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# STORMWATER OPERATIONS & MAINTENANCE MANUAL

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INTERCONTINENTAL HOTELS GROUP

HOLIDAY INN & SUITES

1100 CADILLAC COURT, MILPITAS, CA



Prepared by:



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**BMP HANDBOOK PORTAL: INDUSTRIAL & COMMERCIAL**

## **STORMWATER OPERATIONS & MAINTENANCE MANUAL**

**HOLIDAY INN & SUITES**

**MILPITAS, CA**

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## Notary Acknowledgment

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A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California

County of Santa Clara

On \_\_\_\_\_ before me, \_\_\_\_\_  
(insert name and title of the officer)

personally appeared \_\_\_\_\_,  
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are  
subscribed to the within instrument and acknowledged to me that he/she/they executed the same in  
his/her/their authorized capacity(ies), and that be his/her/their signature(s) on the instrument the  
person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing  
paragraph is true and correct.

WITNESS my hand and official seal.

Signature \_\_\_\_\_

(Seal)



## Owner's Certification

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### Approval and Certification of the Stormwater Operations & Maintenance Manual

Facility Name:

Holiday Inn & Suites, Milpitas, CA

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The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site and facility. A copy of this Stormwater Operations & Maintenance Manual (O&M Manual) will be maintained at the facility office or site.

This O&M Manual will be reviewed with the facility operator, facility supervisors, employees, maintenance and service contractors, or any other party having responsibility for implementing portions of this O&M Manual. At least one copy of this O&M Manual shall be available on the subject property in perpetuity. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the O&M Manual.

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Signature of Facility Manager

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Date

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Facility Manager (Printed)

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Telephone Number

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Holiday Inn & Suites

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1100 Cadillac Ct, Milpitas, CA

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Company

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Address

# Section 1                      Project Description

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## **1.1        INTRODUCTION**

In order to protect the health, safety, and general welfare of the residents of Milpitas, as well as to protect, sustain, and enhance the surface and ground water resources of Milpitas, drainage and stormwater management practices as provided in this Post-Construction Stormwater Operation & Maintenance Manual(O&M Manual) shall be utilized as directed herein to achieve the following objectives:

- Protect water quality by removing and/or treating pollutants prior to discharge to ground and surface waters, and to protect, restore, and maintain the chemical, physical, and biological quality of ground and surface waters.
- Protect natural infiltration and ground water recharge rates in order to sustain ground water supplies and stream base flows.
- Maintain runoff characteristics of the site after completion of development that are consistent with the carrying capacity of the receiving streams and storm sewer systems.
- Protect channels and geomorphology conditions of the receiving streams; protect their flood carrying capacity and aquatic habitats and to reduce in-stream erosion and sedimentation.
- Reduce flooding impacts and prevent a significant increase in surface runoff rates and volumes predevelopment to post-development.
- Protect adjacent lands from adverse impacts of direct stormwater discharges.
- Ensure permanent stormwater management systems are functioning as designed by providing effective long-term maintenance.
- Address applicable requirements of the Municipal Separate Storm Sewer System (MS4) National Pollution Discharge Elimination System (NPDES) Phase II Stormwater Regulations.
- Meet regulatory water quality requirements under state and local law.

## **1.2        O&M MANUAL AVAILABILITY AND IMPLEMENTATION**

The manager shall make the O&M Manual available at the facility during working hours and shall be made available upon request by a State or Municipal inspector.

The O&M Manual shall be implemented concurrently with the opening of the facility.

## **1.3        O&M MANUAL AMENDMENTS**

The O&M Manual should be revised when BMPs do not meet the objectives of reducing or eliminating pollutants in stormwater discharges as determined during site inspections, a visual observation subsequent to a qualifying rain event, during an annual third party site audit, or when a change in management occurs.

## **1.4        RETENTION OF RECORDS**

Paper or electronic records of this O&M Manual shall be retained as long as the facility is in operation.

## Section 2                      Project Information

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### **2.1      PROJECT AND SITE DESCRIPTION**

#### **2.1.1    Site Description**

Holiday Inn & Suites, Milpitas, CA (HISM) is part of the InterContinental Hotels Group. HISM is a hotel located southeast of the Interstate 880, Dixon Landing Road interchange in Milpitas, CA. The physical address for the building is 1100 Cadillac Court, Milpitas, CA 95035. The site is 3.29 acres and will consist of approximately 0.41 acres for the main building, and the remaining 2.88 acres is 115 paved parking spots, landscaping, swimming pool, and other associated infrastructure and site improvements. The main building is a four-story, 126-room hotel. Basic wet and dry utilities such as gas, power, telephone, sewer, and water have been provided for this site. The site improvements include, but are not limited to; construction of building, parking areas, trash enclosures, area lighting, landscaping and irrigation.

The SIC Code number associated with HISM is 7011 for Hotels and Motels. This is a new hotel.

The project site is located at Latitude 37.44494, Longitude -121.91779 and is identified on the Site Map in Appendix A.

#### **2.1.2    Pre-Construction Conditions**

Initial condition of the project site was undeveloped except for a paved inlet containing 14 parking spaces. An office building is located to the west of the property and a paved parking lot directly to the east. The property is bordered to the north by the Highway and to the south by additional office buildings. This segment of Highway 1 is a two-lane road that begins a stretch in which the highway traverses a rural area. Surrounding areas include industrial and general zoned businesses as well as well as single-family urban residences. The project site was previously undeveloped. There are no known historic sources of contamination associated with this site.

#### **2.1.3    Pre-Construction Drainage**

The project site was relatively flat with a 0% to 2% slope to the west. Runoff from the project site was sheet flow to the west and into a Milpitas MS4. Stormwater discharges from the site are not considered direct discharges, as defined by the State Water Board.

#### **2.1.4    Geology and Groundwater**

The site is underlain by Urbanland-Campbell complex with an identified K value of 0.24. Native soil underlying the project site “encountered within a depth of 60 feet on the project site predominately consist of loose/firm to dense/stiff gravelly silty sand, silty sand, silty sand/ sandy silt, silty clay and sandy clay. Several 10 to 20-foot-thick lenses/layers of silty sand were encountered below depths of 23 to 43 feet in the borings.

#### **2.1.5    Developed Condition**

Post construction surface drainage will be directed to vegetated swales in the landscaped areas before discharging to the City of Milpitas MS4 storm drainage system.

## **2.2 REQUIRED SITE MAP INFORMATION**

The construction project's Site Map showing the facility boundaries, stormwater treatment locations, and details regarding the stormwater BMPs is located in Appendix A.

## Section 3 Post Construction Best Management Practice

### 3.1 PURPOSE

This O&M Manual includes BMPs that reduce stormwater run-off volumes and/or reduce pollutants in stormwater discharges after all construction phases have been completed at the site (Post-Construction BMPs). Post-construction BMPs consist of permanent features designed to minimize pollutant discharges, including sediment, from the site after construction has been completed.

Post-Construction BMPs include treatment of stormwater runoff using infiltration, detention/retention, seepage pits, etc., use of efficient irrigation systems, ensuring interior drains are not connected to a storm sewer system, proper material storage practices, appropriate spill response procedures, good housekeeping practices, and appropriately designed and constructed energy dissipation devices. These must be consistent with all state and local post-construction stormwater management requirements, policies, and guidelines.

Stormwater management systems have been designed and constructed to prevent the pollution of ground water resources by stormwater, promote safety, minimize health hazards, preserve natural features and provide infiltration and ground water recharge where appropriate.

### 3.2 SOURCE CONTROL

Source controls are practices that prevent or reduce pollutants, at the source, from entering stormwater. Most stormwater experts consider source control to be the most cost-effective practice to reduce pollution.

The following source control BMP selection table indicates the BMPs that shall be implemented to control pollutants from entering stormwater. Fact Sheets for source control BMPs are provided in Appendix B.

CASQA Fact Sheet	BMP Name	BMP Used		If not used, state reason
		YES	NO	
	Education for Property Owner	X		
	Activity Restriction	X		
	Hazardous Materials Disclosure Compliance	X		
	Uniform Fire Code Implementation	X		
	Employee Training	X		
	BMP Maintenance	X		
SC-10	Non-Stormwater Discharges	X		
SC-11	Spill Prevention, Control and Cleanup	X		
SC-20	Vehicle and Equipment Fueling		X	No Vehicles or Equipment
SC-21	Vehicle and Equipment Cleaning		X	No Vehicles or Equipment
SC-22	Vehicle and Equipment Repair		X	No Vehicles or Equipment
SC-30	Outdoor Loading/Unloading		X	No Outdoor Loading/Unloading
SC-31	Outdoor Liquid Container Storage		X	No Liquid Stored

SC-32	Outdoor Equipment Operations		X	No Equipment
SC-33	Outdoor Storage of Raw Materials		X	No Outdoor Storage
SC-34	Waste Handling and Disposal	X		
SC-35	Safer Alternative Products	X		
SC-40	Contaminated or Erodible Areas		X	All areas stabilized or Vegetated
SC-41	Building and Grounds Maintenance	X		
SC-42	Building Repair and Construction		X	New Building, No Repair or Construction
SC-43	Parking/Storage Area Maintenance	X		
SC-44	Drainage System Maintenance	X		

These source control BMPs shall be implemented in conformance with the following guidelines and as outlined in the BMP Factsheets provided in Appendix B. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the O&M Manual or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the O&M Manual prevails over guidance in the BMP Fact Sheets.

### **Education for Property Owner/Manager**

Property Owner/Manager is required to attend a Pollution Awareness and Spill Prevention training program. The program is designed to increase awareness and knowledge of potential pollutants, how to prevent the release of pollutants, and how to correctly deal with spills. Property Owner/Manager will be retrained annually to maintain awareness. Complete training logs shown in Appendix C.

### **Activity Restrictions**

Employees will be trained to not blow or sweep debris from hotel, parking lot, or landscaping into storm drains. No hosing down of walkways and parking lot will be permitted. Clean up of debris will be performed by sweeping, vacuum, or other approved methods. No car washing will be permitted at this site. No automotive or construction equipment repairs will be allowed on site. They will also be trained to close the lids on dumpsters after use. The person on site responsible to ensure that these activities are being adhered to will be:

Name: \_\_\_\_\_ Position: Manager

### **Hazardous Material Disclosure Compliance**

Hazardous materials such as herbicides, pesticides, fertilizers, paints, solvents and oils will be properly stored in enclosed and covered containment. If the quantities stored exceed the minimum required for disclosure, a "Chemical Inventory and Business Emergency Plan" must be prepared and filed with the local fire department and updated annually. The person on site

responsible to ensure that the “Chemical Inventory and Business Emergency Plan” is prepared and submitted to the local fire department will be:

Name: \_\_\_\_\_ Position: Manager

### **Uniform Fire Code Implementation**

Chemical Inventory and Classification Package, Hazardous Materials Disclosure, High Pile Storage information, and Emergency Response shall be completed for all hazardous materials. A copy of this information shall be forwarded to the local fire department. This will need to be performed on an annual basis with inventories updated as necessary. Because of the complexity of this process, this process should be contracted for completion. A list of contractors can be found at [www.ocfa.org](http://www.ocfa.org).

### **Employee Training**

Employees will receive training upon hire and refresher training annually thereafter. Initial training will be by the manager or supervisor. Training will be directed toward awareness of environmental stewardship and best management practices particularly non-structural BMP such as housekeeping and spill response. Complete and maintain all training logs shown in Appendix C.

### **BMP Maintenance**

BMP maintenance, implementation schedules, and responsible parties are included with each specific structural and non-structural BMP narrative.

### **Non-Stormwater Discharges (SC-10)**

Non-Storm Water discharges are prohibited unless authorization has been granted by the County of Milpitas prior to the non-Storm Water discharge. Employees will be trained as to what constitutes a non-Storm Water discharge and prevent them from occurring.

### **Spill Prevention Control and Clean-up (SC-11)**

Each employee is required to attend a pollution awareness and spill prevention program. The program is designed to increase awareness and knowledge of potential pollutants, how to prevent the release of pollutants, and how to correctly deal with spills. Employees will be retrained annually to maintain awareness.

### **Waste Handling and Disposal (SC-34)**

Employees will be trained to properly handle and dispose of waste materials, and to utilize recycling when appropriate. Employees will be encouraged to submit ideas for waste reduction and recycling. The program is designed to increase awareness and knowledge of handling and

disposing of waste materials, and alternative disposal methods such as recycling. Employees will be retrained annually to maintain awareness.

#### **Safer Alternative Products (SC-35)**

Develop a comprehensive program based on: "Precautionary Principle" approach to evaluate whether a given product is safe, whether or not it is really necessary, and whether or not safer alternative products would perform just as well; Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients; Energy Efficiency Program including no-cost or low-cost energy conservation and efficiency practices; and an Integrated Pest Management or Less-Toxic Pesticide Program.

Name: \_\_\_\_\_ Position: Manager

#### **Building and Grounds Maintenance (SC-41)**

Employees and maintenance contractors will be trained of pollutant issues associated with stormwater runoff from buildings and grounds maintenance activities. These activities can contribute a number of pollutants such as hydrocarbons, fertilizers and pesticides, suspended solids, heavy metals, and pH issues that can enter receiving waters through stormwater runoff or non-stormwater discharges. This BMP is designed to prevent or reduce the discharge of pollutants from maintenance activities.

Name: \_\_\_\_\_ Position: Manager

#### **Common Area Litter Control**

Trash receptacles will be placed at hotel entrance and exit. These will be maintained every day with the trash removed from the receptacles and placed in trash dumpsters. Litter found on parking lots or on outside common areas will be removed by sweepers or by employees. All litter will be disposed of properly and dumpster lids closed to contain trash. Smoking areas will be kept clean with cigarette butts disposed of properly in contained receptacles.

#### **Parking/Storage Area Maintenance (SC-43)**

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through Storm Water runoff or non-Storm Water discharges. This BMP is designed to prevent or reduce the discharge of pollutants from parking lots and storage areas.

#### **Street Sweeping Private Street and Parking Lots**

Parking lot sweeping will be performed on a weekly basis to all accessible areas within the site. The debris from the sweeping operations will be disposed of properly at waste disposal facility. Prior to



October 1<sup>st</sup> of each year, special attention should be made to areas where debris commonly accumulates.

### Drainage System Maintenance (SC-44)

Employees and maintenance contractors will be trained of pollutant issues associated with stormwater runoff and non-stormwater discharges from all activities that will collect in, and possibly clog, the drainage system. These activities can contribute a number of pollutants such as hydrocarbons, fertilizers and pesticides, suspended solids, heavy metals, large floatable trash, and pH issues that can enter receiving waters through stormwater runoff or non-stormwater discharges. This BMP is designed to prevent or reduce the discharge of pollutants by properly maintaining catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis.

## 3.2 BUSINESS CATEGORY CONTROL

Business Category controls are specific to common business types that have higher potential to pollute stormwater based on the products they use and their activities.

The following Business Category control BMP selection table indicates the BMPs that shall be implemented based on business activities associated with the facility. Fact Sheets for business category control BMPs are provided in Appendix B.

CASQA Fact Sheet	BMP Name	BMP used		If not used, state reason
		YES	NO	
BG-10	<b>Animal Care and Handling Facilities</b>		X	No Animal Care
	<b>Automotive Service Facilities</b>			
BG-20	Body Repair		X	No Automotive Service
BG-21	Maintenance		X	No Automotive Service
BG-22	Service Stations		X	No Automotive Service
BG-23	Auto Recycling		X	No Automotive Service
BG-30	<b>Food Service Facilities</b>		X	No Food Service
BG-40	<b>Landscape Maintenance</b>	X		
BG-50	<b>Marinas, Boat/Shipyards, and Ports</b>		X	No Marinas, Boats, Ports
	<b>Mobile Cleaning</b>			
BG-60	Carpets & Upholstery		X	No Mobile Cleaning
BG-61	Food Service-related		X	No Mobile Cleaning
BG-62	Surface Cleaning		X	No Mobile Cleaning
BG-63	Swimming Pools and Spas		X	No Mobile Cleaning
BG-64	Water Softeners		X	No Mobile Cleaning
BG-65	Vehicle and Equipment Washing		X	No Mobile Cleaning

These business category control BMPs shall be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix B. If there is a conflict

between documents, the Site Map will prevail over narrative in the body of the O&M Manual or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the O&M Manual prevails over guidance in the BMP Fact Sheets.

### **Landscape Maintenance (BG-40)**

The landscape irrigation system will be inspected every 2 weeks for broken sprinklers, excessive irrigation that causes runoff, or excessive overspray. If these issues are prevalent between inspections, these problems will be corrected immediately when identified. Irrigation system shall have a rain delay feature to prevent irrigation during rain events. Fertilizer and herbicide applications will not be made when there is a problem with broken sprinklers, or excessive irrigation, or prior to a forecast rain event. Lawn clippings and other vegetative clipping will be properly disposed of and the use of blowers will be prohibited. The person on site responsible to ensure that these activities are being adhered to will be:

Name: \_\_\_\_\_ Position: Manager

### **3.3 TREATMENT & MANUFACTURED CONTROL**

Treatment and Manufactured Control BMPs are physical devices, whether manufactured (patented and purchased through a vendor) or built into landscaping design to filter pollutants from stormwater runoff. The devices require inspection and maintenance to verify that each BMP performs efficiently throughout its design life.

The following Treatment control BMP selection table indicates the BMPs that shall be implemented to control pollutants by physical treatment of the stormwater. Fact Sheets for treatment control BMPs are provided in Appendix B.

CASQA Fact Sheet	BMP Name	BMP used		If not used, state reason
		YES	NO	
TC-10	Infiltration Trench		X	N/A
TC-11	Infiltration Basin		X	N/A
TC-12	Harvest and Reuse		X	N/A
TC-20	Wet Pond		X	N/A
TC-21	Constructed Wetland		X	N/A
TC-22	Extended Detention Basin		X	N/A
TC-30	Vegetated Swale	X		
TC-31	Vegetated Buffer Strip		X	N/A

TC-32	Bioretention		X	N/A
TC-40	Media Filter		X	N/A
TC-50	Water Quality Inlet		X	N/A
TC-60	Multiple Systems		X	N/A
MP-20	Biotreatment		X	N/A
MP-40	Media Filter		X	N/A
MP-50	Wet Vault		X	N/A
MP-51	Gravity Separator		X	N/A
MP-52	Drain Inlet Insert		X	N/A

Treatment Control BMPs shall be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix B. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the O&M Manual or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the O&M Manual prevails over guidance in the BMP Fact Sheets.

### **Vegetated Swale (TC-30)**

A Vegetated Swale is a media and vegetation filled trench that receives stormwater runoff. Also known as bioswales, these systems; collect and slowly convey runoff flow, as well as reduce the discharge of stormwater to receiving waters and lessen the pollutants. Bioswales must be inspected, tested and maintained on a regular basis to preserve the efficiency at which it operates. Clogging can, and will occur, at a faster rate if other control BMPs are not in place. A thick vegetative cover is needed for the swale to function properly. With testing, proper maintenance, and visual observations, life and performance of these systems is enhanced. Also, be sure standing water does not accumulate for longer than 96 hours. Standing water is a breeding ground for vectors and is also an indicator of clogging problems with the bioswale. The person on site responsible to ensure that these activities are being adhered to will be:

Name: \_\_\_\_\_ Position: Manager

## Section 4 BMP Inspection and Maintenance

### 4.1 BMP INSPECTION AND MAINTENANCE

The MS4 Permit requires routine inspections of BMPs, along with inspections before, during, and after rain events. BMPs shall be maintained regularly to ensure proper and effective functionality. Specific details for maintenance, inspection, and repair of BMPs can be found in the BMP Factsheets in Appendix B.

<b>BMP Name</b>	<b>Implementation, Maintenance, and Inspection Frequency and Schedule</b>	<b>Person or Entity with Operation &amp; Maintenance Responsibility</b>
<b>Source Control BMPs</b>		
<b>Education for Property Owner/Manager</b>	Property Owner/Manager will be trained at hire and annually thereafter.	Manager
<b>Activity Restriction</b>	Employees will be trained at hire and annually thereafter.	Manager
<b>Hazardous Materials Disclosure Compliance</b>	Appropriate documentation will be compiled and submitted to local fire department and updated annually.	Manager
<b>Uniform Fire Code Implementation</b>	Appropriate documentation will be compiled and submitted to local fire department prior to hotel opening and updated annually.	Manager
<b>Employee Training</b>	Employees are required to attend a pollution awareness and spill prevention program. The program is designed to increase awareness and knowledge of potential pollutants, how to prevent the release of pollutants, and how to correctly deal with spills. Employees will be retrained annually to maintain awareness.	Manager
<b>BMP Maintenance</b>	The manager will implement a schedule for BMP maintenance and assign duties as necessary.	Manager
<b>SC-10. Non-Storm Water Discharges</b>	Employees will be trained on problems associated with non-Storm Water discharges during the pollution awareness and spill prevention program.	Manager

	Employees will be retrained annually to maintain awareness.	
<b>SC-11. Spill Contingency Plan</b>	Employees are required to attend a pollution awareness and spill prevention program. The program is designed to increase awareness and knowledge of potential pollutants, how to prevent the release of pollutants, and how to correctly deal with spills. Employees will be retrained annually to maintain awareness.	Manager
<b>SC-34. Waste Handling and Disposal</b>	Employees will be encouraged to recycle those materials which can be recycled. Management will provide receptacles for recycling.	Manager
<b>SC-35. Safer Alternative Products</b>	Employees will be encouraged to explore the use of materials which are safer to the environment. Management will encourage employees to practice energy savings in everyday duties.	Manager
<b>SC-41. Building and Grounds Maintenance</b>	Employees and contractors are required to attend a pollution awareness and spill prevention program. The program is designed to increase awareness and knowledge of potential pollutants, how to prevent the release of pollutants, and how to correctly deal with spills. Employees will be retrained annually to maintain awareness.	Manager
<b>Common Area Litter Control</b>	Trash receptacles will be placed at the entrances and exits prior to hotel opening. These receptacles will be maintained daily and will not be allowed to overflow. Trash from receptacles will be disposed of properly into trash dumpsters.	Manager
<b>Design and Construct Trash and Waste Storage Areas to Reduce Pollutant Introduction</b>	The trash and waste storage area will be enclosed with walls and the access side with gates. Damage to the trash and waste storage area will be corrected immediately upon notification of damages.	Manager
<b>SC-43. Parking/Storage Area Maintenance</b>	Employees will be trained on problems associated with parking lot and storage area maintenance during the pollution awareness and spill prevention program. Employees will be retrained annually to maintain awareness.	Manager

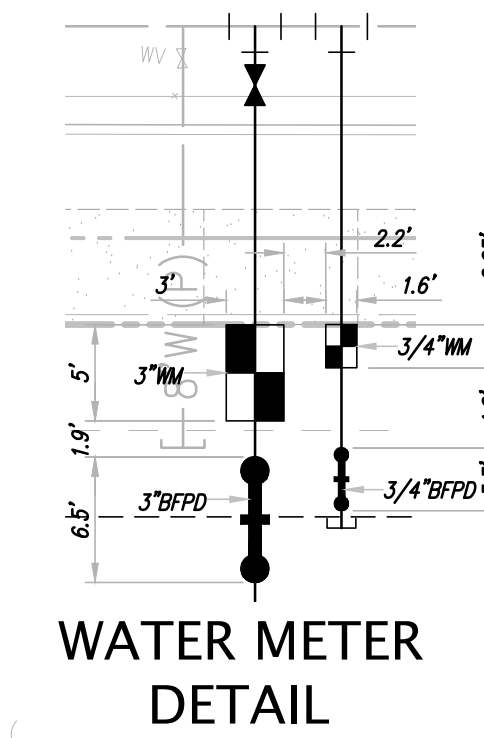
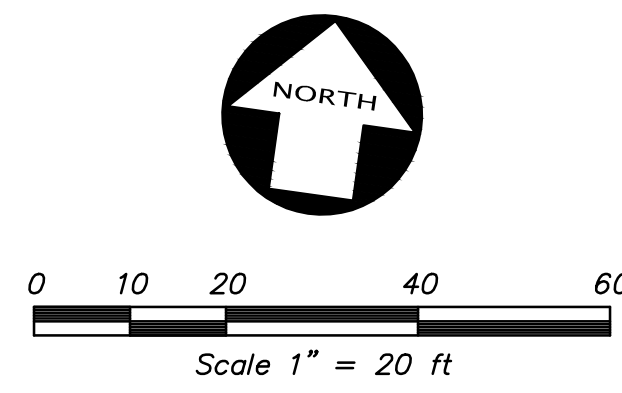
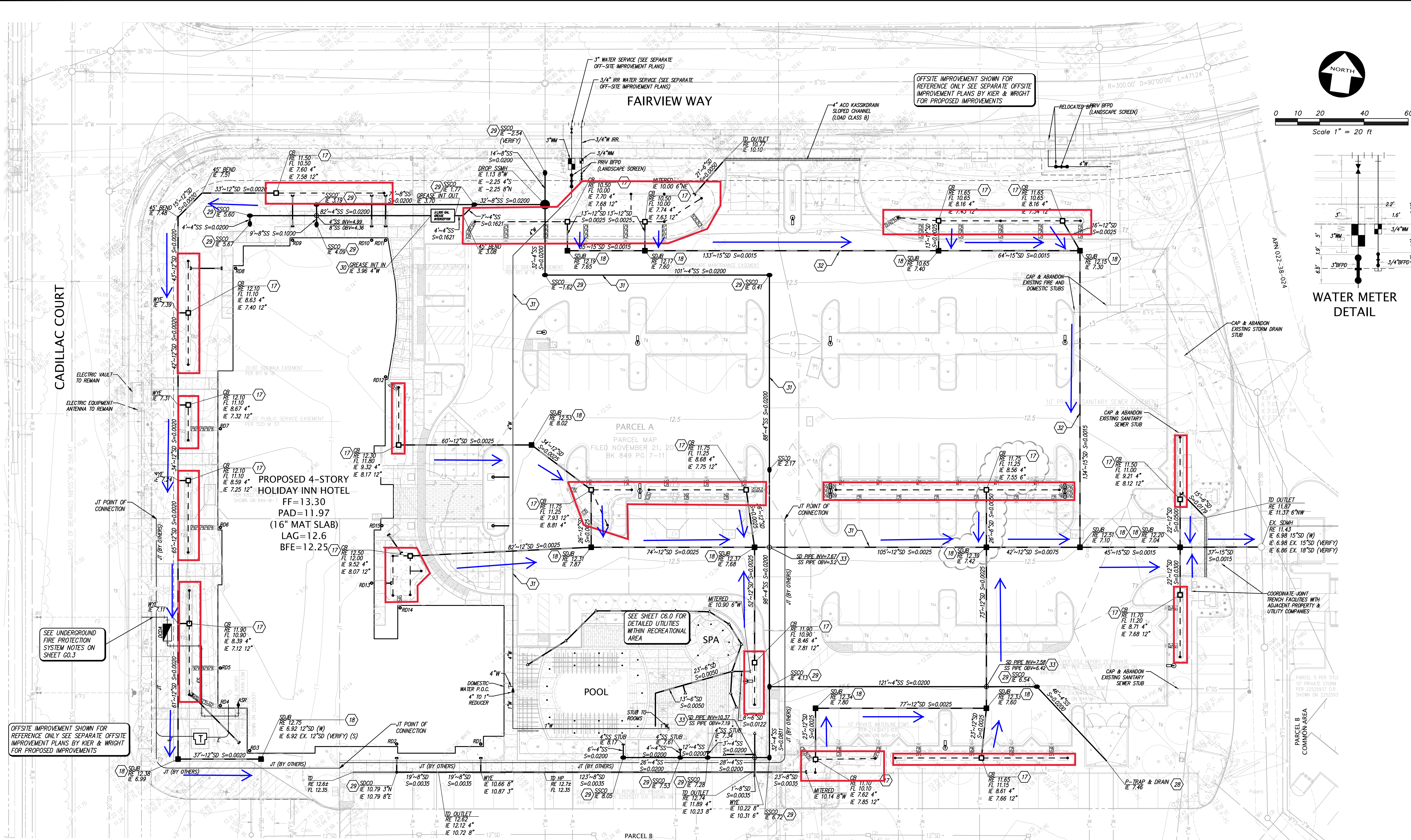
<b>Street Sweeping Private Streets and Parking Lots</b>	Sweeping will be performed weekly to all accessible areas within the site.	Manager
<b>SC-44. Drainage System Maintenance</b>	Storm drain inlets will be inspected annually in the late summer or early fall prior to the rainy season starting October 1 <sup>st</sup> of each year. Damages, re-stenciling, or maintenance do to fill exceeding 40% of capacity; will be addressed before rainy season.	Store Manager
<b>BG-40. Landscape Maintenance</b>	Irrigation system will be inspected at initial startup for damage or overspray. Systems will be adjusted to optimize irrigation without creating runoff. Systems will be inspected every 2 weeks thereafter to ensure systems are operating correctly. Any problems will be repair immediately upon observation.	Manager
<b>TC-30. Vegetated Swale</b>	<p>The swale will be installed according to engineering specifications for the soil, plants and non-vegetative cover. Area should be inspected weekly for problems such as dead plants, irrigation needs, or ponding. Bottoms should be scarified or raked annually. Sediment deposits should be removed from pretreatment devices at least annually by flushing or jetting the system.</p> <p>In general, if approximately 36 hours after a rain event, water is being retained, the system is not functioning properly. If this occurs, notify the Environmental Manager. Removal and reconstruction of the infiltration device may be necessary.</p>	Landscape Contractor

## *Appendix A: Site Map*

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KEY NOTES

- 17 DROP INLET. SEE 1/C11.2
- 18 JUNCTION BOX. SEE 1/C11.2
- 20 MITERED DRAIN OUTFALL. SEE 3/11.2
- 28 P-TRAP. SEE 3/C11.3
- 29 CLEANOUT TO GRADE. SEE 4/C11.3
- 30 GREASE INTERCEPTOR. SEE 5/C11.3
- 31 PLASTIC PIPE BEDDING. SEE TRENCH CONSTRUCTION CITY STD DWG 220/C11.3
- 32 NON-PLASTIC PIPE BEDDING. SEE TRENCH CONSTRUCTION CITY STD DWG 220/C11.3
- 33 UTILITY CROSSING. SEE 6/C11.3

LEGEND

EXISTING	PROPOSED
PROPERTY LINE	
FIRE HYDRANT	
ELECTROLIER	
POWER POLE/ JOINT POLE	
UTILITY BOX	
ELECTRICAL LINE	
FIRE SERVICE LINE & VALVE	
GAS LINE- VALVE & METER	
SANITARY SEWER LINE-MANHOLE & CLEANOUT	
STORM DRAIN LINE-MANHOLE & CATCH BASIN	
WATER LINE- VALVE, BFP & PIV	

ABBREVIATIONS

AD ASR BFPD BSL CB CTVB DCDA DOM E EB ELEC EV EX FF	AREA DRAIN AUTO SPRINKLER RISER BASE FLOOD ELEVATION BACK FLOW PREVENTION DEVICE BUILDING SETBACK LINE CATCH BASIN CABLE TV BOX DOUBLE CHECK DETECTOR ASSEMBLY DOMESTIC EAST ELECTRIC BOX ELECTRICAL LINE ELECTRICAL VAULT EXISTING FINISH FLOOR	FH FL IE IRR JT MIN N P.I.E. PE PC&E PRV RE S	FIRE HYDRANT FLOW LINE INVERT ELEVATION IRRIGATION JOINT TRENCH MINIMUM NORTH PAVEMENT PRIVATE INGRESS EGRESS EASEMENT PIPE END PACIFIC GAS & ELECTRIC PRIVATE RIM ELEVATION SOUTH	SD SDCO SDJB SDMH SL SLB SS SSCO SSMH TB TD TW WM WV	STORM DRAIN STORM DRAIN CLEAN OUT STORM DRAIN JUNCTION BOX STORM DRAIN MANHOLE STREET LIGHT STREET LIGHT BOX SANITARY SEWER SANITARY SEWER CLEAN OUT SANITARY SEWER MANHOLE TELEPHONE BOX TRENCH DRAIN WEST WATER METER WATER VALVE
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NOTE: SEE SHEET G0.3 FOR UTILITY & FIRE PROTECTION NOTES  
SEE SHEET G0.1 FOR ABBREVIATIONS



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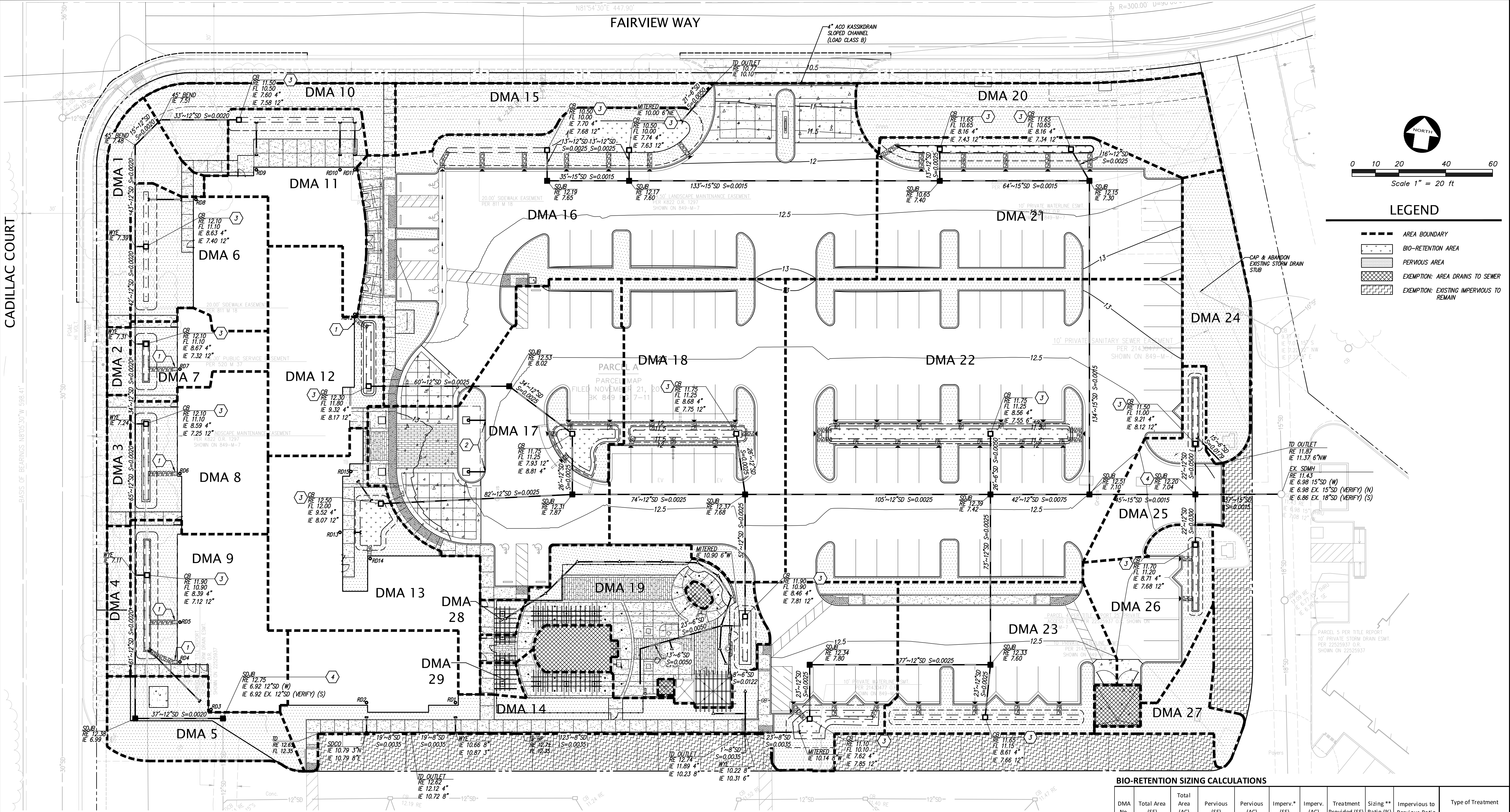
Project: GRADING AND DRAINAGE PLAN S FOR:  
**HOLIDAY INN MILPITAS**  
1100 Cadillac Court, Milpitas CA 95035  
Owner: Alps Group, Inc.

Issue: 04/27/15 City Submittal

Revisions

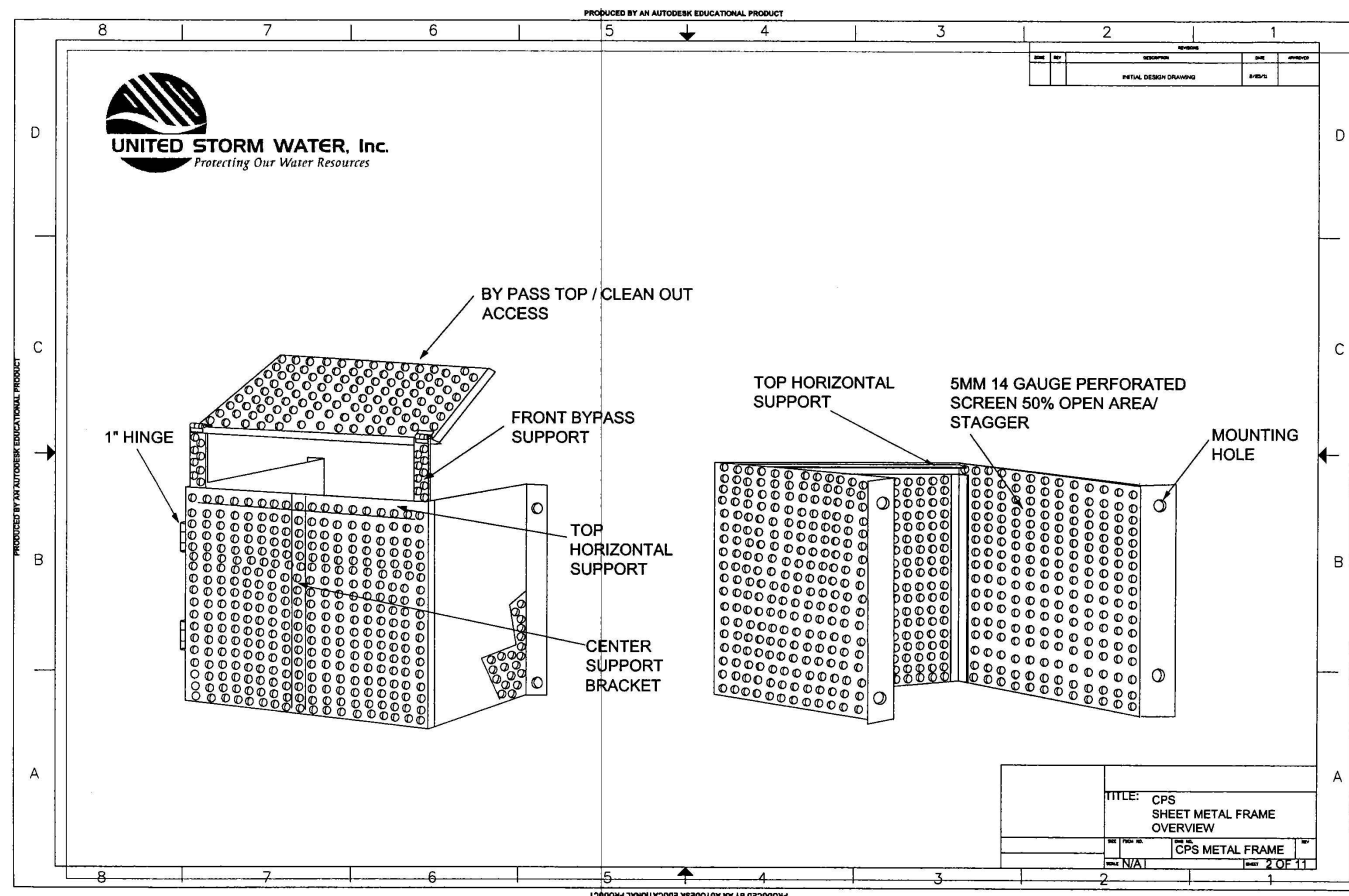
Sheet Title: UTILITY PLAN  
Date Last Edited: March 8, 2017  
Sheet Number: C7.0





### KEY NOTES

- DISCONNECTED DOWNSPOUT RAIN WATER LEADER AT SLAB. SEE 5/C11.2 SPLASH BLOCK. SEE 6/C11.2 SPILLWAY. SEE 7/C11.2
- CURB-O-LET DRAIN. SEE 2/C11.3
- DROP INLET. SEE 1/C11.2 NO DUMPING DRAINS TO BAY. SEE 9/C11.2 BIORETENTION AREA. SEE 8/C11.2
- INSTALL TRASH CAPTURE DEVICE SEE DETAIL 1/C9.0



TRASH CAPTURE DEVICE

NOT TO SCALE

1

### BIO-RETENTION SIZING CALCULATIONS

DMA No.	Total Area (SF)	Total Area (AC)	Pervious (SF)	Pervious (AC)	Imperv.* (SF)	Imperv. (AC)	Treatment Provided (SF)	Sizing ** Ratio (%)	Impervious to Pervious Ratio	Type of Treatment
1	1,572	0.04	1,443	0.03	129	0.00	-	-	0.24 : 1	Self-Retaining
2	291	0.01	234	0.01	57	0.00	-	-	0.24 : 1	Self-Retaining
3	556	0.01	457	0.01	99	0.00	-	-	0.22 : 1	Self-Retaining
4	641	0.01	592	0.01	50	0.00	-	-	0.08 : 1	Self-Retaining
5	2,286	0.05	2,171	0.05	115	0.00	-	-	0.05 : 1	Self-Retaining
6	3,245	0.07	890	0.02	2,262	0.05	94	4.14%	n/a	Bio-Retention Planter
7	1,578	0.04	401	0.01	1,124	0.03	53	4.75%	n/a	Bio-Retention Planter
8	3,594	0.08	629	0.01	2,843	0.07	122	4.31%	n/a	Bio-Retention Planter
9	4,370	0.10	767	0.02	3,459	0.08	144	4.16%	n/a	Bio-Retention Planter
10	2,291	0.05	2,035	0.05	256	0.01	-	-	0.13 : 1	Self-Retaining
11	3,174	0.07	666	0.02	2,408	0.06	100	4.14%	n/a	Bio-Retention Planter
12	3,658	0.08	367	0.01	3,155	0.07	136	4.31%	n/a	Bio-Retention Planter
13	5,539	0.13	462	0.01	4,870	0.11	207	4.24%	n/a	Bio-Retention Planter
14	10,076	0.23	2,550	0.06	7,231	0.17	295	4.08%	n/a	Bio-Retention Planter
15	2,518	0.06	2,518	0.06	0	0.00	-	-	n/a	Self-Treating
16	18,021	0.41	2,476	0.06	14,907	0.34	638	4.28%	n/a	Bio-Retention Planter
17	9,900	0.23	1,256	0.03	8,295	0.19	349	4.21%	n/a	Bio-Retention Planter
18	9,074	0.21	1,483	0.03	7,297	0.17	294	4.03%	n/a	Bio-Retention Planter
19	5,097	0.12	1,369	0.03	2,825	0.06	115	4.07%	n/a	Bio-Retention Planter
20	4,176	0.10	4,105	0.09	71	0.00	-	-	0.02 : 1	Self-Retaining
21	7,549	0.17	1,288	0.03	5,994	0.14	267	4.46%	n/a	Bio-Retention Planter
22	20,021	0.46	2,359	0.05	16,971	0.39	691	4.07%	n/a	Bio-Retention Planter
23	5,671	0.13	1,581	0.04	3,932	0.09	158	4.01%	n/a	Bio-Retention Planter
24	2,796	0.06	2,729	0.06	68	0.00	-	-	0.02 : 1	Self-Retaining
25	2,194	0.05	390	0.01	1,714	0.04	90	5.24%	n/a	Bio-Retention Planter
26	2,733	0.06	827	0.02	1,907	0.04	90	4.71%	n/a	Bio-Retention Planter
27	1,171	0.03	1,096	0.03	75	0.00	-	-	0.07 : 1	Self-Retaining
28	254	0.01	186	0.00	67	0.00	-	-	n/a	Self-Retaining
29	237	0.01	170	0.00	67	0.00	-	-	n/a	Self-Retaining

\* Impervious is equal to Total Area - Pervious - Treatment Provided - Exemptions  
\*\* Sizing Ratio is equal to Treatment Provided / Impervious Area

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Project GRADING AND DRAINAGE PLAN S FOR:  
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Issue  
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Revisions

Sheet Title  
**STORMWATER QUALITY CONTROL PLAN**

Date Last Edited

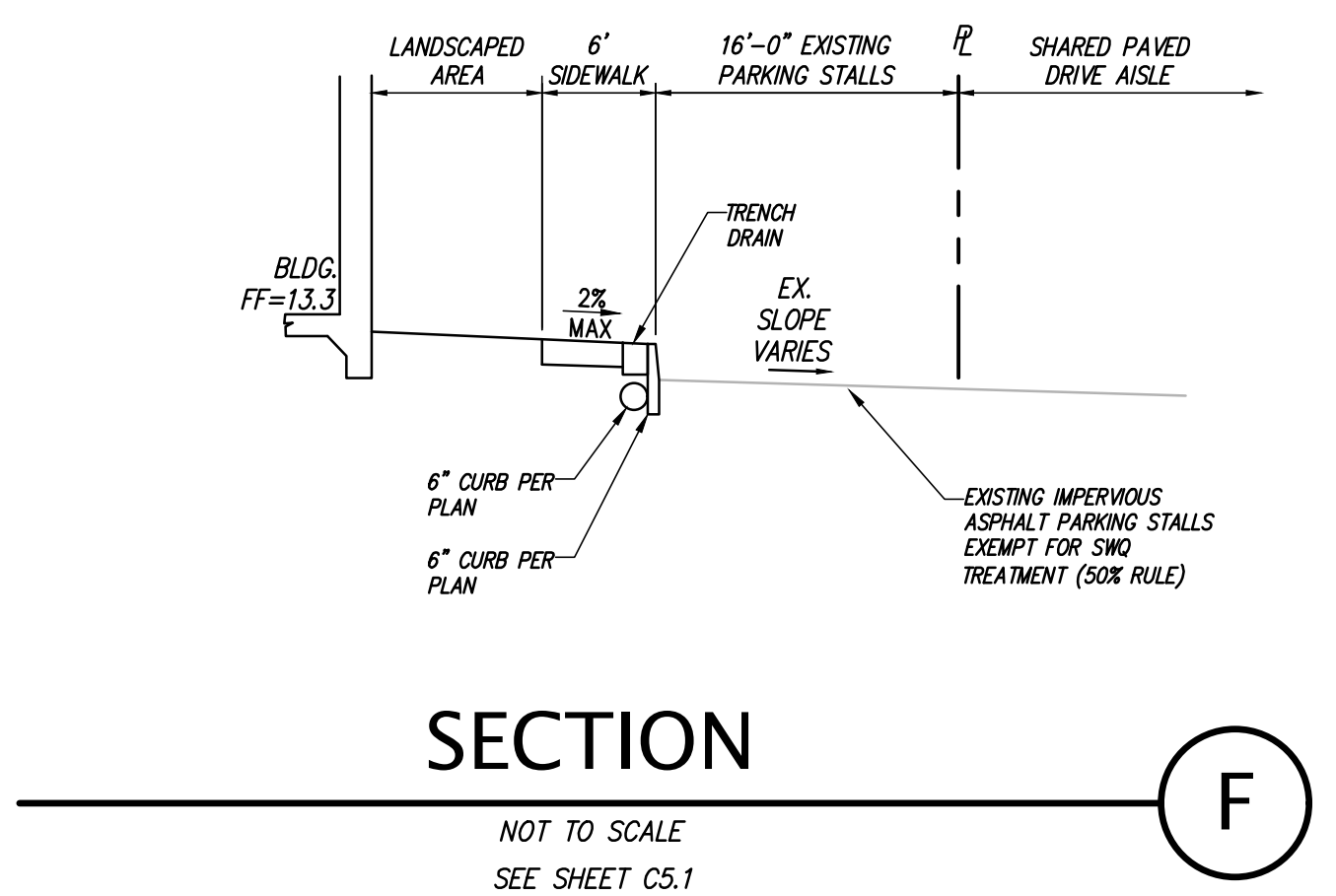
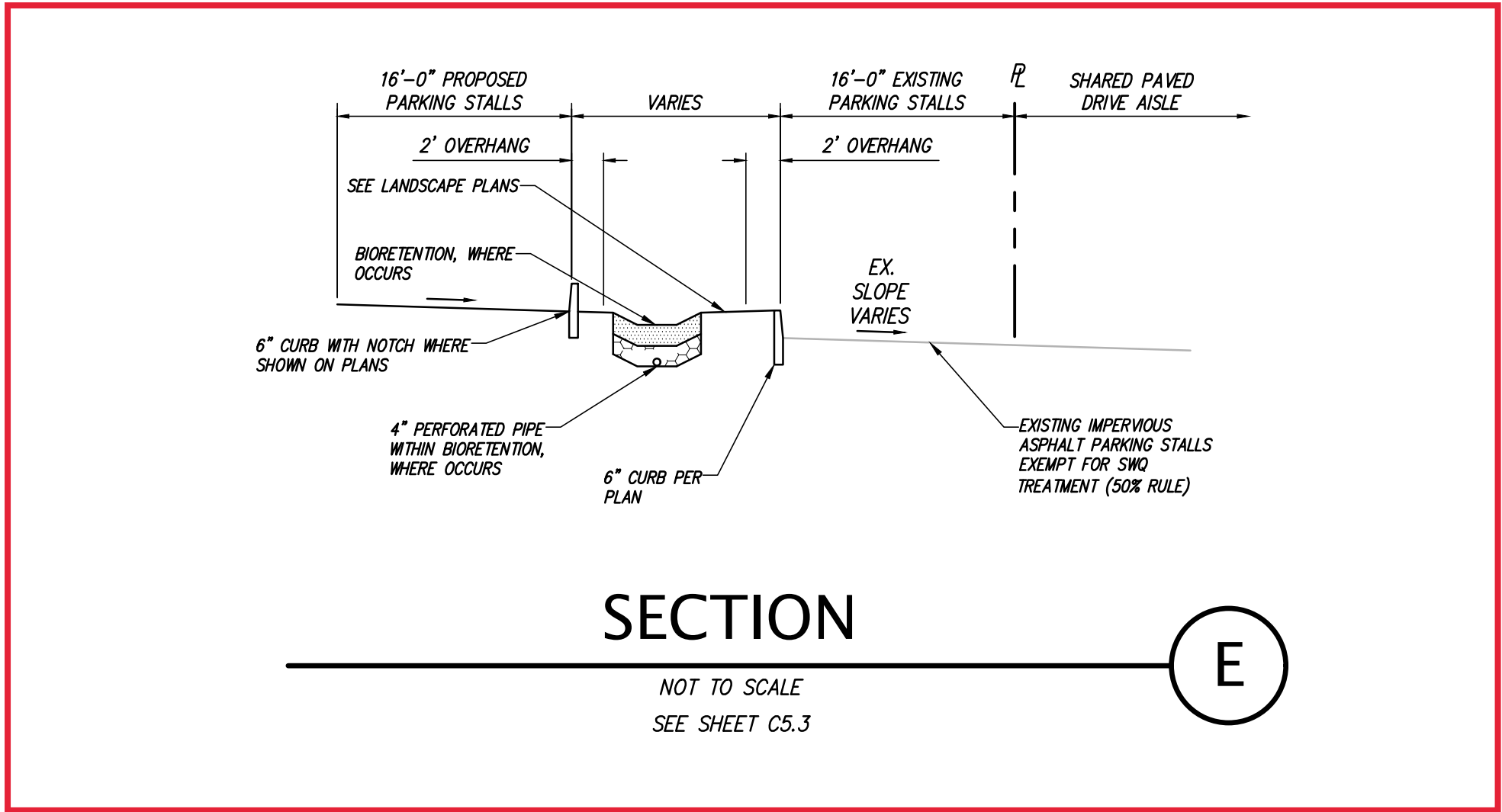
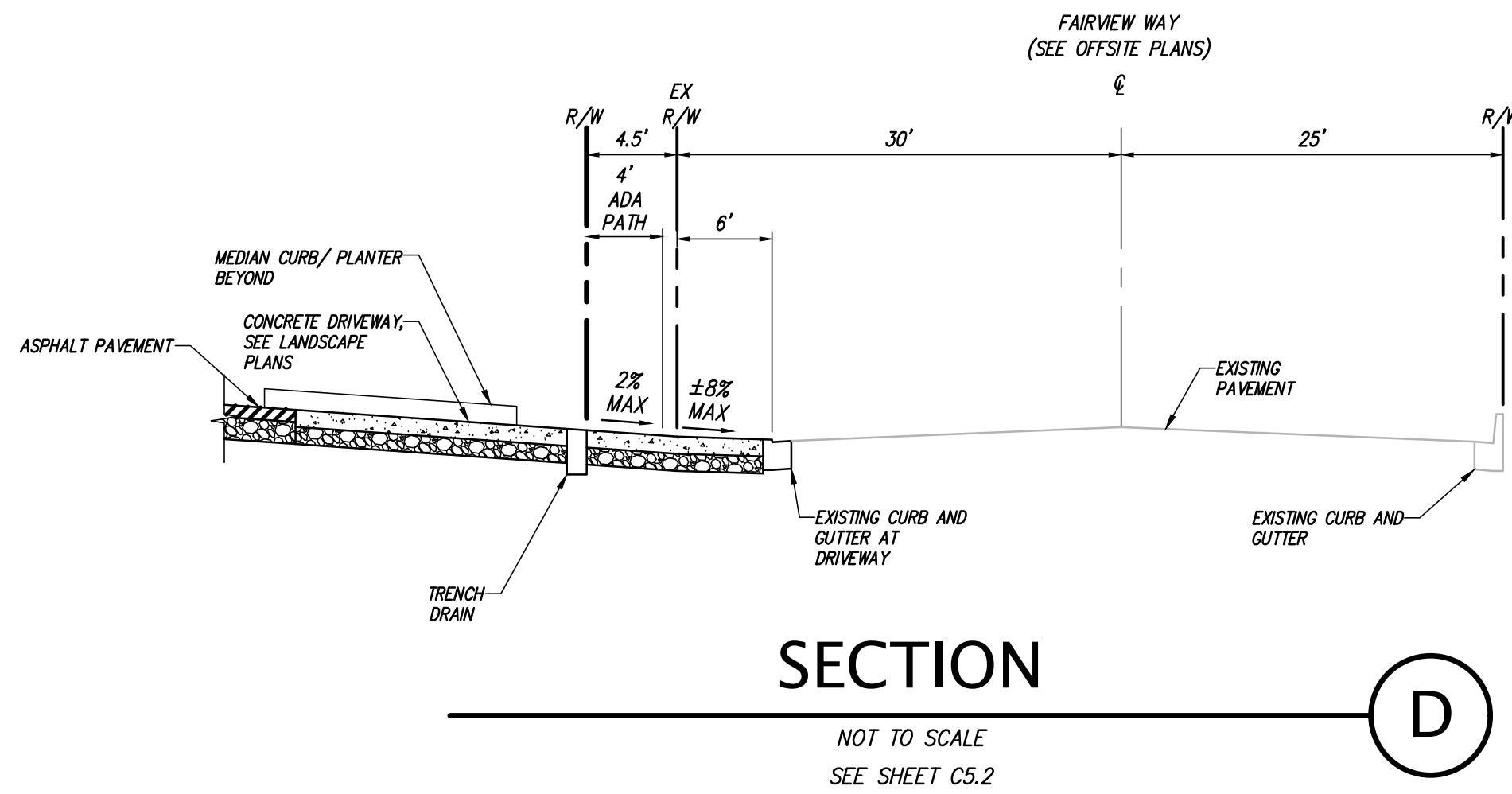
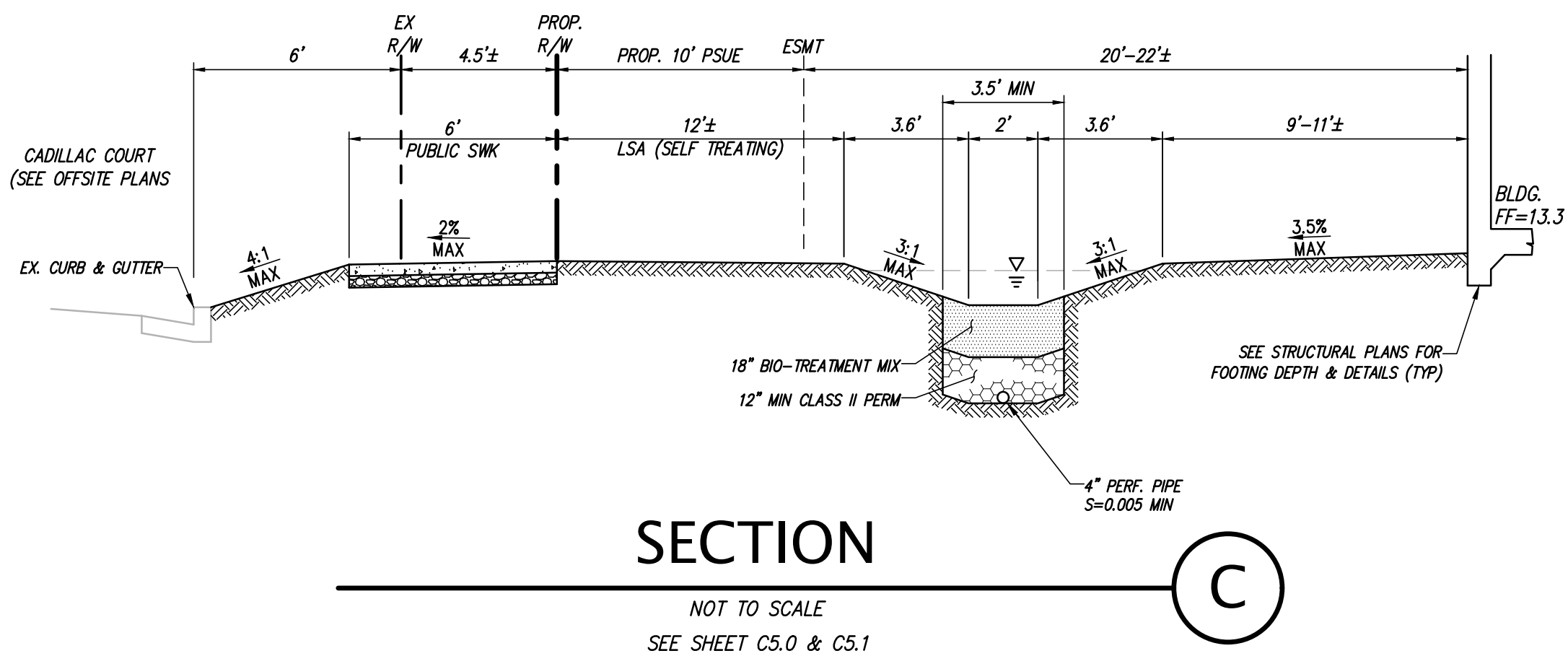
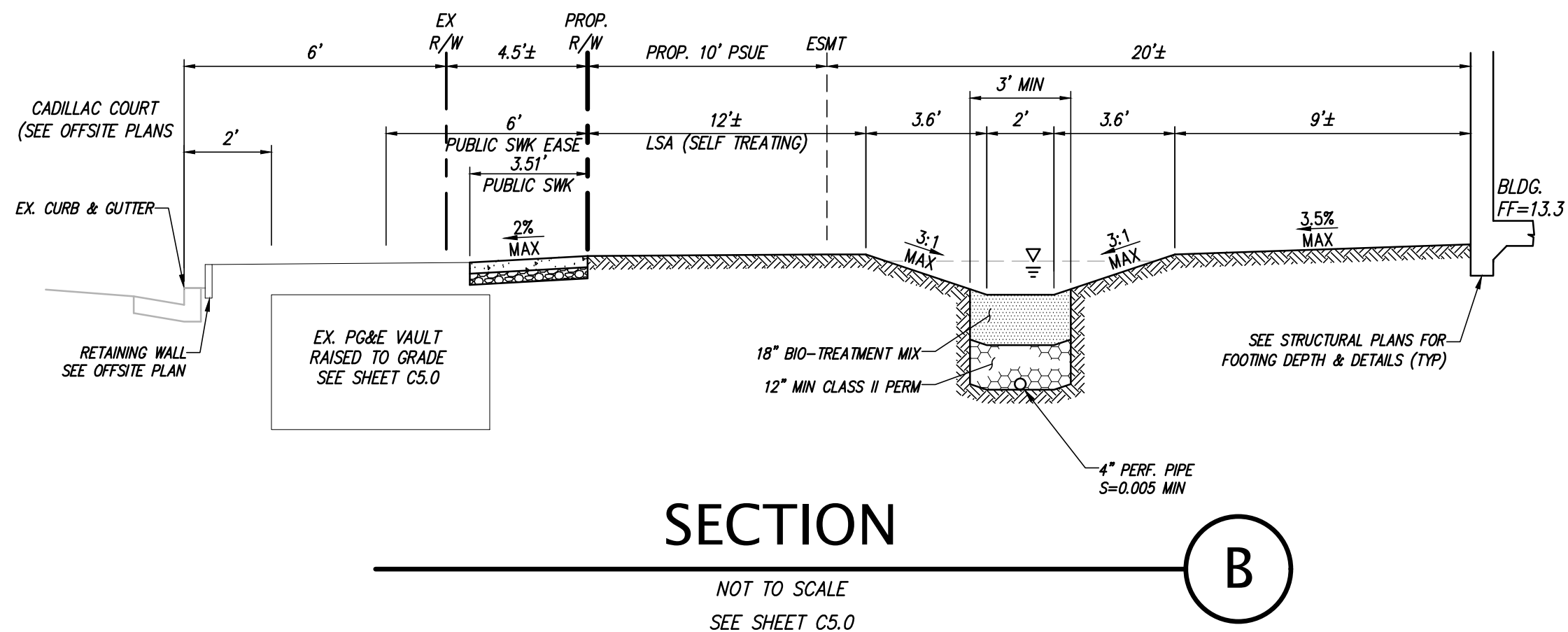
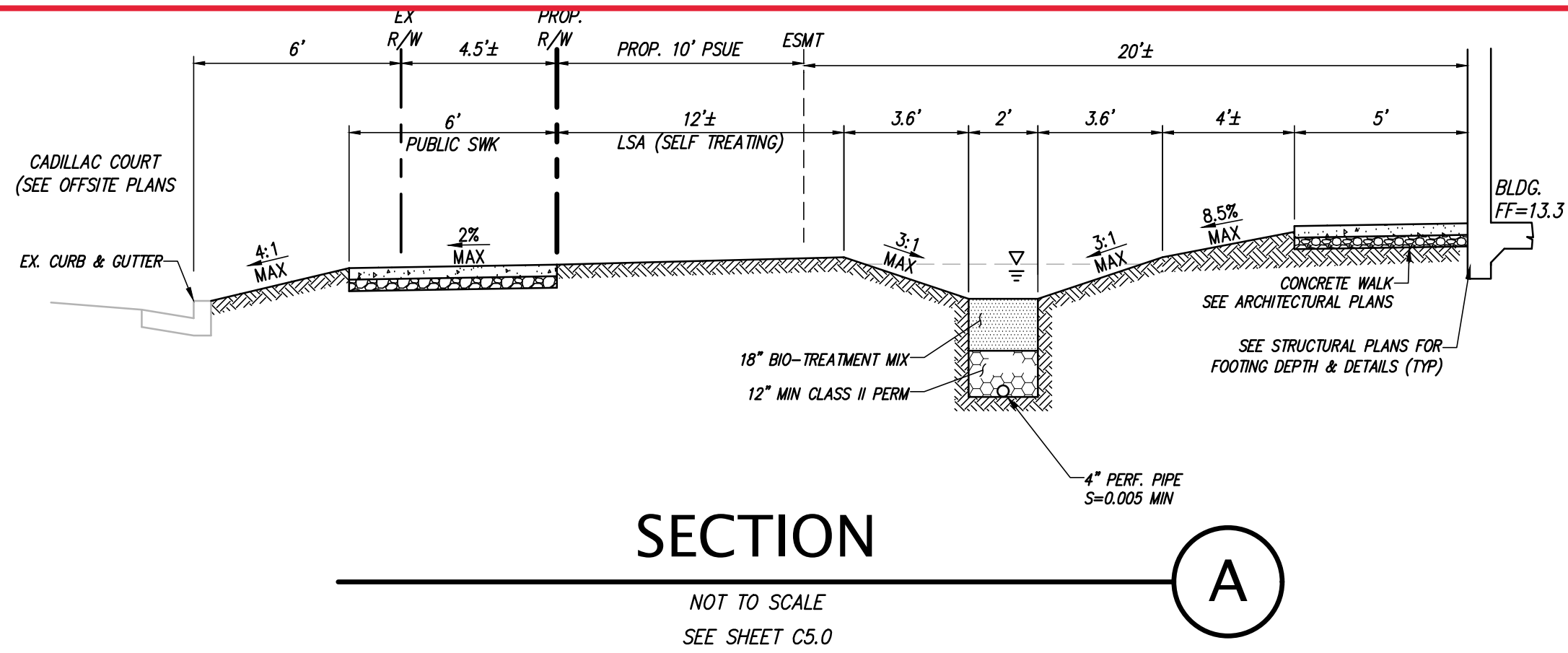
February 2, 2017

Sheet Number

C9.0



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Sheet Title  
SECTIONS

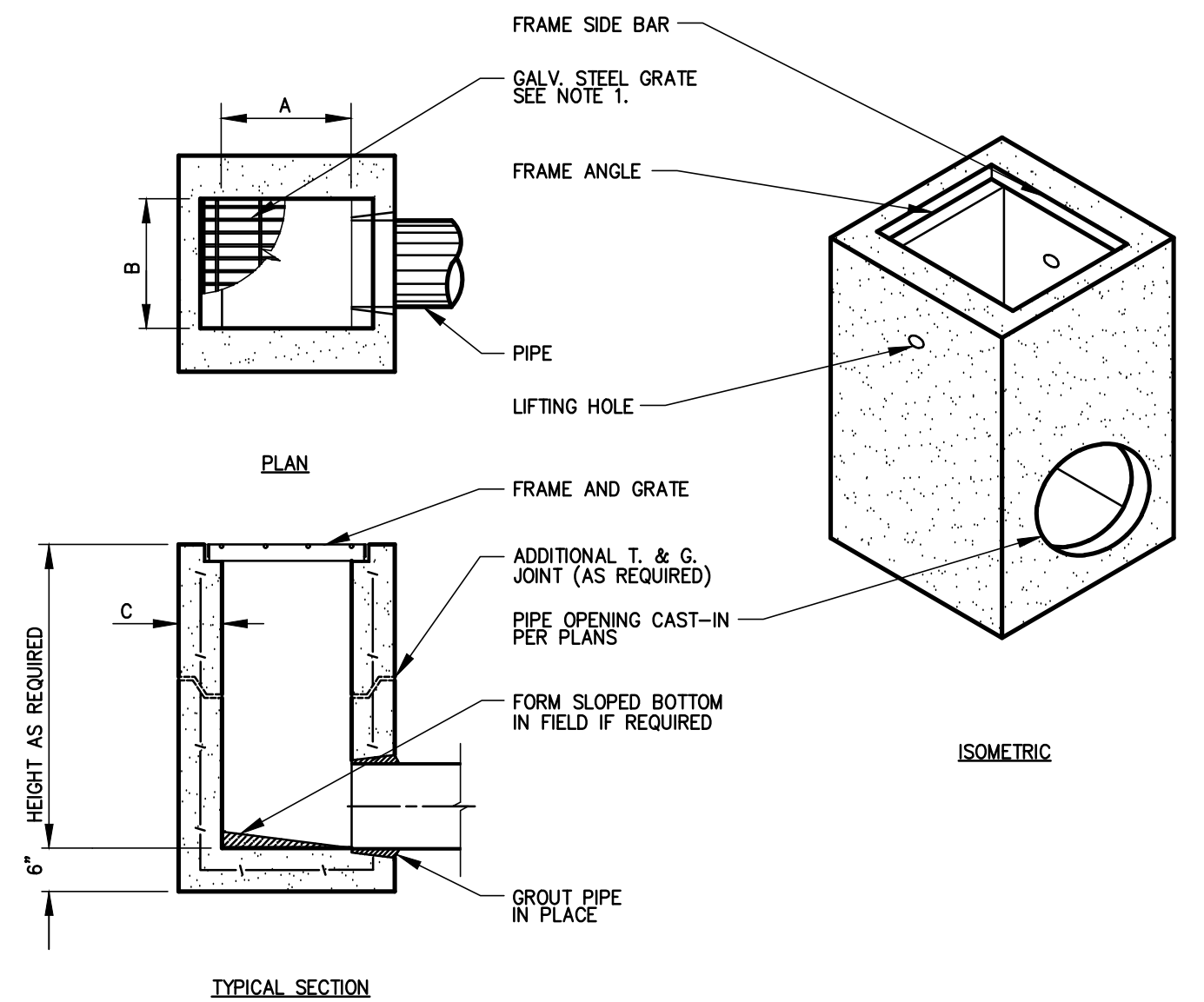
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March 8, 2017

Sheet Number

C10.0



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NOTES :

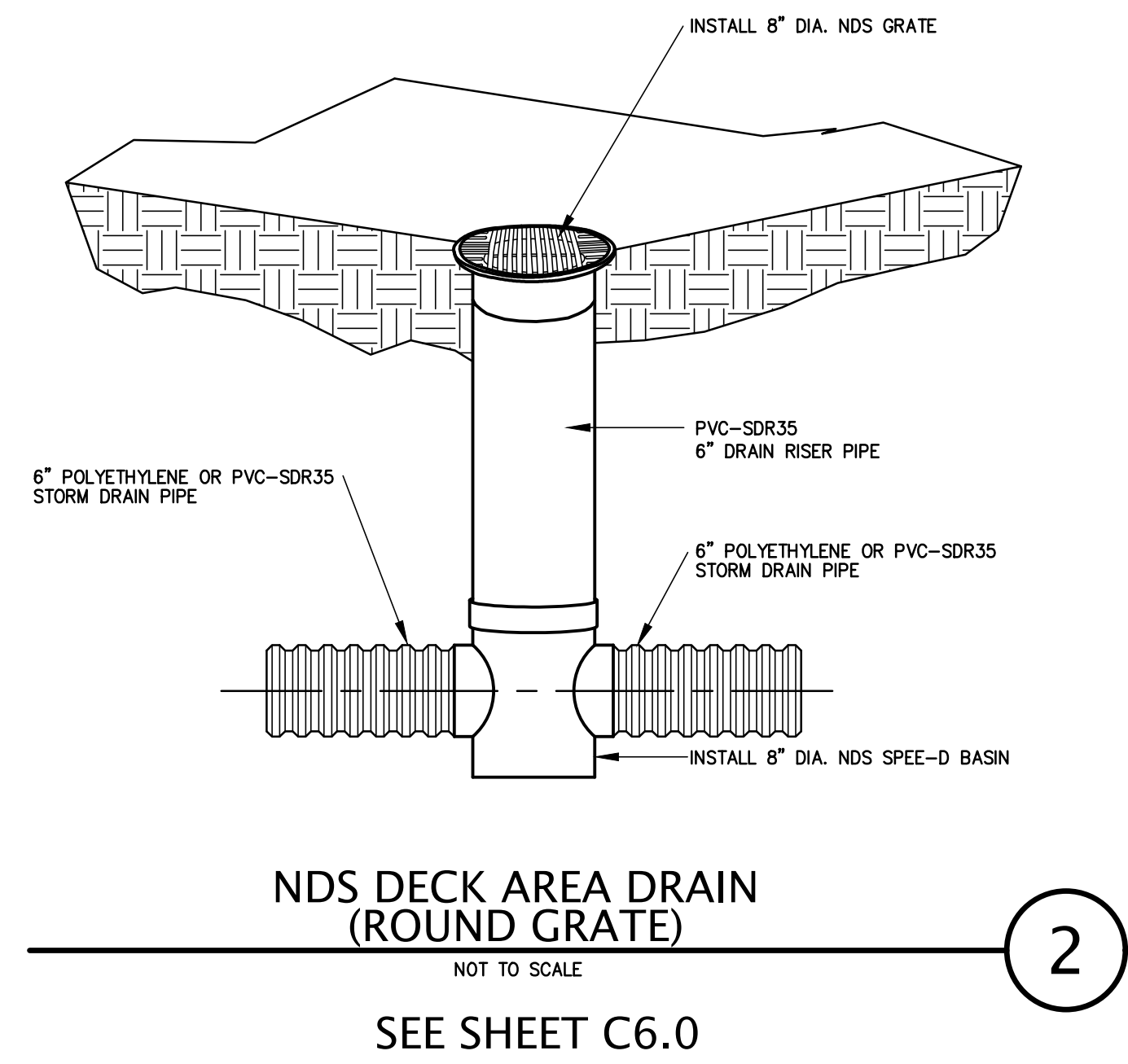
1. FRAMES AND GRATES MAY BE SPECIFIED FOR PEDESTRIAN OR H2O TRAFFIC LOADING. ALL GRATES ARE BICYCLE PROOF. OPTIONAL GRATE LOCKING DEVICE AVAILABLE ON REQUEST SEE DRAWING 'LOCK' ON PAGE 1-7 OF THE CENTRAL PRECAST CATALOG. CLOSED-MESH GRATES OR CAST IRON FRAME AND GRATES ARE AVAILABLE ON REQUEST.
2. FOR SURFACE AND DISCHARGE OPTIONS AVAILABLE SEE DRAWING NO. 'DI-50' PAGE 1-6 AND 'DI-100' PAGE 1-5 OF THE CENTRAL PRECAST CATALOG.
3. FRAMES AND GRATES DETAILS SEE PAGES 1-8, 1-9, AND 1-10 OF THE CENTRAL PRECAST CATALOG.
4. WALL THICKNESSES ON ALL D.I.S. CAN BE CHANGED UPON REQUEST. 5. 18" WIDE D.I.'S REPLACE THE OLD 16" WIDE BOX BK & 1K.
5. SOLID WATER RATE LID FOR JUNCTION BOX CONDITION.
6. ALL INLETS AND JUNCTION BOXES SHALL BE STENCILED WITH "NO DUMPING FLOWS TO BAY" PER DETAIL 9 ON SHEET C3.2

MODEL No.	CPC MODEL NAME	A		B		C	
		IN	MM	IN	MM	IN	MM
CP1212	EK	12	300	12	300	4	100
CP1818	CK	18	450	18	450	5	125
CP1824	1K*	18	450	24	600	5	125
CP2424	2K	24	600	24	600	5	125
CP2430	3K	24	600	30	750	5	125
CP3030	5K	30	750	30	750	6	150
CP2436	1L	24	600	36	900	6	150
CP3636	1M	36	900	36	900	6	150
CP2448	3L	24	600	48	1200	6	150
CP3648	3M	36	900	48	1200	6	150
CP4848	1R	48	1200	48	1200	6	150

## DROP INLET & JUNCTION BOX US CONCRETE PRECAST GROUP

NOT TO SCALE

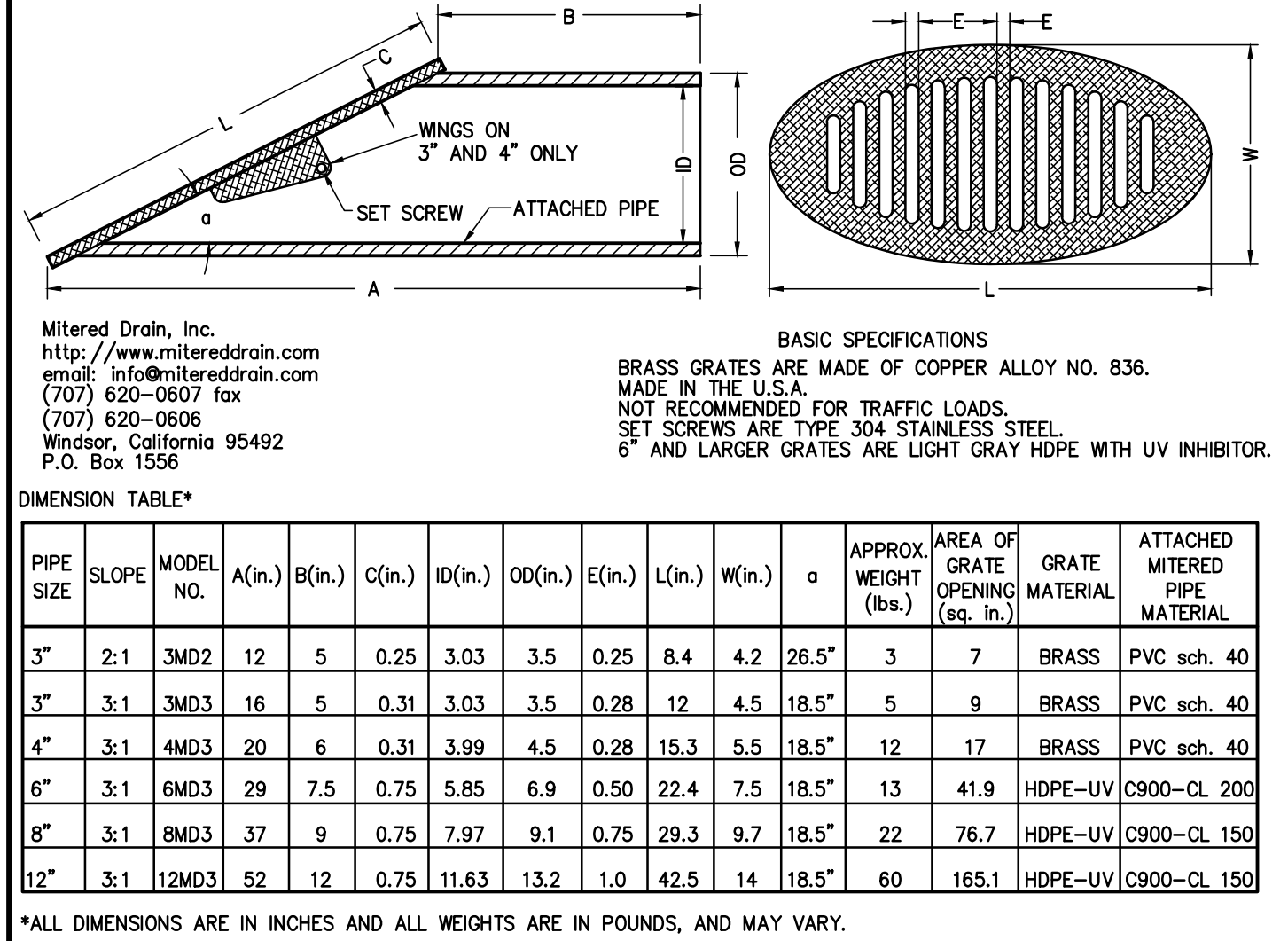
SEE SHEET C5.0 - C5.3



## NDS DECK AREA DRAIN (ROUND GRATE)

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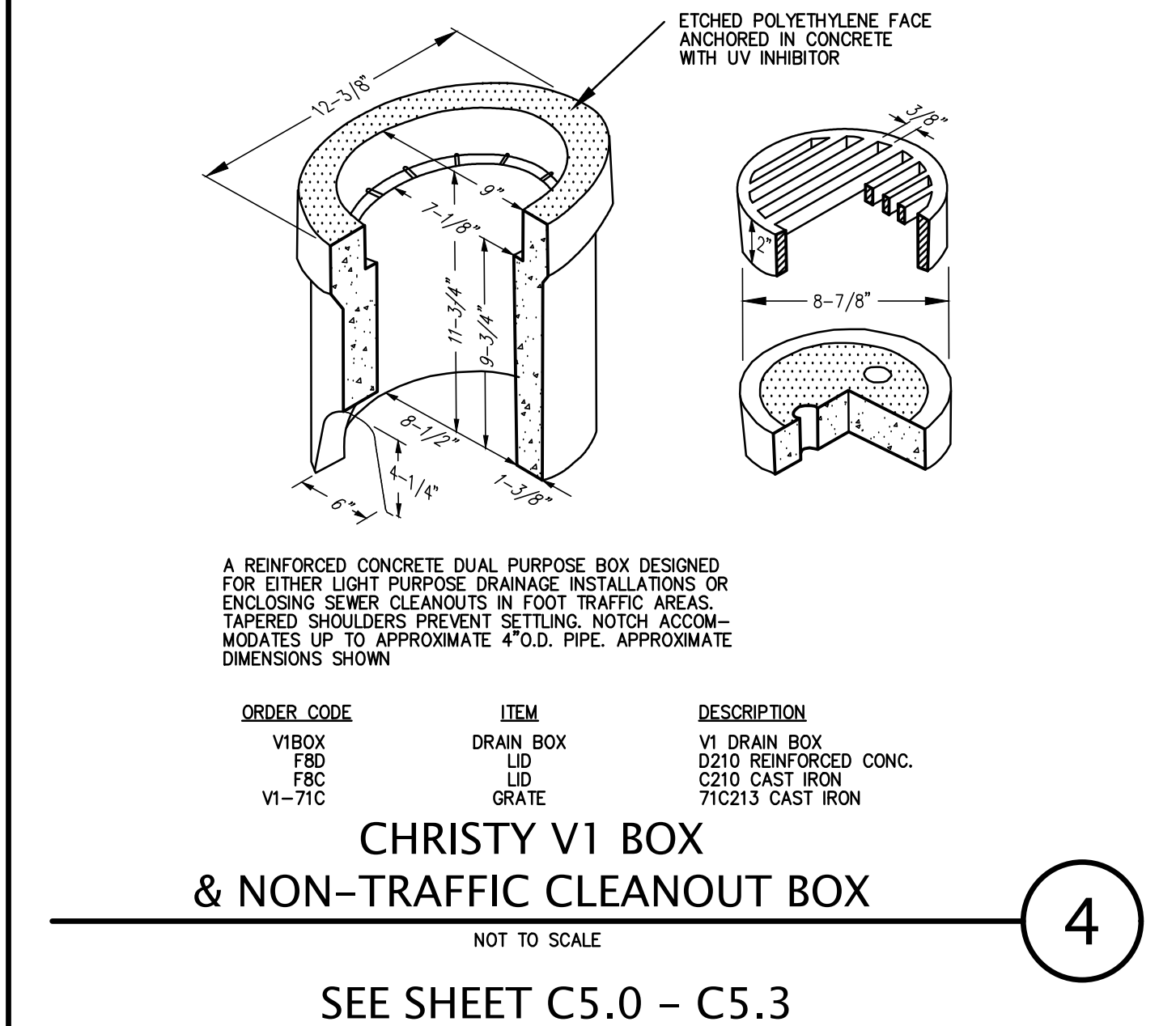
SEE SHEET C6.0



## MITERED DRAIN & OUTFALL AT R/WL

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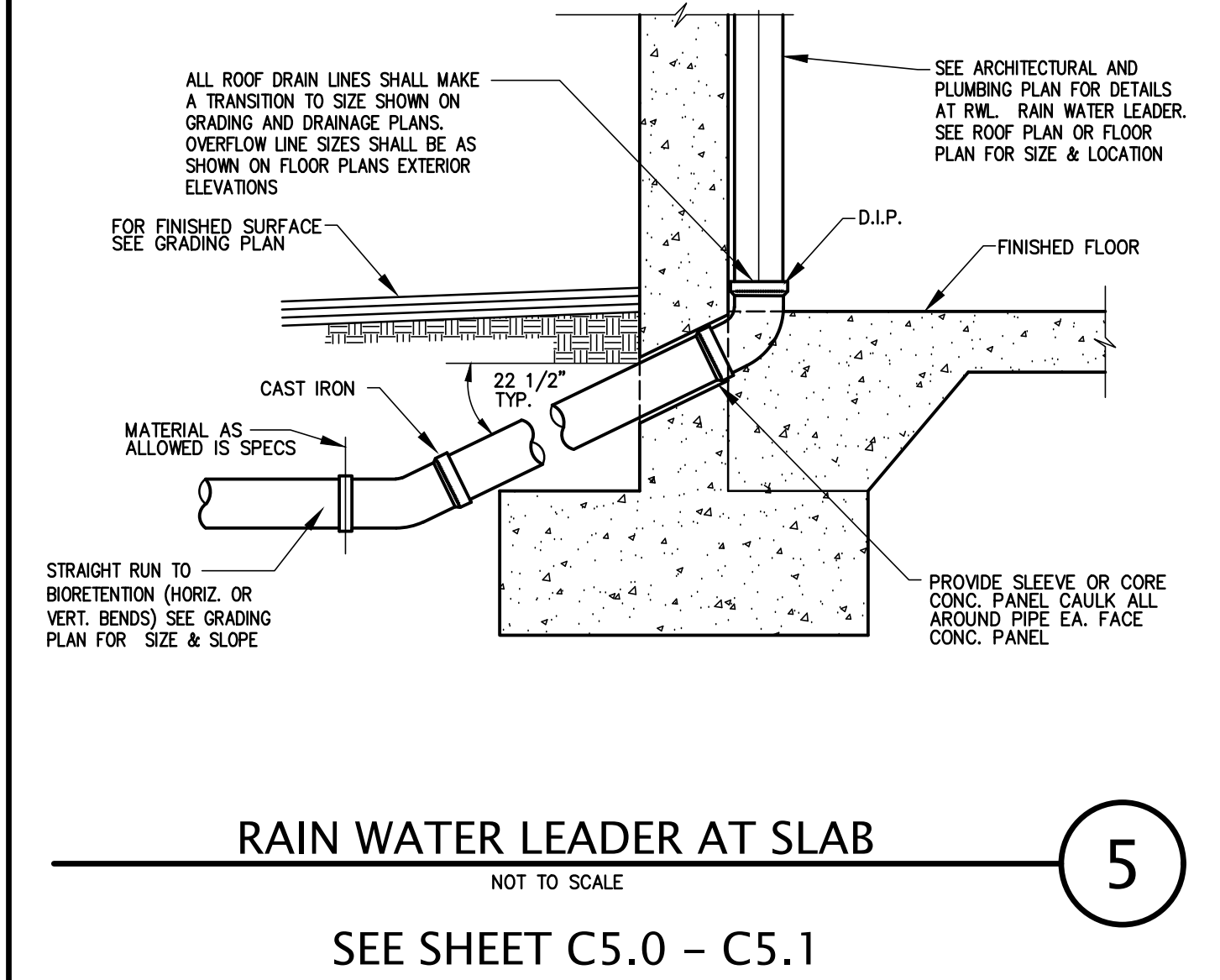
SEE SHEET C5.0 - C5.2



## CHRISTY V1 BOX & NON-TRAFFIC CLEANOUT BOX

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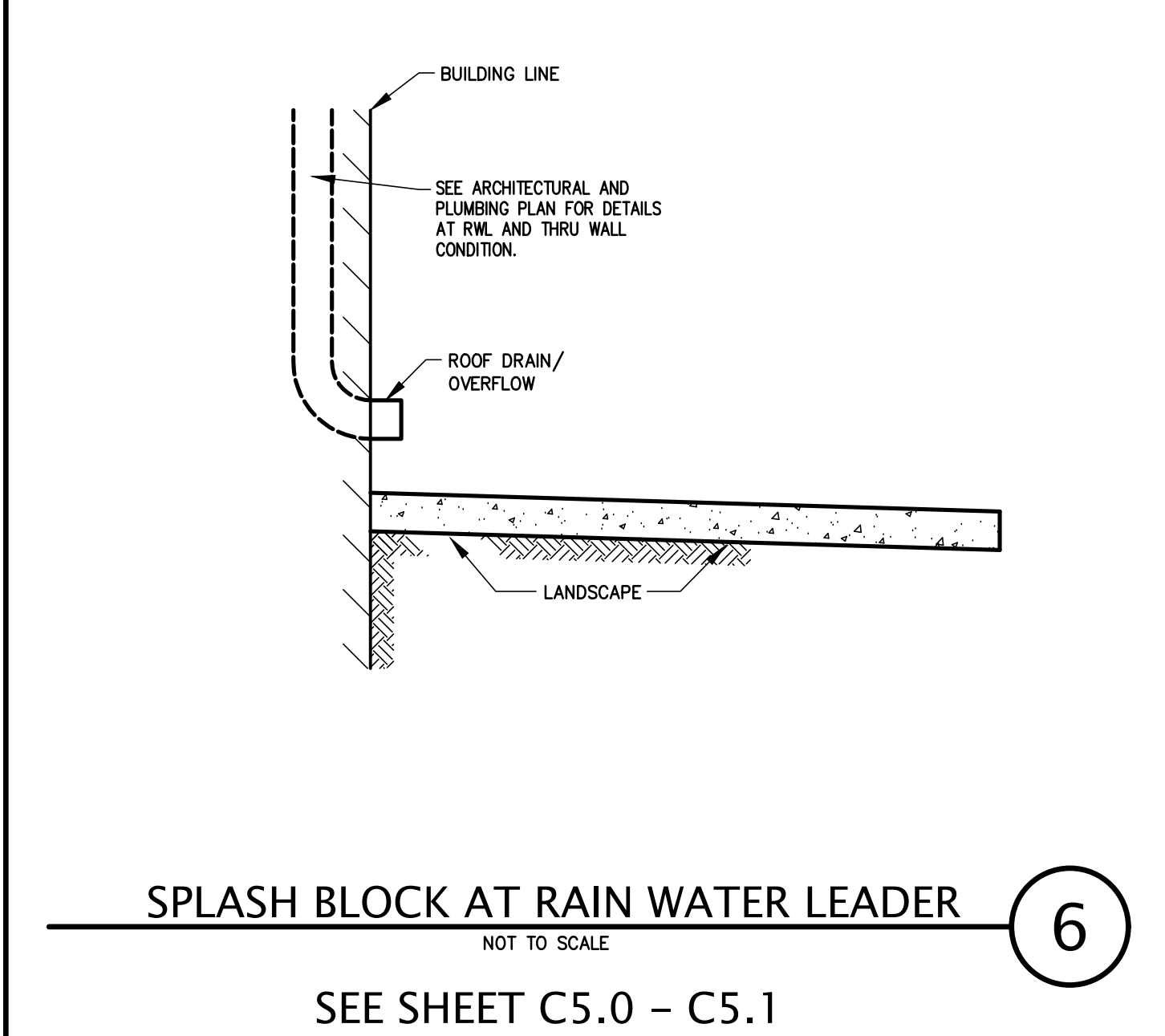
SEE SHEET C5.0 - C5.3



## RAIN WATER LEADER AT SLAB

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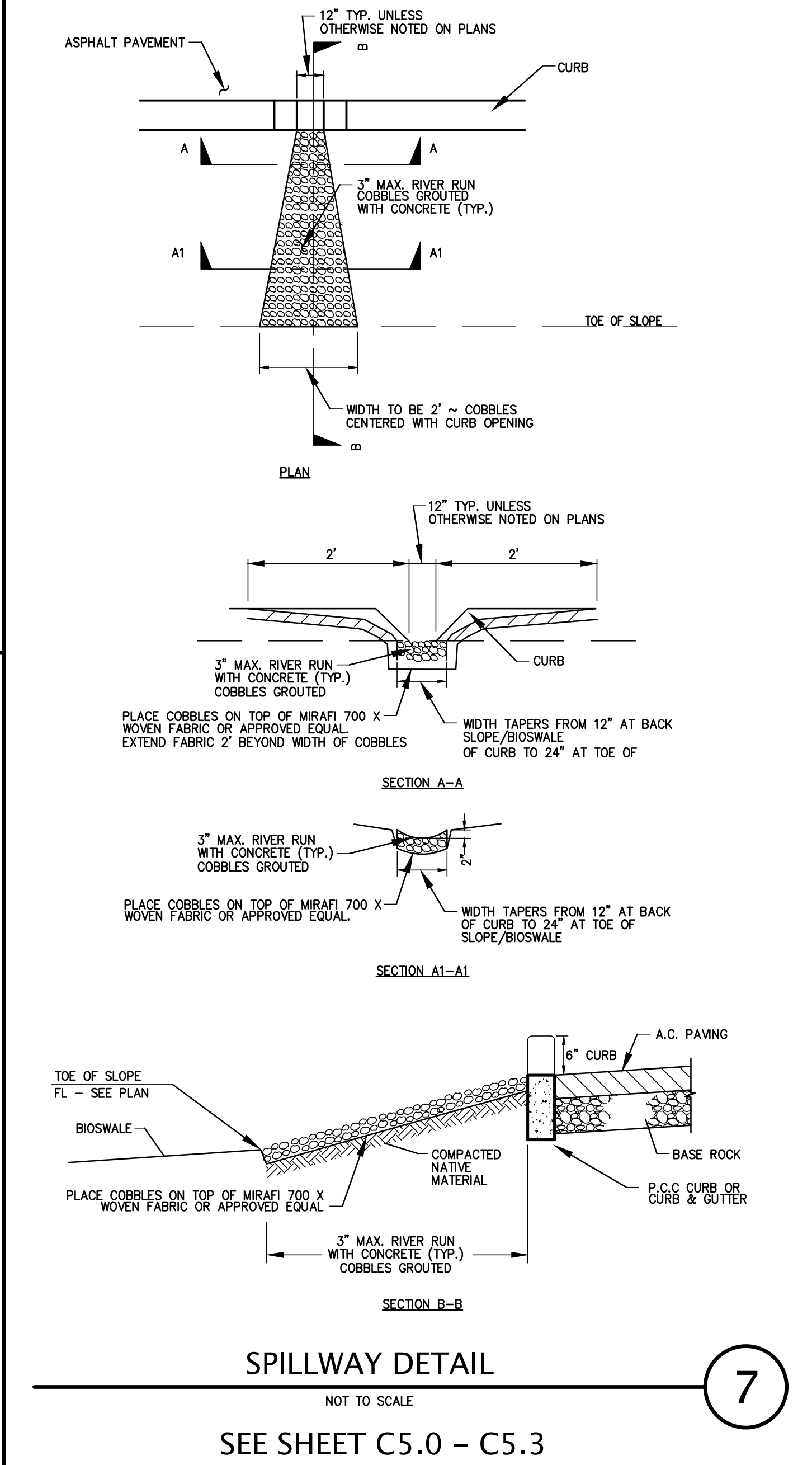
SEE SHEET C5.0 - C5.1



## SPLASH BLOCK AT RAIN WATER LEADER

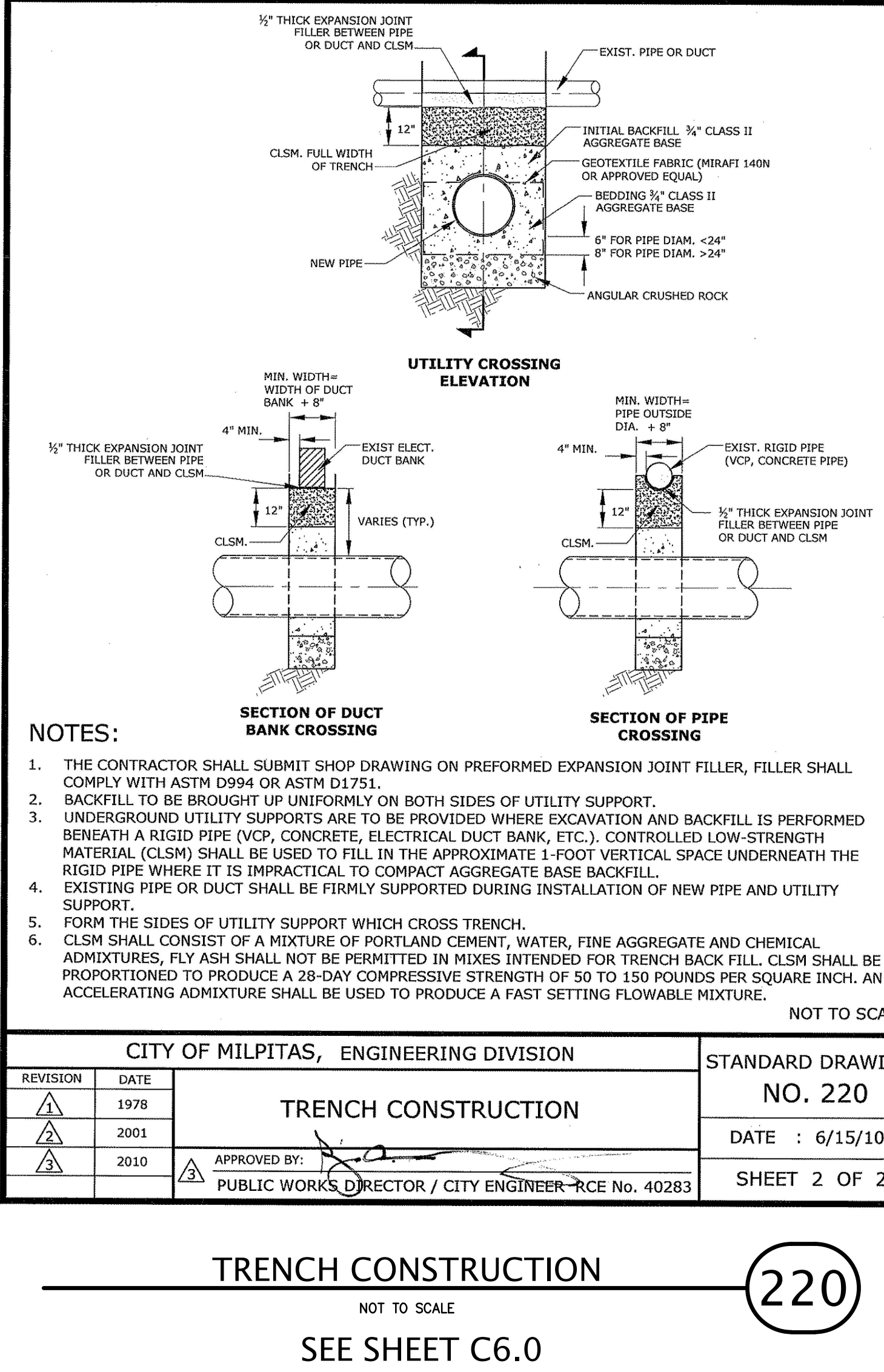
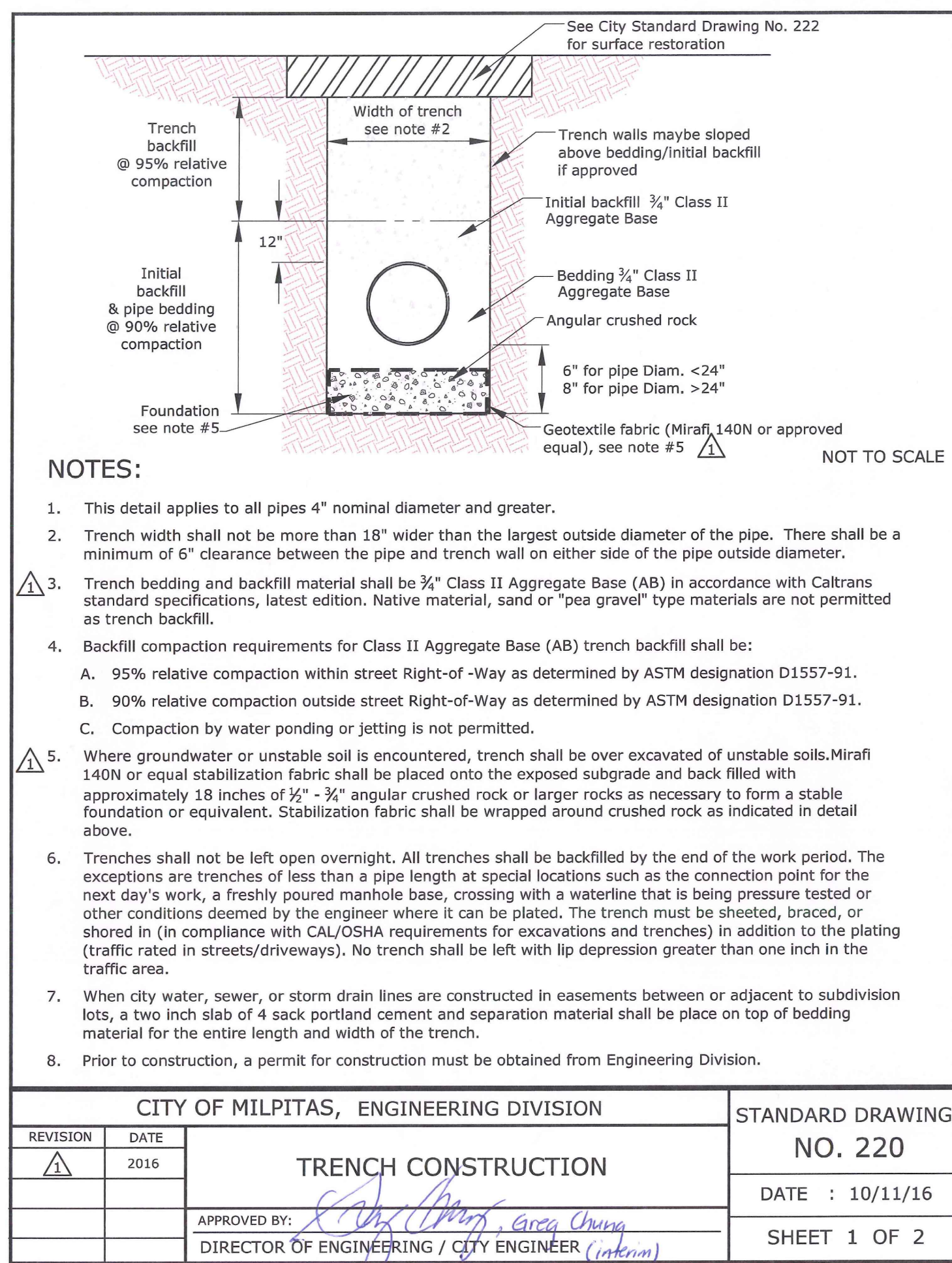
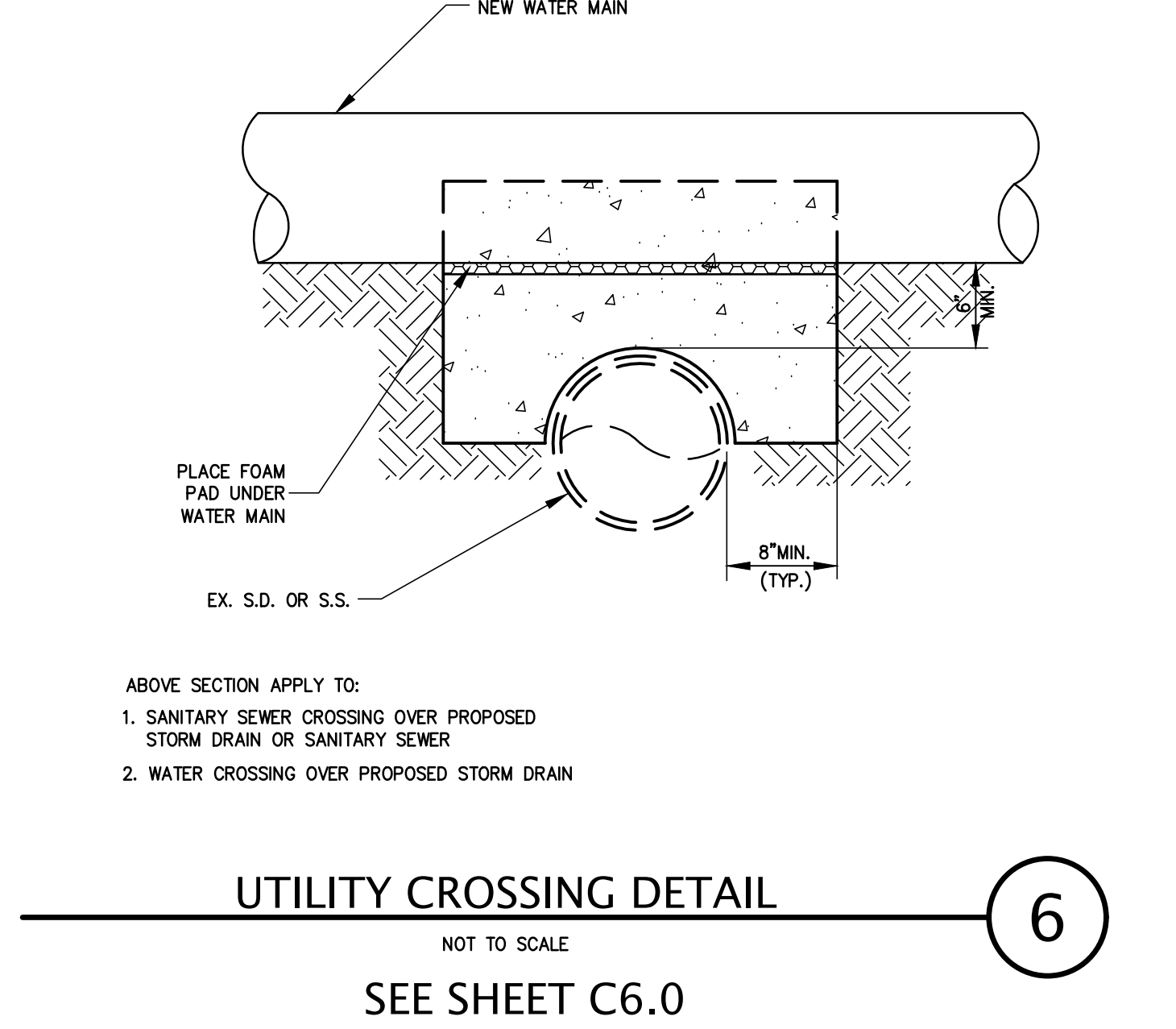
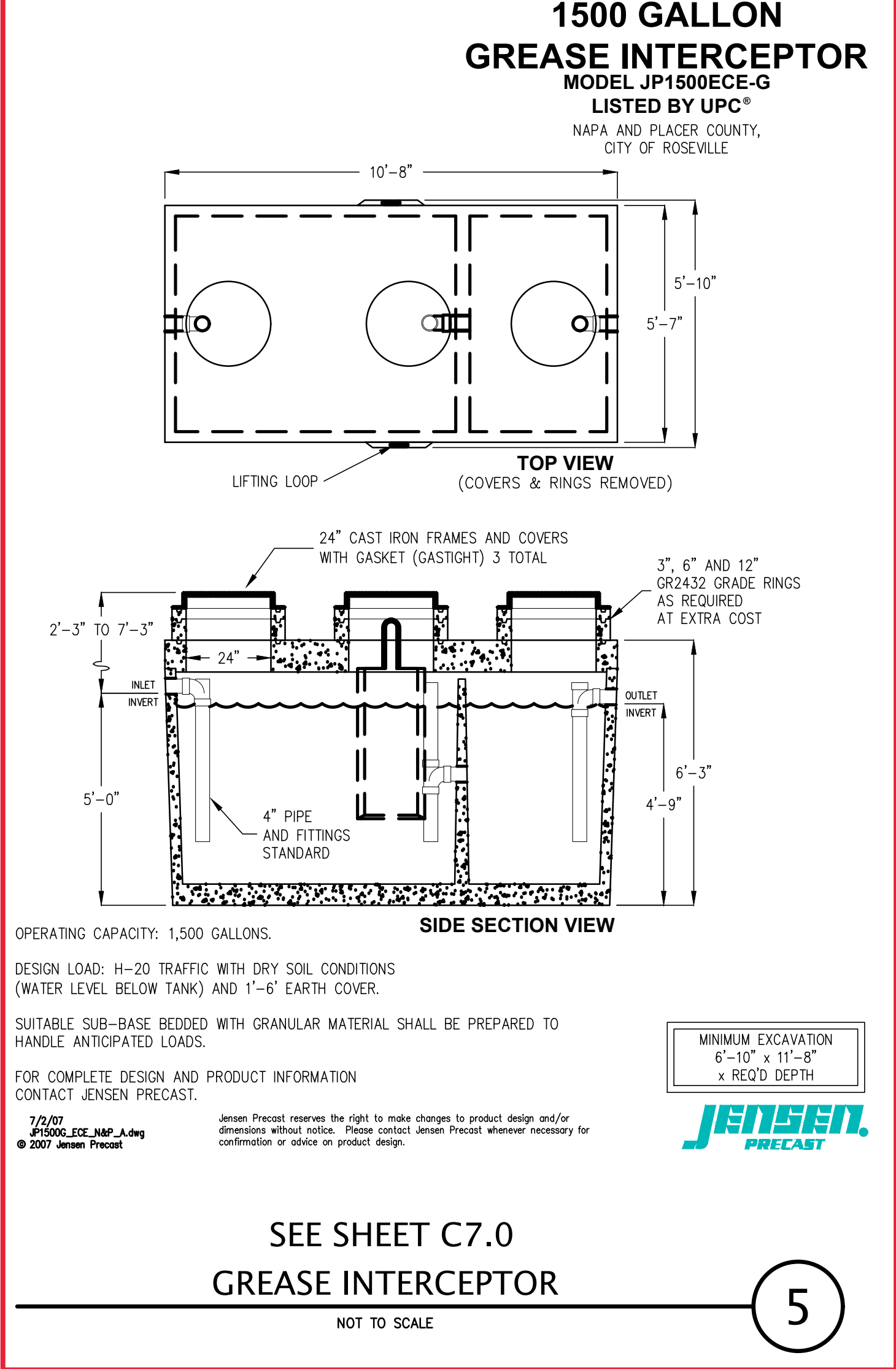
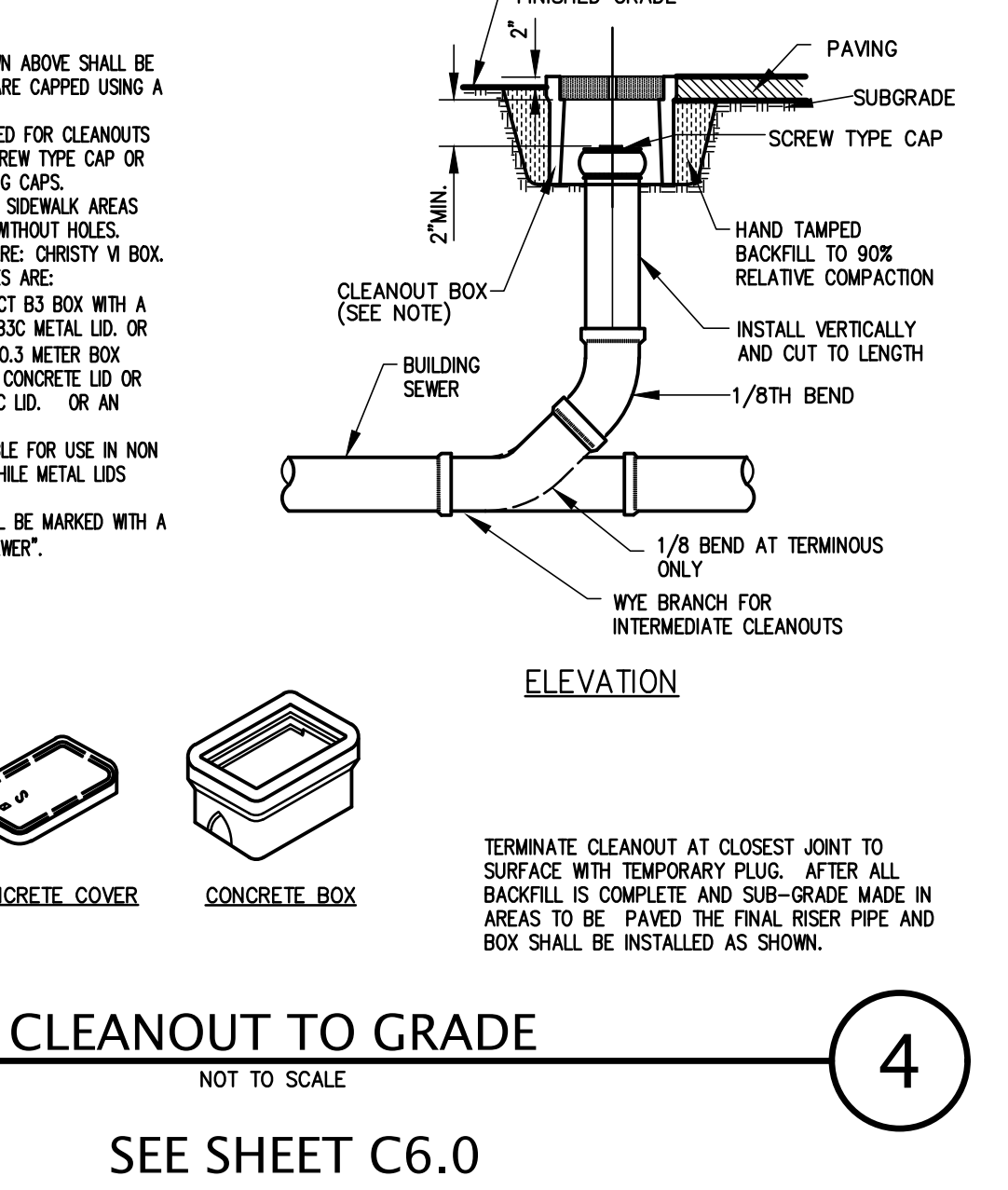
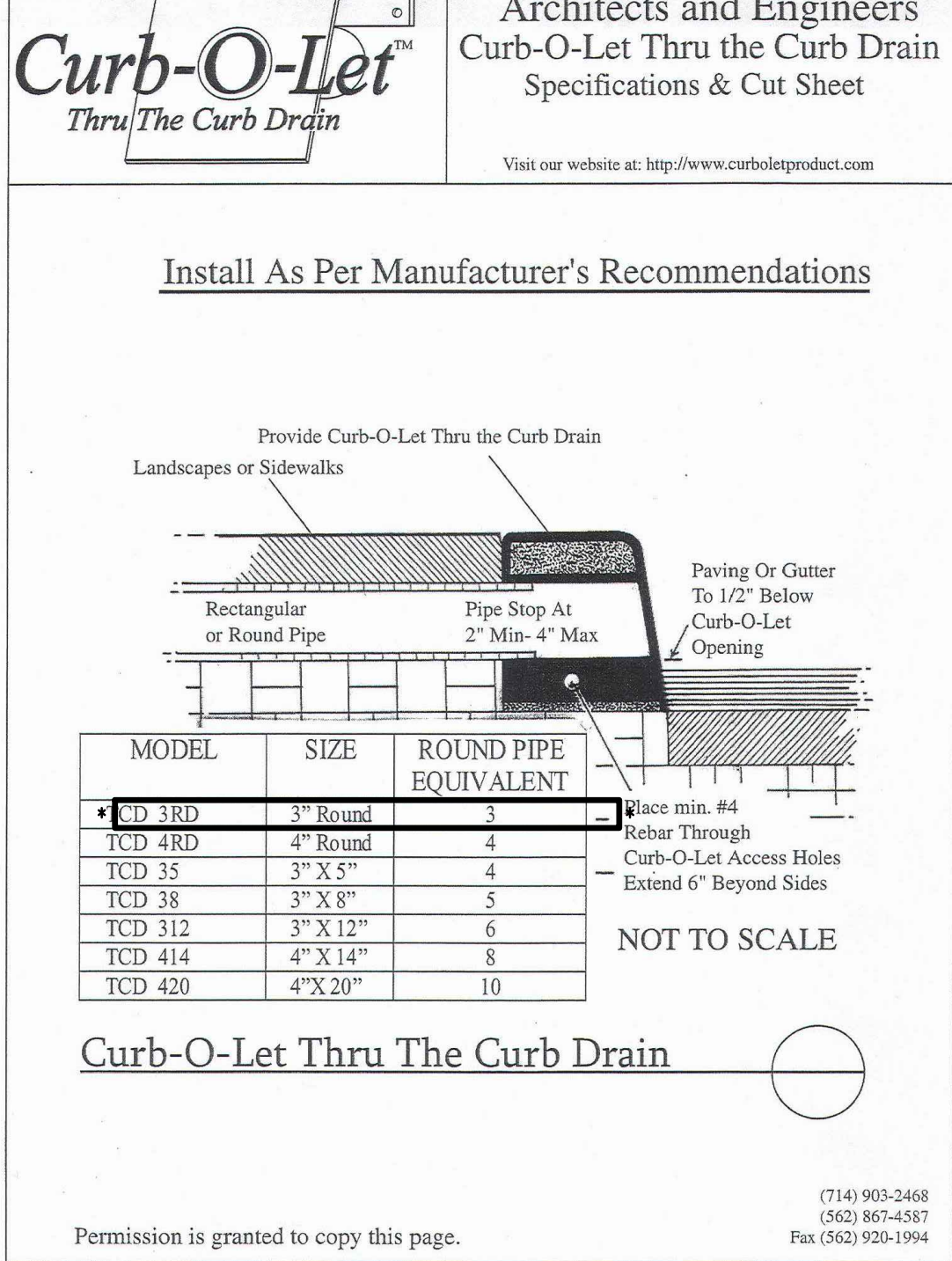
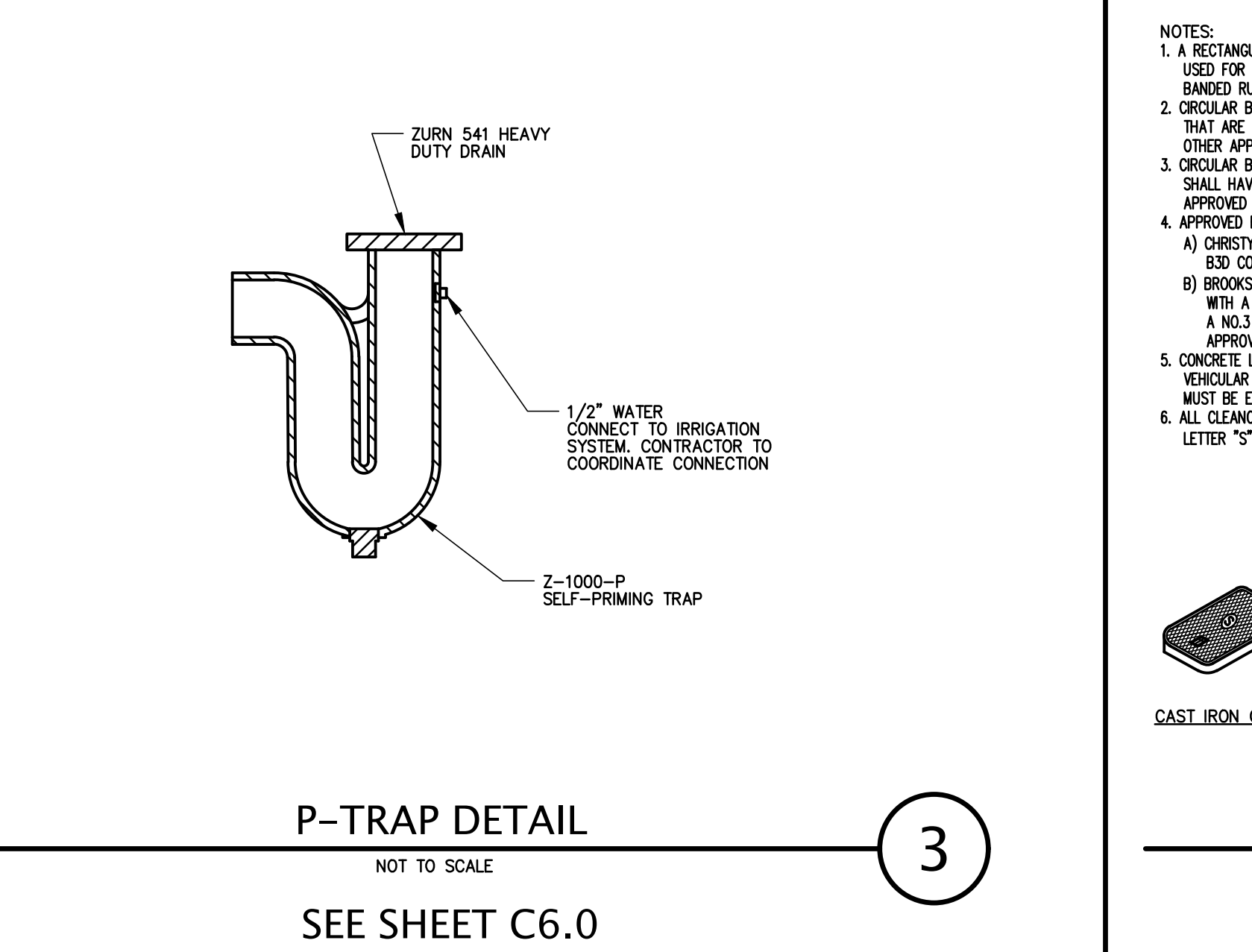
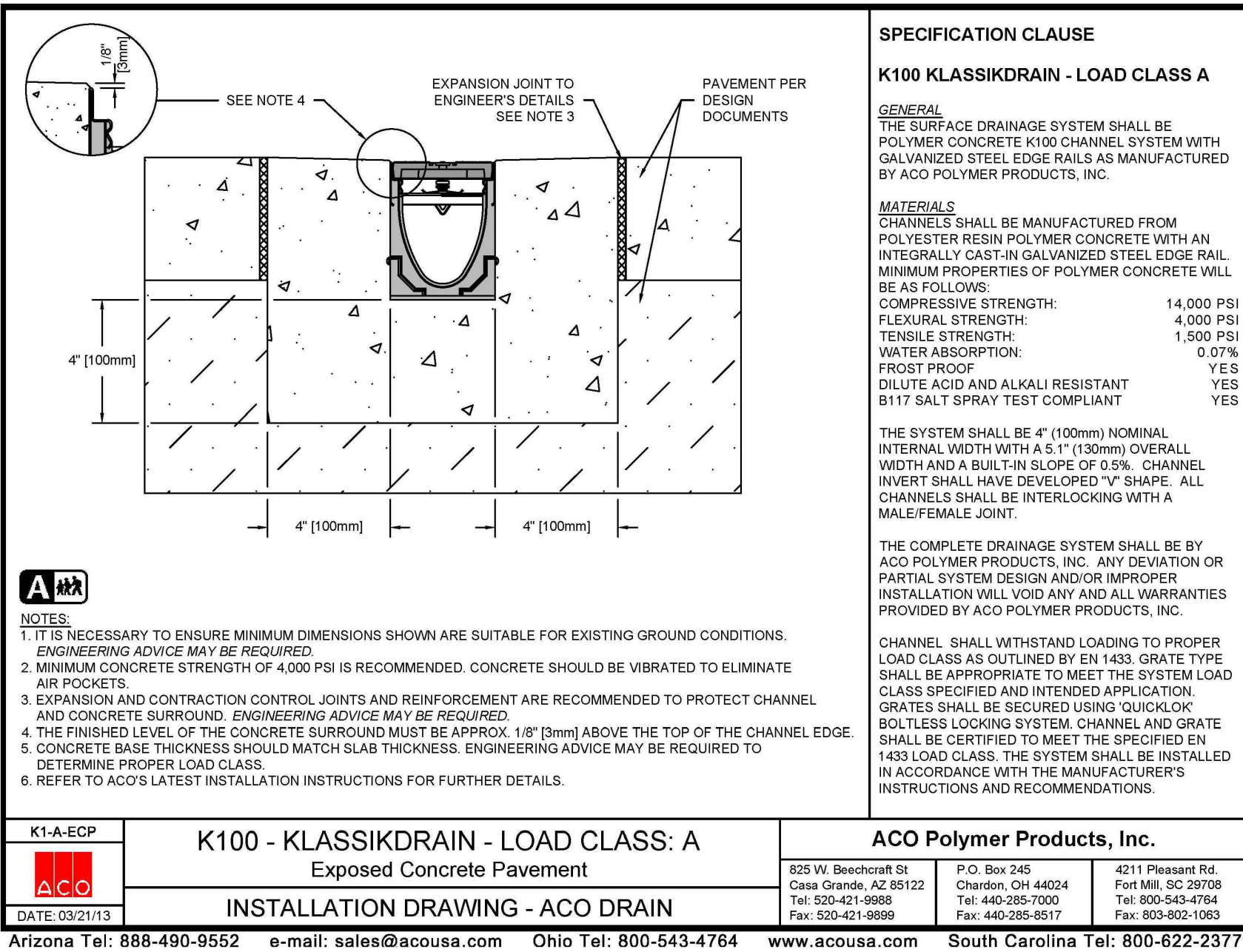
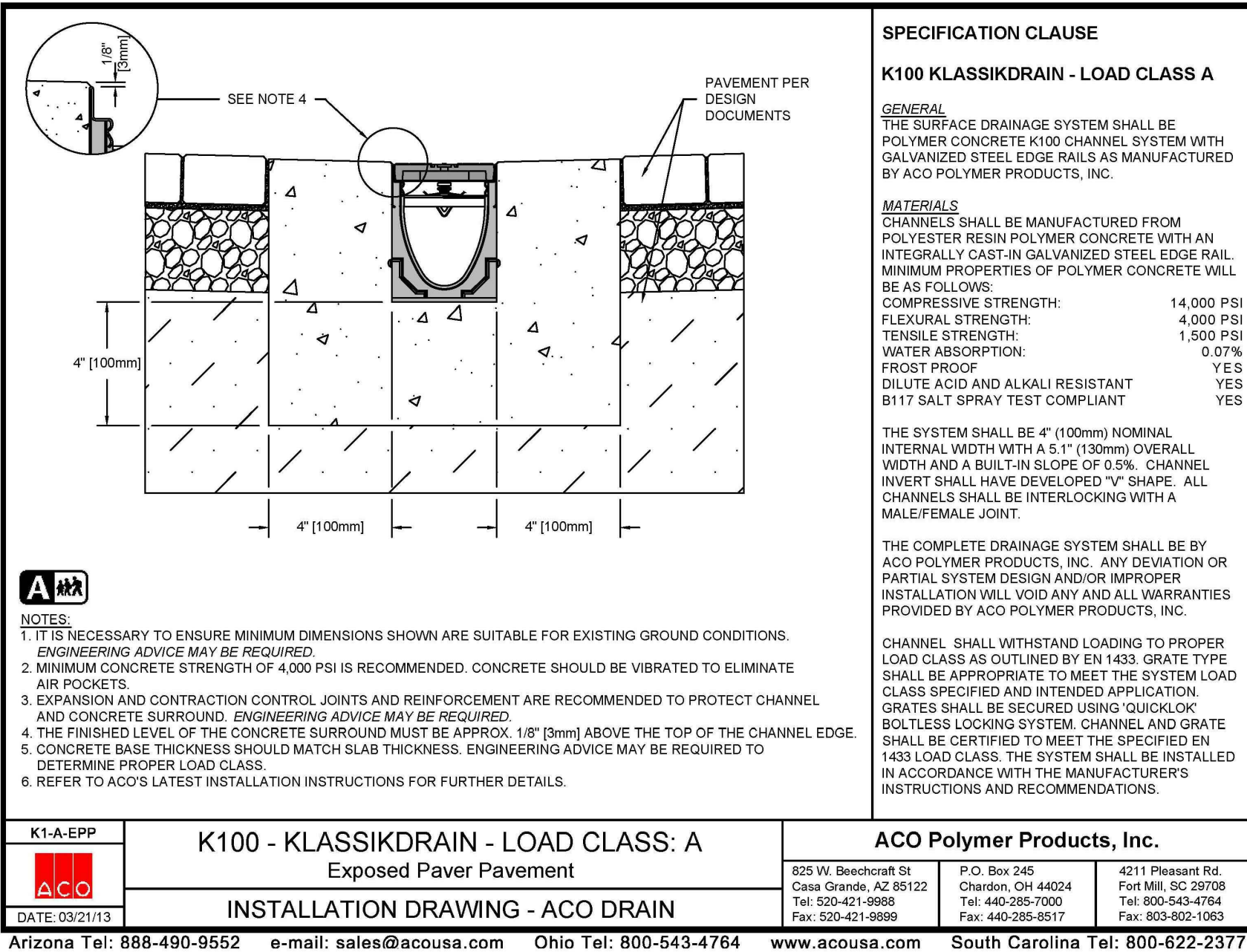
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SEE SHEET C5.0 - C5.1





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1100 Cadillac Court, Milpitas CA 95035  
Owner: **Alps Group, Inc.**

Issue: 04/27/15 City Submittal

Revisions:

Sheet Title: **DETAILS**

Date Last Edited: **March 8, 2017**

Sheet Number:

**C11.3**



*Appendix B: CASQA Stormwater BMP Handbook Portal: Industrial  
and Commercial BMP Cutsheets*

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## Description

Non-stormwater discharges (NSWDs) are flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain if local regulations allow. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include: potable water sources, fire hydrant flushing, air conditioner condensate, landscape irrigation drainage and landscape watering, emergency firefighting, etc. as discussed in Section 2.

However there are certain non-stormwater discharges that pose an environmental concern. These discharges may originate from illegal dumping of industrial material or wastes and illegal connections such as internal floor drains, appliances, industrial processes, sinks, and toilets that are illegally connected to the nearby storm drainage system through on-site drainage and piping. These unauthorized discharges (examples of which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains.

Non-stormwater discharges will need to be addressed through a combination of detection and elimination. The ultimate goal is to effectively eliminate unauthorized non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of

## Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

## Targeted Constituents

<i>Sediment</i>	
<i>Nutrients</i>	✓
<i>Trash</i>	
<i>Metals</i>	✓
<i>Bacteria</i>	✓
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

## Minimum BMPs Covered

	<i>Good Housekeeping</i>	✓
	<i>Preventative Maintenance</i>	
	<i>Spill and Leak Prevention and Response</i>	✓
	<i>Material Handling &amp; Waste Management</i>	
	<i>Erosion and Sediment Controls</i>	
	<i>Employee Training Program</i>	✓
	<i>Quality Assurance Record Keeping</i>	✓



pollutants on streets and into the storm drain system and downstream water bodies.

## **Approach**

Initially the Discharger must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is the elimination of unauthorized non-stormwater discharges. See other BMP Fact Sheets for activity-specific pollution prevention procedures.

### ***General Pollution Prevention Protocols***

- ❑ Implement waste management controls described in SC-34 Waste Handling and Disposal.
- ❑ Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- ❑ Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” or similar stenciled or demarcated next to them to warn against ignorant or unintentional dumping of pollutants into the storm drainage system.
- ❑ Manage and control sources of water such as hose bibs, faucets, wash racks, irrigation heads, etc. Identify hoses and faucets in the SWPPP, and post signage for appropriate use.

### ***Non-Stormwater Discharge Investigation Protocols***

Identifying the sources of non-stormwater discharges requires the Discharger to conduct an investigation of the facility at regular intervals. There are several categories of non-stormwater discharges:

- ❑ Visible, easily identifiable discharges, typically generated as surface runoff, such as uncontained surface runoff from vehicle or equipment washing; and
- ❑ Non-visible, (e.g., subsurface) discharges into the site drainage system through a variety of pathways that are not obvious.

The approach to detecting and eliminating non-stormwater discharges will vary considerably, as discussed below:

### ***Visible and identifiable discharges***

- ❑ Conduct routine inspections of the facilities and of each major activity area and identify visible evidence of unauthorized non-stormwater discharges. This may include:
  - ✓ Visual observations of actual discharges occurring;

- ✓ Evidence of surface staining, discoloring etc. that indicates that discharges have occurred;
  - ✓ Pools of water in low lying areas when a rain event has not occurred; and
  - ✓ Discussions with operations personnel to understand practices that may lead to unauthorized discharges.
- If evidence of non-stormwater discharges is discovered:
- ✓ Document the location and circumstances using Worksheets 5 and 6 (Section 2 of the manual), including digital photos;
  - ✓ Identify and implement any quick remedy or corrective action (e.g., moving uncovered containers inside or to a proper location); and
  - ✓ Develop a plan to eliminate the discharge. Consult the appropriate activity-specific BMP Fact Sheet for alternative approaches to manage and eliminate the discharge.
- Consult the appropriate activity-specific BMP Fact Sheet for alternative approaches to manage and eliminate the discharge. Make sure the facility SWPPP is up-to-date and includes applicable BMPs to address the non-stormwater discharge.

## ***Other Illegal Discharges (Non visible)***

### *Illicit Connections*

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of “as-built” piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate discharges to the storm drain system.
- Visual Inspection and Inventory:
  - ✓ Inventory and inspect each discharge point during dry weather.
  - ✓ Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system.
  - ✓ Non-stormwater discharges are often intermittent and may require periodic inspections.

### *Review Infield Piping*

- A review of the “as-built” piping schematic is a way to determine if there are any connections to the stormwater collection system.



- ❑ Inspect the path of loading/unloading area drain inlets and floor drains in older buildings.
- ❑ Never assume storm drains are connected to the sanitary sewer system.

## *Monitoring for investigation/detection of illegal discharges*

- ❑ If a suspected illegal or unknown discharge is detected, monitoring of the discharge may help identify the content and/or suggest the source. This may be done with a field screening analysis, flow meter measurements, or by collecting a sample for laboratory analysis. Section 5 and Appendix D describe the necessary field equipment and procedures for field investigations.
- ❑ Investigative monitoring may be conducted over time. For example if, a discharge is intermittent, then monitoring might be conducted to determine the timing of the discharge to determine the source.
- ❑ Investigative monitoring may be conducted over a spatial area. For example, if a discharge is observed in a pipe, then monitoring might be conducted at accessible upstream locations in order to pinpoint the source of the discharge.
- ❑ Generally, investigative monitoring requiring collection of samples and submittal for lab analysis requires proper planning and specially trained staff.

## *Smoke Testing*

Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two piping systems. Smoke testing is generally performed at a downstream location and the smoke is forced upstream using blowers to create positive pressure. The advantage to smoke testing is that it can potentially identify multiple potential discharge sources at once.

- ❑ Smoke testing uses a harmless, non-toxic smoke cartridges developed specifically for this purpose.
- ❑ Smoke testing requires specialized equipment (e.g., cartridges, blowers) and is generally only appropriate for specially trained staff.
- ❑ A Standard Operating Procedure (SOP) for smoke testing is highly desirable. The SOP should address the following elements:
  - ✓ Proper planning and notification of nearby residents and emergency services is necessary since introducing smoke into the system may result in false alarms;
  - ✓ During dry weather, the stormwater collection system is filled with smoke and then traced back to sources;

- ✓ Temporary isolation of segments of pipe using sand bags is often needed to force the smoke into leaking pipes; and
- ✓ The appearance of smoke in a waste vent pipe, at a sewer manhole, or even the base of a toilet indicates that there may be a connection between the sanitary and storm water systems.
- Most municipal wastewater agencies will have necessary staff and equipment to conduct smoke testing and they should be contacted if cross connections with the sanitary sewer are suspected. See SC-44 Drainage System Maintenance for more information.

## *Dye Testing*

- Dye testing is typically performed when there is a suspected specific pollutant source and location (i.e., leaking sanitary sewer) and there is evidence of dry weather flows in the stormwater collection system.
- Dye is released at a probable upstream source location, either the facility's sanitary or process wastewater system. The dye must be released with a sufficient volume of water to flush the system.
- Operators then visually examine the downstream discharge points from the stormwater collection system for the presence of the dye.
- Dye testing can be performed informally using commercially available products in order to conduct an initial investigation for fairly obvious cross-connections.
- More detailed dye testing should be performed by properly trained staff and follow SOPs. Specialized equipment such as fluorometers may be necessary to detect low concentrations of dye.
- Most municipal wastewater agencies will have necessary staff and equipment to conduct dye testing and they should be contacted if cross connections with the sanitary sewer are suspected.

## *TV Inspection of Drainage System*

- Closed Circuit Television (CCTV) can be employed to visually identify illicit connections to the industrial storm drainage system. Two types of CCTV systems are available: (1) a small specially designed camera that can be manually pushed on a stiff cable through storm drains to observe the interior of the piping, or (2) a larger remote operated video camera on treads or wheels that can be guided through storm drains to view the interior of the pipe.
- CCTV systems often include a high-pressure water jet and camera on a flexible cable. The water jet cleans debris and biofilm off the inside of pipes so the camera can take video images of the pipe condition.

- ❑ CCTV units can detect large cracks and other defects such as offsets in pipe ends caused by root intrusions or shifting substrate.
- ❑ CCTV can also be used to detect dye introduced into the sanitary sewer.
- ❑ CCTV inspections require specialized equipment and properly trained staff and are generally best left to specialized contractors or municipal public works staff.

## ***Illegal Dumping***

- ❑ Substances illegally dumped on streets and into the storm drain systems and creeks may include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. These wastes can cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- ❑ Establish a system for tracking incidents. The system should be designed to identify the following:
  - ✓ Illegal dumping hot spots;
  - ✓ Types and quantities (in some cases) of wastes;
  - ✓ Patterns in time of occurrence (time of day/night, month, or year);
  - ✓ Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills);
  - ✓ An anonymous tip/reporting mechanism; and
  - ✓ Evidence of responsible parties (e.g., tagging, encampments, etc.).
- ❑ One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

Once a site has been cleaned:

- ❑ Post “No Dumping” signs with a phone number for reporting dumping and disposal.
- ❑ Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- ❑ Lighting or barriers may also be needed to discourage future dumping.
- ❑ See fact sheet SC-11 Spill Prevention, Control, and Cleanup.

## *Inspection*

- ❑ Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- ❑ Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- ❑ Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.



## ***Spill and Leak Prevention and Response***

- ❑ On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.
- ❑ Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- ❑ Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- ❑ For larger spills, a private spill cleanup company or Hazmat team may be necessary.
- ❑ See SC-11 Spill Prevention Control and Cleanup.



## ***Employee Training Program***

- ❑ Training of technical staff in identifying and documenting illegal dumping incidents is required. The frequency of training must be presented in the SWPPP, and depends on site-specific industrial materials and activities.
- ❑ Consider posting a quick reference table near storm drains to reinforce training.
- ❑ Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.
- ❑ Educate employees about spill prevention and cleanup.
- ❑ Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan. Employees should be able to identify work/jobs with high potential for spills and suggest methods to reduce possibility.
- ❑ Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.

- ☐ Conduct spill response drills annually (if no events occurred) in order to evaluate the effectiveness of the plan.
- ☐ When a responsible party is identified, educate the party on the impacts of his or her actions.



## **Quality Assurance and Record Keeping**

### *Performance Evaluation*

- ☐ Annually review internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- ☐ Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.
- ☐ Develop document and data management procedures.
- ☐ A database is useful for defining and tracking the magnitude and location of the problem.
- ☐ Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- ☐ Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- ☐ Annually document and report the results of the program.
- ☐ Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.
- ☐ Document training activities.

## **Potential Limitations and Work-Arounds**

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended “work-arounds.”

- ☐ Many facilities do not have accurate, up-to-date ‘as-built’ plans or drawings which may be necessary in order to conduct non-stormwater discharge assessments.
  - ✓ Online tools such as Google Earth™ can provide an aerial view of the facility and may be useful in understanding drainage patterns and potential sources of non-stormwater discharges
  - ✓ Local municipal jurisdictions may have useful drainage systems maps.

- ❑ Video surveillance cameras are commonly used to secure the perimeter of industrial facilities against break-ins and theft. These surveillance systems may also be useful for capturing illegal dumping activities. Minor, temporary adjustments to the field of view of existing surveillance camera systems to target known or suspected problem areas may be a cost-effective way of capturing illegal dumping activities and identifying the perpetrators.

## **Potential Capital Facility Costs and Operation & Maintenance Requirements**

### ***Facilities***

- ❑ Capital facility cost requirements may be minimal unless cross-connections to storm drains are detected.
- ❑ Indoor floor drains may require re-plumbing if cross-connections are detected.
- ❑ Leaky sanitary sewers will require repair or replacement which can have significant costs depending on the size and industrial activity at the facility.

### ***Maintenance (including administrative and staffing)***

- ❑ The primary effort is for staff time and depends on how aggressively a program is implemented.
- ❑ Costs for containment, and disposal of any leak or discharge is borne by the Discharger.
- ❑ Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- ❑ Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

## **Supplemental Information**

### ***Permit Requirements***

The IGP authorizes certain Non-Storm Water Discharges (NSWDs) provided BMPs are included in the SWPPP and implemented to:

- ❑ Reduce or prevent the contact of authorized NSWDs with materials or equipment that are potential sources of pollutants;
- ❑ Reduce, to the extent practicable, the flow or volume of authorized NSWDs;
- ❑ Ensure that authorized NSWDs do not contain quantities of pollutants that cause or contribute to an exceedance of a water quality standards (WQS); and,

- Reduce or prevent discharges of pollutants in authorized NSWs in a manner that reflects best industry practice considering technological availability and economic practicability and achievability.”

## References and Resources

Center for Watershed Protection, 2004. *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, EPA Cooperative Agreement X-82907801-O.

Dublin San Ramon Sanitation District. <http://www.dsrsd.com/www/smoketest.html>.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: <http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities>.

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US EPA. National Pollutant Discharge Elimination System. Available online at: [http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet\\_results&view=specific&bmp=111](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=111).

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# Spill Prevention, Control & Cleanup SC-11

## Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental spills. Preparation for accidental spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify hazardous material storage areas, specify material handling procedures, describe spill response procedures, and provide locations of spill clean-up equipment and materials. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills. An adequate supply of spill clean-up materials must be maintained onsite.

## Approach

### General Pollution Prevention Protocols

- ☐ Develop procedures to prevent/mitigate spills to storm drain systems.
- ☐ Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- ☐ Establish procedures and/or controls to minimize spills and leaks. The procedures should address:
  - ✓ Description of the facility, owner and address, activities, chemicals, and quantities present;

## Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

## Targeted Constituents

Sediment

Nutrients

Trash

Metals ✓

Bacteria

Oil and Grease ✓

Organics ✓

## Minimum BMPs Covered



Good Housekeeping



Preventative Maintenance



Spill and Leak Prevention and Response ✓



Material Handling & Waste Management



Erosion and Sediment Controls



Employee Training Program ✓



Quality Assurance Record Keeping ✓





# Spill Prevention, Control & Cleanup SC-11

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- ✓ Facility map of the locations of industrial materials;
  - ✓ Notification and evacuation procedures;
  - ✓ Cleanup instructions;
  - ✓ Identification of responsible departments; and
  - ✓ Identify key spill response personnel.
- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.



## ***Spill and Leak Prevention and Response***

### ***Spill Prevention***

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- If illegal dumping is observed at the facility:
- ✓ Post “No Dumping” signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
  - ✓ Landscaping and beautification efforts may also discourage illegal dumping.
  - ✓ Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.
- Store and contain liquid materials in such a manner that if the container is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.
- If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collect runoff from the storage tank area.



### ***Preventative Maintenance***

- Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
- Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site’s spill control plan and/or proper spill cleanup procedures.

# **Spill Prevention, Control & Cleanup SC-11**

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- ❑ Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain*.
- ❑ Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.
- ❑ Label all containers according to their contents (e.g., solvent, gasoline).
- ❑ Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
- ❑ Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
- ❑ Identify key spill response personnel.

## *Spill Response*

- ❑ Clean up leaks and spills immediately.
- ❑ Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).
- ❑ On paved surfaces, clean up spills with as little water as possible.
  - ✓ Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills.
  - ✓ If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.
  - ✓ If possible use physical methods for the cleanup of dry chemicals (e.g., brooms, shovels, sweepers, or vacuums).
- ❑ Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- ❑ Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- ❑ For larger spills, a private spill cleanup company or Hazmat team may be necessary.

# **Spill Prevention, Control & Cleanup SC-11**

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## *Reporting*

- ❑ Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board or local authority as location regulations dictate.
- ❑ Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).
- ❑ Report spills to 911 for dispatch and clean-up assistance when needed. Do not contact fire agencies directly.
- ❑ Establish a system for tracking incidents. The system should be designed to identify the following:
  - ✓ Types and quantities (in some cases) of wastes;
  - ✓ Patterns in time of occurrence (time of day/night, month, or year);
  - ✓ Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills);
  - ✓ Clean-up procedures; and
  - ✓ Responsible parties.



## ***Employee Training Program***

- ❑ Educate employees about spill prevention and cleanup.
- ❑ Well-trained employees can reduce human errors that lead to accidental releases or spills:
  - ✓ The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur; and
  - ✓ Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- ❑ Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.
- ❑ Train employees to recognize and report illegal dumping incidents.

# **Spill Prevention, Control & Cleanup SC-11**

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## ***Other Considerations (Limitations and Regulations)***

- ❑ State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure (SPCC) Plan (Health & Safety Code Chapter 6.67).
- ❑ State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.
- ❑ Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

## **Requirements**

### ***Costs (including capital and operation & maintenance)***

- ❑ Will vary depending on the size of the facility and the necessary controls.
- ❑ Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

### ***Maintenance (including administrative and staffing)***

- ❑ Develop spill prevention and control plan, provide and document training, conduct inspections of material storage areas, and supply spill kits.
- ❑ Extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

## **Supplemental Information**

### ***Further Detail of the BMP***

#### ***Reporting***

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- ❑ Date and time of the incident;
- ❑ Weather conditions;
- ❑ Duration of the spill/leak/discharge;

# **Spill Prevention, Control & Cleanup SC-11**

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- ☐ Cause of the spill/leak/discharge;
- ☐ Response procedures implemented;
- ☐ Persons notified; and
- ☐ Environmental problems associated with the spill/leak/discharge.

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- ☐ Date and time the inspection was performed;
- ☐ Name of the inspector;
- ☐ Items inspected;
- ☐ Problems noted;
- ☐ Corrective action required; and
- ☐ Date corrective action was taken.

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

## *Aboveground Tank Leak and Spill Control*

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- ☐ Installation problems;
- ☐ Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves);
- ☐ External corrosion and structural failure;
- ☐ Spills and overfills due to operator error; and
- ☐ Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa.

# **Spill Prevention, Control & Cleanup SC-11**

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Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- ❑ Tanks should be placed in a designated area.
- ❑ Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- ❑ Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- ❑ Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- ❑ For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- ❑ All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- ❑ Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- ❑ Check for external corrosion and structural failure.
- ❑ Check for spills and overfills due to operator error.
- ❑ Check for failure of piping system (pipes, pumps, flanges, coupling, hoses, and valves).
- ❑ Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- ❑ Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- ❑ Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- ❑ Frequently relocate accumulated stormwater during the wet season.

# **Spill Prevention, Control & Cleanup SC-11**

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- Periodically conduct integrity testing by a qualified professional.

## *Vehicle Leak and Spill Control*

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

## *Vehicle and Equipment Maintenance*

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use absorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

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## *Vehicle and Equipment Fueling*

- Design the fueling area to prevent the run-on of stormwater and the runoff of spills:

Cover fueling area if possible.

Use a perimeter drain or slope pavement inward with drainage to a sump.

Pave fueling area with concrete rather than asphalt.

- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage “topping-off” of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use absorbent materials on small spills and general cleaning rather than hosing down the area. Remove the absorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

## ***Industrial Spill Prevention Response***

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities.

The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department).
- Develop procedures to prevent/mitigate spills to storm drain systems.
- Identify responsible departments.



# **Spill Prevention, Control & Cleanup SC-11**

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- ❑ Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- ❑ Address spills at municipal facilities, as well as public areas.
- ❑ Provide training concerning spill prevention, response and cleanup to all appropriate personnel.

## **References and Resources**

California's Nonpoint Source Program Plan. <http://www.swrcb.ca.gov/nps/index.html>.

Clark County Storm Water Pollution Control Manual. Available online at:  
<http://www.co.clark.wa.us/pubworks/bmpman.pdf>.

King County Storm Water Pollution Control Manual. Available online at:  
<http://dnr.metrokc.gov/wlr/dss/spcm.htm>.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at:  
<http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities>

Santa Clara Valley Urban Runoff Pollution Prevention Program.  
<http://www.scvurppp.org>.

The Stormwater Managers Resource Center. <http://www.stormwatercenter.net/>.

## Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff.

## Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

## General Pollution Prevention Protocols

- Accomplish reduction in the amount of waste generated using the following source controls:
  - ✓ Production planning and sequencing;
  - ✓ Process or equipment modification;
  - ✓ Raw material substitution or elimination;
  - ✓ Loss prevention and housekeeping;
  - ✓ Waste segregation and separation; and
  - ✓ Close loop recycling.
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

## Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

## Targeted Constituents

Sediment

Nutrients

Trash

Metals ✓

Bacteria ✓

Oil and Grease ✓

Organics ✓

## Minimum BMPs Covered

-  Good Housekeeping ✓
-  Preventative Maintenance ✓
-  Spill and Leak Prevention and Response ✓
-  Material Handling & Waste Management ✓
-  Erosion and Sediment Controls ✓
-  Employee Training Program ✓
-  Quality Assurance Record Keeping ✓



- ☐ Use the entire product before disposing of the container.
- ☐ To the extent possible, store wastes under cover or indoors after ensuring all safety concerns such as fire hazard and ventilation are addressed.
- ☐ Provide containers for each waste stream at each work station. Allow time after shift to clean area.



## ***Good Housekeeping***

- ☐ Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.
- ☐ Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- ☐ Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain. Clean in a designated wash area that drains to a clarifier.
- ☐ Transfer waste from damaged containers into safe containers.
- ☐ Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.
- ☐ Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- ☐ Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- ☐ Stencil or demarcate storm drains on the facility's property with prohibitive message regarding waste disposal.
- ☐ Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.
- ☐ If possible, move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.



## ***Preventative Maintenance***

- ☐ Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.
- ☐ Prevent waste materials from directly contacting rain.

- ☐ Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.
- ☐ Cover the area with a permanent roof if feasible.
- ☐ Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- ☐ Check waste containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- ☐ Sweep and clean the waste management area regularly. Use dry methods when possible (e.g., sweeping, vacuuming, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- ☐ Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- ☐ Repair leaking equipment including valves, lines, seals, or pumps promptly.



## ***Spill Response and Prevention Procedures***

- ☐ Keep your spill prevention and plan up-to-date.
- ☐ Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills.
- ☐ Collect all spilled liquids and properly dispose of them.
- ☐ Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.
- ☐ Ensure that vehicles transporting waste have spill prevention equipment that can prevent spills during transport. Spill prevention equipment includes:
  - ✓ Vehicles equipped with baffles for liquid waste; and
  - ✓ Trucks with sealed gates and spill guards for solid waste.



## ***Material Handling and Waste Management***

### ***Litter Control***

- ☐ Post “No Littering” signs and enforce anti-litter laws.
- ☐ Provide a sufficient number of litter receptacles for the facility.
- ☐ Clean out and cover litter receptacles frequently to prevent spillage.

### ***Waste Collection***

- ☐ Keep waste collection areas clean.

- ☐ Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- ☐ Secure solid waste containers; containers must be closed tightly when not in use.
- ☐ Do not fill waste containers with washout water or any other liquid.
- ☐ Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).
- ☐ Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal. Affix labels to all waste containers.

## *Chemical/Hazardous Wastes*

- ☐ Select designated hazardous waste collection areas on-site.
- ☐ Store hazardous materials and wastes in covered containers and protect them from vandalism.
- ☐ Place hazardous waste containers in secondary containment.
- ☐ Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- ☐ Hazardous waste cannot be reused or recycled; it must be disposed of by a licensed hazardous waste hauler.



## ***Employee Training Program***

- ☐ Educate employees about pollution prevention measures and goals.
- ☐ Train employees how to properly handle and dispose of waste using the source control BMPs described above.
- ☐ Train employees and subcontractors in proper hazardous waste management.
- ☐ Use a training log or similar method to document training.
- ☐ Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.



## ***Quality Assurance and Record Keeping***

- ☐ Keep accurate maintenance logs that document minimum BMP activities performed for waste handling and disposal, types and quantities of waste disposed of, and any improvement actions.
- ☐ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.

- Establish procedures to complete logs and file them in the central office.

## **Potential Capital Facility Costs and Operation & Maintenance Requirements**

### ***Facilities***

- Capital costs will vary substantially depending on the size of the facility and the types of waste handled. Significant capital costs may be associated with reducing wastes by modifying processes or implementing closed-loop recycling.
- Many facilities will already have indoor covered areas where waste materials will be stored and will require no additional capital expenditures for providing cover.
- If outdoor storage of wastes is required, construction of berms or other means to prevent stormwater run-on and runoff may require appropriate constructed systems for containment.
- Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

### ***Maintenance***

- Check waste containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the waste management area regularly. Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Repair leaking equipment including valves, lines, seals, or pumps promptly.

## **References and Resources**

Minnesota Pollution Control Agency, *Industrial Stormwater Best Management Practices Guidebook*. Available online at: <http://www.pca.state.mn.us/index.php/view-document.html?gid=10557>.

New Jersey Department of Environmental Protection, 2013. *Basic Industrial Stormwater General Permit Guidance Document NJPDES General Permit No NJ0088315*, Revised. Available online at: [http://www.nj.gov/dep/dwq/pdf/5G2\\_guidance\\_color.pdf](http://www.nj.gov/dep/dwq/pdf/5G2_guidance_color.pdf).

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: <http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities>

Oregon Department of Environmental Quality, 2013. *Industrial Stormwater Best Management Practices Manual- BMP 26 Fueling and Liquid Loading/Unloading Operations*. Available online at:  
<http://www.deq.state.or.us/wq/wqpermit/docs/IndBMP021413.pdf>.

Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control*. Available online at:  
<http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf>.

Sacramento County Environmental Management Stormwater Program: Best Management Practices. Available online at:  
<http://www.emd.saccounty.net/EnvHealth/Stormwater/Stormwater-BMPs.html>.

Santa Clara Valley Urban Runoff Pollution Prevention Program. <http://www.scvurppp-w2k.com/>

US EPA. National Pollutant Discharge Elimination System – Industrial Fact Sheet Series for Activities Covered by EPA’s Multi Sector General Permit. Available online at:  
<http://cfpub.epa.gov/npdes/stormwater/swsectors.cfm>.

## Description

Promote the use of less harmful products and products that contain little or no TMDL and 303(d) list pollutants. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (batteries, fluorescent lamps).

## Approach

Pattern a new program after the many established programs around the state and country. Integrate this best management practice as much as possible with existing programs at your facility.

Develop a comprehensive program based on:

- ❑ The “Precautionary Principle,” which is an alternative to the “Risk Assessment” model that says it’s acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it’s acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.
- ❑ Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility’s custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.
- ❑ Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests

## Objectives

- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

## Targeted Constituents

<i>Sediment</i>	
<i>Nutrients</i>	✓
<i>Trash</i>	
<i>Metals</i>	✓
<i>Bacteria</i>	
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

## Minimum BMPs Covered

	<i>Good Housekeeping</i>	
	<i>Preventative Maintenance</i>	
	<i>Spill and Leak Prevention and Response</i>	
	<i>Material Handling &amp; Waste Management</i>	
	<i>Erosion and Sediment Controls</i>	
	<i>Employee Training Program</i>	✓
	<i>Quality Assurance Record Keeping</i>	





by methods that pose a lower risk to employees, the public, and the environment.

- ❑ Energy Efficiency Program including no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

- ❑ Policies
- ❑ Procedures
  - ✓ Standard operating procedures (SOPs);
  - ✓ Purchasing guidelines and procedures; and
  - ✓ Bid packages (services and supplies).
- ❑ Materials
  - ✓ Preferred or approved product and supplier lists;
  - ✓ Product and supplier evaluation criteria;
  - ✓ Training sessions and manuals; and
  - ✓ Fact sheets for employees.

Implement this BMP in conjunction with the Vehicle and Equipment Management fact sheets (SC-20 – SC-22) and SC-41 Building and Grounds Maintenance.



## ***Employee Training Program***

- ❑ Employees who handle potentially harmful materials should be trained in the use of safer alternatives.
- ❑ Purchasing departments should be trained on safer alternative products and encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.
- ❑ Employees and contractors / service providers can both be educated about safer alternatives by using information developed by a number of organizations including the references and resources provided in this fact sheet.

## **Potential Limitations and Work-Arounds**

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended “work-arounds”

- ❑ Alternative products may not be available, suitable, or effective in every case.

- ✓ Minimize use of hazardous/harmful products if no alternative product is available.

## Regulatory Considerations

This BMP has no regulatory requirements unless local/municipal ordinance applies. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:

- Specialized equipment storage and handling requirements;
- Storm water runoff sampling requirements;
- Training and licensing requirements; and
- Record keeping and reporting requirements.

## Cost Considerations

- The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.
- Some alternative products may be slightly more expensive than conventional products.

## Supplemental Information

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

- Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Refined motor oil is also available.
- Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products – Water-based paints, wood preservatives, stains, and finishes with low VOC content are available.
- Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Chemical Fertilizers – Compost and soil amendments are natural alternatives.
- Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps.

All fluorescent lamps contain mercury, however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.

- Janitorial chemicals – Even biodegradable soap can harm fish and wildlife before it biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting. Use paper products with post-consumer recycled content and implement electric hand dryers.

## ***Examples***

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

## **References and Resources**

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

### ***General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information***

California Department of Toxic Substances Control,  
<http://www.dtsc.ca.gov/PollutionPrevention/GreenTechnology/Index.cfm>.

CalRecycle, <http://www.calrecycle.ca.gov/Business/Regulated.htm>.

City of Santa Monica Office of Sustainability and Environment,  
<http://www.smgov.net/departments/ose/>.

City of Palo Alto, <http://www.city.palo-alto.ca.us/cleanbay>.

City and County of San Francisco, Department of the Environment,  
<http://www.sfenvironment.org/toxics-health/greener-business-practices>.

Green Business Program, <http://www.greenbiz.ca.gov/GRlocal.html> .

Product Stewardship Institute, <http://www.productstewardship.us/index.cfm>.

Sacramento Clean Water Business Partners.  
<http://www.sacstormwater.org/CleanWaterBusinessPartners/CleanWaterBusinessPartners.html>.

USEPA. National Pollutant Discharge Elimination System (NPDES) Stormwater Discharges From Industrial Facilities,  
<http://cfpub.epa.gov/npdes/stormwater/indust.cfm>.

USEPA Region IX Pollution Prevention Program,  
<http://www.epa.gov/region9/waste/p2/business.html>.

Western Sustainability and Pollution Prevention Network, <http://wsppn.org/>.

## ***Metals (mercury, copper)***

National Electrical Manufacturers Association – Environmental Stewardship,  
<http://www.nema.org/Policy/Environmental-Stewardship/pages/default.aspx>.

Sustainable Conservation, <http://www.suscon.org>.

Auto Recycling Project

Brake Pad Partnership

## ***Pesticides and Chemical Fertilizers***

Bio-Integral Resource Center, <http://www.birc.org>.

California Department of Pesticide Regulation,  
<http://www.cdpr.ca.gov/dprprograms.htm>.

University of California Statewide IPM Program,  
<http://www.ipm.ucdavis.edu/default.html>.

## ***Dioxins***

Bay Area Dioxins Project,  
[http://www.abag.ca.gov/bayarea/dioxin/project\\_materials.htm](http://www.abag.ca.gov/bayarea/dioxin/project_materials.htm).

# Building & Grounds Maintenance SC-41

## Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

## Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

## General Pollution Prevention Protocols

- ☐ Switch to non-toxic chemicals for maintenance to the maximum extent possible.
- ☐ Choose cleaning agents that can be recycled.
- ☐ Encourage proper lawn management and landscaping, including use of native vegetation.
- ☐ Encourage use of Integrated Pest Management techniques for pest control.
- ☐ Encourage proper onsite recycling of yard trimmings.
- ☐ Recycle residual paints, solvents, lumber, and other material as much as possible.

## Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

## Targeted Constituents

<i>Sediment</i>	✓
<i>Nutrients</i>	✓
<i>Trash</i>	
<i>Metals</i>	✓
<i>Bacteria</i>	✓
<i>Oil and Grease</i>	
<i>Organics</i>	

## Minimum BMPs Covered

	<i>Good Housekeeping</i>	✓
	<i>Preventative Maintenance</i>	
	<i>Spill and Leak Prevention and Response</i>	✓
	<i>Material Handling &amp; Waste Management</i>	✓
	<i>Erosion and Sediment Controls</i>	
	<i>Employee Training Program</i>	✓
	<i>Quality Assurance Record Keeping</i>	✓



# Building & Grounds Maintenance SC-41

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- Clean work areas at the end of each work shift using dry cleaning methods such as sweeping and vacuuming.



## ***Good Housekeeping***

### *Pressure Washing of Buildings, Rooftops, and Other Large Objects*

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

### *Landscaping Activities*

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils. See also SC-40, Contaminated and Erodible Areas, for more information.

### *Building Repair, Remodeling, and Construction*

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and

# Building & Grounds Maintenance SC-41

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solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- ❑ If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- ❑ Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

## *Mowing, Trimming, and Planting*

- ❑ Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- ❑ Use mulch or other erosion control measures when soils are exposed.
- ❑ Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- ❑ Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- ❑ Use hand weeding where practical.

## *Fertilizer and Pesticide Management*

- ❑ Do not use pesticides if rain is expected.
- ❑ Do not mix or prepare pesticides for application near storm drains.
- ❑ Use the minimum amount needed for the job.
- ❑ Calibrate fertilizer distributors to avoid excessive application.
- ❑ Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- ❑ Apply pesticides only when wind speeds are low.
- ❑ Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- ❑ Irrigate slowly to prevent runoff and then only as much as is needed.
- ❑ Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.

## *Inspection*

- ❑ Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

# Building & Grounds Maintenance SC-41

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## ***Spill Response and Prevention Procedures***

- ☐ Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- ☐ Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- ☐ Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- ☐ Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- ☐ Clean up spills immediately.



## ***Material Handling and Waste Management***

- ☐ Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- ☐ Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- ☐ Dispose of empty pesticide containers according to the instructions on the container label.
- ☐ Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- ☐ Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.



## ***Employee Training Program***

- ☐ Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- ☐ Train employees and contractors in proper techniques for spill containment and cleanup.
- ☐ Be sure the frequency of training takes into account the complexity of the operations and the needs of individual staff.



## ***Quality Assurance and Record Keeping***

- ☐ Keep accurate logs that document maintenance activities performed and minimum BMP measures implemented.
- ☐ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- ☐ Establish procedures to complete logs and file them in the central office.



# Building & Grounds Maintenance SC-41

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## Potential Capital Facility Costs and Operation & Maintenance Requirements

### *Facilities*

- Additional capital costs are not anticipated for building and grounds maintenance. Implementation of the minimum BMPs described above should be conducted as part of regular site operations.

### *Maintenance*

- Maintenance activities for the BMPs described above will be minimal, and no additional cost is anticipated.

## Supplemental Information

### *Fire Sprinkler Line Flushing*

Site fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

## References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual*.

Kennedy/Jenks Consultants, 2007. *The Truckee Meadows Industrial and Commercial Storm Water Best Management Practices Handbook*. Available online at: [http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C BMP Handbook 2-07-final.pdf](http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C_BMP_Handbook_2-07-final.pdf).

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: <http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessactivities>.

Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control*. Available online at:

# **Building & Grounds Maintenance SC-41**

<http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf>.

US EPA, 1997. *Best Management Practices Handbook for Hazardous Waste Containers*. Available online at: <http://www.epa.gov/region6/6en/h/handbk4.pdf>.

Ventura Countywide Stormwater Management Program Clean Business Fact Sheets. Available online at: [http://www.vcstormwater.org/documents/programs\\_business/building.pdf](http://www.vcstormwater.org/documents/programs_business/building.pdf).

## Description

Parking lots can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

BMPs for other outdoor areas on site (loading/unloading, material storage, and equipment operations) are described in SC-30 through SC-33.

## Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

### General Pollution Prevention Protocols

- ☐ Encourage advanced designs and maintenance strategies for impervious parking lots. Refer to the treatment control BMP fact sheets in this manual for additional information.
- ☐ Keep accurate maintenance logs to evaluate BMP implementation.



### Good Housekeeping

- ☐ Keep all parking areas clean and orderly. Remove debris, litter, and sediments in a timely fashion.
- ☐ Post “No Littering” signs and enforce anti-litter laws.

## Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

## Targeted Constituents

<i>Sediment</i>	✓
<i>Nutrients</i>	
<i>Trash</i>	✓
<i>Metals</i>	✓
<i>Bacteria</i>	
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

## Minimum BMPs Covered

	<i>Good Housekeeping</i>	✓
	<i>Preventative Maintenance</i>	✓
	<i>Spill and Leak Prevention and Response</i>	✓
	<i>Material Handling &amp; Waste Management</i>	
	<i>Erosion and Sediment Controls</i>	
	<i>Employee Training Program</i>	✓
	<i>Quality Assurance Record Keeping</i>	✓



- ☐ Provide an adequate number of litter receptacles.
- ☐ Clean out and cover litter receptacles frequently to prevent spillage.



## ***Preventative Maintenance***

### *Inspection*

Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.

- ☐ Inspect cleaning equipment/sweepers for leaks on a regular basis.

### *Surface Cleaning*

- ☐ Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- ☐ Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- ☐ Sweep all parking lots at least once before the onset of the wet season.
- ☐ Dispose of parking lot sweeping debris and dirt at a landfill.
- ☐ Follow the procedures below if water is used to clean surfaces:
  - ✓ Block the storm drain or contain runoff.
  - ✓ Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
- ☐ Follow the procedures below when cleaning heavy oily deposits:
  - ✓ Clean oily spots with absorbent materials.
  - ✓ Use a screen or filter fabric over inlet, then wash surfaces.
  - ✓ Do not allow discharges to the storm drain.
  - ✓ Vacuum/pump discharges to a tank or discharge to sanitary sewer.
  - ✓ Dispose of spilled materials and absorbents appropriately.

### *Surface Repair*

- ☐ Check local ordinance for SUSMP/LID ordinance.
- ☐ Preheat, transfer or load hot bituminous material away from storm drain inlets.
- ☐ Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- ☐ Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in

place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

- ☐ Use only as much water as necessary for dust control during sweeping to avoid runoff.
- ☐ Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.



## ***Spill Response and Prevention Procedures***

- ☐ Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- ☐ Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- ☐ Clean up fluid spills immediately with absorbent rags or material.
- ☐ Dispose of spilled material and absorbents properly.



## ***Employee Training Program***

- ☐ Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- ☐ Train employees and contractors in proper techniques for spill containment and cleanup.
- ☐ Use a training log or similar method to document training.



## ***Quality Assurance and Record Keeping***

- ☐ Keep accurate maintenance logs that document minimum BMP activities performed for parking area maintenance, types and quantities of waste disposed of, and any improvement actions.
- ☐ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- ☐ Establish procedures to complete logs and file them in the central office.

## **Potential Capital Facility Costs and Operation & Maintenance Requirements**

### ***Facilities***

- ☐ Capital investments may be required at some sites to purchase sweeping equipment, train sweeper operators, install oil/water/sand separators, or implement advanced BMPs. These costs can vary significantly depending upon site conditions and the amount of BMPs required.

## ***Maintenance***

- ❑ Sweep and clean parking lots regularly to minimize pollutant transport into storm drains from stormwater runoff.
- ❑ Clean out oil/water/sand separators regularly, especially after heavy storms.
- ❑ Maintain advanced BMPs such as vegetated swales, infiltration trenches, or detention basins as appropriate. Refer to the treatment control fact sheets for more information.

## **Supplemental Information**

### ***Advanced BMPs***

Some parking areas may require advanced BMPs to further reduce pollutants in stormwater runoff, and a few examples are listed below. Refer to the Treatment Control Fact Sheets and the New Development and Redevelopment Manual for more information.

- ❑ When possible, direct sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- ❑ Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- ❑ Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- ❑ Design lot to include semi-permeable hardscape.

## **References and Resources**

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual*.

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Kennedy/Jenks Consultants, 2007. *The Truckee Meadows Industrial and Commercial Storm Water Best Management Practices Handbook*. Available online at: [http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C BMP Handbook 2-07-final.pdf](http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C_BMP_Handbook_2-07-final.pdf).

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[http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min\\_measure&min\\_measure\\_id=5](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=5).

# Drainage System Maintenance SC-44

## Description

As a consequence of its function, the stormwater drainage facilities on site convey stormwater that may contain certain pollutants either to the offsite conveyance system that collects and transports urban runoff and stormwater, or directly to receiving waters. The protocols in this fact sheet are intended to reduce pollutants leaving the site to the offsite drainage infrastructure or to receiving waters through proper on-site conveyance system operation and maintenance. The targeted constituents will vary depending on site characteristics and operations.

## Approach

Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

### General Pollution Prevention Protocols

- ❑ Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.
- ❑ Develop and follow a site specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.



### Good Housekeeping

#### Illicit Connections and Discharges

- ❑ Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:

## Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

## Targeted Constituents

<i>Sediment</i>	✓
<i>Nutrients</i>	✓
<i>Trash</i>	✓
<i>Metals</i>	✓
<i>Bacteria</i>	✓
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

## Minimum BMPs Covered

	<i>Good Housekeeping</i>	✓
	<i>Preventative Maintenance</i>	✓
	<i>Spill and Leak Prevention and Response</i>	✓
	<i>Material Handling &amp; Waste Management</i>	
	<i>Erosion and Sediment Controls</i>	
	<i>Employee Training Program</i>	✓
	<i>Quality Assurance Record Keeping</i>	✓





# Drainage System Maintenance **SC-44**

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- ✓ Identify evidence of spills such as paints, discoloring, odors, etc.
- ✓ Record locations of apparent illegal discharges/illicit connections.
- ✓ Track flows back to potential discharges and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- ✓ Eliminate the discharge once the origin of flow is established.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” or similar stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges for additional information.

## *Illegal Dumping*

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - ✓ Illegal dumping hot spots;
  - ✓ Types and quantities (in some cases) of wastes;
  - ✓ Patterns in time of occurrence (time of day/night, month, or year);
  - ✓ Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills); and
  - ✓ Responsible parties.
- Post “No Dumping” signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges for additional information.



## **Preventative Maintenance**

### *Catch Basins/Inlet Structures*

- Staff should regularly inspect facilities to ensure compliance with the following:
  - ✓ Immediate repair of any deterioration threatening structural integrity.
  - ✓ Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.

# Drainage System Maintenance **SC-44**

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- ❑ Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- ❑ Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Prioritize storm drain inlets; clean and repair as needed.
- ❑ Keep accurate logs of the number of catch basins cleaned.
- ❑ Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- ❑ Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

## *Storm Drain Conveyance System*

- ❑ Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- ❑ Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

## *Pump Stations*

- ❑ Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- ❑ Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- ❑ Conduct routine maintenance at each pump station.
- ❑ Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

## *Open Channel*

- ❑ Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- ❑ Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural state of any river, stream, or lake in California, must enter into a Stream or Lake Alteration Agreement with the Department of Fish and Wildlife. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Army Corps of Engineers and USFWS.



## ***Spill Response and Prevention Procedures***

- ❑ Keep your spill prevention control plan up-to-date.

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- ☐ Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- ☐ Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- ☐ Clean up all spills and leaks using “dry” methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.



## ***Employee Training Program***

- ☐ Educate employees about pollution prevention measures and goals.
- ☐ Train employees how to properly handle and dispose of waste using the source control BMPs described above.
- ☐ Train employees and subcontractors in proper hazardous waste management.
- ☐ Use a training log or similar method to document training.
- ☐ Ensure that employees are familiar with the site’s spill control plan and/or proper spill cleanup procedures.
- ☐ Have staff involved in detection and removal of illicit connections trained in the following:
  - ✓ OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).
  - ✓ OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
  - ✓ Procedural training (field screening, sampling, smoke/dye testing, TV inspection).



## ***Quality Assurance and Record Keeping***

- ☐ Keep accurate maintenance logs that document minimum BMP activities performed for drainage system maintenance, types and quantities of waste disposed of, and any improvement actions.
- ☐ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- ☐ Keep accurate logs of illicit connections, illicit discharges, and illegal dumping into the storm drain system including how wastes were cleaned up and disposed.
- ☐ Establish procedures to complete logs and file them in the central office.

## **Potential Limitations and Work-Arounds**

Provided below are typical limitations and recommended “work-arounds” for drainage system maintenance:

# Drainage System Maintenance SC-44

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- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
  - ✓ Perform all maintenance onsite and do not flush accumulated material downstream to private property or riparian habitats.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, and liquid/sediment disposal.
  - ✓ Develop and follow a site specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
  - ✓ Do not dump illegal materials anywhere onsite.
  - ✓ Identify illicit connections, illicit discharge, and illegal dumping.
  - ✓ Cleanup spills immediately and properly dispose of wastes.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the sanitary sewer system.
  - ✓ Collect all materials and pollutants accumulated in drainage system and dispose of according to local regulations.
  - ✓ Install debris excluders in areas with a trash TMDL.

## Potential Capital Facility Costs and Operation & Maintenance Requirements

### *Facilities*

- Capital costs will vary substantially depending on the size of the facility and characteristics of the drainage system. Significant capital costs may be associated with purchasing water trucks, vacuum trucks, and any other necessary cleaning equipment or improving the drainage infrastructure to reduce the potential .
- Developing and implementing a site specific drainage system maintenance plan will require additional capital if a similar program is not already in place.

## *Maintenance*

- Two-person teams may be required to clean catch basins with vacuum trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.
- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

## **Supplemental Information**

### *Storm Drain Flushing*

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents “plug flow” discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used if allowed or that fire hydrant line flushing coincide with storm sewer flushing.

# Drainage System Maintenance SC-44

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## References and Resources

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Knox County Tennessee *Stormwater Management Manual* Chapter 5 Drainage System Maintenance, 2008. Available online at:  
[http://www.knoxcounty.org/stormwater/manual/Volume%201/knoxco\\_swmm\\_v1\\_chap5\\_jan2008.pdf](http://www.knoxcounty.org/stormwater/manual/Volume%201/knoxco_swmm_v1_chap5_jan2008.pdf).

US EPA. Storm Drain System Cleaning, 2012. Available online at:  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=102>.

# BG-40 Landscape Maintenance

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Photo Credit: Geoff Brosseau

## Description

This category includes businesses that provide landscaping and landscape maintenance/gardening services.

## Pollutant Sources

The following are sources of pollutants:

- Selecting plants or landscape design,
- Installing new landscaping,
- Maintaining landscapes,
- Using pesticides and fertilizers, and
- Using gas-powered equipment.

Pollutants can include:

- Nutrients (fertilizers, yard wastes),
- Pesticides,
- Heavy metals (copper, lead, and zinc),
- Hydrocarbons (fuels, oils and grease), and
- Sediments.

## Approach

Minimize the potential for stormwater pollution and the need for resources/controls (water, pesticides, fertilizers) by creating and maintaining landscapes in a way that is compatible with the local soils, climate, and amount of rain and sun. Make stormwater pollution prevention BMPs a part of standard operating procedures and the employee training program.



# BG-40 Landscape Maintenance

Provide employee education materials in the first language of employees, as necessary.

## Source Control BMPs

The best management practices are listed by activity or area.

<b>Landscape Design</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> Specify native, low maintenance, and insectary (attract beneficial insects) plants and landscape designs.</li><li><input type="checkbox"/> Design zoned, water-efficient irrigation systems using technologies such drip irrigation, soaker hoses, or microspray systems. Landscape design should be consistent with the local Water Efficient Landscape Ordinance. See the following website for a list of local ordinances: <a href="ftp://ftp.water.ca.gov/Model-Water-Efficient-Landscape-Ordinance/Local-Ordinances/">ftp://ftp.water.ca.gov/Model-Water-Efficient-Landscape-Ordinance/Local-Ordinances/</a></li><li><input type="checkbox"/> Do not landscape riparian areas, except to remove non-native plants and replace them with native riparian landscaping.</li><li><input type="checkbox"/> Replant with native species where possible when landscaping or building an ornamental pond. Do not assume something is native because you have seen it in your area. Contact the local nursery for information or visit the California Exotic Pest Plant Council website (<a href="http://www.caleppc.org">www.caleppc.org</a>).</li></ul>
<b>Landscape Installation</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> Protect stockpiles and landscaping materials from wind and rain by storing them under tarps or secured plastic sheeting.</li><li><input type="checkbox"/> Schedule grading and excavation projects during dry weather.</li><li><input type="checkbox"/> Divert runoff from exposed soils or lower its velocity by leveling and terracing.</li><li><input type="checkbox"/> Use temporary check dams or ditches to divert runoff away from storm drains.</li><li><input type="checkbox"/> Protect storm drains with sandbags or other sediment controls.</li><li><input type="checkbox"/> Revegetation is an excellent form of erosion control for any site. Keep soils covered with vegetation or temporary cover material (mulch) to control erosion.</li><li><input type="checkbox"/> Check plant roots before buying a plant. Do not buy plants with roots are that kinked or circling around the container. Do not buy plants with soft, rotten, or deformed root crowns.</li><li><input type="checkbox"/> Do not pile soil around the plant any higher than the root crown.</li></ul>
<b>Landscape Maintenance</b>	<p>Yard Waste</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Allow leaf drop to become part of the mulch layer in tree, shrub, and groundcover areas.</li><li><input type="checkbox"/> Keep lawn mower blades sharp, and grasscycle.</li></ul>



# BG-40 Landscape Maintenance

	<ul style="list-style-type: none"><li>□ Grasscycle – leave grass clippings on the lawn when mowing. Once cut, grass clippings first dehydrate, and then decompose, quickly disappearing from view. Proper mowing is required for successful grasscycling. Cut grass when the surface is dry, and keep mower blades sharp. Follow the "1/3 Rule": mow the lawn often enough so that no more than 1/3 of the length of the grass blade is cut in any one mowing. Frequent mowing will produce short clippings that will not cover up the grass surface. The lawn may have to be cut every seven days when the lawn is growing fast but only every 7 to 14 days when the lawn is growing slowly.</li><li>□ Do not leave clippings on pavement or sidewalks where they can wash off into the street, gutter, or storm drain.</li><li>□ Collect lawn and garden clippings, pruning waste, and tree trimmings. Chip if necessary, and compost or take to the local municipal yard waste recycling/composting facility.</li><li>□ In communities with curbside pick-up of yard waste, place clippings and pruning waste at the curb in approved bags or containers. No curbside pickup of yard waste is available for commercial properties.</li><li>□ Do not blow or rake leaves or other yard waste into the street, or place yard waste in gutters or on dirt shoulders, unless it is being piled up for recycling (allowed by some municipalities). After pick-up, sweep up any leaves, litter, or residue in gutters or on street.</li></ul> <p>Fertilizing and Pruning</p> <ul style="list-style-type: none"><li>□ Perform soil analysis seasonally to determine actual fertilization need and application rates.</li><li>□ Fertilize garden areas with a mulch of leaves, bark, or composted manure and/or garden waste.</li><li>□ Apply chemical fertilizer only as needed, when plants can best use it, and when the potential for it being carried away by runoff is low. Make sure the fertilizer spreader is calibrated.</li><li>□ Prune plants sparingly, if at all. A healthy plant – one that is native to the area and growing under the right conditions – should not need pruning, except when it is not in the right location (where safety or liability is a concern).</li></ul> <p>Watering</p> <ul style="list-style-type: none"><li>□ Use soil probes to determine soil moisture depth, overall moisture levels, and the need to adjust irrigation schedules.</li><li>□ Check sprinklers regularly. Adjust as needed to minimize or eliminate overspray onto impervious surfaces. Replace broken sprinklers or lines.</li></ul>
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# BG-40 Landscape Maintenance

	<p><b>Pest and Weed Control</b></p> <ul style="list-style-type: none"><li>□ Obtain appropriate licenses for pest control and pesticides. Contact the Department of Pesticide Regulation for more information.</li><li>□ Become trained in and offer customers less-toxic pest control or Integrated Pest Management (IPM).</li><li>□ The label on a pesticide container is a legal document. Use a pesticide only as instructed on the label.</li><li>□ Store pesticides, fertilizers, and other chemicals indoors or in a shed or storage cabinet.</li><li>□ Use pesticides sparingly, according to instructions on the label. Rinse empty containers, and use rinsewater as product.</li><li>□ Dispose of rinsed, empty containers in the trash. Dispose of unused pesticides as hazardous waste.</li><li>□ To control weeds, use drip irrigation and mulch. Hand-pull weeds including roots or cut down to ground. Repeat cutting before they flower, grow new leaves, or go to seed. Use herbicides containing pelargonic acid or herbicidal soap as a last resort.</li></ul> <p><b>Handling Gasoline</b></p> <ul style="list-style-type: none"><li>□ Use only containers approved by a nationally recognized testing lab, such as Underwriters Laboratories (UL). Keep the container tightly sealed. Containers should be fitted with a spout to allow pouring without spilling and to minimize the generation of vapors.</li><li>□ Fill cautiously. Always use a funnel and/or spout to prevent spilling or splashing when fueling power mowers, blowers, and all other gas-powered equipment.</li><li>□ Avoid spilling gasoline on the ground, especially near wells. If a spill occurs use kitty litter, saw dust, or an absorbent towel to soak up the spill, then dispose of it properly.</li><li>□ Store carefully. Gasoline moves quickly through soil and into groundwater, therefore, store and use gasoline and fuel equipment as far away from your drinking water well as possible. Be certain to keep a closed cap on the gasoline container. Store at ground level, not on a shelf to minimize the danger of falling and spilling.</li><li>□ Do not dispose of gasoline down the drain, into surface water, onto the ground, or in the trash. Contact the local municipality for directions on proper disposal of excess or old gasoline. Transport old gas in an approved gasoline container.</li></ul> <p><b>Working Near Waterbodies</b></p> <ul style="list-style-type: none"><li>□ Do not dump lawn clippings, other yard waste, or soil along creek banks or in creeks.</li></ul>
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# BG-40 Landscape Maintenance

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	<ul style="list-style-type: none"><li>□ Do not store stockpiles of materials (soil, mulch) along creek banks. These piles can erode over time into a creek.</li><li>□ Do not spray pesticides or fertilizers by creeks.</li><li>□ Do not over water near streams. The excess water may carry pesticides, fertilizers, sediments, and anything else in its path directly into the creek.</li></ul>
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## Treatment Control BMPs

Not applicable.

## More Information

Bay Area Stormwater Management Agencies Association, 1999. Start at the Source – Design Guidance Manual for Stormwater Quality Protection. Available on-line at: <http://www.scvurppp-w2k.com/pdfs/0910/StartAtTheSource.pdf>.

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Southern Sonoma County Resource Conservation District, Undated pamphlet. *A Guide for Rural Landowners and Residents of Petaluma and Sonoma Creek Watersheds*. Available on-line at: [http://www.conservation.ca.gov/dlrp/watershedportal/Documents/SSCRCD%20Creek%20Care%20Guide%20\(southern%20sonoma%20rcd\).pdf](http://www.conservation.ca.gov/dlrp/watershedportal/Documents/SSCRCD%20Creek%20Care%20Guide%20(southern%20sonoma%20rcd).pdf).

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# BG-40 Landscape Maintenance

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City of San Diego, 2012. *Storm Water Standards*. Available on-line at: <http://www.sandiego.gov/development-services/news/pdf/stormwatermanual.pdf>.

City of San Francisco, 2009. *San Francisco Stormwater Design Guidelines*. Available on-line at: <http://www.sfwater.org/modules/showdocument.aspx?documentid=2779>.

County of Los Angeles Department of Public Works, 2009. *Stormwater Best Management Practice Design and Maintenance Manual For Publicly Maintained Storm Drain Systems*. Available on-line at: <http://dpw.lacounty.gov/ldd/publications/Stormwater%20BMP%20Design%20and%20Maintenance%20Manual.pdf>.

## General Description

Vegetated swales (also referred to as bioswales, biofiltration swales, or landscaped swales) are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Swales can be natural or manmade. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, reduce flow velocity, and increase time of concentration of stormwater runoff. Vegetated swales can be implemented to provide effective pretreatment for detention and infiltration stormwater BMPs.

Vegetated swales can serve as part of a stormwater drainage system and can replace curbs, gutters and storm sewer systems. Therefore, swales are best suited for small landscaped portions of industrial or commercial facilities with low peak flow rates. They are not well suited to treat stormwater runoff from industrial areas that have insufficient source control BMPs.

## Inspection/Maintenance Considerations

A thick vegetative cover is needed for vegetated swales to function properly. Usually, swales require little more than normal landscape maintenance activities such as irrigation and mowing to maintain pollutant removal efficiency. Swales can become a nuisance due to mosquito breeding in standing water if obstructions develop (e.g., debris accumulation, invasive vegetation) and/or if proper drainage slopes are not implemented and maintained. The application of fertilizers and pesticides should be minimized.

## Advanced BMPs Covered



## Maintenance Concerns

- *Channelization*
- *Vegetation/Landscape Maintenance*
- *Vector Control*
- *Aesthetics*
- *Flow Obstructions*

## Targeted Constituents

<i>Sediment</i>	▲
<i>Nutrients</i>	●
<i>Trash</i>	●
<i>Metals</i>	▲
<i>Bacteria</i>	●
<i>Oil and Grease</i>	▲
<i>Organics</i>	▲

## Legend (Removal Effectiveness)

- Low ■ High ▲ Medium  
 \* Requires Pretreatment

*Note: The removal effectiveness ratings shown in the table are for properly designed, sited, and maintained BMPs; some configurations will have variations in pollutant effectiveness.*



Inspection Activities	Suggested Frequency
<input type="checkbox"/> Inspect after seeding and after first major storms for any damages.	Post construction
<input type="checkbox"/> Inspect for signs of erosion, damage to vegetation, channelization of flow, debris and litter, and areas of sediment accumulation. Perform inspections at the beginning and end of the wet season. Additional inspections after periods of heavy runoff are desirable.	Semi-annual
<input type="checkbox"/> Inspect level spreader for clogging, grass alongside slopes for erosion and formation of rills or gullies, and sand/soil bed for erosion problems.	Annual
Maintenance Activities	Suggested Frequency
<input type="checkbox"/> Mow grass to maintain a height of 3–4 inches, for safety, aesthetic, or other purposes. Litter should always be removed prior to mowing. Clippings should be composted. <input type="checkbox"/> Irrigate swale during dry season (April through October) or when necessary to maintain the vegetation. <input type="checkbox"/> Provide weed control, if necessary to control invasive species.	As needed (frequent, seasonally)
<input type="checkbox"/> Remove litter, branches, rocks blockages, and other debris and dispose of properly. <input type="checkbox"/> Maintain inlet flow spreader (if applicable). <input type="checkbox"/> Repair any damaged areas within a channel identified during inspections. Erosion rills or gullies should be corrected as needed. Bare areas should be replanted as necessary.	Semi-annual
<input type="checkbox"/> Declog the pea gravel diaphragm, if necessary. <input type="checkbox"/> Correct erosion problems in the sand/soil bed of dry swales. <input type="checkbox"/> Plant an alternative grass species if the original grass cover has not been successfully established. Reseed and apply mulch to damaged areas.	Annual (as needed)
<input type="checkbox"/> Remove all accumulated sediment that may obstruct flow through the swale. Sediment accumulating near culverts and in channels should be removed when it builds up to 3 in. at any spot, or covers vegetation, or once it has accumulated to 10% of the original design volume. Replace the grass areas damaged in the process. <input type="checkbox"/> Rototill or cultivate the surface of the sand/soil bed of dry swales if the swale does not draw down within 48 hours.	As needed (infrequent)

## Additional Information

Research (Colwell et al., 2000) indicates that grass height and mowing frequency have little impact on pollutant removal. Consequently, mowing may only be necessary once or twice a year for safety or aesthetics or to suppress weeds and woody vegetation.

The swale bottom and side slopes should be covered with dense vegetative cover to filter pollutants out of runoff and helps reduce flow velocities and protect the swale from erosion. Fine, close-growing grasses are ideal because increasing the surface area of the vegetation exposed to runoff improves the effectiveness of the swale. Drought tolerant vegetation than can tolerate sediment and debris accumulations are best-suited for swales.

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## *Appendix C: Training Reporting Form*

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# Trained Personnel Log

## Stormwater Management Training Log and Documentation

Specific Training Objective: \_\_\_\_\_

Location: \_\_\_\_\_

Date: \_\_\_\_\_

Instructor: \_\_\_\_\_

Telephone: \_\_\_\_\_

Course Length (hours): \_\_\_\_\_

### Attendee Roster (Attach additional forms if necessary)

Name	Company	Phone