File

STORM WATER MANAGEMENT FACILITIES REPORT

FOR

MMTTC

3855 Corporate Centre Drive
O'Fallon, Missouri 63368

Prepared for:
ARCO Construction Company, Inc.
900 N. Rock Hill Road
St. Louis, Missouri 63119

Prepared by:
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Project No. 1233

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TABLE OF CONTENTS

I. INTRODUCTION

INTRODUCTION

Project Description

This storm water management facilities report is being prepared for MMTTC, a proposed office/warehouse. The proposed development is a 31,000+/- s.f., 1-story building which located on a 2.41 acre lot.

Existing Site Information

The existing 2.41 acre parcel is located within the Dardenne Creek watershed and is currently undeveloped. The site slopes generally from north to south. The site is bounded by residential properties to the north, commercial buildings to the west and east, and Corporate Centre Drive to the south. Stormwater detention has already been provided for this development so no detention is proposed on the subject lot.

According to the Natural Resources Conservation Service website, the site contains soil classified as:

60124 Harvester-Urban land complex, 2 to 9 percent slopes
66092 Fishpot-Urban land complex, 0 to 5 percent slopes, rarely flooded
Hydrologic soil group rating = C, C/D

Proposed Development

The storm water ordinance for the City of O'Fallon requires storm water quality measures to be implemented for new developments. The proposed disturbed area for this development is approximately 2.38 acres and storm water quality is proposed to be provided by two proprietary units called a 'Downstream Defender'. The runoff from the first 1.14 inches of rain is directed to the proprietary structure where the water runs through a filtration system and then is drained back into the main storm sewer. The proprietary structures will pick-up the majority of the pavement and roof areas.

The following BMP measures are proposed for this development:

BMP 1

Tributary Area:	0.75 acres
BMP Type:	Downstream Defender
Location:	Western half of site

BMP 2

Tributary Area:	1.01 acres
BMP Type:	Downstream Defender
Location:	Eastern half of the site

II. WATER QUALITY CALCULATIONS

WATER QUALITY CALCULATIONS
BMP 1-DOWNSTREAM DEFENDER #6

Computing Peak Discharge For Water Quality Storm
Appendix D.10 Maryland Stormwater Design Manual)

Tributary Area	= 0.75 ac.
Impervious Area	= 0.68 ac.
Pervious Area	= 0.07 ac.
% Impervious (I)	= (0.68 ac. / 0.75 ac.) x 100 = 90.7%
Rv	= 0.05 + 0.009I
	= 0.05 + 0.009(90.7) = 0.87
Qa	= (P)(Rv) P = rainfall = 1.14 in.
	= (1.14) (0.87)
	= 0.99"

CN = 1000/{10+5P+10Qa-10(Qa^2 + 1.25QaP)^0.5}
= 1000/{10+5(1.14)+10(0.99)-10(0.99^2+1.25*0.99*1.14)^0.5}
= 98.6

Ia = 200/CN-2 = 200/98.6 – 2 = 0.03

Tc = 5.0 min

Ia/P = 0.03/1.14 = 0.03

Qu = 1,000 csm/in (Fig. D.11.1)

A = 0.75 ac. = 0.0012 sq. mi.

Qp = Peak Discharge
= Qu x A x Qa
= (1,000)(0.0012)(0.99)
Qp = **1.19 cfs**

Check Orifice Size

h = ((Q/Ca)^2)/2g
= ((1.19/(0.6*0.35)^2)/(2*32.2)
= 0.50'

C = 0.6
g = 32.2 ft/sec^2
a = 0.35 ft.^2 (8" dia.)
Q = 1.19 cfs

Flowline @ Flow Splitter:	= 517.50
Overflow pipe flowline:	= 517.50 + 0.50' + 4"
	= 518.33

WATER QUALITY CALCULATIONS
BMP 2-DOWNSTREAM DEFENDER #10

Computing Peak Discharge For Water Quality Storm
Appendix D.10 Maryland Stormwater Design Manual)

Tributary Area	= 1.04 ac.
Impervious Area	= 0.89 ac.
Pervious Area	= 0.15 ac.
% Impervious (I)	= (0.89 ac. / 1.04 ac.) x 100 = 85.6%
Rv	= 0.05 + 0.009I
	= 0.05 + 0.009(85.6) = 0.82
Qa	= (P)(Rv) P = rainfall = 1.14 in.
	= (1.14) (0.82)
	= 0.93"

CN = 1000/{10+5P+10Qa-10(Qa^2 + 1.25QaP)^0.5}
= 1000/{10+5(1.14)+10(0.93)-10(0.93^2+1.25*0.93*1.14)^0.5}
= 98.0

Ia = 200/CN-2 = 200/98.0 – 2 = 0.04

Tc = 5.0 min

Ia/P = 0.04/1.14 = 0.035

Qu = 1,000 csm/in (Fig. D.11.1)

A = 1.04 ac. = 0.0016 sq. mi.

Qp = Peak Discharge
= Qu x A x Qa
= (1,000)(0.0016)(0.93)
Qp = **1.49 cfs**

Check Orifice Size

h = ((Q/Ca)^2)/2g
= ((1.49/(0.6*0.35)^2)/(2*32.2)
= 0.78'

C = 0.6
g = 32.2 ft/sec^2
a = 0.35 ft.^2 (8" dia.)
Q = 1.49 cfs

Flowline @ Flow Splitter:	= 520.60
Overflow pipe flowline:	= 520.60 + 0.78' + 4"
	= 521.71

III. MAINTENANCE PLAN

A. Maintenance and Operation Plan

B. Operation & Maintenance Manual for Downstream Defender (Structures #6 and #10)

MAINTENANCE PLAN

I. PURPOSE

As set forth by the City of O'Fallon, the owner agrees to the following requirements in exchange for the issuance of a sewer permit:

1. To build and construct the drainage facilities and sewer lines in accordance with the plans submitted and approved by the City of O'Fallon.

2. Maintain all pipes and drains in good working order.

3. To maintain and operate the stormwater management in conformity with the approved Stormwater Management Facilities Report.

4. That in the event the owner or its successor in title to said property shall fail to maintain the drainage facilities and sewer lines in accordance with the agreement, the City of O'Fallon shall be permitted to enter onto the property and make the repairs and corrections and perform such maintenance as it deems necessary and bill the owners of said property for the services performed. It is further agreed that in the event said bill or charge for the services performed shall not be paid within a period of thirty (30) days said sum shall become a lien on the real property and shall accrue interest at a rate of eight percent until paid in full.

5. Contact Information for Responsible Party
   Troy C. Pohlman Irrevocable Trust
   3858 Corporate Centre Drive
   O'Fallon, MO 63368
   Contact: Mr. Troy Pohlman
   Ph. (636) 939-5942

II. MAINTENANCE

The property owner will maintain all private stormwater and sanitary facilities in good working order. Minimum maintenance of the private facilities shall include the routine removal of sediment, debris, oil and foreign material from the storm sewers so that the operation and capacity of the stormwater facilities continues to function properly. The stormwater facilities will have an inspection, maintenance and reporting schedule quarterly as well as after each storm exceeding 1 inch of rainfall in 24 hours or as actually needed, whichever is most restrictive.

This maintenance plan explains the basic tasks that are needed to be sure the proprietary structure (Downstream Defender) works properly.

At a minimum, the property owner should inspect the proprietary structures quarterly as well as after each storm exceeding 1 inch of rainfall in 24 hours. The owner of this property must submit a copy of the inspection checklist to the City of O'Fallon. The annual BMP inspection report should be submitted to the City of O'Fallon within 90 days (March 31st) of completion of the calendar year. A city inspector will also periodically inspect the proprietary structures.

III. INSPECTION OF FACILITIES

The property owner will maintain all private stormwater and sanitary facilities in good working order. The stormwater facilities shall be inspected quarterly as well as after each storm exceeding 1 inch of rainfall in 24 hours. The proprietary structures shall be inspected at least 4 times annually as well as after every storm exceeding one inch of rainfall in 24 hours. Four times annually means every three months. For this facility, it is recommended that the property owner utilize a Monthly Checklist to assure that required maintenance and inspections are being performed.

The property owner shall keep a record of the monthly inspection logs detailing the results of the inspection, and any maintenance or corrective action required. Minimum maintenance of the private facilities shall include the routine removal of sediment, debris, oil and foreign material from the storm and sanitary sewers so that the operation and capacity of the facilities continues to function properly.

Inspection Frequency

In the first year of operation, inspections shall take place at least once each quarter during the spring, summer and early fall. Bi-monthly inspections should be conducted from November through March to determine how leaf litter will impact the flow capacity of the structures. After the first year of operation inspections shall take place at a minimum every 3 months.

Routine (every 3 months) inspections of stormwater facilities shall consist of the following:

1. Inspect each manhole and inlet structure for any silt or debris build-up.

2. Check to see that all sewer structure grates and lids are in place, seated properly and no damage has occurred to the grates or lid

3. Inspection of the proprietary structures in accordance with the manufacturer's recommendations

IV. CLEANING OF FACILITIES

The stormwater facility shall be cleaned shortly after the project is completed and erosion control has been removed and vegetation has been established. All silt and debris should be removed from the storm sewer structures and storm sewer lines.

All sediment removed from the site shall be disposed of according to current erosion and sediment control regulations. 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.

The following definitions shall be used as a reference:

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: 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.

A special discharge permit from the City of O'Fallon 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 gpm.

The owner is responsible for determining whether the filter media and debris are classified as special waste and for properly handling and disposal of the material. Records of the same must be kept and be made available for inspection by appropriate authorities. Use of a qualified, even possibly license and bonded, disposal service is highly recommended, and should be contacted for assistance and direction.

The following general guidance is based on the federal regulations, 40 CFR 262.11- Special 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 a special waste using the following method:

1. Determine if the waste is excluded from being a hazardous waste per 10 CSR 25-4.261(2)(A) and 40 CFR 261.4; then
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; then
3. Determine if the waste is a characteristic hazardous waste (i.e. ignitable, corrosive, reactive, or toxic). Consider the materials used or the process used to generate the waste.

Based on this knowledge, determine the appropriate testing and analysis in accordance with 10 CSR 25-4.261(2)(C) and 40 CFR 261 subpart C.

Testing for hazardous waste characteristics requires sampling at the point of generation. If the analyses detects any property characteristic of hazardous waste, you must manage the waste as a hazardous waste. It is very important to understand that hazardous wastes remain 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 waste treatment process regulated or exempted under 10 CSR 25-7 or 10 CSR 25-9. You may not dispose of regulated special wastes in any sanitary, demolition, 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 of moisture or spontaneous chemical changes

Corrosivity
pH<2.0 or pH>12.5

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

Toxicity
TCLP, EPS Method 1311, any contaminants listed in Table 1 of 40 CFR 261.24 equal to or greater than the listed concentration.

Once the waste is determined to be non-hazardous and contain no free liquids, you must request approval from the owner/operator of the disposal facility 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 and hazards associated with the materials, 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 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 a 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 or treatment facility, as and 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.

V. RECORD KEEPING AND REPORTING

The property owner shall keep an inspection log on-site detailing dates of inspection, structures inspected, results of inspections, and any maintenance or corrective action required. Each inspection should log information on the accumulation of materials within the storm sewers and the proprietary structures and the actions performed.

It is recommended that the property owner assign specific personnel who will be responsible for the inspection, maintenance, and record keeping of the private storm and sanitary sewer facilities. Inspection personnel will fully comply with OSHA confined space safety requirements and all other jurisdictions safety requirements.

Annual BMP Maintenance Report

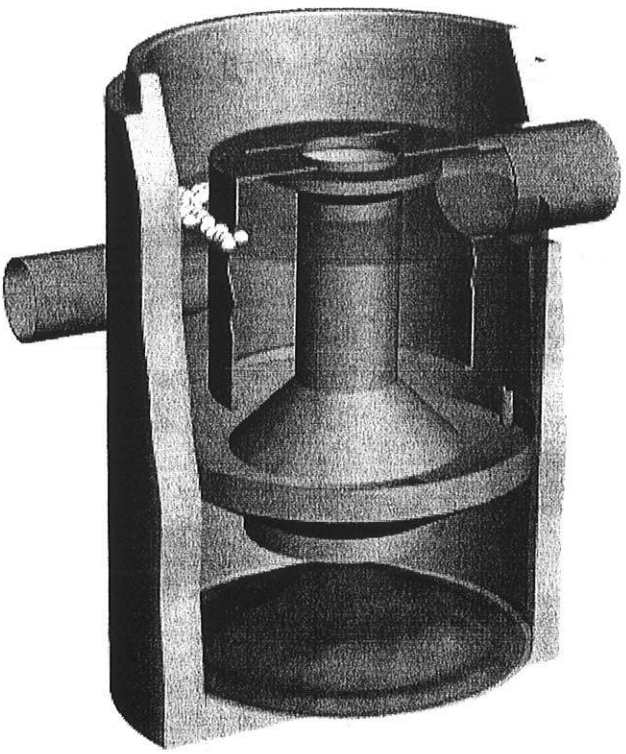
To ensure the maintenance of privately owned stormwater management facilities, the City of O'Fallon requires an Annual BMP Maintenance Report to be submitted to the city for these facilities. The Annual Report should provide documentation that maintenance was performed in accordance with the Stormwater Management Facilities Report submitted for your development and approved by the city for the above referenced project. The Annual Report typically consists of the following:

1. Completed inspection checklist and/or maintenance log
2. Narrative describing the corrective action measures taken
3. Photographs
4. Any other documentation appropriate for demonstrating compliance with the BMP Maintenance Agreement and Facilities Report

The annual BMP inspection report should be submitted to the city within 90 days (March 31st) of each following the calendar year. An city inspector will also periodically inspect the BMP's. The Annual Report should be sent to:

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

Hydro International



Downstream Defender®

Stormwater Treatment System

Operation and Maintenance Manual

Table of Contents

Hydro International

Downstream Defender® by Hydro International

The Downstream Defender is an advanced Hydrodynamic Vortex Separator designed to provide high removal efficiencies of settleable solids and their associated pollutants, oil, and floatables over a wide range of flow rates.

The Downstream Defender has unique, flow-modifying internal components developed from extensive full-scale testing, CFD modeling and over thirty years of hydrodynamic separation experience in wastewater, combined sewer and stormwater applications. These internal components distinguish the Downstream Defender from simple swirl-type devices and conventional oil/grit separators by minimizing turbulence and headlosses, enhancing separation, and preventing washout of previously stored pollutants.

The high removal efficiencies and inherent low headlosses of the Downstream Defender allow for a small footprint making it a compact and economical solution for the treatment of non-point source pollution.

BENEFITS OF THE DOWNSTREAM DEFENDER

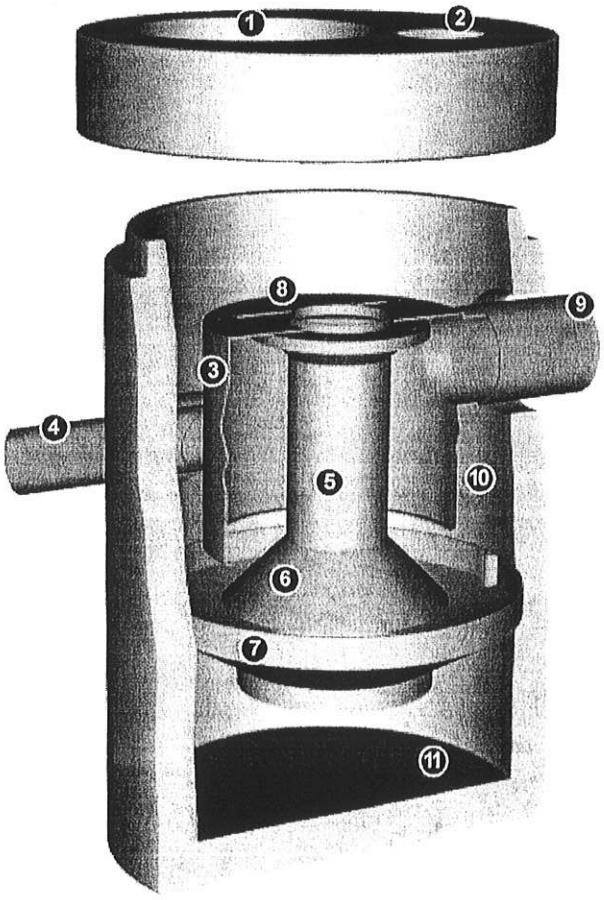
- Removes sediment, floatables, oil and grease
- No pollutant washouts
- Small footprint
- No loss of treatment capacity between clean-outs
- Low headloss
- Efficient over a wide ranges of flows
- Easy to install
- Low maintenance

APPLICATIONS

- New developments and retrofits
- Utility yards
- Streets and roadways
- Parking lots
- Pre-treatment for filters, infiltration and storage
- Industrial and commercial facilities
- Wetlands protection

DOWNSTREAM DEFENDER COMPONENTS

1. Central Access Port
2. Floatables Access Port (6-ft., 8-ft. and 10-ft. models only)
3. Dip Plate
4. Tangential Inlet
5. Center Shaft
6. Center Cone
7. Benching Skirt
8. Floatables Lid
9. Outlet Pipe
10. Floatables Storage
11. Isolated Sediment Storage Zone



Operation

INTRODUCTION

The Downstream Defender operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The Downstream Defender has been designed to allow for easy and safe access for inspection/monitoring and clean-out procedures. Entry into the unit or removal of the internal components is not necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

POLLUTANT CAPTURE AND RETENTION

The internal components of the Downstream Defender have been designed to protect the oil, floatables and sediment storage volumes so that separator performance is not reduced as pollutants accumulate between clean-outs. Additionally, the Downstream Defender is designed and installed into the storm drain system so that the vessel remains wet between storm events. Oil and floatables are stored on the water surface in the outer annulus separate from the sediment storage volume in the sump of the unit providing the option for separate oil disposal, and accessories such as adsorbant pads. Since the oil/floatables and sediment storage volumes are isolated from the active separation region, the potential for re-suspension and washout of stored pollutants between clean-outs is minimized.

WET SUMP

The sump of the Downstream Defender retains a standing water level between storm events. The water in the sump prevents stored sediment from solidifying in the base of the unit. The clean-out procedure becomes more difficult and labor intensive if the system allows fine sediment to dry-out and consolidate. Dried sediment must be manually removed by maintenance crews. This is a labor intensive operation in a hazardous environment.

BLOCKAGE PROTECTION

The Downstream Defender has large clear openings and no internal restrictions or weirs, minimizing the risk of blockage and hydraulic losses. In addition to increasing the system headloss, orifices and internal weirs can increase the risk of blockage within the unit.

Maintenance

OVERVIEW

The Downstream Defender protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the Downstream Defender. The Downstream Defender will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the Downstream Defender will no longer be able to store removed sediment and oil. Maximum pollutant storage capacities are provided in Table 1.

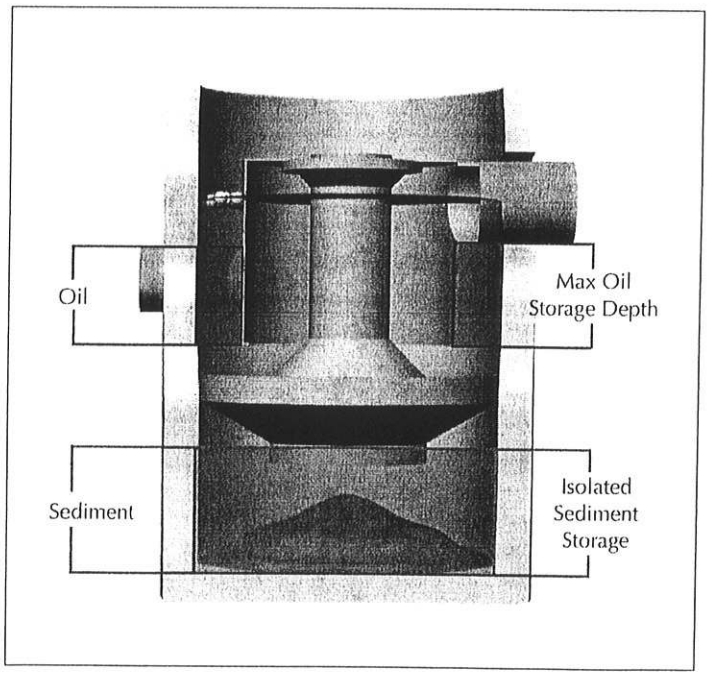


Figure 1: *Pollutant storage volumes of the Downswtream Defender*

The Downstream Defender allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole. On the 6-ft, 8-ft and 10-ft units, the floatables access port is above the outlet pipe between the concrete manhole wall and the dip plate. The sediment removal access ports for all Downstream Defender models are located directly over the hollow center shaft.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the Downstream Defender, nor do they require the internal components of the Downstream Defender to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

DETERMINING YOUR MAINTENANCE SCHEDULE

The frequency of cleanout is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil/flotables removal, for a 6-ft Downstream Defender typically takes less than 30 minutes and removes a combined water/oil volume of about 500 gallons.

INSPECTION PROCEDURES

Inspection is a simple process that does not involve entry into the Downstream Defender. Maintenance crews should be familiar with the Downstream Defender and its components prior to inspection.

SCHEDULING

- It is important to inspect your Downstream Defender every six months during the first year of operation to determine your site-specific rate of pollutant accumulation.
- Typically, inspection may be conducted during any season of the year

RECOMMENDED EQUIPMENT

- Safety Equipment and Personal Protective Equipment (traffic cones, work gloves, etc.)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net
- Sediment probe (such as a Sludge Judge®)
- Trash bag for removed floatables
- Downstream Defender Maintenance Log

Table 1

Downstream Defender Pollutant Storage Capacities and Max. Cleanout Depths

Unit Diameter	Total Oil Storage	Oil Clean-out Depth	Total Sediment Storage	Sediment Clean-out Depth	Max. Liquid Volume Removed
(feet)	(gal.)	(inches)	(gal.)	(inches)	(gal.)
4	70	<16	141	<18	384
6	230	<23	424	<24	1239
8	525	<33	939	<30	2884
10	1050	<42	1,757	<36	5546

NOTES

1. Refer to Downstream Defender Clean-out Detail (Fig. 1) for measurement of depths.
2. Oil accumulation is typically less than sediment, however, removal of oil and sediment during the same service is recommended.
3. Remove floatables first, then remove sediment storage volume.

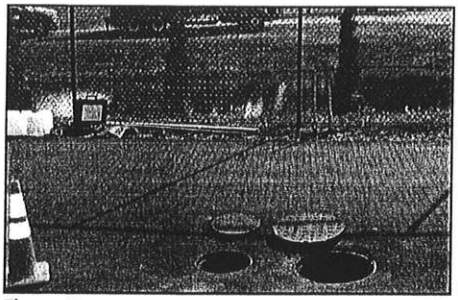


Figure 4

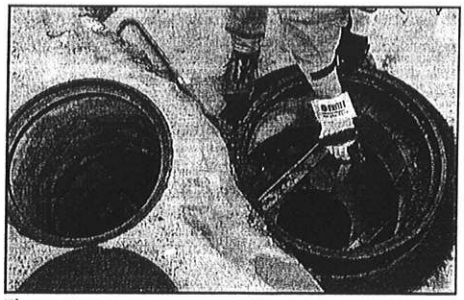


Figure 5

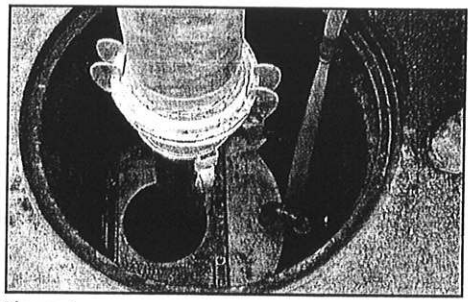


Figure 6

INSPECTION PROCEDURES

1. Set up any necessary safety equipment around the access port or grate of the Downstream Defender as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the lids to the manhole. Figure 4. (NOTE: The 4-ft Downstream Defender® will only have one lid).

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. See Figure 7 and 8 for typical inspection views.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the outer annulus of the chamber.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel. Figure 5.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

FLOATABLES AND SEDIMENT CLEANOUT

Floatables cleanout is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Figure 6.

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose and skimmer pole to be lowered to the base of the sump.

SCHEDULING

- Floatables and sump cleanout are typically conducted once a year during any season.

- Floatables and sump cleanout should occur as soon as possible following a spill in the contributing drainage area

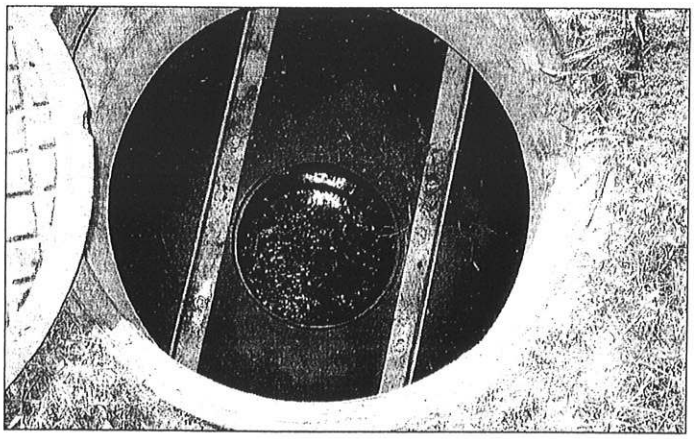


Figure 7: *View over Center Shaft into sediment storage Zone*


Figure 8: *View of outer annulus of floatables and oil collection zone*

RECOMMENDED EQUIPMENT

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- Downstream Defender Maintenance Log

FLOATABLES AND SEDIMENT CLEAN OUT PROCEDURES

1. Set up any necessary safety equipment around the access port or grate of the Downstream Defender as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the lids to the manhole (NOTE: The 4-ft Downstream Defender® will only have one lid).
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. Using the Floatables Port for access, remove oil and floatables stored on the surface of the water with the vactor hose or the skimmer net. Figure 9.
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).
6. Once all floatables have been removed, drop the vactor hose to the base of the sump via the Central Access Port. Vactor out the sediment and gross debris off the sump floor. Figure 6.
7. Retract the vactor hose from the vessel.
8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.
9. Securely replace the grate or lid.

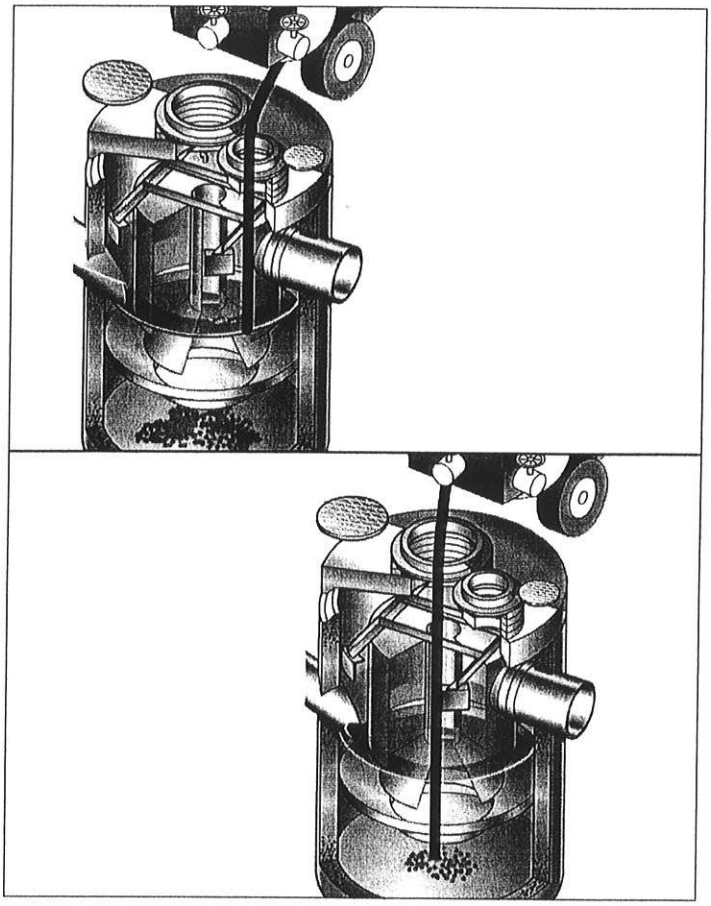


Figure 9: *Floatables and sediment are removed with a vactor hose*

Maintenance at a Glance

ACTIVITY	FREQUENCY
Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most cleanouts it is not necessary to remove the entire volume of liquid in the vessel. Only removing the first few inches of oils/floatables and the sediment storage volume is required.	

Hydro International

Downstream Defender Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL (CIRCLE ONE): 4-FT 6-FT 8-FT 10-FT CUSTOM

Hydro International

Downstream Defender Inspection and Maintenance Log

DATE	INITIALS	DEPTH OF FLOATABLES AND OILS	SEDIMENT DEPTH MEASURED	VOLUME OF SEDIMENT REMOVED	SITE ACTIVITY AND COMMENTS

NOTES

Hydro International

www.hydrointernational.biz

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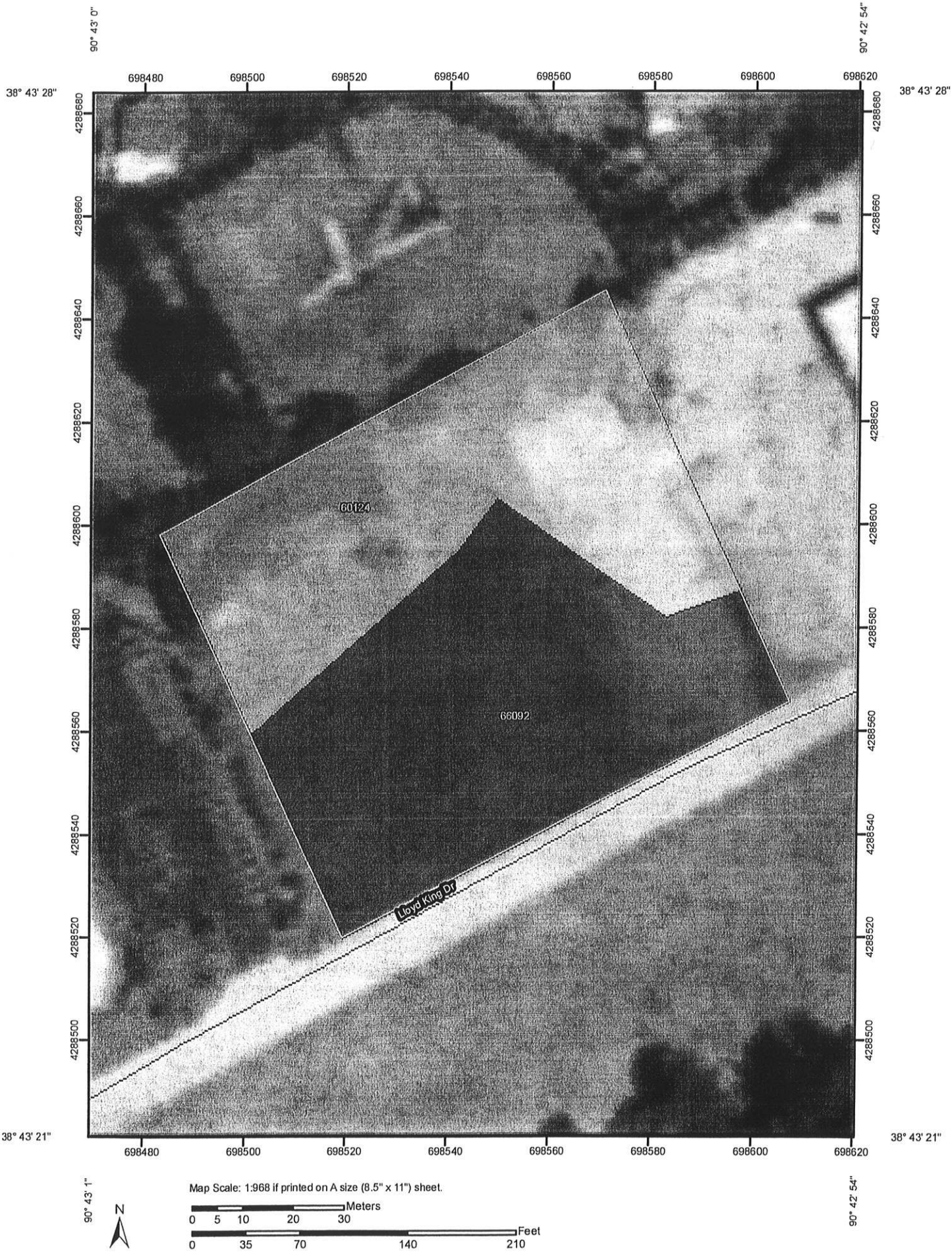
USDD0406

IV. REFERENCE INFORMATION

A. Natural Resources Conservation Service Web Soil Survey
B. C4- Site and Grading Plans
C. C10-Drainage Area Plan
D. C11-BMP Plan


90° 43' 0"
90° 42' 54"
698480
698500
698520
698540
698560
698580
698600
698620
38° 43' 28"
4288680
4288660
4288640
4288620
4288600
4288580
4288560
4288540
4288520
4288500
60124
66092
Lloyd King Dr
38° 43' 21"
90° 43' 1"
N
Map Scale: 1:968 if printed on A size (8.5" x 11") sheet.
Meters
0 5 10 20 30
Feet
0 35 70 140 210

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:968 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 15N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: St. Charles County, Missouri
Survey Area Data: Version 11, Sep 24, 2012

Date(s) aerial images were photographed: 8/10/2007

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — St. Charles County, Missouri (MO183)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
60124	Harvester-Urban land complex, 2 to 9 percent slopes	C	1.0	47.5%
66092	Fishpot-Urban land complex, 0 to 5 percent slopes, rarely flooded	C/D	1.1	52.5%
Totals for Area of Interest			2.1	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

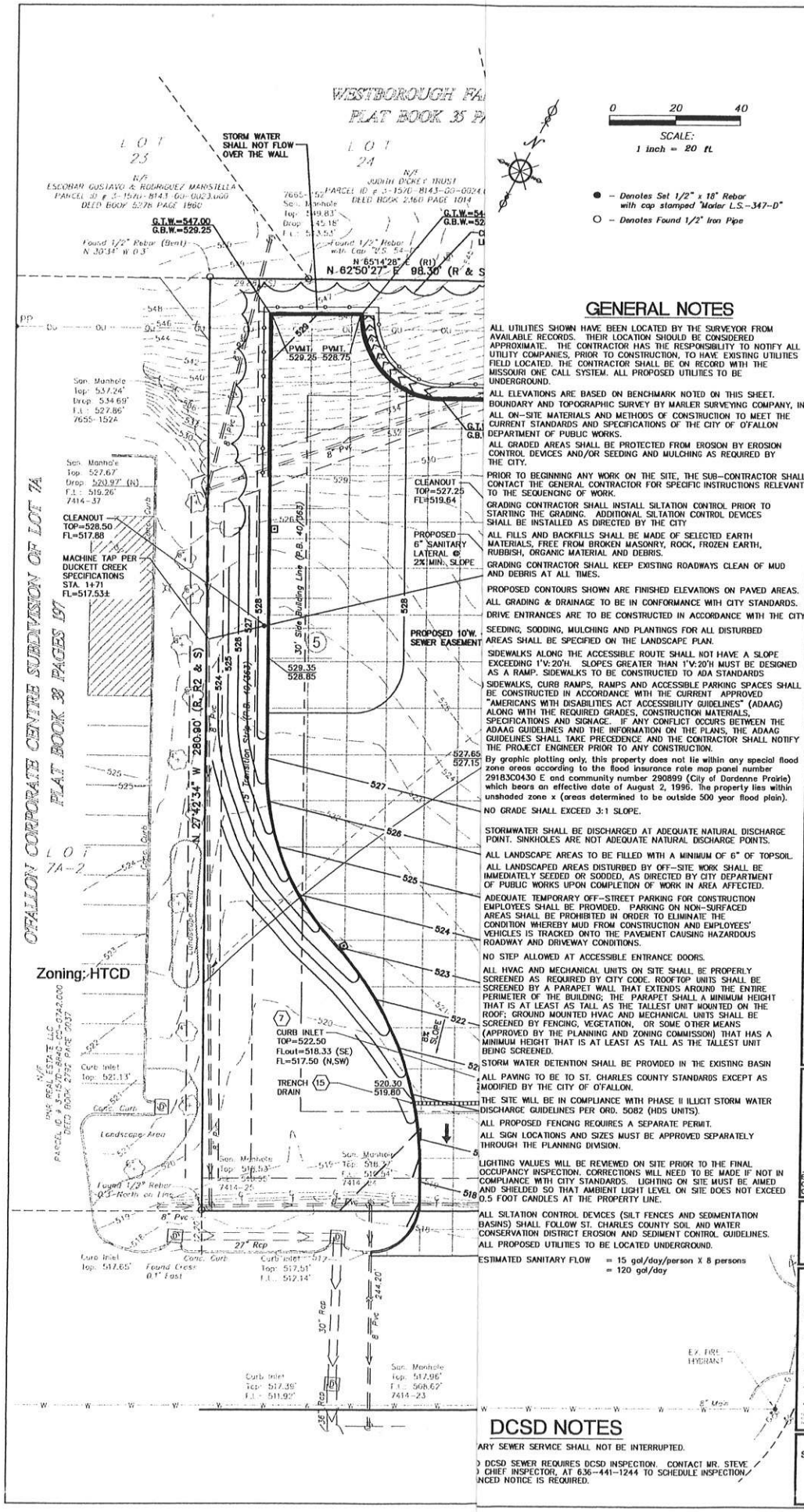
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition



GENERAL NOTES

ALL UTILITIES SHOWN HAVE BEEN LOCATED BY THE SURVEYOR FROM AVAILABLE RECORDS. THEIR LOCATION SHOULD BE CONSIDERED APPROXIMATE. THE CONTRACTOR HAS THE RESPONSIBILITY TO NOTIFY ALL UTILITY COMPANIES, PRIOR TO CONSTRUCTION, TO HAVE EXISTING UTILITIES FIELD LOCATED. THE CONTRACTOR SHALL BE ON RECORD WITH THE MISSOURI ONE CALL SYSTEM. ALL PROPOSED UTILITIES TO BE UNDERGROUND.

ALL ELEVATIONS ARE BASED ON BENCHMARK NOTED ON THIS SHEET.

BOUNDARY AND TOPOGRAPHIC SURVEY BY MARLER SURVEYING COMPANY, INC

ALL ON-SITE MATERIALS AND METHODS OF CONSTRUCTION TO MEET THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF O'FALLON DEPARTMENT OF PUBLIC WORKS.

ALL GRADED AREAS SHALL BE PROTECTED FROM EROSION BY EROSION CONTROL DEVICES AND/OR SEEDING AND MULCHING AS REQUIRED BY THE CITY.

PRIOR TO BEGINNING ANY WORK ON THE SITE, THE SUB-CONTRACTOR SHALL CONTACT THE GENERAL CONTRACTOR FOR SPECIFIC INSTRUCTIONS RELEVANT TO THE SEQUENCING OF WORK.

GRADING CONTRACTOR SHALL INSTALL SILTATION CONTROL PRIOR TO STARTING THE GRADING. ADDITIONAL SILTATION CONTROL DEVICES SHALL BE INSTALLED AS DIRECTED BY THE CITY

ALL FILLS AND BACKFILLS SHALL BE MADE OF SELECTED EARTH MATERIALS, FREE FROM BROKEN MASONRY, ROCK, FROZEN EARTH, RUBBISH, ORGANIC MATERIAL AND DEBRIS.

GRADING CONTRACTOR SHALL KEEP EXISTING ROADWAYS CLEAN OF MUD AND DEBRIS AT ALL TIMES.

PROPOSED CONTOURS SHOWN ARE FINISHED ELEVATIONS ON PAVED AREAS.

ALL GRADING & DRAINAGE TO BE IN CONFORMANCE WITH CITY STANDARDS.

DRIVE ENTRANCES ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE CITY.

SEEDING, SODDING, MULCHING AND PLANTINGS FOR ALL DISTURBED AREAS SHALL BE SPECIFIED ON THE LANDSCAPE PLAN.

SIDEWALKS ALONG THE ACCESSIBLE ROUTE SHALL NOT HAVE A SLOPE EXCEEDING 1'V:20'H. SLOPES GREATER THAN 1'V:20'H MUST BE DESIGNED AS A RAMP. SIDEWALKS TO BE CONSTRUCTED TO ADA STANDARDS

SIDEWALKS, CURB RAMPS, RAMPS AND ACCESSIBLE PARKING SPACES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CURRENT APPROVED "AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES" (ADAAG) ALONG WITH THE REQUIRED GRADES, CONSTRUCTION MATERIALS, SPECIFICATIONS AND SIGNAGE. IF ANY CONFLICT OCCURS BETWEEN THE ADAAG GUIDELINES AND THE INFORMATION ON THE PLANS, THE ADAAG GUIDELINES SHALL TAKE PRECEDENCE AND THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER PRIOR TO ANY CONSTRUCTION.

By graphic plotting only, this property does not lie within any special flood zone areas according to the flood insurance rate map panel number 29183C0430 E and community number 290899 (City of Dardenne Prairie) which bears an effective date of August 2, 1996. The property lies within unshaded zone x (areas determined to be outside 500 year flood plain).

NO GRADE SHALL EXCEED 3:1 SLOPE.

STORMWATER SHALL BE DISCHARGED AT ADEQUATE NATURAL DISCHARGE POINT. SINKHOLES ARE NOT ADEQUATE NATURAL DISCHARGE POINTS.

ALL LANDSCAPE AREAS TO BE FILLED WITH A MINIMUM OF 6" OF TOPSOIL.

ALL LANDSCAPED AREAS DISTURBED BY OFF-SITE WORK SHALL BE IMMEDIATELY SEEDED OR SODDED, AS DIRECTED BY CITY DEPARTMENT OF PUBLIC WORKS UPON COMPLETION OF WORK IN AREA AFFECTED.

ADEQUATE TEMPORARY OFF-STREET PARKING FOR CONSTRUCTION EMPLOYEES SHALL BE PROVIDED. PARKING ON NON-SURFACED AREAS SHALL BE PROHIBITED IN ORDER TO ELIMINATE THE CONDITION WHEREBY MUD FROM CONSTRUCTION AND EMPLOYEES' VEHICLES IS TRACKED ONTO THE PAVEMENT CAUSING HAZARDOUS ROADWAY AND DRIVEWAY CONDITIONS.

NO STEP ALLOWED AT ACCESSIBLE ENTRANCE DOORS.

ALL HVAC AND MECHANICAL UNITS ON SITE SHALL BE PROPERLY SCREENED AS REQUIRED BY CITY CODE. ROOFTOP UNITS SHALL BE SCREENED BY A PARAPET WALL THAT EXTENDS AROUND THE ENTIRE PERIMETER OF THE BUILDING; THE PARAPET SHALL A MINIMUM HEIGHT THAT IS AT LEAST AS TALL AS THE TALLEST UNIT MOUNTED ON THE ROOF; GROUND MOUNTED HVAC AND MECHANICAL UNITS SHALL BE SCREENED BY FENCING, VEGETATION, OR SOME OTHER MEANS (APPROVED BY THE PLANNING AND ZONING COMMISSION) THAT HAS A MINIMUM HEIGHT THAT IS AT LEAST AS TALL AS THE TALLEST UNIT BEING SCREENED.

STORM WATER DETENTION SHALL BE PROVIDED IN THE EXISTING BASIN

ALL PAVING TO BE TO ST. CHARLES COUNTY STANDARDS EXCEPT AS MODIFIED BY THE CITY OF O'FALLON.

THE SITE WILL BE IN COMPLIANCE WITH PHASE II ILLICIT STORM WATER DISCHARGE GUIDELINES PER ORD. 5082 (HDS UNITS).

ALL PROPOSED FENCING REQUIRES A SEPARATE PERMIT.

ALL SIGN LOCATIONS AND SIZES MUST BE APPROVED SEPARATELY THROUGH THE PLANNING DIVISION.

LIGHTING VALUES WILL BE REVIEWED ON SITE PRIOR TO THE FINAL OCCUPANCY INSPECTION. CORRECTIONS WILL NEED TO BE MADE IF NOT IN COMPLIANCE WITH CITY STANDARDS. LIGHTING ON SITE MUST BE AIMED AND SHIELDED SO THAT AMBIENT LIGHT LEVEL ON SITE DOES NOT EXCEED 0.5 FOOT CANDLES AT THE PROPERTY LINE.

ALL SILTATION CONTROL DEVICES (SILT FENCES AND SEDIMENTATION BASINS) SHALL FOLLOW ST. CHARLES COUNTY SOIL AND WATER CONSERVATION DISTRICT EROSION AND SEDIMENT CONTROL GUIDELINES.

ALL PROPOSED UTILITIES TO BE LOCATED UNDERGROUND.

ESTIMATED SANITARY FLOW = 15 gal/day/person X 8 persons
= 120 gal/day

DCSD NOTES

ARY SEWER SERVICE SHALL NOT BE INTERRUPTED.

) DCSD SEWER REQUIRES DCSD INSPECTION. CONTACT MR. STEVE CHIEF INSPECTOR, AT 636-441-1244 TO SCHEDULE INSPECTION. NCED NOTICE IS REQUIRED.

CONSULTING ENGINEERS

CIVIL:
CEDC CIVIL ENGINEERING
11402 GRAVOIS ROAD SUITE 100
ST. LOUIS, MISSOURI 63126
C: BRANDON HARP 314.725.1400 X2

STRUCTURAL:
MCNEALY ENGINEERING INC.
11457 OLDE CABIN ROAD, STE 350
ST. LOUIS, MISSOURI 63141
C: BILL MCNEALY (P) 314.997.7310

MECHANICAL:
ICON MECHANICAL
1616 CLEVELAND AVENUE
GRANITE CITY, IL 62040
C: CHRIS DECK - (618) 452-0035

ELECTRICAL:
CBE ELECTRIC
700 NIEHOFF DR
EUREKA, MO 63025
C: DAN SCHLOTTER - P: 636-451-4441

PLUMBING:
KENT PLUMBING
2549 S BIG BEND BLVD
ST LOUIS, MO 63143
C: MIKE DUBBOLD - P: 314-781-8040

FIRE PROTECTION:
ACCESS FIRE PROTECTION
4821 E RIDGE ROAD
IMPERIAL, MO 63052
C: DENNY WEBB - P: 636-942-7200

CONTRACTOR

ARCO
THE DIFFERENCE IS PEOPLE
800 NORTH ROCK HILL ROAD
SAINT LOUIS, MO 63119
(P) 314-963-0715 (F) 314-965-4758
WWW.ARCONATIONAL.COM

ARCHITECT

GMA
800 NORTH ROCK HILL ROAD
ST. LOUIS, MISSOURI 63119
(P) 314-962-4642 (F) 314-962-0714
WWW.GMA-ARCHITECTS.COM

NEW BUILDING FOR

MMTTC

CORPORATE CENTER DRIVE
OFALLON, MO 63368

BRANDON A. HARP, P.E. E-28650
CIVIL ENGINEER
CEDC LICENSE NO.: 2003004674

JOB NO : 1233
PE : B. HARP
DATE : 03.18.2013

REVISIONS △
Grading Permit
04/19/13 Per City

SITE AND GRADING PLAN

C4

NEW BUILDING FOR
MMTC
CORPORATE CENTER DRIVE
O'FALLON, MO 63368
ARCHITECT
GMA
800 NORTH ROCK HILL ROAD
ST. LOUIS, MISSOURI 63119
(P) 314-822-5191 (F) 314-962-0714
WWW.GMA-ARCHITECTS.COM
CONTRACTOR
ARCO
800 NORTH ROCK HILL ROAD
SAINT LOUIS, MO 63119
(P) 314-962-0715 (F) 314-962-4788
WWW.ARCONATIONAL.COM
CONSULTING ENGINEERS
CIVIL:
CEDE ENGINEERING
11402 GRAVOIS ROAD STE 100
ST. LOUIS, MISSOURI 63126
C: BRANDON HARP 314.726.1400 X2
STRUCTURAL:
MCNEALY ENGINEERING INC.
11477 OLDE CABIN ROAD, STE 350
ST. LOUIS, MISSOURI 63141
C: BILL MCNEALY - P:(314) 997-7310
MECHANICAL:
ICON MECHANICAL
1 GRANITE ISLAND AVENUE
GRANITE ISLAND, IL 62040
C: CHRIS DECK - P:(618) 452-0035
ELECTRICAL:
CBE ELECTRIC
2100 MENHOFF DR
O'FALLON, MISSOURI 63366
C: G. WISCHMEYER - P:636-451-4441
PLUMBING:
KENT PLUMBING
2549 S BIG BEND BLVD
ST. LOUIS, MO 63143
C: DAVID COOLEY P: 314-781-9040
FIRE PROTECTION:
EXCEL FIRE PROTECTION
4821 E 4 RIDGE RD # 12
IMPERIAL, MO 63052
C: DENNY WEBB - P: 636-942-7200
BRANDON A. HARP, P.E. E-28650
CIVIL ENGINEER
CEDC LICENSE NO.: 2003004674
JOB NO : 1233
P.E. : B. HARP
DATE : 03.18.2013
REVISIONS
Grading Permit
04/19/13 Per City
DRAINAGE AREA PLAN
C10
SECTION A-A
Section
Depth (ft)
Reach (ft)
Highlighted
Depth (ft) = 0.44
Q (cfs) = 20.02
Area (sqft) = 10.41
Velocity (ft/s) = 1.92
Wetted Perim (ft) = 24.83
Crit Depth, Yc (ft) = 0.29
Top Width (ft) = 24.32
EGL (ft) = 0.50
Highlighted
Depth (ft) = 0.50
Q (cfs) = 7.984
Area (sqft) = 5.75
Velocity (ft/s) = 1.39
Wetted Perim (ft) = 23.02
Crit Depth, Yc (ft) = 0.38
Top Width (ft) = 23.00
EGL (ft) = 0.53
EAR FLOW PATH
FLOW REQUIRED = 28 c.f.s.
CITY = 64.73 c.f.s.
O IN 42" PIPE #5 TO #4 = 92.73 c.f.s.
WESTBOROUGH FARMS PLAT FOUR
PLAT BOOK 35 PAGES 35-36
SCALE:
1 inch = 20 ft
0 20 40
● – Denotes Set 1/2" x 18" Rebar with cap stamped "Horter L.S.-342-D"
O – Denotes Found 1/2" Iron Pipe
0.02 ac
X3.85 cfs/ac
0.08 cfs
0.20 ac
X 1.87 cfs/ac
0.37 cfs
0.21 ac
X3.85 cfs/ac
0.81 cfs
OVERLAND
FLOW
PATH
0.13 ac
X3.85 cfs/ac
0.50 cfs
0.20 ac
X3.85 cfs/ac
0.77 cfs
0.10 ac
X 1.87 cfs/ac
0.19 cfs
N 27°42'34" W 280.90' (R, R2 & S)
N 62°50'27" E 98.30' (R & S)
N 62°28'E (R1)
PROPOSED 10'W SEWER EASEMENT
PROPOSED 6" SANITARY LATERAL @ 2% MIN. SLOPE
Proposed Lot 5
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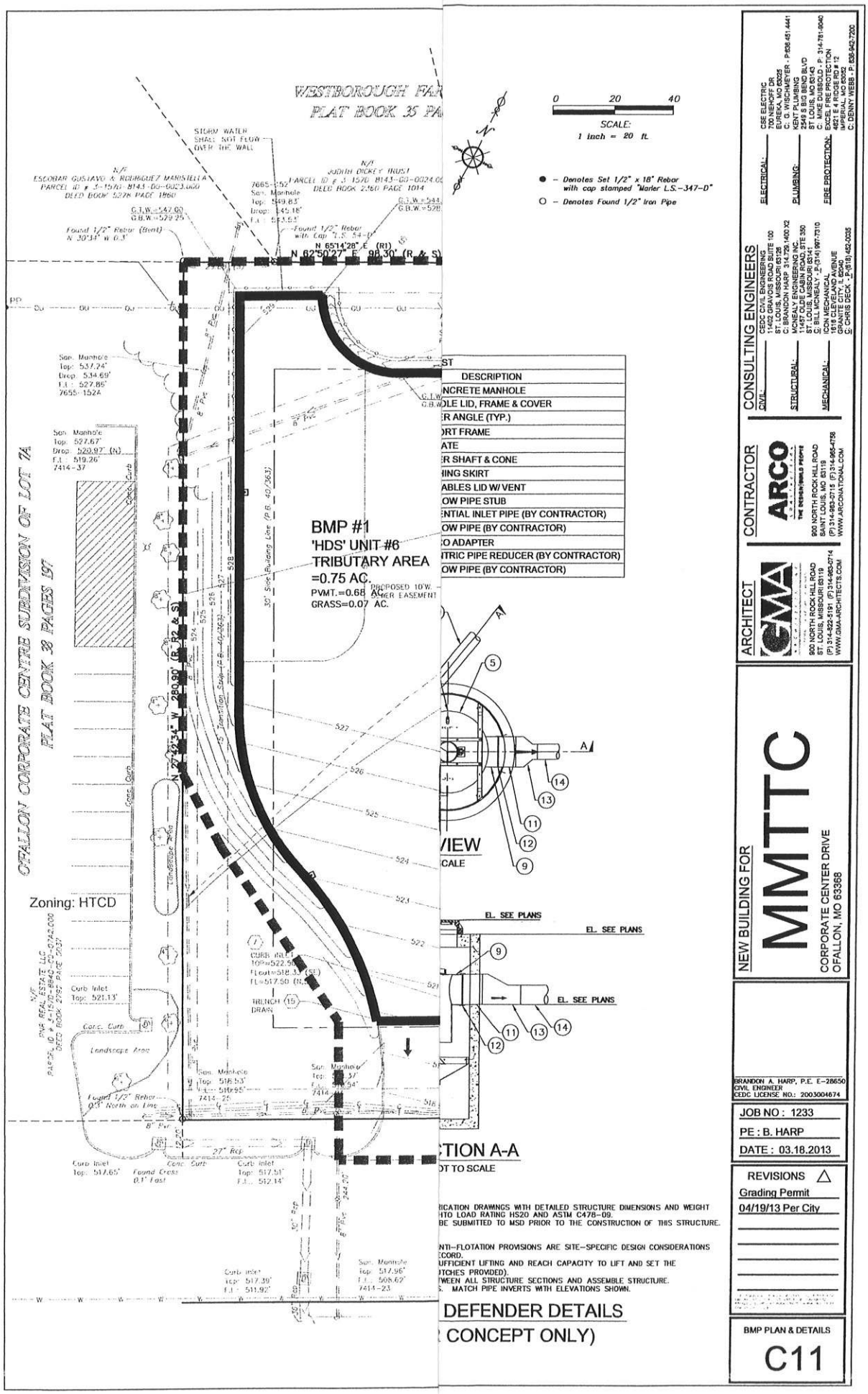

CONSULTING ENGINEERS

CIVIL:
CEDC CIVIL ENGINEERING
11402 GRAVOIS ROAD SUITE 100
ST. LOUIS, MISSOURI 63126
C: BRANDON HARP 314-729-1400 X2

STRUCTURAL:
MONEALY ENGINEERING INC.
11466 DESOTO OLD MILL SITE 350
ST. LOUIS, MISSOURI 63141
C: BILL MCNEALY - P: (314) 997-7310

MECHANICAL:
ICON MECHANICAL
1550 E. 4 RIDGE AVENUE
GRANITE CITY, IL 62040
C: CHRIS DECK - P: (618) 452-0035

ELECTRICAL:
CSE ELECTRIC
700 NEIDE DR
EUREKA, MO 63025
C: G. WISCHMEYER - P: 636.451.4441

PLUMBING:
KENT PLUMBING
2346 S BIG BEND BLVD
ST. LOUIS, MO 63143
C: MIKE DUBBOLD - P: 314-781-6040

FIRE PROTECTION:
EXCEL FIRE PROTECTION
4621 E 4 RIDGE RD # 12
BELLEVILLE, IL 62220
C: DENNY WEBB - P: 636-542-7200

CONTRACTOR

ARCO
THE DESIGN/BUILD PEOPLE
900 NORTH ROCK HILL ROAD
ST. LOUIS, MISSOURI 63119
(P) 314-822-5191 (F) 314-965-4758
WWW.ARCONATIONAL.COM

ARCHITECT

CMA
CHRISTOPHER MARLER ARCHITECTS
900 NORTH ROCK HILL ROAD
ST. LOUIS, MO 63119
(P) 314-822-5191 (F) 314-965-7714
WWW.CMA-ARCHITECTS.COM

NEW BUILDING FOR

MMTTC

CORPORATE CENTER DRIVE
OFALLON, MO 63368

BRANDON A. HARP, P.E. E-28650
CIVIL ENGINEER
CEDC LICENSE NO.: 2003004674

JOB NO : 1233
PE : B. HARP
DATE : 03.18.2013

REVISIONS △
Grading Permit
04/19/13 Per City

BMP PLAN & DETAILS

C11