS OF DISTURBANCE = 3.63 AC.
122 L.F. 15" RCP @ 1.00% SLOPE
49 L.F. VANE DRAIN
(RE: A1–C540)
SINGLE COMBO CURB INLET #2–5
(RE:F1–C540)
TC=623.50
G=623.00
FL IN (NW–12"PVC)=621.41
FL IN (N–15"RCP)=615.57
FL OUT (E–15"RCP)=615.37
SINGLE COMBO CURB INLET #2–6
(RE:F1–C540)
TC=624.25
G=623.75
FL IN (NW–15"RCP)=616.99
FL IN (NE–15"RCP)=616.99
FL OUT (SW–15"RCP)=616.79
48 L.F. OF 6" SDR–35 PVC @ 1.0% MIN. SLOPE
168 L.F. 15" RCP @ 1.00% SLOPE
139 L.F. OF 8" SDR–35 PVC @ 1.0% MIN. SLOPE
FFE 624.50
4" ROOF DOWNSPOUTS AT BACK OF BUILDING, 3" AT SIDES AND FRONT.
SINGLE COMBO CURB INLET #2–7
(RE:F1–C540)
TC=623.35
G=622.85
FL IN (SE–12"PVC)=621.26
FL OUT (SW–15"RCP)=618.67
VETERAN'S MEMORIAL PARKWAY (FORMERLY SOUTH OUTER ROAD) (VARIABLE WIDTH)(CITY)
STA. 1+02 8"WYE RT
FL=614.85
54 L.F. OF 4" SDR–35 PVC @ 1.0% MIN. SLOPE
85 L.F. OF 4" SDR–35 PVC @ 1.0% MIN. SLOPE
33 L.F. VANE DRAIN
(RE: A1–C540)
7 L.F. 8" PVC @ 2.00% SLOPE
75 L.F. 15" RCP @ 3.81% SLOPE
146 S.Y. MSD TYPE 5 RIPRAP W/ 15"RCP FLARED END SECTION #2–1
(RE:F1–C553)
FL=613.00
154 L.F. 15" RCP @ 1.00% SLOPE
68 L.F. OF 8" SDR–35 PVC @ 1.0% MIN. SLOPE
43 S.Y. MSD TYPE 5 RIPRAP W/ 15"RCP FLARED END SECTION #1–1
(RE:F1–C553)
FL=610.00
4" SDR–35 PVC (TYP.)
33 L.F. 15" RCP @ 5.91% SLOPE
67 L.F. OF 4" SDR–35 PVC @ 1.0% MIN. SLOPE
MSD AREA INLET #1–2
(RE:L1–C553&C301) T=619.50
FL IN (NE–8"PVC)=612.86
FL 2.25'W SLOT=615.34
FL OUT (SW–15"RCP)=612.86
FL 8"=615.48
FL 8"=615.08
242 L.F. OF 8" SDR–35 PVC @ 2.0% MIN. SLOPE
FL 8"=618.66
EP #1–3
FL 8"PVC=613.00
INSTALL 7" ORIFICE CAP AND MOUND MSD TYPE 5 RIPRAP 12" MIN. FOR PROTECTION
26 L.F. 12" RCP @ 1.54% SLOPE
5'ø MSD MANHOLE #2–2
(RE:F6–C553) T=622.25
FL IN (NW–15"RCP)=613.83
FL IN (NE–8"PVC)=613.83
FL IN (E–15"RCP)=613.83
FL OUT (S–12"PVC)=613.63
FL OUT (SW–15"RCP)=614.95
SINGLE COMBO CURB INLET #2–4
(RE:F1–C540)
TC=622.50
G=622.00
FL OUT (SW–15"RCP)=618.02
12"RCP FLARED END SECTION #2–10
FL 12"RCP=613.00
85 L.F. 15" RCP @ 4.42% SLOPE
CONTECH CDS 4030 UNIT #2–11
(RE:C301) T=621.80
FL IN (N–12"PVC)=613.40
FL OUT (S2–12"PVC)=613.40
114 L.F. OF 4" SDR–35 PVC @ 1.0% MIN. SLOPE
S34°57'10"W 433.58'
13 L.F. 12" PVC @ 1.77% SLOPE
23 L.F. 15" RCP @ 1.00% SLOPE
SINGLE COMBO CURB INLET #2–3
(RE:F1–C540)
TC=622.32
G=621.82
FL IN (NE–15"RCP)=614.26
FL OUT (W–15"RCP)=614.06
BRYAN ROAD (CITY) (VARIABLE WIDTH)
N34°57'10"E 38.79'
TANK EXCAVATION
30 15 0 30 60

DESIGN STORM

15 YEAR FREQUENCY / 20 MINUTE DURATION

"PI" Factor (5% Impervious) = 1.87 cfs/acre

"PI" Factor (100% Impervious) = 3.85 cfs/acre

100 YEAR FREQUENCY / 20 MINUTE DURATION

"PI" Factor (5% Impervious) = 2.95 cfs/acre

"PI" Factor (100% Impervious) = 6.08 cfs/acre

EXISTING RUNOFF CALCULATIONS:

TOTAL SITE AREA = 3.18 Acres

IMPERVIOUS: 1.66 Ac. x 3.85 = 6.39 c.f.s.
PERVIOUS: 1.52 Ac. x 1.87 = 2.84 c.f.s.

EXISTING 15yr./20min. RUNOFF: 9.23 c.f.s.

PROPOSED RUNOFF CALCULATIONS:

TOTAL SITE AREA = 3.18 Acres

IMPERVIOUS: 1.62 Ac. x 3.85 = 6.24 c.f.s.
PERVIOUS: 1.56 Ac. x 1.87 = 2.92 c.f.s.

PROPOSED 15yr./20min. RUNOFF: 9.16 c.f.s.

DIFFERENTIAL RUNOFF CALCULATIONS:

TOTAL SITE AREA = 3.18 Acres

DIFFERENTIAL=PROPOSED–EXISTING=9.16–9.23=–0.07
NET DECREASE = 0.07 c.f.s.

SITE HAS EXISTING DETENTION.

STATE OF MISSOURI — MICHAEL JAMES VELLOFF — NO. E-2000161862 — REGISTERED PROFESSIONAL ENGINEER

PROJECT NO.:161105

NAME: MICHAEL J. VELLOFF
LICENSE NUMBER: E–2000161862
DISCIPLINE: CIVIL
CORPORATION AUTHORITY NUMBER: 001194

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QuikTrip No. 0662

955 BRYAN ROAD
O'FALLAN, MO 63366

QT

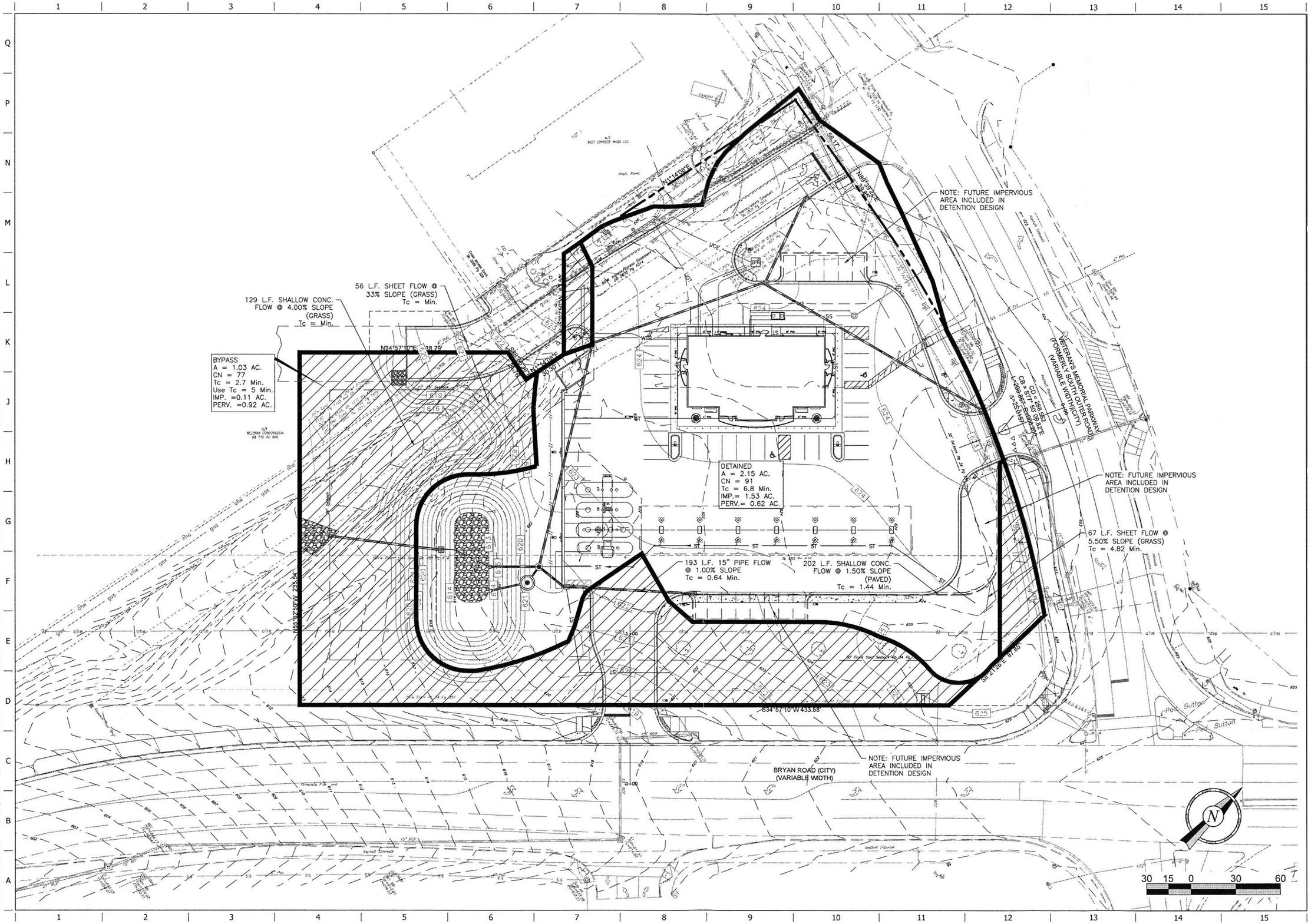
PROTOTYPE: P-92-02
DIVISION: 06
VERSION: 001
DESIGNED BY: RKF
DRAWN BY: RKF
REVIEWED BY: MJV

REV	DATE	DESCRIPTION

ORIGINAL ISSUE DATE: 02/02/17

SHEET TITLE: POST-DEVELOPED DRAINAGE MAP

SHEET NUMBER: C401



STATE OF MISSOURI
MICHAEL JAMES VELLOFF NO. E-2000161862
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NAME: MICHAEL J. VELLOFF
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QuikTrip No. 0662

955 BRYAN ROAD
O'FALLAN, MO 63366

PROTOTYPE: P-92-02
DIVISION: 06
VERSION: 001
DESIGNED BY: RKF
DRAWN BY: RKF
REVIEWED BY: MJV

REV	DATE	DESCRIPTION
		ORIGINAL ISSUE DATE: 02/02/17

SHEET TITLE:
POST-DEVELOPED DETENTION DRAINAGE MAP

SHEET NUMBER:
C403

FILE LOCATION:K:\161105 - QuikTrip #662 - Bryan Road and Veterans Memorial Parkway\Civil\06-0662 Civil.dwg TAB NAME:C403 Post Detention Map USER:rkfryer SAVED:1/25/2018 1:20 PM PLOTTED:1/26/2018 6:13 AM