

ENCLOSURE 1

**ORDINANCE AMENDING THE
BURBANK MUNICIPAL CODE (BMC)
TO ACHIEVE COMPLIANCE WITH
THE PLANNING AND LAND
DEVELOPMENT PROGRAM OF THE
NATIONAL POLLUTANT DISCHARGE
ELIMINATION SYSTEM (NPDES)
MUNICIPAL SEPARATE STORM
SEWER SYSTEM PERMIT**



AN ORDINANCE OF THE COUNCIL OF THE CITY OF BURBANK AMENDING THE BURBANK MUNICIPAL CODE (BMC) TO; AMEND SECTIONS 7-3-102, 7-3-405, AND 9-3-414 TO ACHIEVE COMPLIANCE WITH THE PLANNING AND LAND DEVELOPMENT PROGRAM OF THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) MUNICIPAL SEPARATE STORM SEWER SYSTEM PERMIT.

City Attorney's Synopsis

This Ordinance amends provisions of Titles 7 and 9 of the Burbank Municipal Code to comply with the Planning and Land Development Program of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit. Specifically, new and existing projects meeting certain thresholds will be required to be designed to control storm water pollutants, pollutant loads, and storm water runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through storm water infiltration, evapotranspiration, bioretention and/or rainfall harvest and use.

THE COUNCIL OF THE CITY OF BURBANK FINDS AS FOLLOWS:

A. On December 28, 2012, the Los Angeles Regional Water Quality Control Board issued Final Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4, NPDES Permit Number CAS004001, Order Number R4-2012-0175.

B. On November 5, 2013, City Staff brought to Council a recommendation to approve a Memorandum of Understanding (MOU) with 16 Other Permittees to Administer and Cost-Share the Development of the Upper Los Angeles River (ULAR) Enhanced Watershed Management Program (EWMP) and the Coordinated Integrated Monitoring Program (CIMP).

C. On January 24, 2014, the Regional Board's Executive Officer issued a memo explaining that by June 28, 2015, EWMP participating permittees are to have both a Low Impact Development ordinance and a Green Streets policy in effect.

THE COUNCIL OF THE CITY OF BURBANK DOES ORDAIN AS FOLLOWS:

1. This ordinance is categorically exempt from review under the California Environmental Quality Act (CEQA) pursuant to Class 7 and Class 8 exemptions set

forth in Sections 15307 and 15308 of the CEQA Guidelines as actions by regulatory agencies for the protection of natural resources and the environment, because the ordinance is intended to protect and improve water quality in the Los Angeles River and tributaries.

2. Section 7-3-102 of the Burbank Municipal Code is hereby amended to read as follows:

7-3-102: GREEN STREETS POLICY, DEFINITION AND APPLICABILITY:

A. Green Streets Policy: The Public Works Director shall develop, approve and maintain a policy regarding how and when green streets should be constructed and maintained throughout the City.

B. Green streets: Improvements within the public and private transportation corridors that provide source control of storm water, limit its transport and pollutant conveyance to the collection system, restore predevelopment hydrology to the extent possible, and provide environmentally enhanced roads by incorporating a wide variety of design elements including but not limited to, street trees, sustainable pavements, bioretention, and swales, and are designed to reduce greenhouse gases (GHG), energy consumption during construction, and promote recycling of natural resources.

C. Applicability: The Green Streets Policy shall apply to new streets and road construction of 10,000 square feet or more of impervious surface area, and street and road redevelopment that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site.

3. Section 7-3-405 of the Burbank Municipal Code is hereby amended to incorporate a new subsection K., entitled "Green Street Improvements, and by renumbering subsections K and L to L and M, as follows:

K. Green Street Improvements: Subject to new development or redevelopment meeting certain thresholds, the Green Streets Policy will require green street improvements aimed at capturing and either infiltrating or treating storm water runoff.

L. Other Work: All other work which may be deemed necessary to improve the whole or any portion of any street, property or right of way owned by the City; and all other work auxiliary to any of the foregoing, which may be required to carry out the same.

M. Environmental Impact Report: No improvement which may have a significant effect on the environment shall be authorized under this section until an

environmental impact report is prepared, processed and considered in accordance with the provisions of Title 9, Chapter 3, Article 1 of this code, unless the improvement is otherwise exempt from the provisions of that article.

4. Section 9-3-414 of the Burbank Municipal Code is hereby amended to incorporate new subsections E. and F, which shall read as follows:

E. STORM WATER POLLUTION CONTROL REQUIREMENTS:

The Site for every Planning Priority Project shall be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use.

1. A new single-family hillside home development shall include mitigation measures to:

- a. Conserve natural areas;
- b. Protect slopes and channels;
- c. Provide storm drain system stenciling and signage;
- d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and
- e. Direct surface flow to vegetated areas before discharge, unless the diversion would result in slope instability.

2. Street and road construction of 10,000 square feet or more of impervious surface shall follow USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets (December 2008 EPA-833-F-08-009) to the maximum extent practicable.

3. The remainder of Planning Priority Projects shall prepare a LID Plan to comply with the following:

- a. Retain storm water runoff onsite for the Storm water Quality Design Volume (SWQDv) defined as the runoff from:

- (i) The 85th percentile 24-hour runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or
- (ii) The volume of runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.

- b. Minimize hydromodification impacts to natural drainage systems as defined in the Order R4-2012-0175. The Director or Community Development Director may develop technical guidance on the Hydromodification requirements.

- c. When, as determined by the Director or Community Development Director, 100 percent onsite retention of the SWQDv is technically infeasible, partially or fully, the infeasibility shall be demonstrated in the submitted LID Plan. The

technical infeasibility may result from conditions that may include, but are not limited to:

- (i) The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv onsite.
- (ii) Locations where seasonal high groundwater is within five to ten feet of surface grade;
- (iv) Locations within 100 feet of a groundwater well used for drinking water;
- (v) Brownfield development sites or other locations where pollutant mobilization is a documented concern;
- (vi) Locations with potential geotechnical hazards;
- (vii) Smart growth and infill or redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.

d. If partial or complete onsite retention is technically infeasible, the project Site may biofiltrate 1.5 times the portion of the remaining SWQDv that is not reliably retained onsite. Biofiltration BMPs must adhere to the design specifications provided in Order R4-2012-0175.

- (i) Additional alternative compliance options such as offsite infiltration may be available to the project Site. The project Site should contact the Director or Community Development Director to determine eligibility. Alternative compliance options may be further specified by the Director or Community Development Director.

e. The remaining SWQDv that cannot be retained or biofiltered onsite must be treated onsite to reduce pollutant loading. BMPs must be selected and designed to meet pollutant-specific benchmarks as required per the Municipal NPDES Permit. Flow-through BMPs may be used to treat the remaining SWQDv and must be sized based on a rainfall intensity of:

- (i) 0.2 inches per hour, or
- (ii) The one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, whichever is greater.

f. A Multi-Phased Project may comply with the standards and requirements of this section for all of its phases by: (i) designing a system acceptable to the Director or Community Development Director to satisfy these standards and requirements for the entire Site during the first phase, and (ii) implementing these standards and requirements for each phase of Development or Redevelopment of the Site during the first phase or prior to commencement of construction of a later phase, to the extent necessary to treat the storm water from such later phase. For purposes of this section, "Multi-Phased Project"

shall mean any Planning Priority Project implemented over more than one phase and the Site of a Multi-Phased Project shall include any land and water area designed and used to store, treat or manage storm water runoff in connection with the Development or Redevelopment, including any tracts, lots, or parcels of real property, whether Developed or not, associated with, functionally connected to, or under common ownership or control with such Development or Redevelopment.

F. OTHER AGENCIES OF THE CITY OF BURBANK.

All City of Burbank departments, offices, entities, and agencies shall establish administrative procedures necessary to implement the provisions of this Section on their Development and Redevelopment projects and report their activities annually to the Community Development Department.

5. If any provision of this Ordinance or its application is held invalid by a court of competent jurisdiction, such invalidity shall not affect other provisions, sections, or applications of the Ordinance which can be given effect without the invalid provision or application, and to this end each phrase, section, sentence, or word is declared to be severable.

6. This Ordinance shall become effective at 12:01 a.m. on the thirty-first (31st) day after the date of adoption. Projects that have been deemed complete prior to the effective date shall not be subject to the requirements of this Ordinance.

PASSED AND ADOPTED this 16th day of June, 2015.

s/Bob Frutos
Bob Frutos
Mayor

Attest:

s/Zizette Mullins
Zizette Mullins, CMC, City Clerk

Approved as to Form
Office of the City Attorney

By: s/Joseph H. McDougall
Joseph H. McDougall, Sr. Asst. City Attorney

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss.
CITY OF BURBANK)

I, Zizette Mullins, City Clerk of the City of Burbank, do hereby certify that the foregoing Ordinance No. 3,865 was duly and regularly passed and adopted by the Council of the City of Burbank at its regular meeting held on the 16th day of June, 2015, by the following vote:

AYES: Council Members Gabel-Luddy, Gordon, Rogers, Talamantes and Frutos.

NOES: None.

ABSENT: None.

I further certify that said Synopsis was published as required by law in a newspaper of general circulation in the City of Burbank, California on the 24th day of June, 2015.

s/Zizette Mullins
Zizette Mullins, CMC, City Clerk

ENCLOSURE 2

GREEN STREETS POLICY





APPROVED: B. Teaford

DATE: 6-10-15

Bonnie Teaford
Public Works Director

City of Burbank Green Street Policy

PURPOSE

The City of Burbank's Public Works Department shall implement green street Best Management Practices (BMPs) for transportation corridors associated with new and redevelopment street and roadway projects, including Capital Improvement Projects (CIPs). This policy is intended to demonstrate compliance with the National Pollutant Discharge Elimination System (NPDES) Municipal Storm Sewer Separate System (MS4) Permit for the Los Angeles Region (Order No. R4-2012-0175).

Green streets are an amenity that provides many benefits including water quality improvement, groundwater replenishment, creation of attractive streetscapes, creation of parks and wildlife habitats, and pedestrian and bicycle accessibility. Green streets are defined as right-of-way areas that incorporate infiltration, biofiltration, and/or storage and use BMPs to collect, retain, or detain stormwater runoff as well as a design element that creates attractive streetscapes.

DEFINITIONS

Green Streets

Green streets are improvements within the transportation corridor designed to reduce greenhouse gases (GHG), energy consumption during construction, promote recycling of our natural resources, provide source control of stormwater, limit its transport and pollutant conveyance to the collection system, restore predevelopment hydrology to the extent possible, and provide environmentally enhanced roads. Effectively incorporating green street design into our existing transportation network can help achieve multiple benefits, such as improved water quality, reduce GHG emissions, and help support sustainable communities. Green streets can incorporate a wide variety of design elements including but not limited to, street trees, sustainable pavements, bioretention, and swales. A number of green street features are listed and described in the Green Infrastructure Guidelines. The Guidelines detail the design of these features as well as the anticipated maintenance needs.

Transportation Corridor

Any designated route within the public right-of-way including sidewalks, roadways, and alley ways.

New Street and Road Construction

Construction activity includes any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that results in land disturbance. Construction does not include emergency construction activities required to immediately protect public health and safety or routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain the original line and grade, hydraulic capacity, or original purposes of the facility. See “Routine Maintenance” definition for further explanation.

Existing Street and Road Redevelopment

Land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed transportation corridor. Redevelopment includes, but is not limited to: the expansion of a transportation corridor; replacement of impervious transportation corridor area that is not part of a routine maintenance activity; and land disturbing activities related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

Routine Maintenance

Routine maintenance projects include, but are not limited to projects conducted to:

1. Maintain the original line and grade, hydraulic capacity, or original purpose of the facility.
2. Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.
3. Includes road shoulder work, regarding dirt or gravel roadways and shoulders and performing ditch cleanouts.
4. Update existing lines¹ and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
5. Repair leaks

Routine maintenance does not include construction of new² lines or facilities resulting from compliance with applicable codes, standards and regulations.

POLICY

A. Application

The City’s Public Works Department shall condition green street strategies³ as specified in the City of Burbank’s Green Streets Manual to the maximum extent practicable, effective June 28, 2015, for new construction and redevelopment within the transportation corridor⁴.

¹ Update existing lines includes replacing existing lines with new materials or pipes.

² New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

³ The Green Street policy applicability is for new street and road construction of 10,000 square feet or more of impervious surface area, and street and road redevelopment that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site.

⁴ New street and road construction, and street and road redevelopment apply to transportation corridors, standalone streets, roads, highways, freeway projects, as well as streets within larger projects.

B. Exceptions

Maintenance and repair projects or emergency projects in the City of Burbank public right-of-way are exempt from the watershed-based approaches but will comply with sustainable approaches that reduce greenhouse gas during construction. Maintenance and repair projects shall include, but is not limited to, road resurfacing, chip seal, slurry seal, curb and gutter, sidewalk repair, minor shoulder paving, and grind and overlay work.

C. Amenities

The City's Public Works Department shall consider opportunities to replenish groundwater, create attractive streetscapes, create parks and wildlife habitats, and provide pedestrian and bicycle accessibility through new development and redevelopment of streets and roadway projects and CIPs.

D. Guidance

Projects subject to the requirements of the Green Streets policy shall use the City of Burbank's Green Streets Manual and the City of Los Angeles' Green Street design standards⁵, or a standard acceptable to the City's Public Works Director.

E. Retrofit Scope

The City's Public Works Department shall use the City's Enhanced Watershed Management Program to identify opportunities for green street BMP retrofits. Final decisions regarding implementation will be determined by the Public Works Director, or her designee, based on the availability of adequate funding.

F. Training

The City's Public Works Department shall incorporate aspects of green streets into internal annual staff trainings.

⁵ The City of Los Angeles' Green Street standards are available at <http://eng.lacity.org/techdocs/stdplans/s-400.htm> (See Plans S-480 to S-486).

ENCLOSURE 3

GREEN STREETS MANUAL



City of Burbank

Green Streets Manual



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SECTION 1 – INTRODUCTION

1.1 WHAT ARE GREEN STREETS?

Transportation corridors¹ present many opportunities for green infrastructure application. One principle of green infrastructure involves reducing and treating storm water close to its source. Urban transportation right-of-ways integrated with green techniques are often called “green streets.” Green streets provide source controls for storm water runoff and pollutant loads. In addition, green infrastructure approaches complement street facility upgrades, street aesthetic improvements, and urban tree canopy efforts that also make use of the transportation corridor and allow it to achieve multiple goals and benefits. Using the transportation corridor for treatment of storm water runoff links green with grey infrastructure.

Green streets are beneficial for new road construction and retrofits. They can provide substantial economic benefits when used in transportation applications. Coordinating green infrastructure installation with broader transportation improvements can reduce the cost of storm water management by including it within larger infrastructure improvements. A large municipal concern regarding green infrastructure use is maintenance access; using transportation corridors as locations for green infrastructure not only addresses a significant pollutant source, but also alleviates access and maintenance concerns by using the public space.

Green streets can incorporate a wide variety of design elements including street trees, permeable pavements, bioretention, and swales. Although the design and appearance of green streets will vary, the functional goals are the same; provide source control of storm water, limit its transport and pollutant conveyance to the storm drain system, restore pre-development hydrology to the maximum extent practicable, and provide environmentally enhanced transportation corridors. Successful application of green techniques will encourage soil and vegetation contact and infiltration and retention of storm water.

1.2 WHY ARE GREEN STREETS BEING REQUIRED?

This Green Streets Manual provides guidance to comply with the MS4 Permit Order Number R4-2012-0175, which requires that jurisdictions in Los Angeles County reduce contaminants in the urban runoff.

The MS4 Permit requires Green Streets strategies to be implemented for transportation corridors. Transportation corridors represent a large percentage of the impervious area within Los Angeles and therefore generate a substantial amount of runoff from storm events. The altered flow regime from traditional roadways, increased runoff volume, and high runoff peak flows, are damaging to the environment and a risk to property downstream.

Traditional street design has focused on removing water from the street as quickly as possible and transferring it to storm drains, channels, and ultimately local water bodies. Storm water runoff can contain bacteria and other pollutants, and is thereby regulated at the state and local level (refer to *Table 1* for a list of pollutants typical of roads). Green Streets will help to transform the design of streets from the conventional method of moving water off-site as quickly as possible to a method of storing, treating, and either infiltrating, reusing, or releasing water on-site in order to reduce or eliminate pollutants from entering waters of the U.S.

¹ The transportation corridor is any designated route within the public right-of-way including sidewalks, roadways, and alley ways.

Street and road construction applies to major arterials, state routes, highways, or rail lines used for the movement of people or goods by means of bus services, trucks, and vehicles, and transportation corridors within larger projects.

Projects which are required to follow this Green Streets Guidance Manual include the following:

1. Street and road construction of 10,000 square feet or more of impervious surface area.
2. Street and road redevelopment resulting in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

Table 1: Examples of Storm water Pollutants Typical of Roads (*Managing Wet Weather with Green Infrastructure Municipal Handbook: Green Streets, 2008*).

Pollutant	Source	Effects
Trash	Littering	Physical damage to aquatic animals and fish, release of poisonous substances
Sediment/solids	Construction, unpaved areas	Increased turbidity, increased transport of soil bound pollutants, negative effects on aquatic organisms reproduction and function
Metals (Copper, Zinc, Lead, Arsenic)	Vehicle brake pads, vehicle tires, motor oil, vehicle emissions and engines, vehicle emissions, brake linings, automotive fluids	Toxic to aquatic organisms and can accumulate in sediments and fish tissues
Organics associated with petroleum (e.g., PAHs)	Vehicle emissions, automotive fluids, gas stations	Toxic to aquatic organisms
Nutrients	Vehicle emissions, atmospheric deposition	Promotes eutrophication and depleted dissolved oxygen concentrations

1.3 PLANNING AND DEVELOPMENT

Ideally, a site would be designed to capture and reuse or infiltrate the entire runoff volume of a storm. However site and design constraints make it difficult to achieve that goal. This Green Streets Manual is designed to provide guidance with BMP selection based on site constraints typical to street design. Streetscape geometry, topography, and climate determine the types of controls that can be implemented. The initial step in selecting a storm water tool is determining the feasible area and site constraints. Storm water controls should be selected using the hierarchy represented in *Figure 1*, the site guidelines represented in *Table 2*, and the location opportunities listed in *Table 3*.

1.3.1 Site Considerations

Specific elements which should be given special consideration in the site assessment process for applicable Green Streets include:

- **Ownership of land adjacent to transportation corridors.** The opportunity to provide storm water treatment may depend on the ownership of land adjacent to the transportation corridors. Acquisition of additional right-of-way and/or access easements

may be more feasible if land bordering the project is owned by relatively few land owners.

- **Location of existing utilities.** The location of existing storm drainage utilities can influence the opportunities for Green Streets infrastructure. For example, storm water planters can be designed to overflow along the curb-line to an existing storm drain inlet, thereby avoiding the infrastructure costs associated with an additional inlet. The location of other utilities may limit the allowable placement of BMPs to only those areas where a clear pathway to the storm drain exists.
- **Grade differential between road surface and storm drain system.** Some BMPs require more head from inlet to outlet than others. Therefore, allowable head drop may be an important consideration in BMP selection. Storm drain elevations may be constrained by a variety of factors in a transportation corridor project (utility crossings, outfall elevations, etc.) that cannot be overcome and may override storm water management considerations.
- **Longitudinal slope.** The suite of BMPs which may be installed on steeper transportation corridor sections is more limited. Specifically, permeable pavement and swales are more suitable for gentle/shallow grades. Other BMPs may be more readily terraced to be used on steeper slopes, likely requiring storm water volume detention.
- **Soil suitability.** Infiltration BMPs require specific types of soil. The site assessment should determine the type of soils on the site and the infiltration rate of the soils if infiltration BMPs are proposed. Additionally, optimal soils will need to consider the site's previous use(s) to ensure no plume or groundwater contamination is further spread.
- **Potential access opportunities.** A significant concern with the installation of BMPs in transportation corridors is the ability to safely access the BMPs for maintenance considering traffic hazards. Vehicle travel lanes and specific areas potentially hazardous for maintenance crews should be identified during the site assessment. For maintenance purposes, avoid placing BMPs in unsafe areas.

1.3.2 Design Considerations

The drainage patterns of the project should be developed or altered so that drainage can be routed to areas with BMP opportunities before entering storm drains. For example, if a median strip is present, a reverse crown should be considered so that storm water can drain to a median swale. Likewise, standard peak-flow curb inlets should be located downstream of areas with potential for storm water planters so that water can first flow into the planter, whereby the overflow is sent to the downstream inlet if capacity of the planter is exceeded.

Although Green Streets projects are not required to treat off-site runoff, treatment of commingled off-site runoff may be used to off-set the inability to treat areas within the project for which significant constraints prevent the ability to provide treatment.

Applicable Green Streets projects should apply the following site design measures to the maximum extent practicable and as specified by the Public Works Director or her designee, and the Burbank Municipal Code:

- Minimize street width where feasible while maintaining traffic flow and public safety.
- Add tree canopy by planting or preserving trees/shrubs.
- Use porous pavement or pavers for low traffic roadway areas, on-street parking, shoulders or sidewalks.

- Integrate traffic calming measures in the form of bioretention curb extensions.

1.3.3 BMP Sizing for Applicable Green Streets Projects

An 85th percentile standard design storm should be used to determine the appropriate size, slope, and materials for each Green Streets project. After identifying the appropriate storm water BMP(s) for a site, an integrated approach using several BMPs is encouraged. To increase water quality and functional hydrologic benefits, several storm water management BMPs can be used in succession. This is called a treatment train approach. The control measures should be designed using available topography to take advantage of gravity for conveyance to and through each facility. All Green Streets designs must be based off of a published design standard.

The following steps should be used to size BMPs for applicable Green Streets projects:

1. Delineate drainage areas tributary to BMP locations and compute imperviousness.
2. Look up the recommended sizing method for the BMP selected in each drainage area and calculate target sizing criteria.
3. Design BMPs per the City of Los Angeles' Green Street design standards², or a standard accepted by the City's Public Works Director.
4. Attempt to provide the calculated sizing criteria for the selected BMPs.
5. If sizing criteria cannot be achieved, document the constraints that override the application of BMPs and provide the largest portion of the sizing criteria that can be reasonably provided given constraints. If BMPs cannot be sized to provide the calculated volume for the tributary area, it is still essential to design the BMP inlet, energy dissipation, and overflow capacity for the full tributary area to ensure that flooding and scour is avoided. It is strongly recommended that BMPs which are designed to less than their target design volume be designed to bypass peak flows.

1.3.4 Alternative Compliance Options for Applicable Green Streets Projects

Alternative compliance programs should be considered for applicable Green Streets projects if on-site green infrastructure approaches cannot practicably treat the design volume. The primary alternative compliance option for applicable Green Streets projects is the completion of off-site mitigation projects. The proponent would need to implement a project to reduce storm water pollution for other portions of the transportation corridor or similar land uses when being reconstructed to the project in the same hydrologic unit, ideally as close to the project as possible and discharging to the same outfall.

1.3.5 Infiltration Considerations

Appropriate soils, infiltration media, and infiltration rates should be used for infiltration BMPs. If infiltration is proposed, a complete geotechnical or soils report should be undertaken to determine infiltration rates, groundwater depth, soil toxicity and stability, and other factors that will affect the ability and the desirability of infiltration. At a minimum, the infiltration capacity of the underlying soils shall be deemed suitable for infiltration (0.3 inches per hour or greater), appropriate media should be used in the BMP itself, and the groundwater shall be located at a depth of ten feet or greater.

² The City of Los Angeles' Green Street design standards are available at <http://eng.lacity.org/techdocs/stdplans/s-400.htm> (see Plans S-480 to S-486).

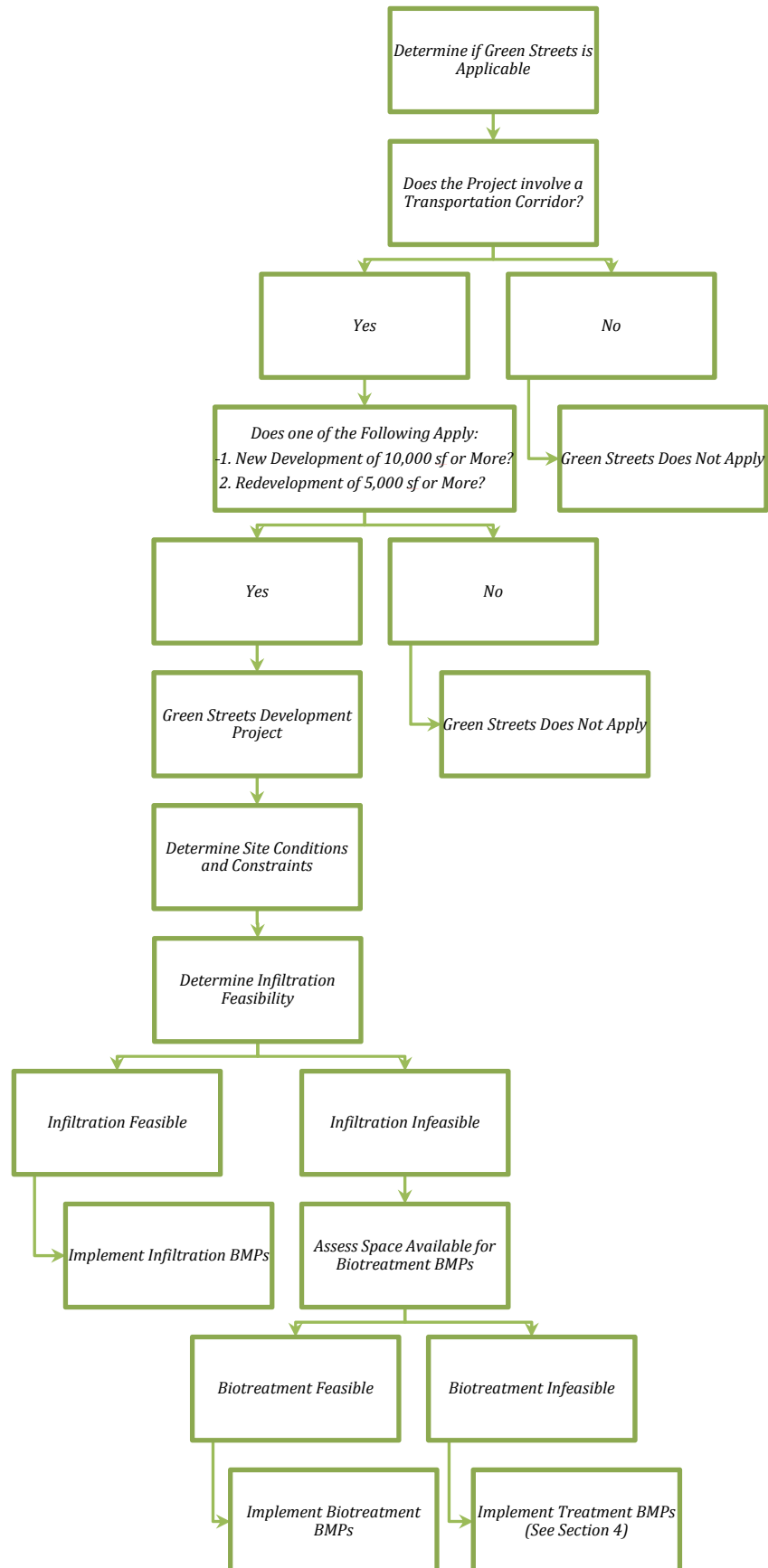


Figure 1: BMP Selection Flow Chart.

Table 2: BMP Selection by Street Context (Model for Living Streets Design Manual, 2011).

	STREET CONTEXT	BIORETENTION			DETENTION		PAVING	INLET PROTECTIONS		
		Swales	Planters	Vegetated Buffer Strips	Rain Gardens	Infiltration Trenches & Dry Wells		Storm Drain Inlet Screens	Storm Drain Filter Inserts	Pipe Filter Inserts
Commercial	Downtown Commercial		✓			✓	✓	✓	✓	✓
	Commercial Thoroughway		✓	✓		✓	✓	✓	✓	✓
	Neighborhood Commercial		✓	✓	✓	✓	✓	✓	✓	✓
Residential	Downtown Residential	✓	✓		✓	✓	✓	✓	✓	✓
	Residential Thoroughway	✓	✓		✓	✓	✓	✓	✓	✓
	Neighborhood Residential	✓	✓		✓	✓	✓	✓	✓	✓
Industrial And Mixed-Use	Industrial	✓	✓		✓	✓	✓	✓	✓	✓
	Mixed-Use		✓	✓	✓	✓	✓	✓	✓	✓
	Sidewalk Furniture Zone	✓	✓		✓	✓	✓	✓	✓	✓
Special	Park Edge	✓	✓		✓	✓	✓	✓	✓	✓
	Boulevard	✓	✓		✓	✓	✓	✓	✓	✓
	Ceremonial (Civic)						✓	✓	✓	✓
Small	Alley		✓			✓	✓	✓	✓	✓
	Shared Public Way		✓			✓	✓	✓	✓	✓
	Walk Street		✓	✓		✓	✓	✓	✓	✓

Table 3: BMP Location Opportunity Summary.

BMP	Location Opportunity Summary
Bioretention	<ul style="list-style-type: none"> • Adjacent to traveled way and in frontage or furniture sidewalk zones • Can be located in curb extensions, medians, traffic circles, roundabouts, and any other landscaped area • Suitable for constrained locations
Infiltration Trench/Dry Well	<ul style="list-style-type: none"> • Can be located under sidewalks and in sidewalk planting strips, curb extensions, roundabouts, and medians
Rain Gardens	<ul style="list-style-type: none"> • Can be integrated medians, islands, circles, street ends, chicanes, and curb extensions • Can be located at the terminus of swales in the landscape
Permeable Pavement	<ul style="list-style-type: none"> • Suitable for parking or emergency access lanes • Can be located in furniture zones of sidewalks especially adjacent to tree wells • Cannot be placed in areas with large traffic volume or heavy load lanes • Avoid steep streets • Cannot be placed within 20 feet of sub-sidewalk basements • Cannot be within 50 feet of domestic water wells
Flow-Through Planters	<ul style="list-style-type: none"> • Above-grade planters should be structurally separate from adjacent sidewalks • At-grade planter systems can be installed adjacent to curbs within the frontage and/or furniture zones
Vegetated Swales	<ul style="list-style-type: none"> • Can be located adjacent to roadways, sidewalks, or parking areas • Can be integrated into traffic calming devices such as chicanes and curb extensions • Can be placed in medians where the street drains to the median • Can be placed alongside streets and pathways • Should be designed to work in conjunction with the street slope
Vegetated Buffer Strips	<ul style="list-style-type: none"> • Can be located in multi-way boulevards, park edge streets, or sidewalk furniture zones • Can serve as pre-treatment
Treatment BMPs	<ul style="list-style-type: none"> • Can be located in a catch basin, manhole, or vault • Can be installed on an existing outlet pipe or at the bottom of an existing catch basin with an overflow • Can be placed on existing curbside catch basins and flush grate openings • Can be installed on the existing wall of a catch basin and on the curb side wall of a catch basin • Minimum set-backs from foundations and slopes should be observed if the BMP is not lined
Street Trees	<ul style="list-style-type: none"> • Can be placed on sidewalks, in furniture zones, and on medians • Adequate spacing must be provided between trees and street lights, pedestrian lights, accessible parking spaces, bus shelters, awnings, canopies, balconies, and signs

SECTION 2 – INFILTRATION

Infiltration systems utilize rock, gravel, and other highly permeable materials for on-site infiltration. In these systems, storm water runoff is directed to the system and allowed to infiltrate into the soils for on-site retention and groundwater recharge. During small storm events, infiltration systems can result in significant or even complete volume reduction of storm water runoff.

Infiltration should be used to the maximum extent practicable. Biotreatment BMPs should be considered if infiltration is found to be infeasible due to low infiltration rates, soil instability, high groundwater, or soil contamination.

Infiltration BMPs may become damaged by storm water carrying high levels of sediment. Therefore, pre-treatment features should be designed to treat street runoff prior to discharging to infiltration features. Media filters, filter inserts, vortex type units, bioretention devices, sumps, and sedimentation basins are several pre-treatment tools effective at removing sediment. Additionally, BMP maintenance will be required to ensure the BMP is optimally functioning and not damaged.

2.1 INFILTRATION TRENCHES AND DRY WELLS

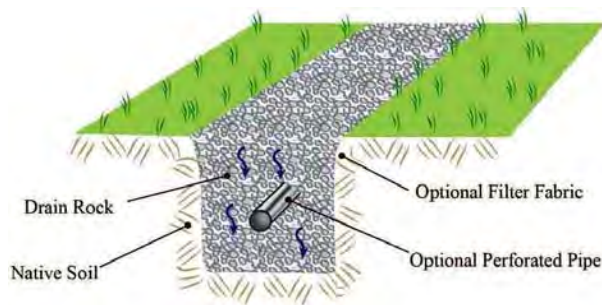


Figure 2: Infiltration Trench (*Model for Living Streets Design Manual, 2011*).

Description

Infiltration trenches are linear, rock-filled features that promote infiltration by providing a high ratio of sub-surface void space in permeable soils. They provide on-site storm water retention and may contribute to groundwater recharge. Infiltration trenches may accept storm water from sheet flow, concentrated flow from a swale or another surface feature, or piped flow from a catch basin. Because they are not flow-through BMPs, infiltration trenches are not intended to have outlets, but may consider an overflow outlet due to large storm events.

Dry wells are typically distinguished from infiltration trenches by being deeper than they are wide. They are usually circular, resembling a well, and are backfilled with the same materials as infiltration trenches. Dry wells typically accept concentrated flow from surface features or from pipes and are not intended to have outlets.

Infiltration trenches and dry wells are typically designed to infiltrate all flow they receive. In large storm events, partial infiltration of runoff can be achieved by providing an overflow outlet and/or a bypass system. Significant or even complete volume reduction is possible in smaller storm events for infiltration trenches and dry wells. During large storm events, infiltration trenches and dry wells may function as detention facilities and provide a limited amount of retention and infiltration.

Location and placement guidelines

Infiltration trenches and dry wells typically have small surface footprints so they are potentially some of the most flexible elements of landscape design. However, because they involve sub-surface excavation, these features may interfere with surrounding facilities. Care needs to be taken to ensure that surrounding building foundations, pavement bases, and utilities are not damaged by infiltration features. Once structural soundness is ensured, infiltration features may be located under sidewalks and in sidewalk planting strips, curb extensions, roundabouts, and medians. Infiltration trenches and dry wells in medians are most effective when the street is graded to drain to the median. Dry wells require less surface area than trenches and may be more feasible in densely developed areas.

Infiltration features should be sited on uncompacted soils with acceptable infiltration capacity. They are best used where soil and topography allow for moderate to good infiltration rates (0.3 inches per hour or better) and the depth to groundwater is at least 10 feet. Prior to design of any retention or infiltration system, proper soil investigation and percolation testing shall be conducted to determine appropriate infiltration design rates, depth to groundwater, and if soil will exhibit instability as a result of infiltration. Any site with potential for previous underground contamination shall be investigated. Infiltration trenches and dry wells can be designed as stand-alone systems when water quality is not a concern or may be combined in series with other storm water tools.

Perforated pipes and piped inlets and outlets may be included in the design of infiltration trenches. Cleanouts should be installed at both ends of any piping and at regular intervals in long sections of piping, to allow access to the system. Access ports are recommended for both trenches and wells and can be combined with clean-outs. If included, the overflow inlet from the infiltration trench should be properly designed for anticipated flows.

2.2 RAIN GARDENS



Figure 3: Rain garden (*Model for Living Streets Design Manual, 2011*).

Description

Rain gardens are vegetated depressions in the landscape. They have flat bottoms and gently sloping sides. Rain gardens can be similar in appearance to swales, but their footprints may be any shape. Rain gardens hold water on the surface, like a pond, and require overflow outlets. The detained water is infiltrated through the topsoil and subsurface drain rock, unless the

volume of water is so large that the excess overflows. Rain gardens can reduce or eliminate off-site storm water discharges while increasing on-site recharge.

Location and Placement Guidelines

Rain gardens may be placed where there is sufficient area in the landscape and where soils are suitable for infiltration. Rain gardens can be integrated with traffic calming measures installed along streets, such as medians, islands, circles, street ends, chicanes, and curb extensions. Rain gardens are often used at the terminus of swales in the landscape.

2.3 PERMEABLE PAVEMENT



Figure 4: Permeable pavement during a storm event
(Model for Living Streets Design Manual, 2011).

Description

Permeable pavement is a system with the primary purpose of slowing or eliminating direct runoff by absorbing rainfall and allowing it to infiltrate into the pavement and ultimately the soil. Permeable pavement also filters and cleans pollutants such as petroleum deposits on streets, reduces water volumes for existing storm drain systems, and decreases the cost of any necessary offsite or onsite downstream water quality infrastructure. This BMP is impaired by sediment-laden run-on, which diminishes the porosity of the pavement. Care should be taken to avoid flows from landscaped areas reaching permeable pavement. Permeable pavement is, in certain situations, an alternative to standard pavement. Conventional pavement is designed to move storm water off-site quickly. Permeable pavement, alternatively, accepts the water where it falls, minimizing the need for management facilities downstream.

Location and Placement Guidelines

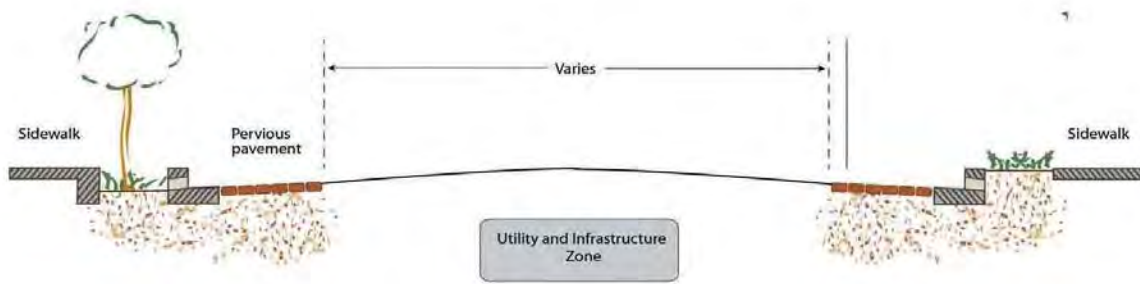


Figure 5: Possible pervious pavement design layout (*Model for Living Streets Design Manual, 2011*).

Conditions where permeable pavement should be encouraged include:

- Sites where there is limited space in the transportation corridor for other BMPs;
- Parking or emergency access lanes; and
- Furniture zones of sidewalks especially adjacent to tree wells

Conditions where permeable pavement should be avoided include:

- Large traffic volume or heavy load lanes;
- Where runoff is already being harvested from an impervious surface for direct use, such as irrigation of bioretention landscape areas;
- Steep streets;
- Gas stations, car washes, auto repair, and other sites/sources of possible chemical contamination;
- Areas with shallow groundwater;
- Within 20 feet of sub-sidewalk basements; and
- Within 50 feet of domestic water wells.

Material and Design Guidelines

A soil or geotechnical report should be conducted to provide information about the permeability rate of the soil, load-bearing capacity of the soil, the depth to groundwater (10 feet or more required), and if soil will exhibit instability as a result of infiltration systems. Infiltration rate and load capacity are key factors in the functionality of this BMP. Permeable pavement generally does not have the same load-bearing capacity as conventional pavement, so this BMP may have limited applications depending on the underlying soil strength and the intended pavement use(s). Permeable pavement should not be used in general traffic lanes due to the possible variety of vehicle weights and heavy volumes of traffic.

When used as road paving, permeable pavement that carries light traffic loads typically has a thick drain rock base material. Pavers should be concrete as opposed to brick or other light-duty materials. Other possible permeable paving materials include porous concrete and porous asphalt. These surfaces also have specific base materials that detain infiltrated water and provide structure for the road surface. Base material depths should be specified based on design load and the soils report.

Plazas, emergency travel or loading road areas, and other areas of limited vehicular access can also be paved with permeable pavement. Paving materials for these areas may include open cell paver blocks filled with stones or grass and plastic cell systems. Base material specifications may vary depending on the product used, design load, and underlying soils.

When used for pedestrian paths, sidewalks, and shared-use paths, appropriate materials include those listed above as well as rubber pavers and decomposed granite or something similar (washed or pore-clogging fine material). Pedestrian paths may also use broken concrete pavers as long as ADA requirements are met. Paths should drain into adjoining landscapes and should be higher than adjoining landscapes to prevent run-on. Pavement used for sidewalks and pedestrian paths should be ADA compliant, smooth, and not exceed a 2 percent slope or have gaps wider than 0.25 inches. Tripping hazards should be avoided.

Design considerations for permeable pavement should include:

- The location, slope and load-bearing capacity of the street, and the infiltration rate of the soil;
- The amount of storage capacity of the base course;
- The traffic volume and load from heavy vehicles;
- The design storm volume calculations and the quality of water; and
- Drain rock, filter fabrics, and other subsurface materials.

Maintenance Guidelines

Maintenance of permeable pavement systems and other Green Street BMPs is essential to their continued functionality. Regular inspection, vacuuming, street sweeping, and when necessary, replacement of BMP(s) should be performed to remove sediment from the pavement surface. The bedding and base material should be selected for long-term durability and sufficient infiltration rates.

SECTION 3 – BIOTREATMENT

Biotreatment BMPs are landscaped, shallow depressions that capture and filter storm water runoff. These types of BMPs are an increasingly common type of storm water treatment device that are installed at the curb level and filled with a bioretention type soil. They are designed as soil and plant-based filtration devices that remove pollutants through a variety of physical, biological, and chemical treatment processes. These systems typically consist of a ponding area, mulch layer, planting soils, and plants. Storm water is directed to the system and pollutants are treated as the storm water drains through the planting soil and either infiltrated or collected by an underdrain and directed to a collection system.

Biotreatment should only be used in cases where infiltration has been proven infeasible due to low infiltration rates, soil instability, high groundwater, or soil contamination.

3.1 BIORETENTION



Figure 6: Bioretention system (*Model for Living Streets Design Manual, 2011*).

Description

Bioretention is a storm water management process that cleans storm water by mimicking natural soil filtration processes as water flows through a bioretention BMP. It incorporates mulch, soil pores, microbes, and vegetation to reduce and remove sediment and pollutants from storm water. Bioretention is designed to slow, spread, and, to some extent, infiltrate water. Each component of the bioretention BMP is designed to assist in retaining water, evapotranspiration, and adsorption of pollutants into the soil matrix. As runoff passes through the vegetation and soil, the combined effects of filtration, absorption, adsorption, and biological uptake of plants achieve the removal of pollutants.

For areas with low permeability or other soil constraints, bioretention can be designed as a flow-through system with a barrier protecting storm water from native soils. Bioretention areas can be designed with an underdrain system that directs the treated runoff to infiltration areas, cisterns, or the storm drain system, or may treat the water exclusively through surface flow. Examples of bioretention BMPs include swales, planters, and vegetated buffer strips.

Location and Placement Guidelines

Bioretention facilities can be included in the design of all street components; adjacent to the traveled way and in the frontage or furniture sidewalk zones. They can be designed into curb extensions, medians, traffic circles, roundabouts, and any other landscaped area. Depending on the feature, maintenance and access should always be considered in locating the device. Bioretention systems are also appropriate in constrained locations where other storm water facilities requiring more extensive subsurface materials are not feasible.

If bioretention devices are designed to include infiltration, native soil should have a minimum permeability rate of 0.3 inches per hour and at least 10 feet to the groundwater table. Sites that have more than a 5 percent slope may require other storm water management approaches or special engineering.

3.2 FLOW-THROUGH PLANTERS

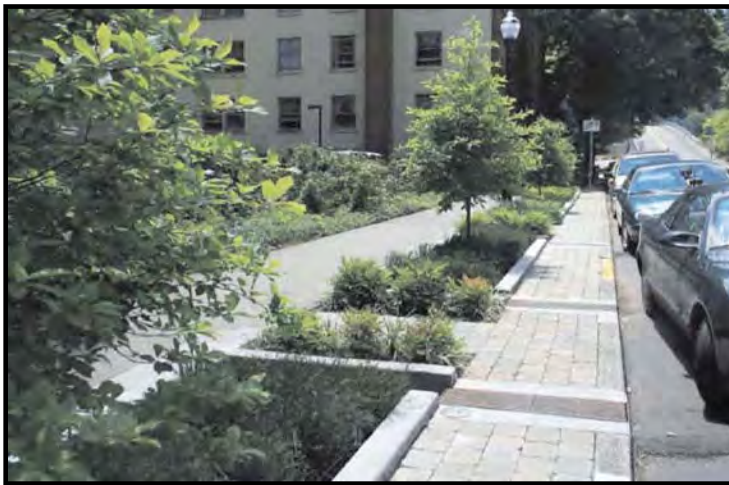


Figure 7: Flow-through planter (*Model for Living Streets Design Manual, 2011*).

Description

Flow-through planters are typically above-grade or at-grade with solid walls and a flow-through bottom. They are contained within an impermeable liner and use an underdrain to direct treated runoff back to the collection system. Where space permits, buildings can direct roof drains first to building-adjacent planters. Both underdrains and surface overflow drains are typically installed with building-adjacent planters.

At-grade street-adjacent planter boxes are systems designed to take street runoff and/or sidewalk runoff and incorporate bioretention processes to treat storm water. These systems may or may not include underdrains.

Location and Placement Guidelines

Above-grade planters should be structurally separate from adjacent pedestrian sidewalks to allow for future maintenance and structural stability per the City's Public Works' standards. At-grade planter systems can be installed adjacent to curbs within the frontage and/or furniture zones.

All planters should be designed to pond water for less than 48 hours after each storm. Flow-through planters designed to detain roof runoff can be integrated into a building's foundation walls, and may be either raised or left at grade.

For at-grade planters, small localized depressions may be included in the curb opening to encourage flow into the planter. Following the inlet, a sump (depression) to capture sediment and debris may be integrated into the design to reduce sediment loadings.

3.3 VEGETATED SWALES



Figure 8: Vegetated swale (Signal Hill, CA).

Description

Swales are linear, vegetated depressions that capture rainfall and runoff from adjacent surfaces. The swale bottom should have a gradual slope to convey water along its length. Swales can reduce off-site storm water discharge and remove pollutants along the way. In a swale, water is slowed by traveling through surface vegetation on a relatively flat grade. This gives particulates time to settle out of the water while contaminants are removed by the vegetation.

Location and Placement Guidelines

Swales can easily be located adjacent to roadways, sidewalks, or parking areas. Transportation corridor runoff can be directed into swales via flush curbs or small evenly-spaced curb cuts into a raised curb. Swale systems can be integrated into traffic calming devices such as curb extensions.

Swales can be placed in medians where the street drains to the median. Placed alongside streets and pathways, vegetated swales can be landscaped with native plants which filter sediment and pollutants and provide habitat for wildlife. Swales should be designed to work in conjunction with the street slope to maximize filtration and slowing of storm water.

Swales are designed to allow water to slowly flow through the system. Depending on the landscape and design storm, an overflow or bypass for larger storm events may be needed. Curb openings should be designed to direct flow into the swale. Following the inlet, a sump may be built to capture sediment and debris.

3.4 VEGETATED BUFFER STRIPS

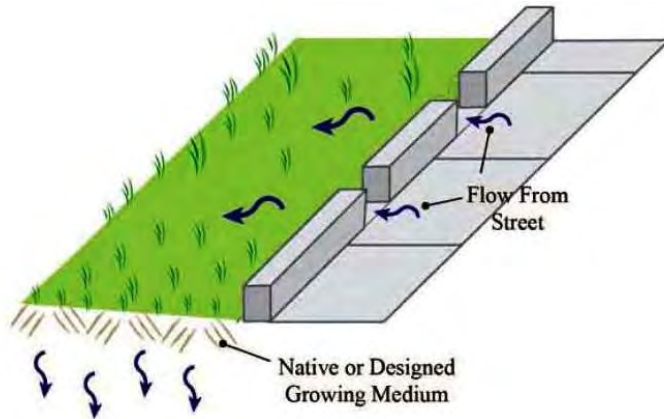


Figure 9: Vegetated buffer strip detail (*Model for Living Streets Design Manual, 2011*).

Description

Vegetated buffer strips are sloping planted areas designed to treat and absorb sheet flow from adjacent impervious surfaces. These strips are not intended to detain or retain water, only to treat it as a flow-through feature. They should not receive concentrated flow from swales or other surface features, or concentrated flow from pipes.

Location and Placement Guidelines

Vegetated buffer strips are well-suited for treating runoff from roads and highways, small parking lots, and pervious surfaces. They may be commonly used on multi-way boulevards, park edge streets, or sidewalk furniture zones with sufficient space. When selecting potential placement, the need for supplemental irrigation should be considered. Vegetated buffers can also be situated so they serve as pre-treatment for another storm water management feature, such as an infiltration BMP.

SECTION 4 – TREATMENT BMPS

4.1 SAND FILTERS & STORM DRAIN INLET PROTECTIONS

As described in Section 1 of this Green Streets Manual, it may be infeasible for specific projects to apply infiltration or biotreatment BMPS. In these cases, sand filters or filter inserts as treatment BMPS can be considered as an alternative. Sand filters and filter inserts can be designed to prevent particulates, debris, metals, and petroleum-based materials conveyed by storm water from entering the storm drain system. All treatment BMP units should have an overflow system that allows the storm drain to remain functional if the filtration system becomes overwhelmed during rainstorms. All storm drain inlet protections must be of a style and configuration approved by the agency³ with ownership of the inlet.

Typical maintenance of catch basins includes scheduled trash removal if a screen or other debris capturing device is used. Street sweeping should be performed by vacuum sweepers with occasional weed and large debris removal. Maintenance should include keeping a log of the amount of sediment collected and the data of removal.

The following are examples of acceptable treatment BMPS:

- **Sand Filters:** Sand filters are designed to filter storm water through a constructed media bed and then directing these flows to an underdrain system. As storm water flows through the media pollutants are filtered out of the water. The filtered water is conveyed through the underdrain to a sub-drain system. Pretreatment is necessary to eliminate significant sediment load or other large particles which would overwhelm the system. Minimum setbacks from foundations and slopes should be observed if the facility is not lined. Filters should be designed such that ponded water should not persist for longer than 48 hours following a storm event.
- **Cartridge Media Filters:** Cartridge media filters contain multiple modular filters which contain engineered media. The filters can be located in a catch basin, manhole, or vault. The manhole or vault may be divided into multiple chambers so that the first chamber may act as a pre-settling basin for removal of coarse sediment while the next chamber may act as the filter chamber. Cartridge media filters are recommended in circumstances with limited available surface area or where surface BMPS would restrict uses. Depending on the number of cartridges, maintenance events can have long durations. Locations should be chosen so that maintenance events will not significantly disrupt businesses or traffic. Inlet inserts should be sized to capture all debris while maintaining a hydraulic overflow capacity and should therefore be selected to match the specific size and shape of each catch basin and inlet. Filter media should be selected to target pollutants of concern. A combination of media may be used to remove a variety of pollutants. Systems with lower maintenance requirements are preferred.
- **Storm Drain Inlet Screens:** Inlet screens are designed to prevent large litter and trash from entering the storm drain system while allowing smaller particles to pass through. The screens function as the first preventive measure in removing pollutants from the storm water system. The City should ensure compliance with local specifications and to schedule regular maintenance. Annual inspection of the screen is recommended to ensure

³ Please note that various storm drain facilities within the City of Burbank are owned by the Los Angeles County Flood Control District.

functionality. Note that most LA River drainage areas are already protected using connector pipe screens through collective systems.

- **Storm Drain Pipe Filter Insert:** The storm drain outlet pipe filter is designed to be installed on an existing outlet pipe or at the bottom of an existing catch basin with an overflow. This filter removes debris, particulates, and other pollutants from storm water as it leaves the storm drain system. This BMP is less desirable than a protection system that prevents debris from entering the storm drain system because the system may become clogged with debris. Outlet pipe filters can be placed on existing curbside catch basins and flush grate openings. Regular maintenance is required and inspection should be performed rigorously. Because this filter is located at the outlet of a storm drain system, clogging with debris is not as apparent as with filters at street level. An overflow design should be considered to prevent the potential for flooding. This BMP may be used as a supplemental filter with an inlet screen or inlet insert unit.

SECTION 5 – STREET TREES

5.1 STREET TREES



Figure 10: Street trees (Burbank, CA).

Description

Healthy urban trees are powerful storm water management tools. Leaves and branches catch and slow rain as it falls, helping it to soak into the ground. The plants themselves take up and store large quantities of water that would otherwise contribute to surface runoff. Part of this moisture is then returned to the air through evaporation. As an important element along sidewalks, street trees must be provided with conditions that allow them to thrive, including adequate uncompacted soil, water, and air.

The goal of adding street trees is to increase the canopy cover of the street, the percentage of its surface either covered by or shaded by vegetation. The selection, placement, and management of all elements in the street should enhance the longevity of a city's street trees and healthy, mature plantings should be retained and protected whenever possible.

Benefits to adding street trees include:

- Creation of shade to lower temperatures in a city, reduces energy use, and makes the street a more pleasant place in which to walk and spend time;
- Slowing and capture of rainwater, helping it soak into the ground to restore local hydrologic functions and aquifers; and
- Improving air quality by cooling air, producing oxygen, and absorbing and storing carbon in woody plant tissues

Guidelines

For guidelines on street tree design refer to the Burbank Tree Ordinance, which can be found in the Burbank Municipal Code's⁴ Title 7, Article 4.

⁴ The Burbank Municipal Code can be accessed at <http://www.codepublishing.com/ca/burbank/>

SECTION 6 – BMP APPLICABILITY

As noted earlier, projects which are required to follow this Green Streets Guidance Manual include the following:

1. Street and road construction of 10,000 square feet or more of impervious surface area.
2. Street and road redevelopment resulting in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

Depending on the project type (new construction or reconstruction) and the project size (in square feet), the following minimum and/or additional BMPs apply:

NEW CONSTRUCTION

Project Size (square feet)	Minimum BMP(s)	Additional BMP(s) if applicant demonstrates that Minimum BMP is not feasible
10,000 - 15,000	Biotreatment (Section 3)	Treatment BMPs (Section 4)
15,000 -25,000	Infiltration (Section 2)	Biotreatment (Section 3)
25,000 or greater	Infiltration (Section 2)	Biotreatment (Section 3) and Treatment BMPs (Section 4)

RECONSTRUCTION

Project Size (square feet)	Minimum BMP(s)	Additional BMP(s) if applicant demonstrates that Minimum BMP is not feasible
5,000 - 9,999	Biotreatment (Section 3)	Treatment BMPs (Section 4)
10,000 - 20,000	Infiltration (Section 2)	Biotreatment (Section 3)
20,000 or more	Infiltration (Section 2)	Biotreatment (Section 3) and Treatment BMPs (Section 4)

SECTION 7 – DEFINITIONS

Best Management Practice (BMP)

Operating methods and/or structural devices used to reduce storm water volume, peak flows, and/or pollutant concentrations of storm water runoff through evapotranspiration, infiltration, detention, filtration, and/or biological and chemical treatment.

Bioretention

Soil and plant-based retention practice that captures and biologically degrades pollutants as water infiltrates through sub-surface layers containing microbes that treat pollutants. Treated runoff is then slowly infiltrated and recharges the groundwater.

Conveyance

The process of water moving from one place to another.

Design Storm

A storm whose magnitude, rate, and intensity do not exceed the design load for a storm drainage system or flood protection project.

Detention

Storm water runoff that is collected at one rate and then released at a controlled rate. The volume difference is held in temporary storage.

Filtration

A treatment process that allows for removal of solid (particulate) matter from water by means of porous media such as sand, soil, vegetation, or a man-made filter. Filtration is used to remove contaminants.

Furniture Zone

The furniture zone is the area which lies between the curb and pedestrian zones and is intended to house utilities and pedestrian amenities.

Hardscape

Impermeable surfaces, such as concrete or stone, used in the landscape environment along sidewalks or in other areas used as public space.

Infiltration

The process by which water penetrates into soil from the ground surface.

Permeability/Impermeability

The quality of a soil or material that enables water to move through it, determining its suitability for infiltration.

Retention

The reduction in total runoff that results when storm water is diverted and allowed to infiltrate into the ground through existing or engineered soil systems.

Runoff

Water from rainfall that flows over the land surface that is not absorbed into the ground.

Sedimentation

The deposition and/or settling of particles suspended in water as a result of the slowing of the water.

Storm water

Water runoff from rain or snow resulting from a storm.

Transportation Corridor

Any designated route within the public right-of-way including sidewalks, roadways, and alley ways.

SECTION 8 – REFERENCES

1. Los Angeles County. *Model for Living Streets Design Manual*. 2011.
2. U.S. Environmental Protection Agency (EPA). *Managing Wet Weather With Green Infrastructure Municipal Handbook: Green Streets*. December 2008.
3. Orange County. *Technical Guidance Document*. May 2011.

ENCLOSURE 4

GREEN STREETS

STANDARDS



GENERAL REQUIREMENTS FOR GREEN STREET (s-480-0)



GENERAL REQUIREMENTS

1. ALL BEST MANAGEMENT PRACTICES (BMPs) FOR STORMWATER INFILTRATION AND WATER QUALITY IMPROVEMENTS PLACED IN THE PUBLIC RIGHT OF WAY SHALL CONFORM TO THE DETAILS AND REQUIREMENTS SPECIFIED IN THIS STANDARD PLAN AND OTHER APPLICABLE STANDARD PLANS. THE BEST MANAGEMENT PRACTICE (BMP) MEANS ANY PROGRAM, TECHNOLOGY, PROCESS, SITING CRITERIA, OPERATIONAL METHODS OR MEASURES, OR ENGINEERED SYSTEMS, WHICH WHEN IMPLEMENTED PREVENT, CONTROL, REMOVE OR REDUCE POLLUTION. A PROJECT SITE CAN BE INSTALLED WITH A SINGLE OR A SERIES OF THE BMPs. ALL WORKS SHALL ALSO CONFORM WITH THE STANDARDS OF THE AMERICANS WITH DISABILITIES ACT (ADA), THE STANDARD SPECIFICATIONS FOR THE PUBLIC WORKS CONSTRUCTION (SSPWC) AS AMENDED BY LOS ANGELES CITY BROWN BOOK, LATEST EDITION AND ANY OTHER APPLICABLE REGULATIONS. IF ANY CONFLICT OCCURS, THE MOST STRINGENT REQUIREMENTS SHALL GOVERN.

2. EXCEPT IN THE PROJECTS CONSTRUCTED BY CITY FORCES, ALL BMPs AND THEIR WORKS, MATERIALS AND PRODUCTS MUST BE SHOWN ON THE PROJECT PLANS AND/OR THE SPECIFICATIONS SUBMITTED TO THE CITY ENGINEER FOR REVIEW AND APPROVAL AND ALL WORKS MUST BE PERFORMED AND INSPECTED UNDER THE APPROVED TYPE B WORK PERMITS IN ACCORDANCE WITH THE LOS ANGELES CITY MUNICIPAL CODE SECTION 62.105. ADDITIONAL REVIEWS AND APPROVALS, INCLUDING BUT NOT NECESSARILY LIMITED TO, THE WATERSHED PROTECTION DIVISION (WPD) OF THE BUREAU OF SANITATION (BOS) (http://www.lacitysan.org/watershed_protection/contact_us.htm), THE URBAN FORESTRY DIVISION (UFD) OF THE BUREAU OF STREET SERVICES (BSS) (<http://bss.lacity.org/UrbanForestryDivision/>), THE DEPARTMENT OF TRANSPORTATION (DOT) (http://www.ladot.lacity.org/tf_Development_Review.htm) MAY ALSO BE REQUIRED. ALL ADDITIONAL REVIEWS AND APPROVALS SHALL BE PREREQUISITE TO THE CITY ENGINEER'S APPROVAL. IMPLEMENTATION OF THE BMPs AS SPECIFIED ON THE CITY STANDARD PLANS WITHOUT CONFORMING TO THE CRITERIA ESTABLISHED HEREIN DOES NOT CONSTITUTE AN APPROVAL OF THE PROJECT BY THE CITY ENGINEER. ALL PROJECT PLANS MUST BE STAMPED BY A CIVIL ENGINEER OR A LICENSED ARCHITECT REGISTERED IN THE STATE OF CALIFORNIA CERTIFYING THAT THE PLANS AND THE BMPs MEET THE ESTABLISHED CRITERIA.

3. THE PROJECT PLANS AND/OR THE SPECIFICATIONS SHALL CONTAIN THE FOLLOWING, BUT NOT NECESSARILY LIMITED TO:
 - A. THE DESIGN REQUIREMENTS FOR APPLYING THE PRACTICE TO ACHIEVE ITS INTENDED USE; SITE CONDITIONS INCLUDING THE ADJACENT LOCAL STORMWATER CONVEYANCE SYSTEMS; THE TYPE AND THE INTENT (TREATMENT AND/OR INFILTRATION) OF BMP TO BE USED; MATERIALS AND CONSTRUCTION PROCESSES; LOCATIONS, SIZES AND ELEVATIONS OF THE NEW AND EXISTING FACILITIES; THE OVERFLOW OR BY-PASS CONVEYANCE SYSTEM AND ALL COMPONENTS OF THE BMP.
 - (1) THE BMP SHALL COMPLY WITH ALL GENERAL SITE, INFILTRATION AND DESIGN REQUIREMENTS SPECIFIED HEREIN,
 - (2) THE EXISTING SITE CONDITIONS SHALL ALSO INCLUDE ALL SURFACE IMPROVEMENTS AND INFRASTRUCTURE TO BE PROTECTED, RELOCATED AND /OR REINSTALLED. PROJECT PLANS SHALL INCLUDE SIDEWALKS, CURBS AND GUTTERS AND OTHER STREET PAVEMENTS THAT ARE AFFECTED BY THE WORKS, THEIR STATIONS AND NEW ELEVATIONS.
 - (3) PRODUCT INFORMATION AND /OR SPECIFICATIONS FOR ALL THE MATERIALS INTENDED TO BE USED INCLUDING THEIR SIZES OR GRADATIONS, THEIR SOURCES OR ORIGINS. ALL MATERIALS MUST BE APPROVED BY THE CITY ENGINEER PRIOR TO THE INSTALLATION.
 - B. SITE SURVEY IF NECESSARY TO SUPPORT THE DESIGN AND INSTALLATION. SITE SURVEY SHALL BE PREPARED BY A SURVEYOR LICENSED IN THE STATE OF CALIFORNIA.
 - C. SOIL REPORT. A SOIL REPORT MUST BE PREPARED BY THE GEOTECHNICAL ENGINEER LICENSED IN THE STATE OF CALIFORNIA.
 - (1) THE SOIL REPORT MUST PROVIDE NECESSARY SOIL DATA, PREPARED BY A QUALIFIED AND EXPERIENCED LOCAL APPROVED SOIL TESTING LABORATORY, INCLUDING THE SOIL TYPE, THE DEPTH TO THE GROUNDWATER, THE LIQUEFACTION POTENTIAL, THE PRESENCE OF EXISTING OR REMOVED UNDERGROUND STORAGE TANKS AND SOIL AND/OR GROUNDWATER CONTAMINATION (INCLUDING HEAVY METALS, ARSENIC, LEAD, CADMIUM, CHROMIUM, HYDROCARBON, ASBESTOS, POLYCHLORINATED BIPHENYL (PCB), AND ETC.) AS DEFINED IN APPLICABLE SECTIONS OF THE CODE OF FEDERAL REGULATIONS (CFR) AND CALIFORNIA CODE OF REGULATIONS (CCR).
 - (2) THE SOIL REPORT MUST CONTAIN THE RECOMMENDATIONS OF THE FOLLOWING:
 - (A) WHETHER THE SITE IS SUITABLE FOR THE PROPOSED BMP AND STATEMENTS REGARDING THE EFFECTS OF THE WATER INFILTRATION ON FOUNDATION SETTLEMENT AND ON HYDROSTATIC PRESSURE.
 - (B) WHETHER THE GEOTEXTILE WITH THE OPENING SIZE AS DESCRIBED IN ARTICLE 5.6.13 ARE SUITABLE FOR THE EXISTING SUBGRADE SOIL AND PROPOSED TOPSOIL AND WHETHER A REPLACEMENT IS RECOMMENDED.
 - (3) THE SOIL REPORT MUST CONTAIN THE RESULTS OF THE WATER PERCOLATION TEST AND THE TESTING METHOD USED, THE RECOMMENDED RELATIVE COMPACTION EFFORTS FOR THE INSTALLATION OF THE BMP AND THE RELOCATION OF UTILITIES AND/OR STRUCTURES.
 - (A) THE SOIL REPORT MUST ALSO INCLUDE THE TESTING RESULTS OF THE AGRICULTURAL SOIL SUITABILITY AND FERTILITY ANALYSIS TESTS OF THE EXISTING AND/OR IMPORTED SOIL IF APPROVED BY THE CITY ENGINEER.
 - (B) FOR PROJECTS WHERE RELOCATION OF UTILITIES AND/OR STRUCTURES IS REQUIRED, OBTAIN ADDITIONAL SOIL SAMPLES, AND CONDUCT TESTING IN ACCORDANCE WITH ASTM G 57-STANDARD TEST METHOD FOR FIELD MEASUREMENT OF SOIL RESISTIVITY USING THE WENNER FOUR ELECTRODE METHOD. SUBMIT TESTING REPORT TO EACH APPLICABLE UTILITY OWNER AS PART OF THE REVIEWS AND APPROVALS.



BUREAU OF ENGINEERING		DEPARTMENT OF PUBLIC WORKS		CITY OF LOS ANGELES	
GENERAL REQUIREMENTS FOR GREEN STREET				STANDARD PLAN S-480-0	
PREPARED ALBERT TAM BUREAU OF ENGINEERING	SUBMITTED JEONG PARK, S.E. ENGINEER OF DESIGN BUREAU OF ENGINEERING DATE: 6/29/10	APPROVED GARY LEE MOORE, P.E. CITY ENGINEER DATE: 6-29-10		SUPERSEDES	REFERENCES S-481 S-484 S-482 S-485 S-483 S-486
CHECKED PATRICK LEE, CE42448 BUREAU OF ENGINEERING				B-4643	
				SHEET 1 OF 9 SHEETS	

- D. LANDSCAPING AND IRRIGATION PLANS. FOR BMPs CONTAINING LANDSCAPING, SUBMIT LANDSCAPING PLANS WITH ALL NECESSARY DETAILS INCLUDING ALL PLANTING MATERIALS, TYPE OF MULCH, PLANT LAYOUTS AND SEED PLACEMENT, PLANTING TIME OF THE YEAR, RECOMMENDED PROTECTION FROM OTHER STRESSES SUCH AS WIND AND SUN TO MAXIMIZE PLANT GROWTH AND SURVIVAL, RECOMMENDED SOIL AMENDMENTS AND FERTILIZERS. THE USE OF PESTICIDES AND QUICK RELEASE SYNTHETIC FERTILIZERS SHALL BE MINIMIZED AND THE PRINCIPLES OF INTEGRATED PEST MANAGEMENT (IPM) SHALL BE FOLLOWED. THE IRRIGATION PLANS SHALL SPECIFY TYPES AND THE LOCATIONS OF ALL EQUIPMENTS, VALVES, DRIP METERS OR LOW FLOW OR MICROSPRAY HEAD LOCATIONS, CONTROLLERS AND WIRING, RAIN SHUT OFF UNITS, APPROVED BACKFLOW DEVICE, PIPE AND PIPE SLEEVE LOCATIONS AND THEIR SIZES, AND RECOMMENDED WATERING SCHEDULES. PLANTS SHALL BE THE NATIVE, DROUGHT AND INUNDATION TOLERANT PLANTS OF SPECIES APPROVED BY THE UFD.
- E. UTILITY PLANS. ALL UTILITIES INCLUDING ALL WATER LINES, ELECTRICAL CABLES AND CONDUITS, BELOW GRADE STRUCTURES, SEWERS AND STORM DRAIN FACILITIES, STREET LIGHTING STANDARDS AND CONDUITS, TRAFFIC CONTROLS AND CONDUITS, POWER POLES AND CONDUITS AND CABLES, TELEPHONE AND OTHER TELECOMMUNICATION CABLES, GAS PIPES, FIRE HYDRANTS, ETC. SHALL BE PROTECTED, RELOCATED AND REINSTALLED IN ACCORDANCE WITH THE UTILITY OWNERS' REQUIREMENTS. ALL ELECTRICAL VAULTS, CABLES AND CONDUITS SHALL BE ONLY PROTECTED IN PLACE AND NOT RELOCATED.
- (1) IF IT IS NECESSARY TO INSTALL ANCHOR ROD/GUY WIRE INSIDE BMP TO SUPPORT THE ADJACENT POWER POLE, PROVIDE INSTALLATION DETAILS THROUGH BMP.
 - (2) IF AN EXISTING WATER SUPPLY MAIN CATHODIC PROTECTION TEST STATION (CPST) IS ENCOUNTERED, NOTIFY THE UTILITY OWNER IMMEDIATELY, PROTECT AND RELOCATE CPST TO APPROVED LOCATION WITHOUT DAMAGING OR DISCONNECTING THE WIRES.
- F. OPERATION AND MAINTENANCE (O & M) PLANS. THE OPERATION AND MAINTENANCE PLANS FOR THE BMPs SHALL BE PREPARED AND THE RESPONSIBLE PARTY SHALL BE IDENTIFIED. THE PLANS SHALL INCLUDE THE INSPECTION SCHEDULES; CLEANING AND MAINTENANCE REQUIREMENTS, REMOVAL AND REPAIR ACTIVITIES AND REQUIRED DISPOSAL PLANS; OPERATION MANUAL FOR ANY MANUFACTURED SYSTEM; COMPLIANCE PROCEDURES IF MAINTENANCE IS NEGLECTED OR ANY CONVENTIONAL MAINTENANCE TASKS THAT SHOULD BE AVOIDED, AND FORM OR LOG TO BE USED. THE O & M PLANS SHALL INCLUDE ALL THE ACTIVITIES AS SPECIFIED HEREINAFTER AND ANY ADDITIONAL MAINTENANCE TRIGGERED BY THE INSPECTIONS.
- (1) THE COVENANT & AGREEMENT (C&A) FORM FOR THE MAINTENANCE OF THE BMPs. EXCEPT PROJECTS CONSTRUCTED BY THE CITY FORCES, SUBMIT C & A WITH O & M PLAN TO THE WPD FOR APPROVAL AND SIGNATURE. THE C & A CAN BE VIEWED AND DOWNLOADED FROM THE FOLLOWING WEB ADDRESS, (http://www.lasstormwater.org/siteorg/download/App_E.pdf.) THE C & A SHALL PROVIDE GUARANTEE ACCESS PERMISSION FOR THE CITY PERSONNEL TO ENTER THE FACILITY TO VERIFY THAT MAINTENANCE IS BEING CONDUCTED IN ACCORDANCE WITH THE O & M PLAN THROUGHOUT THE LIFE OF THE PROJECT. THE C & A FORM SHALL BE EXECUTED BETWEEN ALL THE PROPERTY OWNERS AND THE CITY. BOTH C & A AND O & M SHALL BE RECORDED WITH THE LOS ANGELES COUNTY REGISTRAR-RECORDER. THE EXECUTION AND THE RECORDING ARE PARTS OF THE APPROVAL PROCESS FOR THE BMPs. A COPY OF THE O & M PLANS SHALL BE PROVIDED TO ALL PROPERTY OWNERS AND TENANTS.
 - (2) IN THE EVENT ADEQUATE MAINTENANCE IS NOT CONDUCTED AND FOR THE BEST INTEREST OF THE CITY, THE CITY MAY TAKE NECESSARY STEPS TO RESTORE THE TREATMENT FACILITY TO GOOD WORKING ORDER. THE PROPERTY OWNERS WILL BE RESPONSIBLE TO REIMBURSE THE CITY FOR EXPENDITURES ASSOCIATED WITH THE RESTORATION WORKS.
 - (3) THE CITY ENGINEER HAS THE RIGHT TO SUSPEND ANY APPROVAL OF THE INSTALLATION OF THE BMP WHEN THE BMP IS DISCOVERED OR DETECTED WITH FLAWS, DAMAGES OR DEFECTS WHICH MAY CAUSE HARM TO THE PUBLIC 30 DAYS AFTER THE CITY'S CORRECTION NOTIFICATION AND THE PROPERTY OWNER'S REFUSAL OR FAILURE OF ANY CORRECTION ACTION.
 - (4) THE CITY PERSONNEL HAS THE RIGHT TO ENTER, MAKE NECESSARY ALTERATION AND REPAIR TO ANY BMP TO PROVIDE NECESSARY STREET WIDENING OR UTILITY INSTALLATION WITH NO ADDITIONAL MONETARY COMPENSATION TO THE PROPERTY OWNER.

4. GENERAL SITE AND INFILTRATION REQUIREMENTS.

- A. UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER, NO BMP SHALL BE ALLOWED IN ANY PROJECT SITES CONTAINING ANY ONE OF THE FOLLOWING CONDITIONS:
- (1) SITES LOCATED IN THE CITY OF LOS ANGELES DESIGNATED "LANDSLIDE" OR "HILLSIDE GRADING" AREAS AS SPECIFIED BY THE DEPARTMENT OF CITY PLANNING'S ZONE INFORMATION AND MAP ACCESS SYSTEM (ZIMAS) AND/OR WITH SLOPE STEEPER THAN 5% (20:1, HORIZONTAL TO VERTICAL).
 - (2) SITES WITH PRIMARY STRUCTURAL COMPACTED FILL UNLESS IT IS VERIFIED BY AN APPROVED CERTIFIED COMPACTION REPORT SIGNED BY THE SOIL ENGINEER/GEOTECHNICAL ENGINEER THAT IT IS IN CONFORMANCE WITH THE SOIL PERMEABILITY REQUIREMENTS AS SPECIFIED HEREIN WITHOUT ANY NEGATIVE IMPACTS TO THE STRUCTURAL SUPPORT.
 - (3) SITES LESS THAN 50 FEET DOWNGRADE OF ANY STORMWATER CATCH BASIN.
 - (4) SITES WITH DISTANCE LESS THAN 100 FEET FROM ANY BRIDGE, OVER OR UNDER PASS, TUNNEL, RAIL ROAD, AND/OR RETAINING WALL.
 - (5) SITES WITH DISTANCE LESS THAN 1000 FEET FROM ANY WATER SUPPORT OR DRINKING WELL.
 - (6) SITES WITH HISTORIC HIGH GROUNDWATER WITHIN 10 FEET OF EXISTING GRADE.
 - (7) ON OR UP-GRADE OF SITES WITH THE PRESENCE OF SOIL AND/OR GROUNDWATER CONTAMINATION, EXISTING AND/OR REMOVED SEPTIC OR UNDERGROUND STORAGE TANKS. THE CONTAMINATED SITES SHALL BE DOCUMENTED BY CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) OR NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) ENVIRONMENTAL REPORTS, APPROVED SOIL REPORTS, THE PERMITS ON FILE WITH THE CITY OR A REVIEW OF THE STATE OF CALIFORNIA GEOTRACKER WEBSITE.
 - (8) SITES LOCATED IN THE UPPER LOS ANGELES RIVER AREA (ULARA) WITHOUT THE APPROVAL OF THE ULARA WATERMASTER.
 - (9) SITES WITH STRUCTURAL ELEMENTS SUCH AS MAJOR TRAFFIC SIGNS, GATEWAY AND ARCH, MONUMENT OR STATUE, FOUNTAIN, FLAG POLE AND ETC. TO BE INCLUDED IN THE BMP WITHOUT ANY STRUCTURAL RETROFITTING OR REINFORCEMENT. MINIMUM 10 FEET CLEARANCE SHALL BE MAINTAINED WITH THE FACILITIES.
 - (10) SITES WITH EXISTING TREES THAT ARE REQUIRED TO REMAIN BY UFD AND THESE TREES CANNOT BE REMOVED OR RELOCATED DUE TO THE POTENTIAL FOR MORTALITY, EXCESSIVE ROOT CUTTING OR PRUNING. MAINTAIN MINIMUM THREE FEET CLEARANCE BETWEEN THE BMPs AND ANY PART OF THE TREETWELLS AND/OR TREETWELL GRATES.



- (11) SITES DESIGNATED AS UTILITY CORRIDOR OR EASEMENT OR SITES CONTAINING EXISTING UTILITIES INCLUDING VAULTS, PULL BOXES, ABOVE GRADE FACILITIES (AGF), STREET LIGHTING STANDARDS, POWER POLES, SEWAGE AND STORM DRAIN FACILITIES, TRAFFIC SIGNALS, FIRE HYDRANTS AND ETC. ALL UTILITIES, VAULTS, PIPINGS, CONDUITS AND CABLES SHALL NOT BE LOCATED INSIDE ANY BMP WITHOUT ANY STRUCTURAL DESIGN, MODIFICATION OR RETROFITTING. ALL UTILITIES SHALL BE PROTECTED AT ALL TIME AND ONLY BE ALLOWED TO BE RELOCATED AND REINSTALLED IN ACCORDANCE WITH ARTICLE 5 E. ALL UTILITIES SHALL BE LOCATED ADJACENT TO OR NEAR ANY BMP AND THE ZONE OF SATURATION WITH MINIMUM CLEARANCES LISTED AS FOLLOWS:
- (A) FOR UTILITIES CONSISTING OF AGF, STREET LIGHTING STANDARDS, POWER POLES, TRAFFIC SIGNALS, FIRE HYDRANTS AND ETC., MAINTAIN A MINIMUM FIVE FEET RADIAL CLEARANCE BETWEEN THE BMP AND ANY COMPONENTS OF THE UTILITIES. ON ONE SIDE OF THE FIVE FEET RADIAL CLEARANCE PERPENDICULAR TO THE STREET CURB AS SELECTED BY CITY ENGINEER, PROVIDE ADDITIONAL 3 FEET ACCESSIBILITY CLEARANCE TO THE FIVE RADIAL CLEARANCE.
 - (B) FOR ON GRADE OR BELOW GRADE VAULTS, PULL BOXES, MAINTENANCE HOLE FRAMES AND COVERS; MAINTAIN A MINIMUM TWO FEET CLEARANCE BETWEEN THE BMP AND ITS ZONE OF SATURATION AND ANY COMPONENT OF THE VAULTS, PULL BOXES, AND/OR MAINTENANCE HOLE FRAME AND COVER. IF ANY COMPONENT OF THE VAULTS, PULL BOXES AND ETC. IS LOCATED LESS THAN 24 INCHES FROM THE ZONE OF SATURATION, ALL VAULTS, PULL BOXES, AND ETC. SHALL BE PROTECTED ALL AROUND WITH AN IMPERMEABLE LINER /GEOMEMBRANE.
 - (C) FOR ALL UTILITY LINES, PIPES, CONDUITS AND CABLES, MAINTAIN A MINIMUM TWO FEET HORIZONTAL CLEARANCE OR DISTANCE AS DETERMINE BY UTILITY OWNER, WHICHEVER IS THE MOST STRINGENT.
- (12) SITES REGISTERED AS HISTORIC SITE OR HISTORIC-CULTURAL MONUMENTS, OR CONSIDERED AS HISTORICALLY IMPORTANT. SEE LISTING IN (http://cityplanning.lacity.org/complan/HCM/dsp_hcm_result.cfm?community=Central%20City)
- (13) SITES LOCATED IN FRONT OF FIRE DEPARTMENT CONNECTION; STANDPIPE; INLET, OUTLET OR DRAIN PIPE THAT ARE INSTALLED AT THE EXTERIOR OF THE BUILDING. SUCH FIRE FACILITIES SHALL BE READILY ACCESSIBLE BY THE FIRE DEPARTMENT AND SHALL BE PROVIDED WITH A MINIMUM OF 48 INCHES CLEAR SIDEWALK ACCESS FROM THE STREET CURB TO THE FIRE FACILITIES. NO TEST DRAIN OF ANY STANDPIPE SYSTEM OR ANY OTHER BUILDING PRESSURIZED OUTLET PIPE INCLUDING SUMP PUMP PIPE SHALL BE CUT OR INTERRUPTED OR CONCEALED OR REROUTED AND DRAIN TO BMPs.
- (14) SITES WITH SHALLOW, LOW PERMEABILITY OR IMPERVIOUS SOILS (SILT, CLAY OR HARD PAN, BED ROCK) NOT CONFORMING WITH THE INFILTRATION REQUIREMENTS AS DESCRIBED IN ARTICLE 5.G.1 OF THIS STANDARD PLAN TO WITHIN FIVE FEET FROM THE BOTTOMS OF THE BMPs.
- (15) SITES WITHIN 50 FEET CLEARANCE OF BUS STOP, BUS SHELTER, BUS BENCH AND THEIR REQUIRED CLEAR APPROACH AREA. FOR ARTICULATED BUS STOP, MINIMUM 60 FEET CLEARANCE SHALL BE MAINTAINED.
- (16) SITES WITHIN 25 FEET OF THE BEGINNING OF CURB RETURN (BCR), THE END OF CURB RETURN (ECR), THE TOP OF CURB OF ANY CURB RAMP OR ALLEY INTERSECTION, AND SITES WITHIN 10 FEET FROM THE "X" TRANSITION OF THE TOP OF DRIVEWAY.
5. GENERAL DESIGN REQUIREMENTS. ALL THE BMPs SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE DETAILS AND REQUIREMENTS AS SPECIFIED HEREIN AND OTHER APPLICABLE STANDARD PLANS.
- A. NO BMPs SHALL ALTER OR INTERFERE WITH FLOOD CONTROL FUNCTIONS OF EXISTING CONVEYANCE SYSTEMS OR DETENTION STRUCTURE.
 - B. ALL BMPs MUST HAVE ADEQUATE DESIGN, MEASUREMENT AND SIZE TO CONVEY STORMWATER RUNOFF TO THE GROUND AND TO INFILTRATE WITHOUT DANGER TO THE GROUND WATER AFTER APPROPRIATE TREATMENT. THE RUNOFF IN EXCESS OF THE DESIGNED CAPACITY MUST BE DISCHARGED THROUGH AN OVERFLOW OR BYPASS CONVEYANCE SYSTEM TO EXISTING STORMWATER CONVEYANCE SYSTEM.
 - C. FOR BMPs WITH INFILTRATION CAPABILITIES, NO RUNOFF SHOULD ERODE THE BMP OR DISLODGE, RESUSPEND OR FLUSH OUT ANY SEDIMENTS OR POLLUTANTS THAT HAVE BEEN ACCUMULATED OR CAUSE ANY SIGNIFICANT ADVERSE IMPACT TO ADJACENT OR DOWN-GRADIENT SITES OR PROPERTIES.
 - D. NO PORTION OF BMPs SHALL BE ALLOWED TO FALL INTO THE COMPLETE SHADES OF ADJACENT BUILDINGS OR TREES THROUGHOUT THE ENTIRE DAY AS THIS WILL CAUSE POOR PLANT GROWTH. NO NEW TREES SHALL BE ALLOWED IN THE BMPs UNLESS THEIR SHADES WOULD NOT COVER THE BMPs AND BLOCK OUT THE SUNLIGHT AND PREVENT THE GROWTH OF OTHER PLANTS OR VEGETATION. TREES AND SHRUBS MUST FOLLOW THE RELEVANT STANDARD PLANS FOR PLANNING INCLUDING THE REQUIRED PROPER PLANTING AND TOP SOIL DEPTHS AND WIDTHS WITHOUT ALTERING THE DESIGN OR THE SURFACE FLOW IN THE BMPs.
 - E. FOR PERVIOUS OR PERMEABLE PAVING TYPE OF BMPs LOCATED IN THE SIDEWALK AND STREET PAVEMENT INCLUDING ANY APPLICABLE VEHICULAR TRAFFIC AREA, THEY SHALL CONFORM TO THE APPLICABLE VEHICULAR AND PEDESTRIAN LOADING REQUIREMENTS AND OTHER REQUIREMENTS AS DETERMINED BY THE CITY ENGINEER. THEY SHALL BE PROVIDED WITH RIGID PAVEMENT OR FLEXIBLE PAVEMENT DESIGN, WHICHEVER IS APPLICABLE, CONFORMING TO THE BUREAU OF ENGINEERING STREET PAVEMENT DESIGN REQUIREMENTS. ALL PERVIOUS OR PERMEABLE PAVING TYPE OF BMPs SHALL BE DESIGNED AND CONSTRUCTED AS STORMWATER PRETREATMENT SYSTEM WITH RUNOFF EXFILTRATED THROUGH A DRAINAGE OR BYPASS PIPE TO THE STORMWATER CONVEYANCE SYSTEM. UNLESS OTHERWISE SPECIFIED BY THE CITY ENGINEER, PERVIOUS OR PERMEABLE PAVING TYPE OF BMPs SHALL NOT BE ALLOWED IN ANY AREA HAVING AVERAGE DAILY TRIPS (ADT) GREATER THAN 100.
 - F. UNLESS OTHERWISE SPECIFIED, A MINIMUM 48 INCHES WIDE SIDEWALK ACCESS OR OTHER CLEARANCE AS SPECIFIED HEREIN, WHICHEVER IS THE MOST STRINGENT, MUST BE PROVIDED AT EACH END OF THE BMPs FROM THE SIDEWALK TO THE STREET CURB. ALL FINAL OR FINISHED SURFACES OF THE BMPs THAT ARE SUBJECT TO PEDESTRIAN OR VEHICULAR TRAFFIC SHALL HAVE ADEQUATE AND APPROVED PROTECTIVE, SLIP AND/OR SKID RESISTANT FINISHES IN ACCORDANCE WITH ADA, THE SSPWC AS AMENDED BY THE BROWN BOOK AND THE STANDARD PLAN S-601, LATEST EDITION.
 - G. FOR BMPs THAT INCLUDE LANDSCAPING/VEGETATION, THE EXISTING SOILS AND/OR AMENDED TOP SOILS AND/OR PERMEABLE AGGREGATE BASES USED TO RETAIN AND TREAT RUNOFF BY FILTRATION OR POLLUTANT REMOVAL AND TO TEMPORARILY STORE THE RUNOFF BEFORE ALLOWING IT INFILTRATE INTO THE SUBSOILS, SHALL CONFORM TO THE FOLLOWING:
 - (1) SOIL INFILTRATION. SOILS IN PROJECT SITE SHALL BE GROUP A, LOAM SAND SOIL, WITH LESS THAN 5% CLAY CONTENT, AS CLASSIFIED BY THE U.S. DEPARTMENT OF AGRICULTURE, NATURE RESOURCES CONSERVATION SERVICE (NRCS) (FORMERLY THE SOIL CONSERVATION SERVICE) OR SM OR SC SOIL AS CLASSIFIED IN UNIFIED SOIL CLASSIFICATION SYSTEM, RESPECTIVELY. THE INFILTRATION OR PERCOLATION RATES OF THE SOILS WITHIN 10 FEET OF THE EXISTING GRADE SHALL BE MINIMUM 0.5 INCH PER HOUR AND MAXIMUM 2.40 INCHES PER HOUR. NO BMPs WITH STORMWATER INFILTRATION OBJECTIVES SHALL BE PLACED IN EXISTING SOILS WITH LOWER SOIL CLASSIFICATIONS SUCH AS GROUPS B, C OR D SOILS AS CLASSIFIED BY NRCS.



THE SOILS SHOULD BE CERTIFIED BY A QUALIFIED GEOTECHNICAL ENGINEER LICENSED IN STATE OF CALIFORNIA AS REQUIRED IN ARTICLE 3.C.

- (2) TOP SOILS. EXISTING SOILS OR IMPORTED SOILS USED AS THE TOP SOILS FOR PLANTING SHALL BE FERTILE AND FRIABLE GARDEN SOIL SUITABLE FOR SUSTAINING AND PROMOTING THE GROWTH OF THE SPECIFIED PLANTS. THE TOP SOILS SHALL CONFORM TO THE SOIL PROPERTIES AND INFILTRATION AS SPECIFIED IN ARTICLE 5.6.1 TOP SOILS SHALL BE FREE OF ROOTS, CLODS, STONE LARGER THAN ONE INCH IN THE GREATEST DIMENSION, POCKETS OF COARSE SAND, NOXIOUS WEEDS, STICKS, LUMBER BRUSH AND OTHER LITTER BEFORE BEING MIXED OR AMENDED. THE SOILS SHALL BE FREE OF NEMATODES OR ANY OTHER UNDESIRABLE DISEASE-CAUSING ORGANISMS SUCH AS INSECT PESTS AND PLANT PATHOGENS.
- (3) THE BMPs SHALL SEEK TO MINIMIZE OR TO COMPLETELY AVOID THE USE OF FERTILIZERS OR PESTICIDES. SOIL CONDITIONING MATERIALS IF USED SHALL COMPLY WITH THE APPLICABLE REQUIREMENTS OF THE STATE AGRICULTURAL CODE AND THE DETAILS OF THE APPROVED LANDSCAPING PLANS. ALL MATERIALS SHALL BE PACKAGED, FIRST GRADE, COMMERCIAL QUALITY ORGANIC PRODUCTS AND SHALL NOT CONTAIN ANY INORGANIC FERTILIZERS, TOXIC INGREDIENTS, PESTICIDES OR OTHER FILLERS IN QUANTITIES THAT MAY BE HARMFUL TO HUMAN, ANIMAL, OR PLANT LIFE.
- (4) ANY IMPORT OR EXISTING SOILS USED AS TOP SOILS SHALL BE COMPLETELY AMENDED TO COMPLY WITH THE FOLLOWING.
50% CONSTRUCTION SAND
20-30% TOP SOIL WITH LESS THAN 5% MAXIMUM CLAY CONTENT
20-30% ORGANIC LEAF COMPOST
- (5) CONSTRUCTION SAND. CONSTRUCTION SAND SHALL BE COARSE SAND (0.02-0.04 INCH), CLEANED TO REMOVE CLAY AND SILT PARTICLES AND SHALL MEET ASTM C 33 -SPECIFICATIONS OF CONCRETE AGGREGATE.
- (6) PEA GRAVEL. IF PEA GRAVEL OR ANGULAR CRUSHED PEBBLE IS SPECIFIED TO SEPARATE TOPSOIL FROM DRAIN ROCK/PERMEABLE AGGREGATE BASE, THE MATERIAL SHALL BE 1/4 TO 3/4 INCHES, CLEAN, WASHED AND FREE OF ORGANIC MATERIALS.
- (7) DRAIN ROCK/PERMEABLE AGGREGATE BASE. THE DRAIN ROCK/PERMEABLE BASE SHALL BE NO. 4 AGGREGATES WITH THE GRADATION IN ACCORDANCE WITH THE ASTM D 448-CLASSIFICATION FOR SIZES OF AGGREGATE FOR ROAD AND BRIDGE CONSTRUCTION. THE AGGREGATES SHALL BE DURABLE, CRUSHED ANGULAR AGGREGATES WITH MORE THAN TWO FRACTURED FACES. THE AGGREGATES SHALL BE, CLEAN AND FREE OF ALL FINES AND ORGANIC.

ASTM D 448 NO. 4 AGGREGATE (1 1/8 INCH TO 3/4 INCH)

SIEVE SIZE	% PASSING
2"	-
1 1/2"	90-100
1"	20-55
3/4"	0-15
1/2"	-
3/8"	0-5
No. 4 (3/16")	-
No. 8 (3/32")	-



- (8) THE AGGREGATES SHALL HAVE LOS ANGELES ABRASION WEAR NOT TO EXCEED 45% AS DETERMINED BY AASHTO T96-RESISTANCE TO ABRASION OF SMALL SIZE COURSE AGGREGATE BY USE OF THE LOS ANGELES MACHINE. THE SOUNDNESS PERCENT LOSS SHOULD NOT EXCEED 12 OR 18 PERCENT AS DETERMINED BY CALIFORNIA TEST METHOD NO. 214 OR THE SODIUM SULFATE OR MAGNESIUM SULFATE TESTS. CONDUCTED IN ACCORDANCE WITH AASHTO T104.

THE COEFFICIENT OF UNIFORMITY RATIO OF THE D60 PARTICLE SIZE TO THE D10 PARTICLE SIZE, ($C_u = D_{60}/D_{10}$), OF THE AGGREGATE SHOULD BE GREATER THAN FOUR TO PROVIDE THE REQUIRED STABILITY DURING CONSTRUCTION.

D60 SHALL MEAN PARTICLE SIZE (mm) THAT HAS 60% PASSING
D10 SHALL MEAN PARTICLE SIZE (mm) THAT HAS 10% PASSING

- (9) COMPOST. THE COMPOST SHALL BE A MIXTURE THAT CONSISTS LARGELY OF AEROBICALLY DECAYED ORGANIC LEAF WASTE THAT IS FREE OF GLASS, METAL, PLASTIC, HERBICIDES, TOXIC, TRASH, UNCOMPOSTED MATERIAL, RESIDUAL SEED MATERIALS OR PATHOGENS, HEAVY METALS OR OTHER POLLUTANTS AND COMPOUNDS SUCH AS AMMONIA AND ORGANIC ACID, IN CONCENTRATIONS TOXIC TO PLANT GROWTH. THE COMPOST SHALL BE RESISTANT TO FURTHER DECOMPOSITION. THE COMPOST SHALL HAVE PARTICLE SIZE WITH 98% OF THE COMPOST PASSING THROUGH A 0.75 INCH SIEVE SCREEN. THE COMPOST SHALL HAVE AT LEAST 40% ORGANIC MATTER, LESS THAN 60% ASH CONTENT AND pH BETWEEN 6 AND 8. FOR BMP WITHOUT PERMEABLE AGGREGATE BASE, COMPOST CAN BE INCORPORATED INTO THE EXISTING SOIL USING A CHISEL FLOW OR ROTARY DEVICE WITH THE CAPABILITY OF REACHING 12 INCHES BELOW THE EXISTING SURFACE.
- (10) PLANTS AND VEGETATION. THE PLANTS AND THE VEGETATION USED IN ANY BMP SHALL BE NATIVE, NON-INVASIVE, FIRE RESISTANT, DEEP ROOTED PLANTS OR VEGETATION INCLUDED IN THE LANDSCAPE PLAN AND THE C&A APPROVED BY THE UFD AND THE CITY ENGINEER. CHOOSE PLANTS THAT MINIMIZE OR ELIMINATE THE USE OF FERTILIZERS OR PESTICIDES AND THAT ARE ABLE TO SUSTAIN GROWTH WHERE THE CONTINUOUS LOW BASE FLOW AND FLAT SLOPES ARE LIKELY TO RESULT IN SATURATED SOIL CONDITIONS. USE SPECIES THAT WOULD BE ABLE TO WITHSTAND PERIODIC WETTING, INCLUDING TOTAL SUBMERGENCE FOR SHORT PERIODS IN SUMMER AND CONTINUED WETTING AND OCCASIONAL PERIODS OF SUBMERGENCE IN WINTER TIME.

NO PLANT MATERIAL USED IN ANY BMP SHALL EXCEED THE HEIGHT OF 36 INCHES FROM THE FINISH ELEVATIONS OF ADJACENT ROADWAY SURFACES OR TO ANY HEIGHT THAT WOULD CAUSE OBSTRUCTION TO THE LINE OF SIGHT VERTICALLY AND HORIZONTALLY IF THE BMP IS LOCATED WITHIN THE 45 FEET OF THE VISIBILITY TRIANGLE AREAS AT TYPICAL STREET INTERSECTIONS AS DEFINED IN LOS ANGELES CITY MUNICIPAL CODE SECTION 62.200. IT SHALL BE A MINIMUM ONE FOOT CLEARANCE BETWEEN THE PLANT MATERIALS IN THE BMPs AND THE SIDEWALKS.

- (11) IRRIGATION SYSTEM. IMPLEMENT IRRIGATION PLANS WITH IRRIGATION SYSTEMS DESIGNED TO EACH LANDSCAPE AREA'S SPECIFIC WATER REQUIREMENTS WITH THEIR MAXIMUM APPLIED WATER ALLOWANCES (MAWA) AND THE ESTIMATED TOTAL WATER USES (ETWU) APPROVED BY THE CITY ENGINEER. PROJECTS, LOCATED NEAR ACTIVE SEISMIC FAULTS, NEED TO INCORPORATE SPECIAL DESIGN FEATURES TO ALLOW THE PIPES TO BE BUILT ACROSS THE FAULTS AND TO ACCOMMODATE THE GRADUAL MOVEMENT OF THE TECTONIC PLATES THAT MEET AT THE FAULT LINE. THE IRRIGATION PLANS SHALL BE CONSISTENT WITH THE CALIFORNIA STATE MODEL WATER EFFICIENT LANDSCAPE ORDINANCE AND OTHER LOCAL WATER CONSERVATION ORDINANCE. THE IRRIGATION SYSTEMS SHALL HAVE RAIN OR MOISTURE TRIGGERED SENSORS AND SHUT OFF DEVICES TO PREVENT IRRIGATION AFTER PRECIPITATION. THE IRRIGATION SYSTEMS SHALL ALSO HAVE PROGRAMMABLE IRRIGATION CONTROLLER WHICH HAS THE FOLLOWING MINIMUM FEATURES:

- THREE INDEPENDENT PROGRAMS
- THREE START TIMES PER PROGRAMS

- ODD/EVEN, WEEKLY AND INTERVAL PROGRAM CAPABILITY UP TO 30 DAYS
- WATER BUDGETING FROM 0-200%, IN 10% INCREMENTS
- 365 DAY CALENDAR, ADJUSTED FOR LEAP YEAR
- NON-VOLATILE MEMORY AND BATTERY BACK-UP
- "OFF", "AUTO", AND "MANUAL" MODELS WITHOUT DISTURBING PROGRAMMING
- RAIN OR MOISTURE TRIGGERED SENSING AND SHUT-OFF CAPABILITY
- DIAGNOSTIC CIRCUITRY TO NOTIFY USER WHEN STATION IS SHORTED OR A POWER FAILURE HAS OCCURRED

UNLESS SPECIFIED OTHERWISE BY THE CITY ENGINEER, POINT SOURCE OR DRIP TYPE IRRIGATION DEVICES THAT EMIT WATER SLOWLY SHALL BE USED FOR INDIVIDUAL PLANTS SUCH AS SHRUBS.

WHEN NECESSARY AND AS DIRECTED BY THE CITY ENGINEER, INCLUDE DESIGN FEATURING FLOW REDUCERS OR EMERGENCY SHUT OFF VALVES THAT ARE TRIGGERED BY A PRESSURE DROP AND SO ABLE TO CONTROL WATER LOSS IN THE EVENT OF BROKEN SPRINKLER HEADS OR LINES.

- (12) MULCH. SURFACE MULCH LAYER SHALL BE USED AND SHALL BE ALLOWED TO SETTLE PRIOR TO PLANTING. MULCH SHALL BE TYPE 1 MULCH PER SSPWC OR CONSISTING OF GROUNDED OR SHREDDED HARDWOOD OR CHIP PRODUCTS DERIVED FROM REDWOOD, FIR OR CEDAR SAWDUST, OR FROM THE BARK OF FIR OR PINE AGED A MINIMUM OF 12 MONTHS AND TREATED WITH A NON-TOXIC AGENT. THE MULCH SHALL BE PLACED ON THE SURFACE OF PLANTING AREAS OF THE BMPs WITH 2 TO 3 INCHES DEPTH OR TO THE DEPTH AS INDICATED ON THE PROJECT PLANS. THE MULCH SHALL BE FREE OF FOREIGN MATERIALS INCLUDING OTHER PLANT MATERIAL.
- (13) GEOTEXTILES. APPROVED GEOTEXTILES SHALL BE DESIGNED TO PERFORM THE FUNCTIONS OF FILTRATION, DRAINAGE AND/OR MATERIAL SEPARATION WITHIN THE BMPs. THE GEOTEXTILE MAY BE USED AS AGGREGATE SEPARATOR LAYER BETWEEN THE TOP SOILS AND THE PERMEABLE AGGREGATE BASE OR BETWEEN THE PEA GRAVEL, OR BETWEEN THE PERMEABLE AGGREGATE BASE AND THE SUBGRADE SOIL. THE GEOTEXTILE MUST ALSO BE STRONG ENOUGH TO PROVIDE A STABLE WORKING PLATFORM FOR THE CONSTRUCTING OF THE PERMEABLE AGGREGATE BASE. THE GRADATION OF THE GEOTEXTILE USED AS AGGREGATE SEPARATOR LAYER MUST BE CAREFULLY VERIFIED BEFORE APPLICATION TO PREVENT TOP SOILS FALLING INTO THE PERMEABLE AGGREGATE BASE OR THE FINES FROM PUMPING UP FROM THE SUBGRADE INTO THE PEA GRAVEL OR PERMEABLE AGGREGATE BASE.

THE GEOTEXTILE SHALL BE NEEDLE PUNCH, NON-WOVEN, AND ULTRA VIOLET LIGHT RESISTIVE. THE GEOTEXTILE SHALL BE MADE OF POLYPROPYLENE AND SHALL HAVE MINIMUM THICKNESS OF 130 MILS AND MINIMUM WEIGHT OF 10 OZ/ SQ YARD. THE GEOTEXTILE SHALL HAVE FLOW RATE GREATER 125 GPM/SQ. FT. AND APPARENT OPENING SIZE US #70 OR #80 SIEVES AND WITH THE FOLLOWING PHYSICAL STRENGTHS:

STRENGTH REQUIREMENTS	CLASS A
GRAB STRENGTH (ASTM D 4632)	250 LBS
GRAB ELONGATION AT BREAK, (ASTM D 4632)	50%
SEAM BREAKING STRENGTH (ASTM D 4632)	160 LBS
PUNCTURE STRENGTH (ASTM D 4833)	150 LBS
MULLEN BURST STRENGTH (ASTM D 3768)	290 LBS
TRAPEZOIDAL TEAR (ASTM D 4355)	100 LBS
UV RESISTANCE AT 150 HRS (ASTM D 4355)	70%

NOTE: ASTM D 3768-METHOD FOR TESTING MICROCELLULAR URETHANES-FLEXURAL RECOVERY
 ASTM D 4355-TEST METHOD FOR DETERIORATION OF GEOTEXTILES FROM EXPOSURE TO ULTRAVIOLET LIGHT AND WATER
 ASTM D 4632-TEST METHOD FOR GRAB BREAKING LOAD AND ELONGATION OF GEOTEXTILES.
 ASTM D 4833-TEST METHOD FOR INDEX PUNCTURE RESISTANCE OF GEOTEXTILES, GEOMEMBRANES AND RELATED PRODUCTS.

- H. IMPERMEABLE LINER/GEOMEMBRANE (IL/GM). IL/GM SHALL BE A SINGLE-PLY, 30 MIL THICK POLYVINYL CHLORIDE (PVC) LINER. THE IL/GM SHALL HAVE THE MINIMUM PHYSICAL PROPERTIES AS SPECIFIED HEREIN. THE MAXIMUM ALLOWABLE SLOPE RECOMMENDED BY THE MANUFACTURE FOR THE IL/GM SHALL NOT EXCEED THE SLOPES ALLOWED IN THE BMPs. EXCEPT AREAS WITH PIPE AND CONDUIT PENETRATIONS AND FIELD REPAIRS WHERE FIELD WELDING ARE REQUIRED, ALL SEAMS SHALL BE FACTORY MADE WITH THERMAL FUSION WELD.

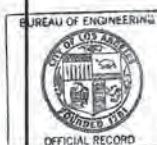
STRENGTH REQUIREMENTS	CLASS A
TENSILE STRENGTH AT BREAK (ASTM D 882)	73 LBS/IN
ELONGATION AT BREAK (ASTM D 882)	380 %
TEAR STRENGTH (ASTM D 1004)	8 LBS/IN
SHEAR STRENGTH ON SEAM (ASTM D 882)	58.4 LBS/IN
PEEL STRENGTH ON SEAM (ASTM D 882)	15 LBS/IN
HYDROSTATIC RESISTANCE (ASTM D 751)	100 PSI

NOTE: ASTM D 751-METHOD OF TESTING COATED FABRICS
 ASTM D 882- TEST METHODS FOR TENSILE PROPERTIES OF THIN PLASTIC SHEETING
 ASTM D 1004- TEST METHOD FOR INITIAL TEAR RESISTANCE OF PLASTIC FILM AND SHEETING

- I. OBSERVATION WELLS. IT IS RECOMMENDED TO INSTALL IN ALL BMPs A MINIMUM OF ONE OBSERVATION WELL MADE OF TWO INCH DIAMETER PVC SDR 35 PERFORATED PIPE WRAPPED WITH GEOTEXTILE IN FULL DEPTH AT A LOCATION NEAR THE CENTER OF THE BMP. EACH OBSERVATION WELL SHALL HAVE CAP SECURED WITH A LOCK. FOR OBSERVATION WELL LOCATED WITHIN PERVIOUS OR PERMEABLE PAVING, OBSERVATION WELL SHALL BE ENCLOSED WITHIN A CITY APPROVED TRAFFIC RATED PULL/VALVE BOX AND COVER.
- J. TRASH SCREEN. IF BMP IS INSTALLED IN LOCATION DEFINED BY BOS AS A HIGH TRASH GENERATION AREA OR WITH FREQUENT LITTER NUISANCE AND DIRECTED BY THE CITY ENGINEER, INSTALL A TRASH SCREEN COVER AT CURB INLET. TRASH SCREEN COVER SHALL BE MANUFACTURED FROM ASTM A36 STEEL, HOT DIPPED GALVANIZED EXPANDED METAL WITH DIAMOND SHAPE OPENINGS SIZED ONE INCH LONGITUDINAL BY 3/4 INCH VERTICAL AND SHALL HAVE A SMOOTH EDGE AROUND THE PERIMETER WITH NO PRONGS AND JAGGED EDGES. TRASH SCREEN COVER SHALL SPAN THE ENTIRE LENGTH OF THE CURB OPENING AND HEIGHT AND FASTENED OVER STAINLESS STEEL ANCHOR INSERTS, MINIMUM TWO ON EACH SIDE, WITH STAINLESS STEEL FASTENERS. IF TRASH SCREEN COVER IS USED, THE WARPED GUTTER IN FRONT OF THE CURB INLET MAY NO LONGER BE REQUIRED.



6. NON-STANDARD PLAN BMPs, OR BMPs LOCATED IN AN UN-DEVELOPED AREA, OR NO EXISTING STORMWATER CONVEYANCE SYSTEM EXISTED. THE PROJECT PLANS AND SPECIFICATIONS FOR BMPs DESCRIBED IN THIS ARTICLE SHALL HAVE THE DESIGN REQUIREMENTS AS SPECIFIED HEREINBEFORE AND THE FOLLOWING:
- A. STORMWATER RUNOFF/HYDROLOGICAL DESIGN. THE HYDROLOGICAL DESIGN WITH THE TOTAL STORMWATER RUNOFF AND THE TRIBUTARY AREAS, THE TREATMENT OR DRAINAGE AREA (INCLUDING ALL THE PERVIOUS AND THE IMPERVIOUS AREA AND OTHER OFF SITE OR SELF TREATING AREA) MUST BE DETERMINED IN ACCORDANCE WITH THE LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS (LADPW) HYDROLOGY MANUAL, AND/OR LADWP SEDIMENTATION MANUAL, LATEST EDITION, (SEE <http://www.ladpw.org/wrd/Publication/index.cfm>), OR THE SUSMPs OR OTHER METHOD APPROVED BY THE CITY ENGINEER. FLOW CALCULATIONS WORKSHEET SHALL ALSO BE SUBMITTED.
 - B. FOLLOW THE TECHNIQUES AND PRACTICES AS SPECIFIED IN CALTRANS STORM WATER QUALITY HANDBOOKS PROJECT PLANNING AND DESIGN GUIDE (http://www.dot.ca.gov/hq/opd/stormwtr/Final-PPDG_Master_Document-6-04-07.pdf), THE LATEST EDITION; COUNTY OF LOS ANGELES LOW IMPACT DEVELOPMENT STANDARD MANUAL, LATEST EDITION (http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf); OR THE SUSMPs; WHICHEVER IS THE MOST STRINGENT; TO DESIGN AND CONSTRUCT THE BMPs.
 - C. ALL BMPs SHALL BE DESIGNED EITHER AS VOLUME BASED BMPs, FLOW BASED BMPs OR COMBINED VOLUME BASED AND FLOW BASE BMPs. THE SIZE OF THE BMP, MAXIMUM WATER OR FLOW DEPTH, FLOW VELOCITY, MINIMUM HYDRAULIC RESIDENCE TIME, DESIGNED SLOPES AND GRADES, STORAGE CAPACITY, OVER FLOW AND BY-PASS DRAIN OR STRUCTURE IF APPLICABLE, ETC. MUST BE PROVIDED.
 - D. UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER, ALL BMPs SHALL HAVE FLOW VELOCITY LESS THAN ONE FEET/SEC, MINIMUM HYDRAULIC RESIDENCE TIME NOT LESS THAN FIVE MINUTES AND THE FLOW DEPTH NOT TO EXCEED 2/3 OF THE HEIGHT OF THE VEGETATION.
 - E. DETENTION STRUCTURE TYPE OF BMPs SUCH AS SAND TRAP OR OIL/WATER SEPARATORS, STORMWATER, ETC THAT MAY CONSIST OF ONE OR MORE CHAMBERS TO PROMOTE SEDIMENTATION OF COARSE MATERIALS AND SEPARATION OF FREE OIL OR OTHER POLLUTANTS FROM STORMWATER SHALL PROVIDE ADEQUATE STRUCTURAL SUPPORTS AS INDICATED IN THE STANDARD PLAN S-601, LATEST EDITION. EACH DETENTION STRUCTURE TYPE OF BMPs SHALL HAVE A DEVICE THAT PROVIDES CONTROLS OF THE RUNOFF FLOWING INTO THE UNIT AND ALLOWING THE SEDIMENTS, THE LITTERS AND THE FLOATABLE TO BE CAPTURED/RETAINED AND REMOVED AND THE CONTROLS WOULD BE AUTOMATICALLY STORED AFTER THE REMOVAL. THE DETENTION STRUCTURE TYPE OF BMPs SHALL HAVE AN INTERNAL BYPASS INVOLVING A UNIQUE DESIGN DIVERTING ALL FLOWS IN EXCESS OF THE TREATMENT CAPACITY. THIS BYPASS OR DIVERSION SHALL PREVENT RESUSPENSION OR LOSS OF SEDIMENTS AND FLOATABLE THAT HAVE BEEN ACCUMULATED. DETENTION STRUCTURE TYPE BMP's SHALL ALSO BE UNDERWRITERS LABORATORIES (UL) CERTIFIED. ALL MANUFACTURING INFORMATION INCLUDING THE TOTAL WATER VOLUME; SEDIMENT CAPACITY; FLOATABLE CAPACITY; FLOW CONTROL AND BYPASS OR DIVERSION DEVICES; EQUIPMENT AND WIRING; RESET FUNCTIONS; RECOMMENDED FREQUENCY OF REMOVAL AND DISPOSAL; STRUCTURE CLEANING; AND ETC. SHALL BE CLEARLY DESCRIBED ON THE PROJECT PLANS. IF BYPASS OR DIVERSION IS CONNECTED TO THE SEWER LINES, INDUSTRIAL WASTE PERMIT SHALL BE OBTAINED.
 - F. ALL DETENTION STRUCTURE , PERVIOUS OR PERMEABLE PAVING AND OTHER TYPES OF BMPs SHALL CONFORM WITH ANY ADDITIONAL TESTING REQUIREMENTS AND ACCEPTANCE CRITERIA AS DETERMINED BY THE CITY ENGINEER. THEY MUST BE REVIEWED, TESTED AND PRE-APPROVED BY THE CITY ENGINEER PRIOR TO INSTALLATION. ALL FASTENERS USED WITHIN THE DETENTION STRUCTURES MUST BE STAINLESS STEEL TO AVOID ANY GALVANIC CORROSION EFFECT AND MUST BE USED WITH WATER-TIGHT CONCRETE ANCHOR OR INSERT.
 - G. UNLESS OTHERWISE SPECIFIED BY THE CITY ENGINEER, THE RUNOFF VOLUME OF THE VOLUME BASED BMPs TO BE RETAINED OR TREATED SHALL BE DETERMINED BY ONE OF THE FOLLOWING METHODS, WHICHEVER IS THE MOST STRINGENT:
 - (1) THE 85TH PERCENTILE OF THE VOLUME OF THE ANNUAL RUNOFF DURING A 24 HOUR PERIOD DETERMINED AS THE MAXIMIZED CAPTURE STORMWATER VOLUME FOR THE AREA, OR
 - (2) THE VOLUME OF ANNUAL REPORT, BASED ON THE UNIT BASIN STORAGE WATER QUALITY VOLUME, TO ACHIEVE 80 PERCENTS OR MORE VOLUME TREATMENT BY THE METHOD RECOMMENDED IN CALIFORNIA STORMWATER BEST MANAGEMENT PRACTICE HANDBOOK, OR
 - (3) THE VOLUME OF RUNOFF PRODUCED FROM A 0.75 INCH STORM EVENT PRIOR TO ITS DISCHARGE TO A STORMWATER CONVEYANCE SYSTEM, OR
 - (4) THE VOLUME OF RUNOFF FROM A HISTORICAL RECORD BASED REFERENCE 24 HOUR RAINFALL CRITERION FOR TREATMENT 0.75 INCH AVERAGE FOR THE COUNTY OF LOS ANGELES AREA THAT ACHIEVES APPROXIMATELY THE SAME REDUCTION IN POLLUTANT LOADS ACHIEVED BY THE 85TH PERCENTILE 24 HOUR RUNOFF EVENT.
 - H. THE FLOW OF RUNOFF FOR THE FLOW BASED BMPs SHALL BE DETERMINED BY ONE OF THE FOLLOWING METHODS, WHICHEVER IS THE MOST STRINGENT:
 - (1) FLOW OF RUNOFF PRODUCED FROM A RAIN EVENT EQUAL TO AT LEAST 0.2 INCH/HOUR INTENSITY, OR
 - (2) FLOW OF RUNOFF PRODUCED FROM A RAIN EVENT EQUAL TO AT LEAST 2 TIMES THE 85TH PERCENTILE HOURLY RAINFALL INTENSITY FOR THE COUNTY OF LOS ANGELES, OR
 - (3) FLOW OF RUNOFF PRODUCED FROM A RAIN EVENT THAT WILL RESULT IN TREATMENT OF THE SAME PORTION OF RUNOFF AS TREATED USING VOLUMETRIC STANDARDS ABOVE.
 - I. FOR THE COMBINED VOLUME BASED AND FLOW BASED BMPs, APPLY THE APPROPRIATE DESIGN METHOD SHOWN IN ARTICLES 6.G AND 6.H TO EACH OF THE ELEMENTS OF THE BMPs AND THEN SIZE THE ELEMENTS ACCORDINGLY.
7. CONSTRUCTION. ALL WORKS SHALL CONFORM WITH THE SSPWC AS AMENDED BY THE BROWN BOOK, THE WORK AREA TRAFFIC CONTROL HANDBOOK (WATCH), LATEST EDITION AND THE REQUIREMENTS OF OTHER LOCAL GOVERNING AGENCIES.
- A. ALL WORKS SHALL HAVE FABRICATION AND SITE INSPECTIONS IN ACCORDANCE WITH SECTIONS 2 AND 4 OF THE SSPWC AS AMENDED BY THE BROWN BOOK. IF NECESSARY, A PRE-CONSTRUCTION MEETING SHOULD BE HELD BETWEEN THE CONTRACTOR AND THE INSPECTOR PRIOR TO COMMENCEMENT OF THE WORKS TO DISCUSS THE WORK SCHEDULES, THE INSTALLATIONS AND THEIR METHODS, ALL NECESSARY CERTIFICATIONS AND DOCUMENTS, AND THE INSPECTION REQUIREMENTS.
 - B. NO CONSTRUCTION WASTE OR RUNOFF SHALL ENTER INTO THE BMPs. THE BMPs SHALL BE PROTECTED FROM ANY RUNOFF OR SPILLAGE AT ALL TIME INCLUDING DURING THE PERIOD OF VEGETATION ESTABLISHMENT. SANDBAG INLETS FROM ANY UPSTREAM FLOW OR APPLY OTHER APPROVED PRACTICE S AS NEEDED TO PROTECT FROM EROSION BEFORE VEGETATION ARE ESTABLISHED. WHERE RUNOFF DIVERSION IS NOT POSSIBLE, COVER GRADED AND SEEDED AREAS WITH SUITABLE EROSION CONTROL MATERIALS.



- C. FOR THE BMPs CONSTRUCTED AS PART OF A LARGER PROJECT DEVELOPMENT, THE BMPs SHOULD BE SEQUENCED AND CONSTRUCTED IN A SINGLE OPERATION, AS ONE OF THE LAST ITEMS TO BE BUILT ON THE SITE TO AVOID CONTAMINATION BY SILT, POLLUTANTS OR SOIL FROM THE ADJACENT WORK AREAS.
- D. EXCAVATION. (THE FOLLOWING SHALL NOT APPLY TO DETENTION STRUCTURE TYPE OF BMPs WHICH WOULD REQUIRE PROPER SOIL LOAD BEARING CAPACITY AND SOIL COMPACTION. THE EXCAVATION AND COMPACTION REQUIREMENTS FOR THE DETENTION STRUCTURE TYPE OF BMPs SHALL BE APPROVED BY CITY ENGINEER.)
- (1) EXCAVATION SHALL BE LIMITED TO THE INSTALLATION OF THE BMPs AND ANY UTILITY RELOCATION WORK. EXCAVATE WITH CARE AND DO NOT OVER-EXCAVATE. WHERE POSSIBLE, EXCAVATOR OR EQUIPMENT SHOULD WORK FROM THE SIDES AND SHOULD NOT ENTER THE BMPs. EXCAVATION IS REQUIRED TO THE APPROPRIATE DESIGN DEPTHS AND DIMENSIONS AND IN A MANNER TO MINIMIZE OR MITIGATE THE EFFECTS OF COMPACTION TO THE BOTTOM OF EXCAVATION AND TO PREVENT ANY DAMAGE OR COMPACTION TO THE SURFACES, SUBBASES, SUBGRADES OR SIDEWALLS OF THE BMPs. THE EXCAVATED MATERIAL SHOULD BE STOCKPILED AWAY FROM THE OPEN EXCAVATION. ALL REUSABLE NATIVE SOILS SHALL BE FREE OF DELETERIOUS MATERIALS AS DESCRIBED IN ARTICLE 5.G.2. APPLY EFFECTIVE HERBICIDE TO REMOVE UNWANTED VEGETATION.
 - (2) FOR BMPs WITH INFILTRATION CAPABILITIES, THE INITIAL EXCAVATION SHOULD BE CONDUCTED TO WITHIN ONE FOOT OF THE FINAL EXCAVATION OF THE INVERTS OF THE BMPs. FINAL EXCAVATION TO THE FINISHED GRADE SHOULD BE DEFERRED UNTIL ALL DISTURBED AREA IN THE UPGRADE HAVE BEEN STABILIZED OR PROTECTED OR COMPLETED. THE FINAL PHASE OF EXCAVATION SHOULD REMOVE ALL ACCUMULATED SEDIMENT. THE NATIVE SOILS AT THE FINISHED GRADE ALONG THE BOTTOMS AND SIDES OF THE BMPs SHOULD NOT BE SCARIFIED, TILLED OR DISTURBED.
- THE FINISHED GRADE INCLUDING THE AREA TO BE LINED WITH GEOTEXTILE AND/OR IL/GM SHALL BE LEVELED, SMOOTH, FIRM AND WITHOUT ANY LOOSE OR SOFT SOIL OR ABRUPT CHANGE OF GRADE. ALL ROCKS GREATER THAN 1/2 INCH DIAMETER, STICKS, SHARP OBJECTS OR DEBRIS OF ANY KIND SHALL BE REMOVED FROM THE FINISHED GRADE.
- SLIGHTLY ROUNDED CORNERS SHALL BE PROVIDED IN THE TRENCH WHERE THE GEOTEXILES AND/OR IL/GM ADJOIN THE TRENCH SO AS TO AVOID ANY SHARP BENDS IN THE GEOTEXILES AND/OR IL/GM.
- AFTER EXCAVATION IS COMPLETED, PREVENT SEDIMENT FROM ENTERING THE BMPs BY FIRST CONVEYING THE RUNOFF WATER THROUGH AN APPROPRIATE PRETREATMENT SYSTEM SUCH AS A PRE-SETTLING BASIN, WET POND, OR SAND FILTER.
- (3) CONSTRUCT NEW UTILITIES LOCATED INSIDE BMPs IN ACCORDANCE WITH APPROVED INSTALLATION DETAILS. PROVIDE ALL NECESSARY COOPERATION AND COORDINATION.
 - (4) THE FINISHED GRADE AND CONSTRUCTED UTILITIES SHALL BE INSPECTED BY THE INSPECTOR PRIOR TO BACKFILL AND PLACEMENT OF GEOTEXILES AND/OR IL/GM.
- E. PLACEMENT OF GEOTEXILES AND/OR IL/GM. GEOTEXILES AND IL/GM SHALL BE INSTALLED AT THE LOCATIONS INDICATED ON THE PROJECT PLANS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDED INSTRUCTIONS AND THE REQUIREMENTS DESCRIBED HEREIN.
- (1) PRIOR TO PLACEMENT, THE BMPs MUST HAVE NO STANDING WATER, MUD, DEBRIS OR EXCESSIVE MOISTURE. NO GEOTEXILES OR IL/GM SHALL BE PLACED ON A SUBGRADE THAT HAS BECOME SOFTENED BY WATER OR OVERLY DRIED UNTIL THE SUBGRADE HAS BEEN PROPERLY RECONDITIONED, RESTORED AND REINSPECTED.
 - (2) APPROVED METHODS SHALL BE USED TO UNFOLD THE GEOTEXILES AND/OR IL/GM WITHOUT CAUSING DAMAGES OR WRINKLES TO THE MATERIALS. IF NECESSARY, BOOTS AND SHROUDS MADE OF SAME MATERIALS SHALL BE USED IN ALL PIPE OR CONDUIT PENETRATIONS.
 - (3) THE GEOTEXILES AND IL/GM SHALL BE INSTALLED ON THE BOTTOMS AND THE SIDES OF THE BMPs AND/OR ON TOP OF THE PERMEABLE AGGREGATE BASE AND TO THE ELEVATIONS IN ACCORDANCE WITH THE PLAN DETAILS. ALL GEOTEXILES AND IL/GM SHALL HAVE MINIMUM TWO INCHES TOP SOIL AND/OR MULCH COVERS AND THEY SHALL NOT BE EXPOSED TO ANY SUNLIGHT.
 - (4) FOR THE GEOTEXILES, THE APPROPRIATE SIDE OF THE GEOTEXILES SHALL BE PLACED AND FACING THE OUTSIDE OF THE TRENCH (OR AGAINST THE NATIVE SOIL).
 - (5) THE GEOTEXILES SHALL HAVE MINIMUM LONGITUDINAL AND VERTICAL OVERLAPS. UNLESS SPECIFIED OTHERWISE, WHEN OVERLAPS ARE REQUIRED BETWEEN ROLLS, THE UPSTREAM ROLL SHALL OVERLAP A MINIMUM TWO FEET OVER THE DOWNSTREAM ROLL IN ORDER TO PROVIDE A SHINGLED EFFECT.
- FOR NATIVE SOILS HAVING A CALIFORNIA BEARING RATIO LESS THAN 5 OR R-VALUE LESS THAN 20, A 36 INCH OVERLAP SHALL BE USED.
- AT LOCATIONS WHERE GEOTEXILES ARE NOT REQUIRED IN THE VERTICAL SURFACES OF THE TRENCH, THE GEOTEXILES IN THE HORIZONTAL PLACEMENTS SHALL BE EXTENDED AND TURNED UP MINIMUM SIX INCHES ON THE VERTICAL SURFACES TO PROVIDE TIGHT LAYER SEPARATION.
- (6) VOIDS BETWEEN THE GEOTEXILES, IL/GM AND EXCAVATION SIDES MUST BE PREVENTED DURING CONSTRUCTION. REMOVING BOULDERS OR OTHER OBSTACLES FROM THE TRENCH WALLS MAY CREATE SUCH VOIDS. NATURAL SOILS SHOULD BE PLACED IN THESE VOIDS AT THE MOST CONVENIENT TIME DURING THE CONSTRUCTION TO ENSURE GEOTEXILES COMPLETELY AND UNIFORMLY CONFORM TO THE SIDES OF THE EXCAVATION.
 - (7) AT LOCATIONS WHERE CONTAINING PIPE AND CONDUIT PENETRATIONS AND THE BOOT SLEEVES AND/OR THE SHROUDS ARE USED, THE BOOT SLEEVES AND THE SHROUDS SHALL BE ALIGNED WITH THE PENETRATIONS AND PROPERLY WELDED TO THE ADJACENT SURFACES. STAINLESS STEEL HOSE CLAMPS SHALL BE USED ON THE BOOT SLEEVES AND/OR THE SHROUDS TO FORM A WATER TIGHT SEAL OVER THE PIPING AND/CONDUITS.
 - (8) NO TRAFFIC OR OTHER EQUIPMENT SHALL BE ALLOWED DIRECTLY ON THE GEOTEXILES, AND IL/MG.
 - (9) EXCESS GEOTEXILES AND/OR IL/MG SHOULD NOT BE TRIMMED UNTIL THE SITE IS FULLY STABILIZED.



- (10) BEFORE COVERING, THE CONDITIONS OF THE GEOTEXILES AND/OR THE IL/GM INCLUDING ALL FACTORY SEAMS SHALL BE OBSERVED BY THE INSPECTORS TO DETERMINE THAT THERE ARE NO HOLES OR RIPS EXIST IN THE GEOTEXILES AND/OR THE IL/GM AND ALL PIPING OR CONDUIT PENETRATIONS ARE PROPERLY SEALED AND WELDED. ALL SUCH OCCURRENCES SHALL BE REPAIRED BY PLACING A NEW LAYER OF SAME MATERIAL EXTENDING BEYOND THE DEFECT IN ALL DIRECTIONS A DISTANCE EQUAL TO THE MINIMUM OVERLAP REQUIRED FOR ADJACENT ROLLS.

F. PLACEMENT OF PERMEABLE AGGREGATE BASE AND PEA GRAVEL.

- (1) THE PERMEABLE AGGREGATE BASE OR PEA GRAVEL SHALL BE MOISTENED AND SPREAD IN SIX INCH LIFTS TO THE DESIRED DEPTH ON THE GEOTEXTILE IN SUCH A MANNER AND THICKNESS THAT ANY WHEEL RUTTING OF AGGREGATE OR PEA GRAVEL OVER THE GEOTEXTILE IS LIMITED TO 1/2 INCH.
- (2) COMPACT USING A VIBRATORY ROLLER IN STATIC MODE OR COMPACTION PLATE UNTIL THE PERMEABLE AGGREGATE BASE OR THE PEA GRAVEL IS STABLE AND THERE IS NO VISIBLE MOVEMENT OR RUTTING UNDER ANY TRAFFIC.
- (3) DO NOT CRUSH THE PERMEABLE AGGREGATE BASE OR PEA GRAVEL WITH THE VIBRATORY ROLLER OR PLATE.

G. PLACEMENT OF TOP SOILS.

- (1) INSTALL AMENDED TOPSOILS IN A MANNER THAT ENSURES ADEQUATE INFILTRATION. PLACE IN TWO EQUAL LIFTS. LIFTS MAY BE LIGHTLY WATERED TO ENCOURAGE NATURAL COMPACTING AND LIGHTLY COMPACTED WITH A WATER FILED LANDSCAPE ROLLER OR VIBRATORY PLATE TO ASSIST IN PREVENTING EROSION OR SETTLEMENT.
- (2) OVERFILL THE TRENCH WITH ACCEPTABLE AMOUNT WITHOUT CAUSING ANY HAZARDS OR OVERSPILL ABOVE PROPOSED FINISHED GRADE AND TO ACCOMMODATE NATURAL SETTLEMENT.

H. PLANTING.

- (1) AFTER INSTALLING THE IRRIGATION SYSTEM, GROUP PLANT MATERIALS WITH SIMILAR WATER USE REQUIREMENTS ON THE SAME VALVE TO REDUCE OVER AND UNDERWATERING AND HELP PREVENT EXCESS IRRIGATION RUNOFF. IRRIGATION SCHEDULES SHOULD BE ADJUSTED TO PROMOTE SURFACE FILTRATION. PLANTINGS SHALL BE INSTALLED WITHIN THE BMPs IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF THE SSPWC, STANDARD PLANS AND THE DETAILS AS SHOWN ON THE APPROVED LANDSCAPE PLANS
- (2) THE NECESSARY EROSION CONTROL METHODS SHALL BE APPLIED TO DIVERT ANY EXCESS FLOWS AND SHALL BE MAINTAINED TO PROTECT ALL PLANTS, SEEDS AND MATERIALS AT ALL TIME AND TO AT LEAST 75 DAY AFTER THE FIRST RAINFALL OF THE RAINY SEASON.
- (3) REMOVE ANY SEDIMENT AND CONFIRM THE COMPLETE ESTABLISHMENT OR REPLACEMENT OF ALL PLANNED VEGETATION UPON THE FINAL ACCEPTANCE OF THE PROJECT.

B. INSPECTION AND MAINTENANCE.

- A. INSPECTIONS AND MAINTENANCE WORKS IN THE BMPs SHALL BE DONE IN ACCORDANCE WITH THE INDUSTRY STANDARDS AND PRACTICES, LOCAL AND STATE REQUIREMENTS AND THE APPROVED O & M PLANS. IF REQUIRED BY THE CITY ENGINEER, SUBMIT SEEPAGE ANALYSIS TO DETERMINE IF ANY ADVERSE EFFECTS MAY BE CAUSED ON ADJACENT PROPERTIES.

- (1) INSPECTION AND REMOVAL OF DEBRIS SHOULD BE CONDUCTED ON A MONTHLY BASIS AND DEBRIS SHOULD BE REMOVED IMMEDIATELY OR WHENEVER IT IS OBSERVED ON SITE.
- (2) INSPECTIONS AND MAINTENANCE SHALL BE CONDUCTED TO ENSURE THAT WATER INFILTRATES INTO THE SUBSURFACE COMPLETELY (RECOMMENDED PONDING RATE OF 72 HOURS OR LESS) AND THAT PLANTS, PONDING, INFILTRATION AND VEGETATION ARE CAREFULLY MANAGED TO PREVENT CREATING MOSQUITO AND OTHER VECTOR HABITATS.
- (3) INSPECT THE SOIL MOISTURE AND ALL PARTS OF THE IRRIGATION SYSTEMS MONTHLY TO ENSURE THE RAIN OR MOISTURE SENSORS AND THE IRRIGATION CONTROLLER ARE FUNCTIONING PROPERLY AND IN ACCORDANCE WITH THE APPROVED IRRIGATION PLANS AND THE MANUFACTURING INSTRUCTIONS.
- (4) INSPECT ALL PARTS OF THE BMPs AT LEAST TWICE ANNUALLY FOR EROSION AND DAMAGE TO VEGETATION. INSPECTION SHALL BE DONE PREFERABLY AT THE END OF THE WET SEASON IN ORDER TO SCHEDULE FOR SUMMER MAINTENANCE AND TO BE PREPARED FOR WINTER OR NEXT RAINY SEASON. INSPECTIONS FOR ANY DAMAGES ARE ALSO REQUIRED BEFORE AND AFTER ANY MAJOR RAIN EVENT.
- (5) ALL DETENTION STRUCTURE TYPE OF BMPs SHALL BE INSPECTED BEFORE AND AFTER EACH MAJOR RAIN EVENT FOR ACCUMULATED SEDIMENTS, LITTERS AND FLOATABLE; AND TO ENSURE ALL INTERNAL BYPASS OR DIVERSION DEVICES CAN BE PROPERLY OPENED, CLOSED OR RESET.
- (6) OBSERVE DRAIN TIME FOR THE DESIGN STORM AFTER COMPLETION OR MODIFICATION OF THE BMP TO CONFIRM THAT THE DESIRED DRAIN TIME HAS BEEN OBTAINED. USE THE OBSERVATION WELL TO OBSERVE OR MONITOR THE WATER LEVELS IN THE BMPs AND TO DETERMINE THE SECTIONS OF THE BMPs WHERE THE PARTIAL CLOG MAY EXIST AND REQUIRE REPAIRS.

9. MAINTENANCE WORKS FOR BMPs WITH INFILTRATION CAPABILITIES SHALL ALSO INCLUDE BUT NOT BE LIMITED TO ROUTINE OR PERIOD MOVING AND PRUNING, RESEEDING OF BARE AREAS, REPLENISHMENT OF MULCH AND SEEDING, WEED CONTROL, WATERING DURING DROUGHT CONDITIONS, ELIMINATING THE USES OF THE PESTICIDES AND FERTILIZER AND REMOVAL OF THE DEBRIS AND SEDIMENTS.

- A. MAINTENANCE SHOULD BE CONDUCTED EVERY SIX MONTHS OR AS NEEDED TO PREVENT CLOGGING WITHIN THE BMPs. ANY BMPs THAT MAINTAIN PERMANENT STANDING WATER MAY REQUIRE ROUTINE INSPECTIONS AND TREATMENTS BY LOCAL MOSQUITO AND VECTOR CONTROL AGENCIES TO SUPPRESS MOSQUITO PRODUCTION BEFORE THE REPAIR CAN BE MADE. IF ROUTINE CLEANING AND REPAIR DO NOT RESTORE INFILTRATION RATES, THE RECONSTRUCTION OF PART OR THE WHOLE OF THE BMPs MAY BE REQUIRED ALONG WITH AN OVERALL INCREASE OF THE DIMENSIONS OF THE BMP MAY ALSO BE REQUIRED TO PROVIDE A FRESH SURFACE FOR INFILTRATION.
- B. IF THE BMPs DEVELOP RUTS OR HOLES, THEY SHOULD BE REPAIRED UTILIZING A SUITABLE SOIL THAT IS PROPERLY TAMED AND SEEDED.
- C. GRASS OR VEGETATION SHALL NOT BE CUT OR TRIMMED SHORTER THAN THE DESIGN FLOW DEPTH OR MAXIMUM HEIGHT ALLOWED. VEGETATION SHALL BE TRIMMED DURING SUMMER OR AT THE BEGINNING AND THE END OF THE WET SEASON TO PREVENT ANY ESTABLISHMENT OF WOODY VEGETATION AND FOR AESTHETIC, FIRE AND VECTOR CONTROL REASONS. VEGETATION AND/OR SHRUBS SHALL BE TRIMMED BACK SO THAT THERE IS A MINIMUM ONE FEET CLEARANCE BETWEEN THE PLANTS AND THE SIDEWALK.



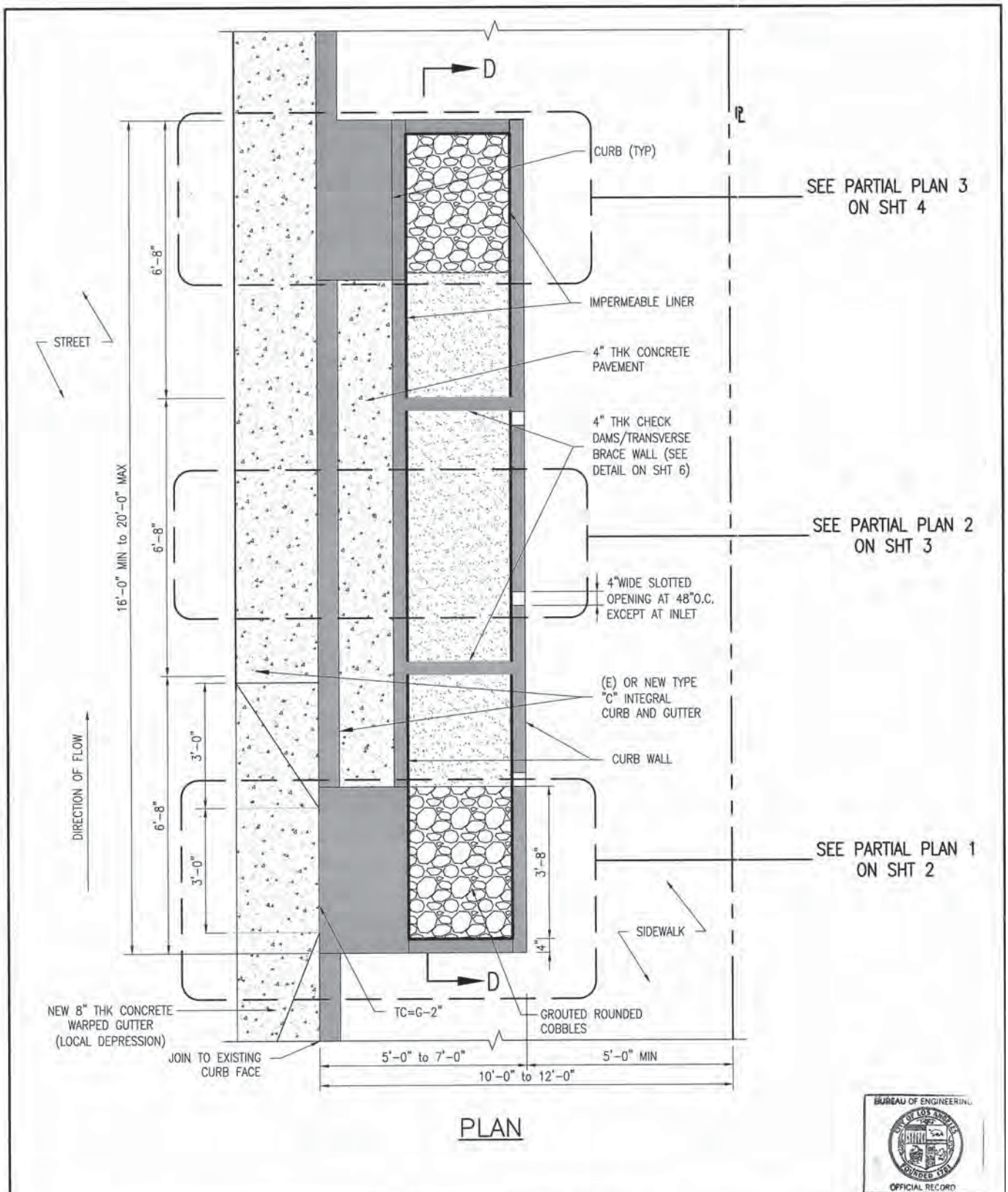
- D. ACCUMULATED SEDIMENT SHOULD BE ALSO REMOVED TO AVOID CLOGGING AND CONCENTRATED FLOWS IN THE BMPs. SEDIMENT ACCUMULATION SHALL BE HAND REMOVED, WITHOUT ANY MECHANICAL EQUIPMENT, WITH MINIMUM DAMAGE OR DISTURBANCE TO THE VEGETATION. AVOID ANY COMPACTION OF THE TOP SOIL IN THE BMPs DURING THE SEDIMENT REMOVAL PROCESS. REPAIR AND REPLACE MATERIALS IN DAMAGED OR ERODED AREAS. FILL ANY ERODED AREAS WITH NEW TOPSOIL AND REPLANT OR RESEED.
- E. MAINTENANCE SHALL INCLUDE KEEPING A LOG OF ALL THE MAINTENANCE ACTIVITIES AND THE AMOUNT OF SEDIMENT COLLECTED AND THE DATE OF REMOVAL. THE LOG SHALL BE READILY AVAILABLE FOR INSPECTION UPON REQUEST BY THE CITY.
- F. ALL INLETS AND OUTLETS OF THE BMPs SHOULD BE CLEANED AT LEAST TWICE A YEAR OR AS NEEDED DURING THE WET SEASON, BEFORE AND AFTER PERIODS OF HEAVY RAIN.
- G. ALL LEAF LITTER AND DETRITUS SHALL BE REMOVED MANUALLY AND NOT WITH LEAF BLOWERS WHICH MAY EXPOSE THE PLANT ROOTS OR CREATE A HARD-CRUSTED SOIL SURFACE OF LOW PERMEABILITY AND HIGH HEAT CONDUCTION THAT DISCOURAGE SURFACE ROOTS. REAPPLY PROPER DEPTH OF MULCHING REGULARLY AND AS NEEDED TO THE SOIL SURFACE TO IMPROVE WATER RETENTION.
- H. ALL DEAD VEGETATIONS SHALL BE REMOVED AND REPLACED WITHIN A SPECIFIC TIMEFRAME INDICATED ON THE O & M PLANS OR IMMEDIATELY IF IT IS REQUIRED TO MAINTAIN COVER DENSITY AND TO CONTROL EROSION.
- I. DAMAGED IRRIGATION AND OVERFLOW PIPES SHALL BE REPAIRED OR REPLACED UPON DISCOVERY.
- J. REMOVAL OF ACCUMULATED MATERIALS OF ALL DETENTION STRUCTURE TYPE OF BMPs SHALL BE MADE BY AN EDUCTOR TRUCK AT LEAST ONCE PER YEAR AND AS NEEDED. REMOVAL AND DISPOSAL OF FLOATABLE SHALL BE MADE SEPARATELY DUE TO THE PRESENCE OF PETROLEUM PRODUCT OR OTHER POLLUTANTS CONSIDERED AS HAZARDOUS WASTE.
- K. ALL PERVIOUS OR PERMEABLE PAVING TYPE OF BMPs SHALL HAVE DRY WEATHER SWEEPING MINIMUM TWICE A YEAR WITH AT LEAST ONE SWEEPING TO BE DONE IN SPRING MONTHS. SWEEPING SHALL BE DONE BY A VACUUM SWEEPER THAT DOES NOT USE WATER SPRAY. VACUUM SETTINGS SHOULD BE CALIBRATED SO THAT THEY WOULD NOT PICK UP ANY PAVING AGGREGATE AND/OR AGGREGATE FILLERS.
- L. ALL ACCUMULATED RESIDUALS INCLUDING BUT NOT NECESSARILY LIMITED TO TRASH, DEAD VEGETATION, SEDIMENTS, FLOATABLE, ETC. SHALL BE PROPERLY DISPOSED OF. RESIDUALS THAT ARE CONSIDERED AS CONTAMINANTS OR REACHING THE LEVELS CONSIDERED AS HAZARDOUS WASTE SHALL BE HANDLED AND DISPOSED OF IN ACCORDANCE WITH IN APPLICABLE SECTIONS OF THE CODE OF FEDERAL REGULATIONS (CFR), CALIFORNIA CODE OF REGULATIONS (CCR) AND THE LOCAL REGULATIONS. IF USED, COPIES OF THE MANIFEST FROM THE TREATMENT, STORAGE OR DISPOSAL (TSD) FACILITY WHERE THE WASTE HAS BEEN SENT SHALL BE KEPT AS RECORD.
- M. ANY REPAIR THAT MAY ALTER THE ORIGINAL DESIGN OF THE BMP OR THE WORKS AS SHOWN ON THE ORIGINAL APPROVED PLANS MUST BE PERFORMED AND INSPECTED UNDER A NEW APPROVED TYPE B WORK PERMIT IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED HEREINBEFORE.
10. ALL WORKS SHALL HAVE FABRICATION AND SITE INSPECTIONS IN ACCORDANCE WITH SECTIONS 2 AND 4 OF THE SSPWC AND THE BROWN BOOK.
11. SUBMIT FINAL AS-BUILT DRAWINGS FOR RECORDING PRIOR TO FINAL INSPECTION AND PROJECT ACCEPTANCE.



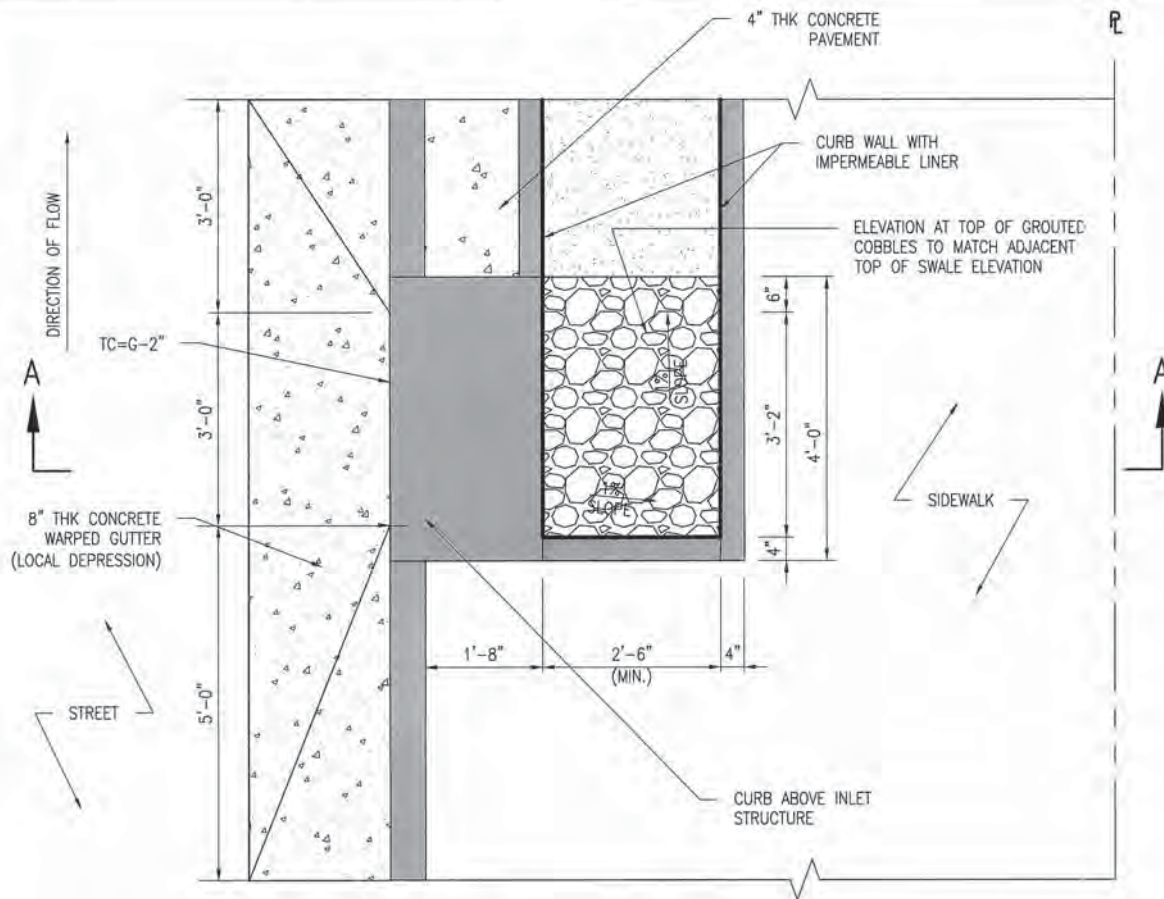
PARKWAY SWALE IN MAJOR-SECONDARY HIGHWAYS

(s-481-0)



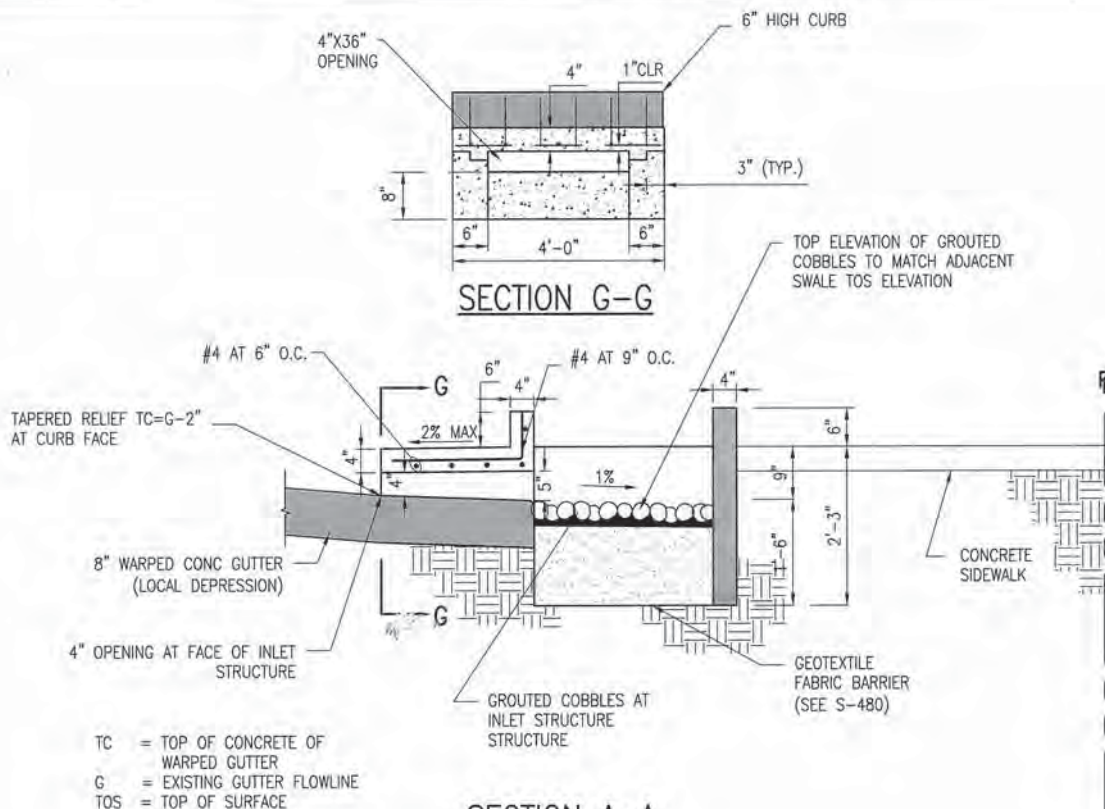


BUREAU OF ENGINEERING		DEPARTMENT OF PUBLIC WORKS		CITY OF LOS ANGELES	
PARKWAY SWALE IN MAJOR/SECONDARY HIGHWAYS				STANDARD PLAN S-481-0	
PREPARED	SUBMITTED	APPROVED	SUPERSEDES	REFERENCES	
ALICE GONG, CE49107 BUREAU OF SANITATION ENRIQUE C. ZALDIVAR, P.E., DIRECTOR	JEONG PARK, S.E. ENGINEER OF DESIGN BUREAU OF ENGINEERING 6/28/10	GARY KEE MOORE, P.E. CITY ENGINEER 6-29-10		S-410 S-480 S-484	
CHECKED			VAULT INDEX NUMBER		
PATRICK LEE, CE42448 BUREAU OF ENGINEERING	KEN REDD, P.E. ACTING DEPUTY CITY ENGINEER 6/29/10		B - 4644		
			SHEET 1 OF 8 SHEETS		



PARTIAL PLAN
INLET/TOP CONCRETE

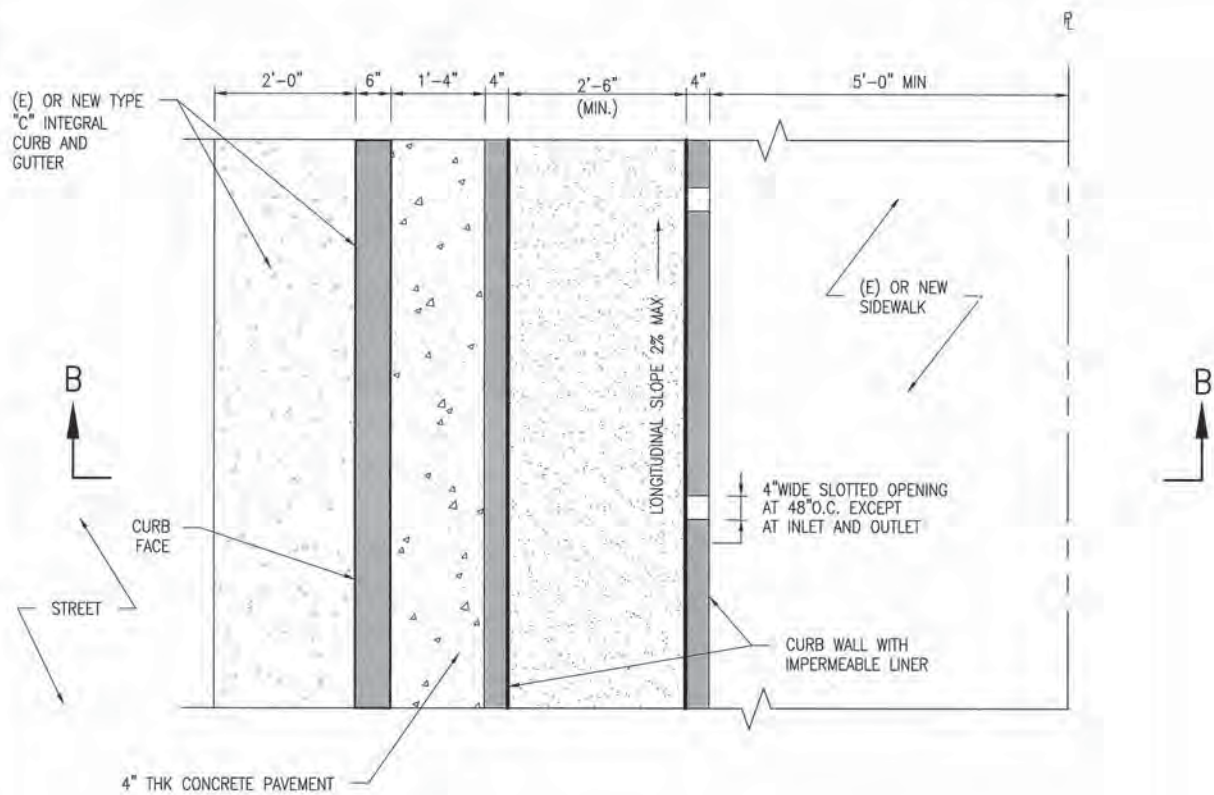
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SECTION A-A
INLET WITH COVER

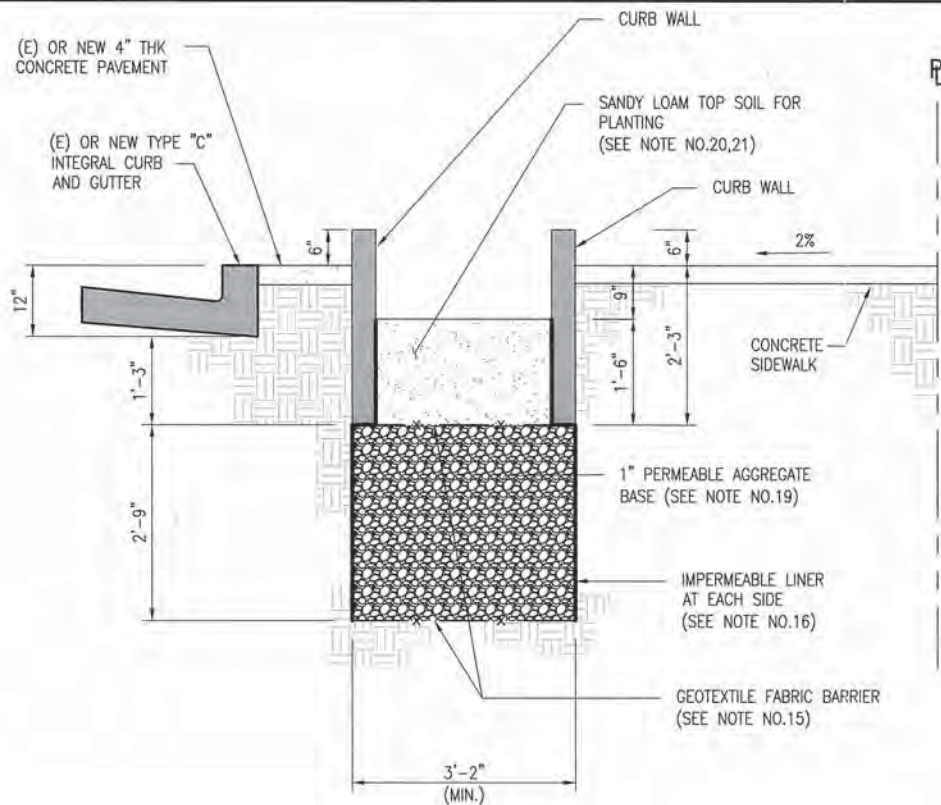
TC = TOP OF CONCRETE OF
WARPED GUTTER
G = EXISTING GUTTER FLOWLINE
TOS = TOP OF SURFACE





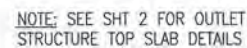
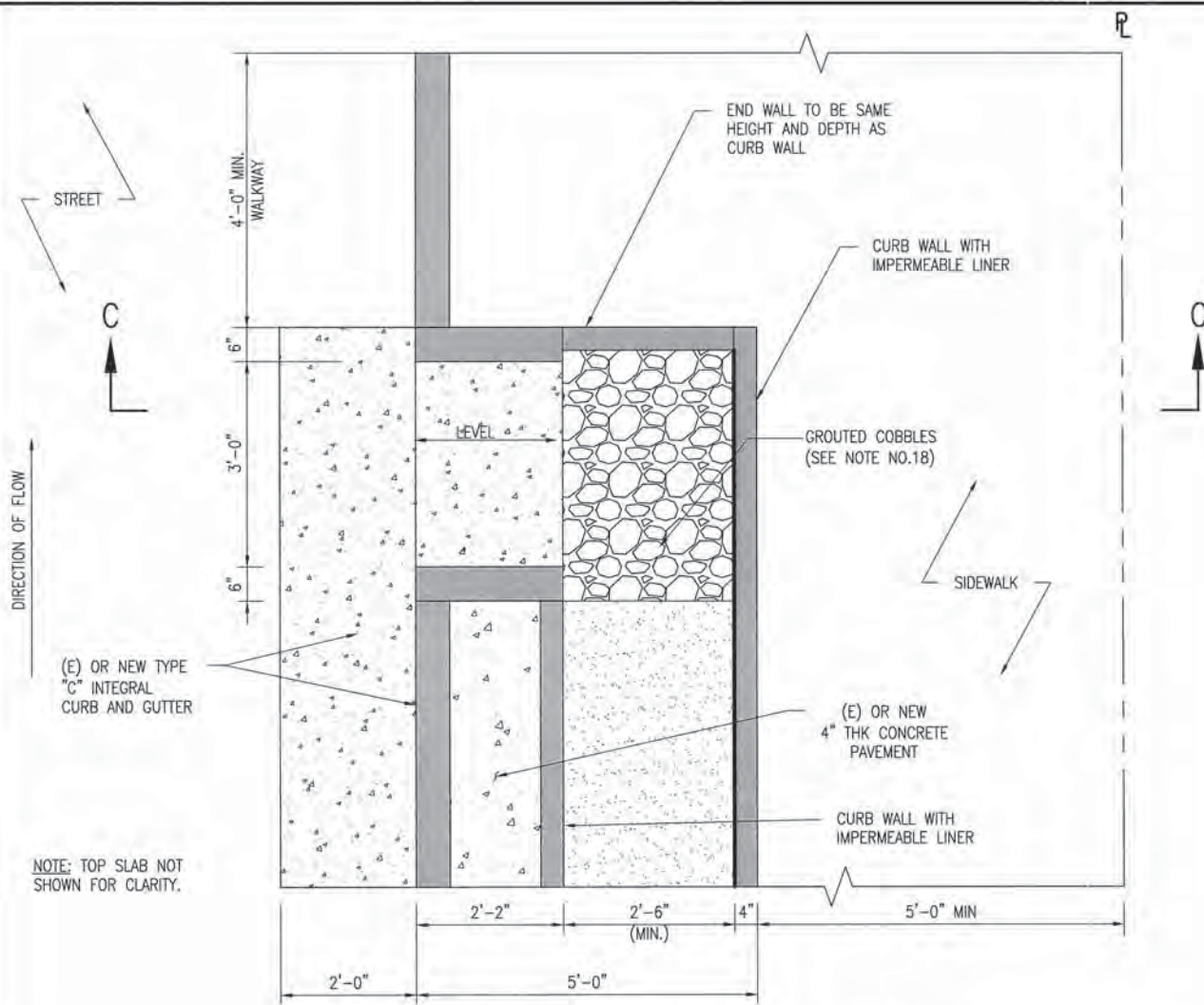
PARTIAL PLAN
TYPICAL SWALE PLAN

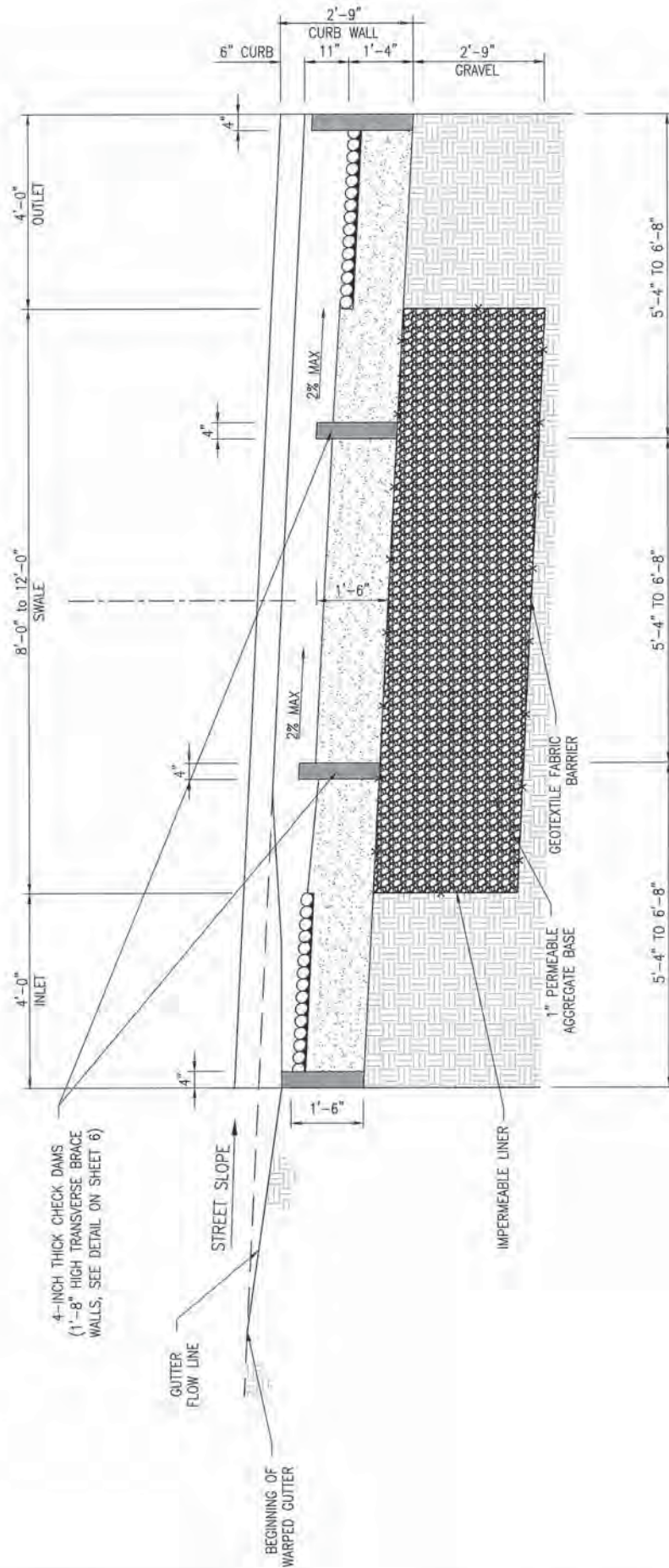
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SECTION B-B
TYPICAL SWALE SECTION

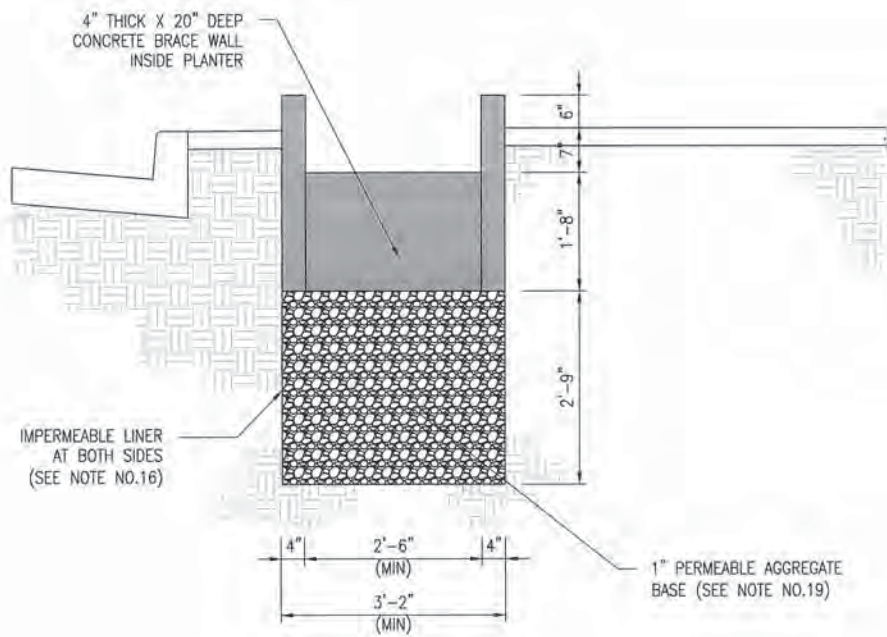






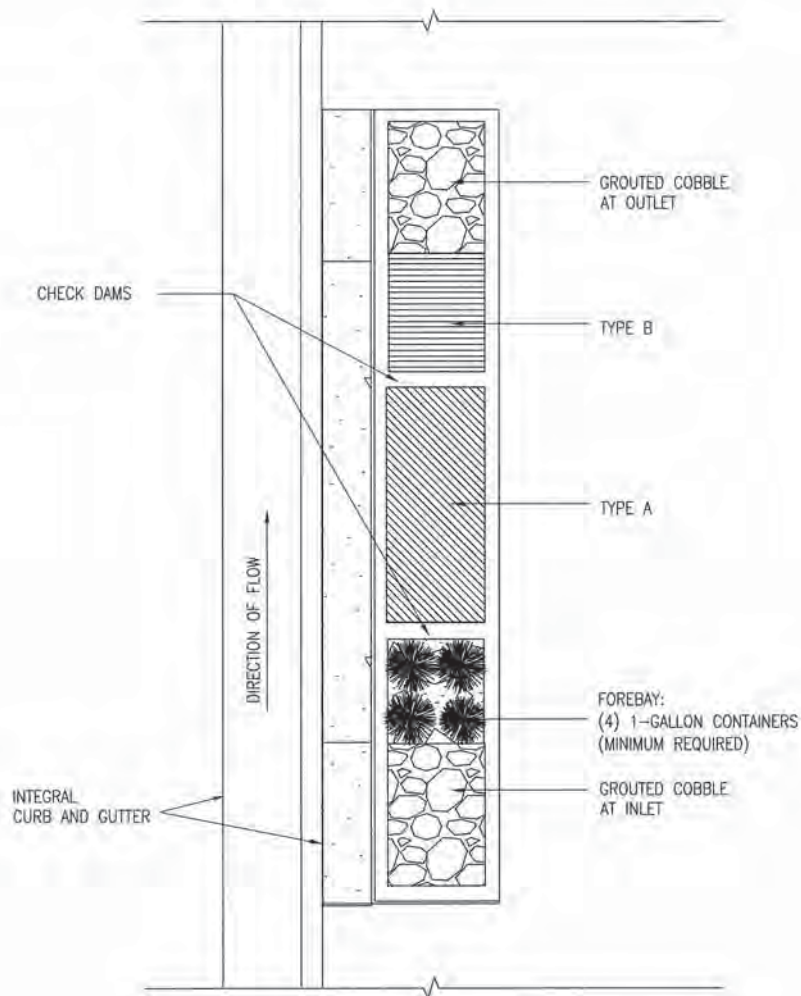
SECTION D-D
 LONGITUDINAL SECTION OF PARKWAY SWALE ON STREETS
 WITH LONGITUDINAL SLOPE OF 2% OR GREATER (5% MAXIMUM)





TYPICAL TRANSVERSE BRACE WALL





PLANTING TEMPLATES (SCHEMATIC ONLY*)

* SEE APPROVED PLANT MATERIAL LIST ON SHEET 9 OF STANDARD PLAN NO. S-484.
PLANTED FOREBAY WITH APPROVED TOPSOIL IS REQUIRED. PLANTING PLANS MAY BE ALTERNATED OR COMBINED.

PLANTING MATERIALS AND OBJECTIVES:



FOREBAY:
REDUCE INFLOW VELOCITY AND REDUCE EROSION.



TYPE A:
INCLUDES A PLANTED FOREBAY. USE INUNDATION TOLERANT SPECIES WITH GROWTH FORMS THAT REDUCE INFLOW VELOCITY AND ROOTS THAT ASSIST IN EROSION CONTROL. INSTALL WITH MULCH OR PEAGRAVEL.



TYPE B:
INUNDATION AND DROUGHT TOLERANT SPECIES WITH ROOT SYSTEMS THAT RESISTS EROSION.
INSTALL WITH MULCH OR PEAGRAVEL.



NOTES:

1. PARKWAY SWALE SHALL CONFORM TO THE LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (SSPWC) AS AMENDED BY THE BROWN BOOK, LATEST EDITION AND TO THE REQUIREMENTS SPECIFIED IN STANDARD PLAN S-480, LATEST EDITION.
2. PARKWAY SWALES SHALL ONLY BE CONSTRUCTED IN AREAS WITH WELL DRAINING SOILS. THE MINIMUM SITE SOIL PERCOLATION RATE SHALL BE 0.5 INCHES PER HOUR.
3. PARKWAY SWALE STANDARD PLANS SHALL NOT BE USED IN LOCATIONS WITH A LONGITUDINAL STREET SLOPE GREATER THAN 5 PERCENT. WHERE THE STREET LONGITUDINAL SLOPE EXCEEDS 2%, USE THE TRANSVERSE BRACE WALLS AS CHECK DAMS TO LIMIT THE LONGITUDINAL SLOPE WITHIN THE SWALE TO 2% MAX. SEE LONGITUDINAL SWALE SECTION FOR ADDITIONAL INFORMATION.
4. PARKWAY SWALES SHALL BE LOCATED SO AS NOT TO REQUIRE ANY RELOCATION OF EXISTING STREET LIGHTS, TRAFFIC LIGHTS, UTILITY POLES, OR REMOVAL OF STREET TREES. SEE DWP POLE AND ANCHOR CLEARANCE REQUIREMENTS FOR PARKWAY SWALE SETBACKS FROM UTILITY POLES AND ANCHOR RODS.
5. MINIMUM LENGTH OF SWALE TO BE 16 FEET AND MAXIMUM LENGTH TO BE 20 FEET.
6. CONSTRUCT CONCRETE SIDEWALK WHEN SPECIFIED ON PLAN. SIDEWALK TO BE MINIMUM 5'-0" IN CLEAR WIDTH.
7. FOR PARKWAY SWALE INSTALLATIONS IN EXISTING SIDEWALKS, REPAIR/REPLACE ANY PORTIONS OF SIDEWALKS TO REMAIN WHICH ARE DAMAGED, SEVERELY CRACKED AND/OR UPLIFTING.
8. A MINIMUM 4-FOOT WIDE CONCRETE WALKWAY SHALL BE PROVIDED AT EACH END OF SWALE FOR PEDESTRIAN TRAFFIC.
9. LOCAL DEPRESSION (WARPED GUTTER) PER APWA STANDARD PLAN 313, EXCEPT FOR "K" DIMENSION AS SHOWN HEREON. PROVIDE MINIMUM 8-INCH THICK COMPACTED CRUSHED MISC. BASE BELOW WARPED GUTTER.
10. CONSTRUCT INTEGRAL CURB AND GUTTER PER STANDARD PLAN S-410 WHEN SPECIFIED ON PLANS.
11. ALL CONCRETE SHALL BE CLASS 520-C-2500 PORTLAND CEMENT CONCRETE.
12. CURB WALLS, END WALLS, AND TRANSVERSE BRACE WALLS SHALL EACH BE POURED MONOLITHIC. JOINTS BETWEEN WALLS SHALL BE SEALED PER SECT.303-1.8.7 OF THE GREEN BOOK.
13. ALL CURB, BRACE, AND END WALLS TO HAVE $\frac{3}{4}$ -INCH RADIUS ROUNDED CORNERS AT TOP EDGES.
14. EXPANSION JOINTS SHALL BE PROVIDED WITH APPROVED POLYSTYRENE JOINT FILLER AND TWO-PART POLYURETHANE SEALANT.
15. PLACEMENT OF GEOTEXTILE FABRIC SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECT 300-8 OF THE GREEN BOOK.
16. IMPERMEABLE LINER TO BE A MINIMUM OF 16 MIL THICKNESS.
17. CEMENT GROUT SHALL BE COMPOSED OF ONE PART CEMENT, THREE PARTS SAND AND THE MINIMUM AMOUNT OF WATER NECESSARY FOR THE MIXTURE TO FLOW UNDER ITS OWN WEIGHT.
18. COBBLE STONES TO BE ROUNDED AND 2-INCH TO 4-INCH IN DIAMETER AND SHALL BE EMBEDDED ONE INCH MINIMUM INTO TWO INCH THICK CEMENT GROUT.
19. PLACEMENT OF GRAVEL (1-INCH PERMEABLE AGGREGATE BASE) TO BE SELF COMPACTING.
20. COMPACT TOP SOIL TO 80-85 PERCENT RELATIVE COMPACTION. TOP SOIL TO BE PLACED IN A MINIMUM OF TWO EQUAL LIFTS, IN ORDER TO MINIMIZE COMPACTION AND EXCESSIVE SETTLEMENT.
21. SOIL AMEDEMMENTS SHALL CONFORM TO THE REQUIREMENTS OF S-480.
22. A TEMPORARY IRRIGATION SYSTEM IS REQUIRED TO BE INSTALLED FOR PLANT ESTABLISHMENT.



STANDARD PLAN NO.

S-481-0

VAULT INDEX NUMBER

B-4644

SHEET 8 OF 8 SHEETS

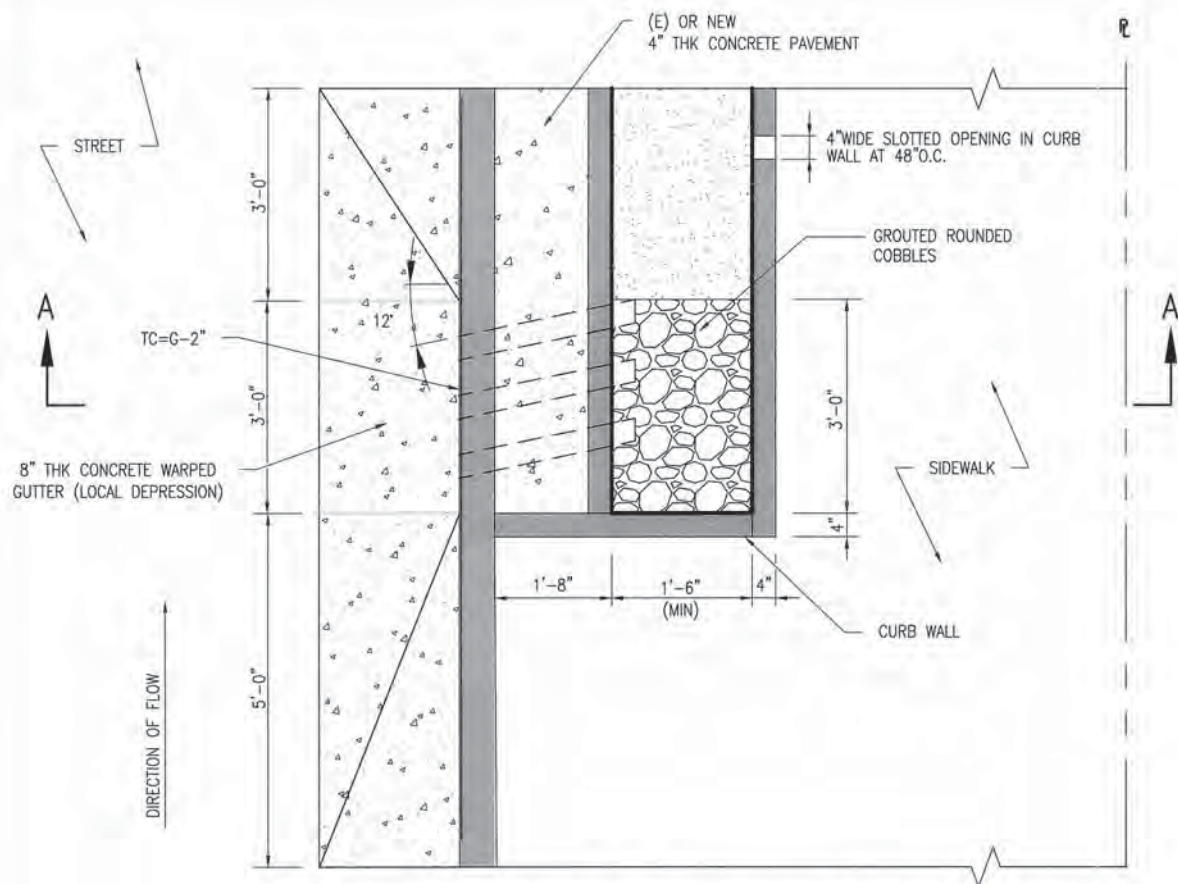
B-4644

B-4644

PARKWAY SWALE IN LOCAL-COLLECTOR STREETS

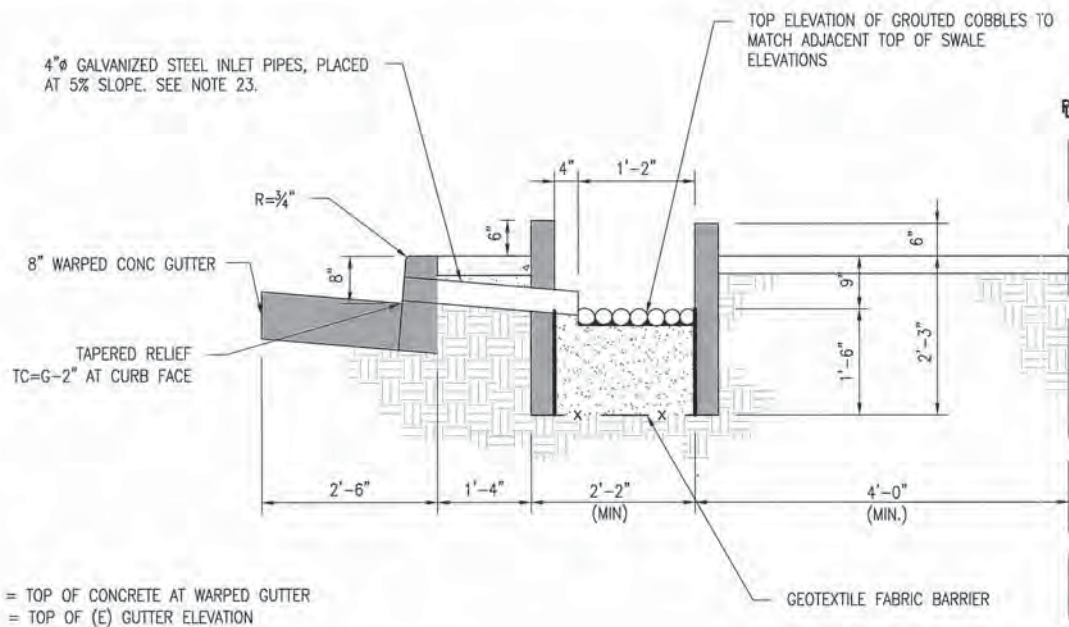
(s-482-0)





PARTIAL PLAN
INLET PLAN

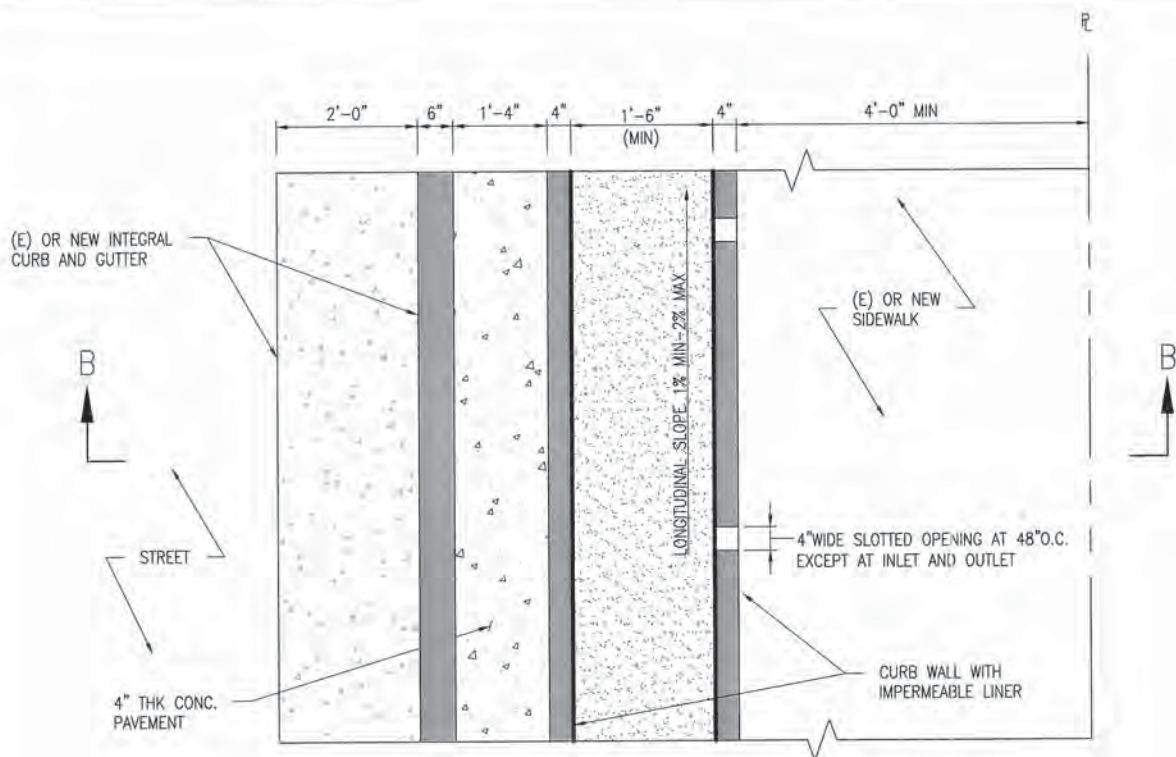
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TC = TOP OF CONCRETE AT WARPED GUTTER
G = TOP OF (E) GUTTER ELEVATION

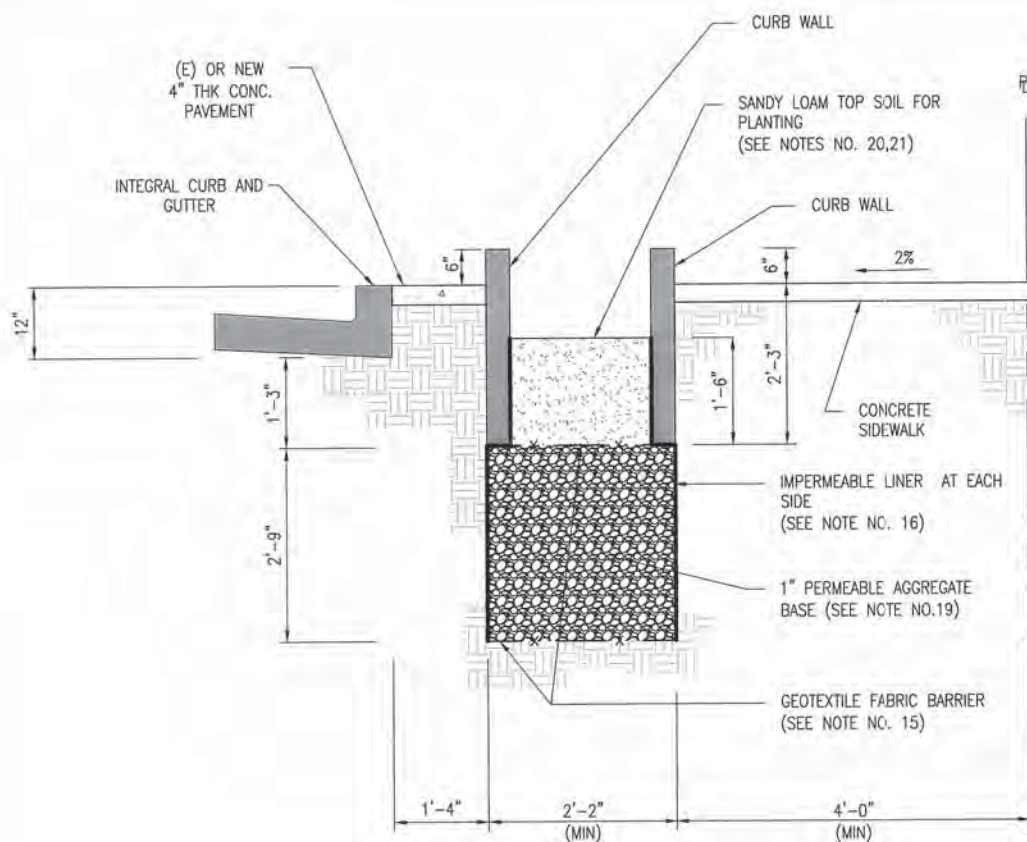
SECTION A-A
INLET SECTION





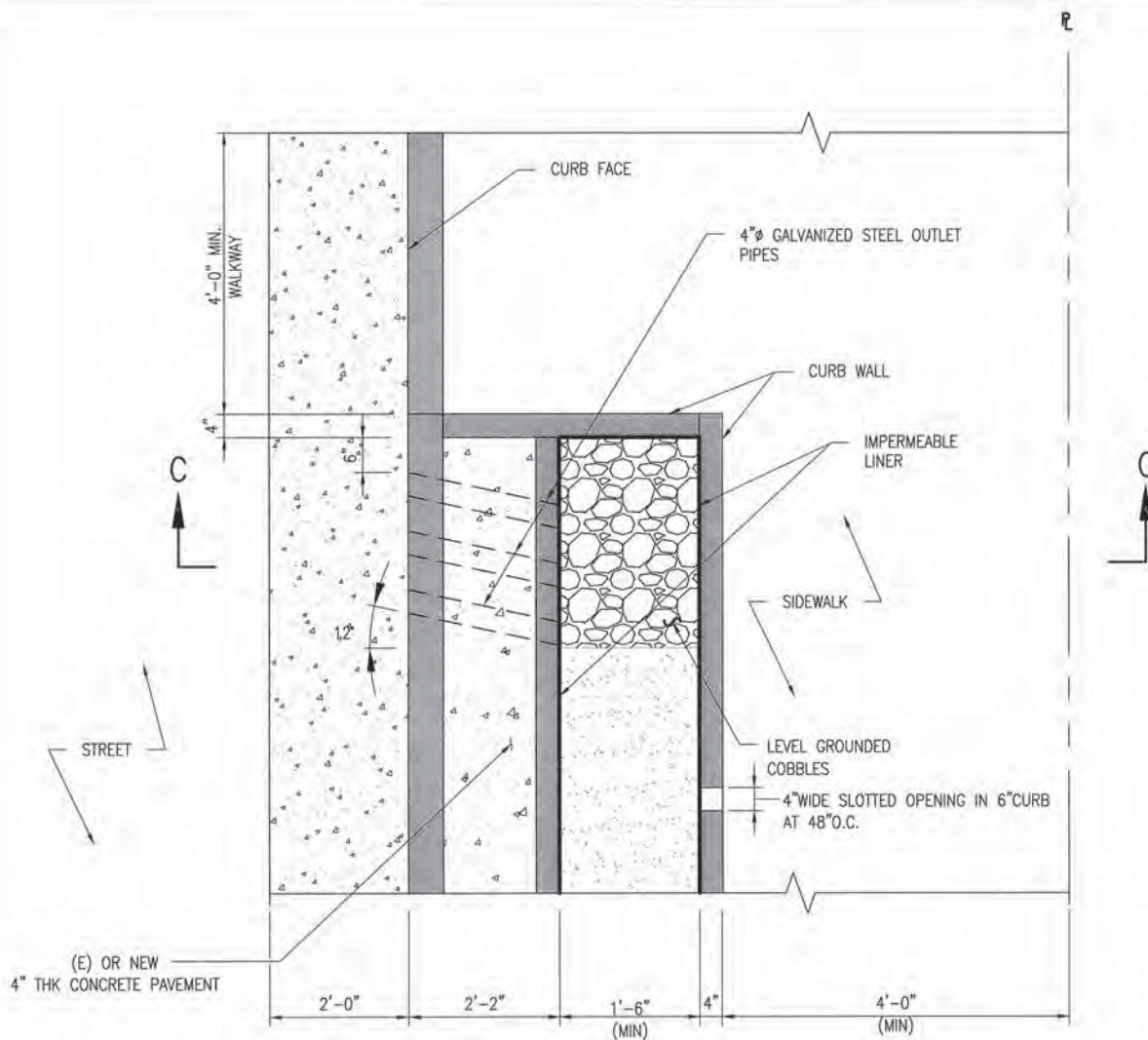
PARTIAL PLAN
TYPICAL SWALE PLAN

2
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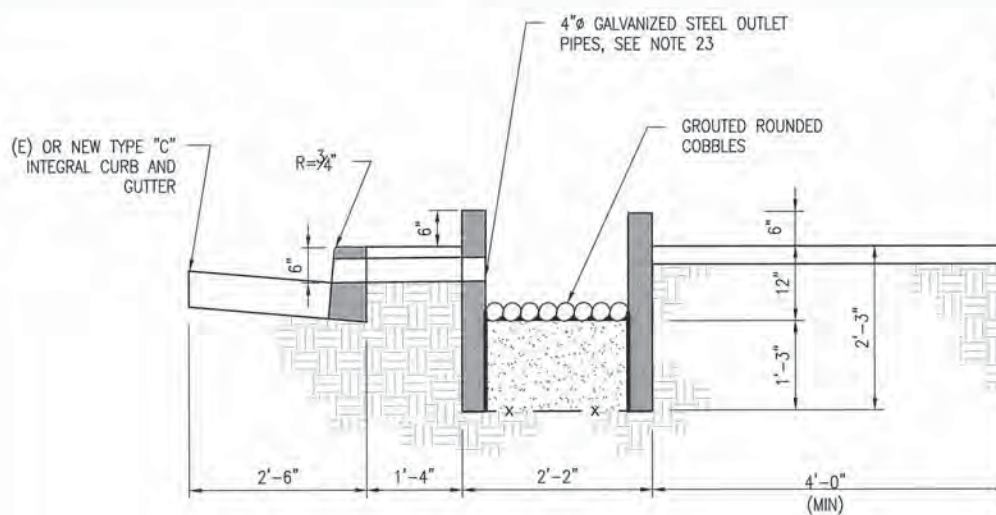
SECTION B-B
TYPICAL SWALE SECTION





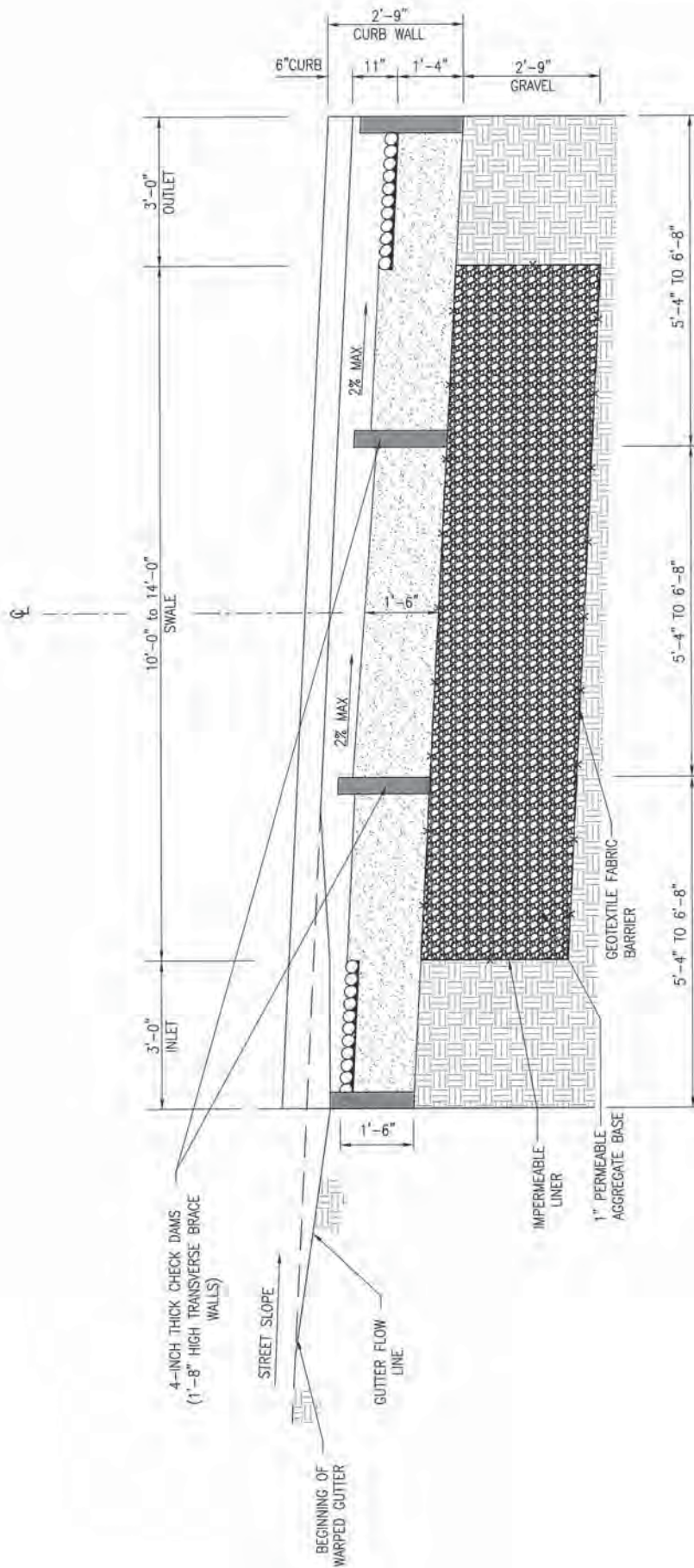
PARTIAL PLAN
OUTLET PLAN

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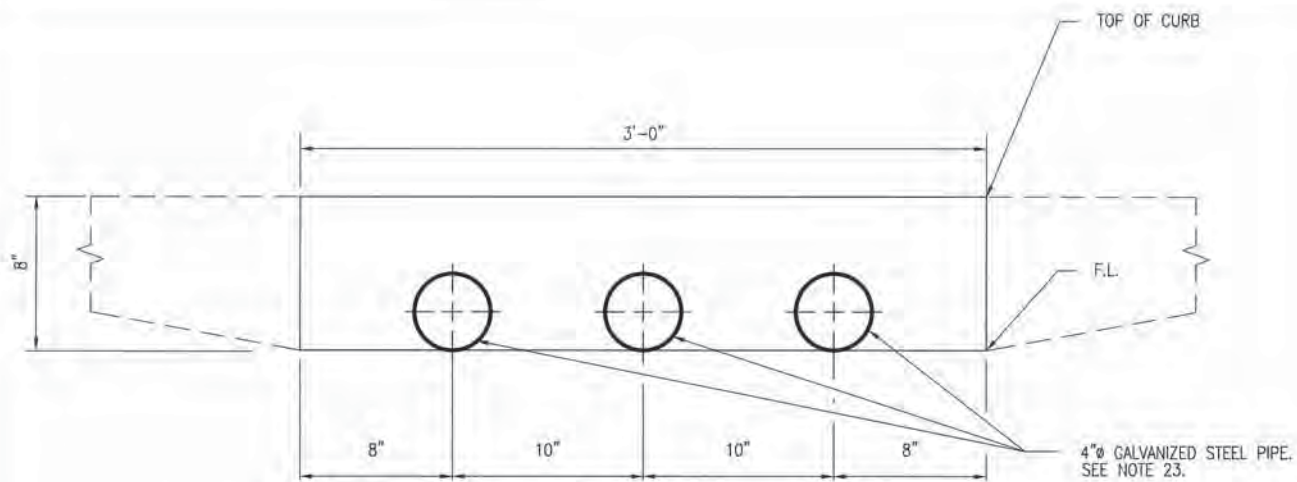
SECTION C-C
OUTLET SECTION



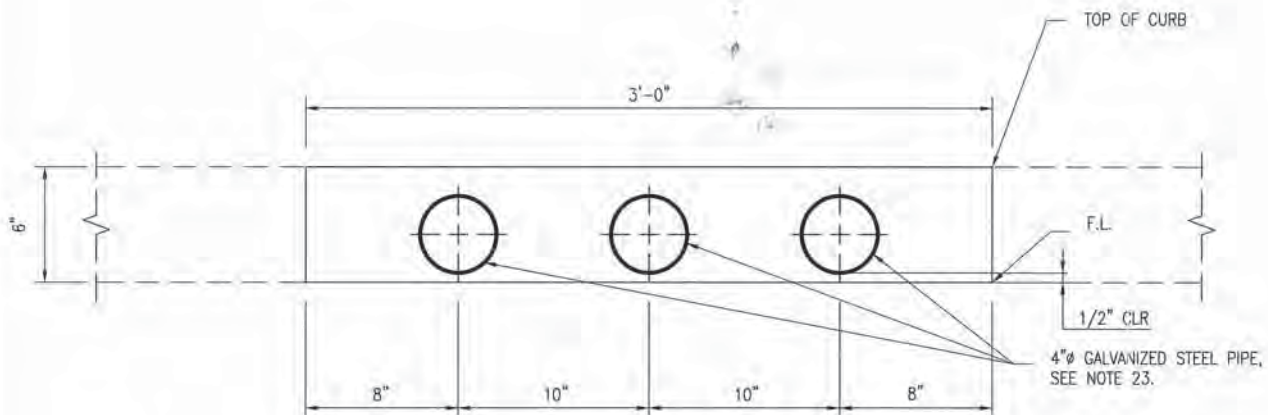


SECTION D-D
LONGITUDINAL SECTION OF PARKWAY SWALE ON STREETS
WITH LONGITUDINAL SLOPE OF 2% OR GREATER (5% MAXIMUM)



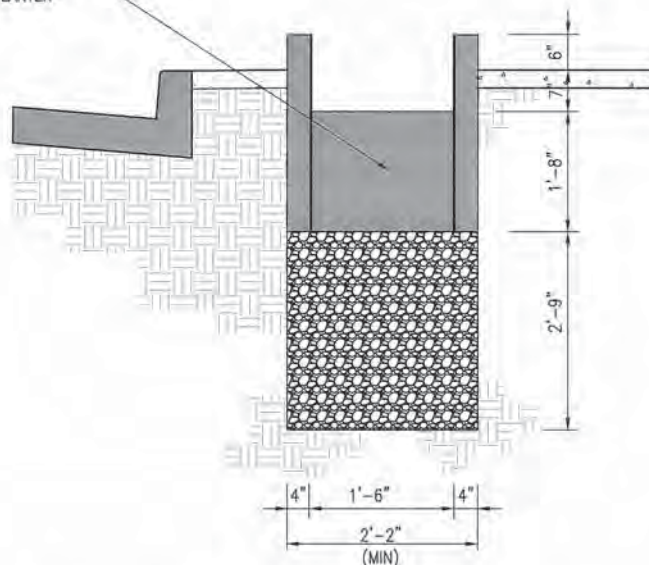


INLET PIPES AT FACE OF WARPED CURB AND GUTTER



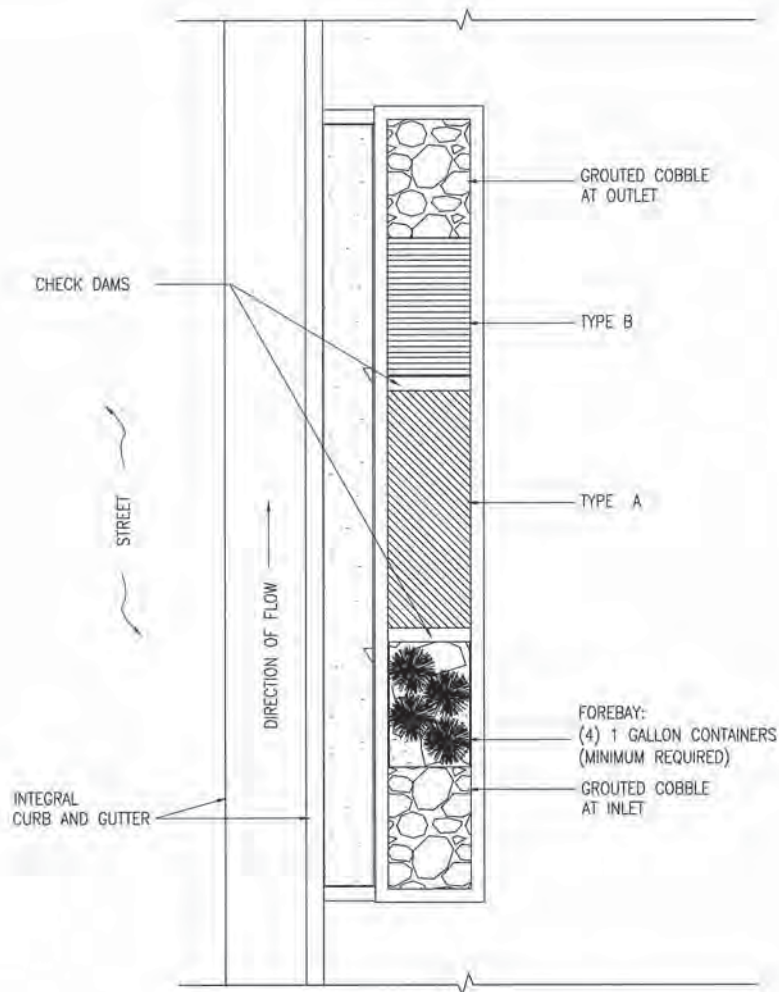
OUTLET PIPES AT FACE OF INTEGRAL CURB AND GUTTER

4" THICK X 20" DEEP CONCRETE
BRACE WALL INSIDE PLANTER



TYPICAL TRANSVERSE BRACE WALL





PLANTING TEMPLATES (SCHEMATIC ONLY*)

* SEE APPROVED PLANT MATERIAL LIST ON SHEET 9 OF STANDARD PLAN NO. S-484.
PLANTED FOREBAY WITH APPROVED TOPSOIL IS REQUIRED. PLANTING PLANS MAY BE ALTERNATED OR COMBINED.

PLANTING MATERIALS AND OBJECTIVES:



FOREBAY:
REDUCE INFLOW VELOCITY AND REDUCE EROSION.



TYPE A:
INCLUDES A PLANTED FOREBAY. USE INUNDATION TOLERANT SPECIES WITH GROWTH FORMS THAT REDUCE INFLOW VELOCITY AND ROOTS THAT ASSIST IN EROSION CONTROL. INSTALL WITH MULCH OR PEAGRAVEL.



TYPE B:
INUNDATION AND DROUGHT TOLERANT SPECIES WITH ROOT SYSTEMS THAT RESISTS EROSION. INSTALL WITH MULCH OR PEAGRAVEL.



NOTES:

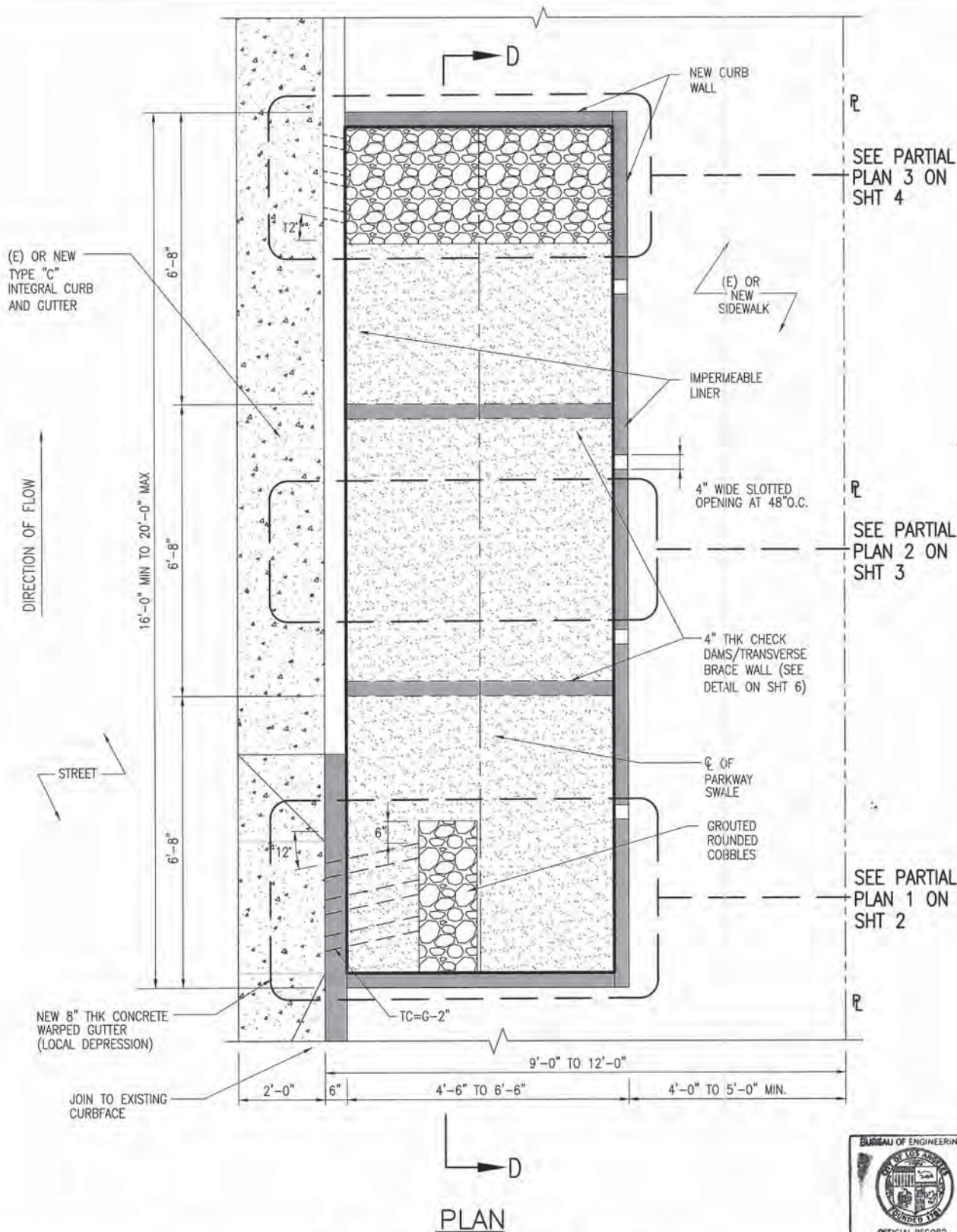
1. PARKWAY SWALE SHALL CONFORM TO THE LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (SSPWC) AS AMENDED BY THE BROWN BOOK LATEST EDITION AND TO THE REQUIREMENTS SPECIFIED IN STANDARD PLAN S-480, LATEST EDITION.
2. PARKWAY SWALES SHALL ONLY BE CONSTRUCTED IN AREAS WITH WELL DRAINING SOILS. THE MINIMUM SITE SOIL PERCOLATION RATE SHALL BE 0.5 INCHES PER HOUR.
3. PARKWAY SWALE STANDARD PLANS SHALL NOT BE USED IN LOCATIONS WITH A LONGITUDINAL STREET SLOPE GREATER THAN 5 PERCENT. WHERE THE STREET LONGITUDINAL SLOPE EXCEEDS 2%, USE THE TRANSVERSE BRACE WALLS AS CHECK DAMS TO LIMIT THE LONGITUDINAL SLOPE WITHIN THE SWALE TO 2% MAX. SEE LONGITUDINAL SWALE SECTION FOR ADDITIONAL INFORMATION.
4. PARKWAY SWALES SHALL BE LOCATED SO AS NOT TO REQUIRE ANY RELOCATION OF EXISTING STREET LIGHTS, TRAFFIC LIGHTS, UTILITY POLES, OR REMOVAL OF STREET TREES. SEE DWP POLE AND ANCHOR CLEARANCES REQUIREMENTS FOR PARKWAY SWALE SETBACKS FROM UTILITY POLES AND ANCHOR RODS.
5. MINIMUM LENGTH OF SWALE TO BE 16 FEET AND MAXIMUM LENGTH TO BE 20 FEET.
6. CONSTRUCT CONCRETE SIDEWALK WHEN SPECIFIED ON PLANS. WIDTH OF SIDEWALK TO BE MINIMUM 4'-0" WIDE FOR INDUSTRIAL COLLECTOR AND INDUSTRIAL LOCAL STREETS, 5'-0" WIDE FOR NON-CONTINUOUS LOCAL STREETS AND FOR COLLECTOR STREETS.
7. FOR PARKWAY SWALE INSTALLATIONS IN EXISTING SIDEWALKS, REPAIR/REPLACE ANY PORTIONS OF SIDEWALKS TO REMAIN WHICH ARE DAMAGED, SEVERELY CRACKED AND/OR UPLIFTING.
8. MINIMUM 4-FOOT WIDE CONCRETE WALKWAY SHALL BE PROVIDED AT EACH END OF SWALE FOR PEDESTRIAN TRAFFIC.
9. LOCAL DEPRESSION (WARPED GUTTER) PER APWA STANDARD PLAN 313, EXCEPT FOR "K" DIMENSION AS SHOWN HEREON. PROVIDE MINIMUM 8-INCH THICK COMPACTED CRUSHED MISC. BASE BELOW WARPED GUTTER.
10. CONSTRUCT INTEGRAL CURB AND GUTTER PER STANDARD PLAN S-410 WHEN SPECIFIED ON PLANS.
11. ALL CONCRETE SHALL BE CLASS 520-C-2500 PORTLAND CEMENT CONCRETE.
12. CURB WALLS, END WALLS, AND TRANSVERSE BRACE WALLS SHALL EACH BE POURED MONOLITHIC. JOINTS BETWEEN WALLS SHALL BE SEALED PER SECT. 303-1.8.7 OF THE GREENBOOK.
13. ALL CURB, BRACE, AND END WALLS TO HAVE 3/4-INCH RADIUS ROUNDED CORNERS AT TOP EDGES.
14. EXPANSION JOINTS SHALL BE PROVIDED WITH APPROVED POLYSTYRENE JOINT FILLER AND TWO-PART POLYURETHANE SEALANT.
15. PLACEMENT OF GEOTEXTILE FABRIC SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECT 300-8 OF THE GREEN BOOK.
16. IMPERMEABLE LINER TO BE A MINIMUM OF 16 MIL THICKNESS.
17. CEMENT GROUT SHALL BE COMPOSED OF ONE PART CEMENT, THREE PARTS SAND AND THE MINIMUM AMOUNT OF WATER NECESSARY FOR THE MIXTURE TO FLOW UNDER ITS OWN WEIGHT.
18. COBBLE STONES TO BE ROUNDED AND 2-INCH TO 4-INCH IN DIAMETER AND SHALL BE EMBEDDED ONE INCH MINIMUM INTO TWO INCH THICK CEMENT GROUT.
19. PLACEMENT OF GRAVEL (1-INCH PERMEABLE AGGREGATE BASE) TO BE SELF COMPACTING.
20. COMPACT TOP SOIL TO 80-85 PERCENT RELATIVE COMPACTION. TOP SOIL TO BE PLACED IN MINIMUM OF TWO EQUAL LIFTS, IN ORDER TO MINIMIZE COMPACTION AND EXCESSIVE SETTLEMENT.
21. SOIL AMENDMENTS SHALL CONFORM TO THE REQUIREMENTS OF S-480.
22. A TEMPORARY IRRIGATION SYSTEM IS REQUIRED TO BE INSTALLED FOR PLANT ESTABLISHMENT.
23. INLET AND OUTLET PIPES SHALL BE GALVANIZED 4" STANDARD PIPE.



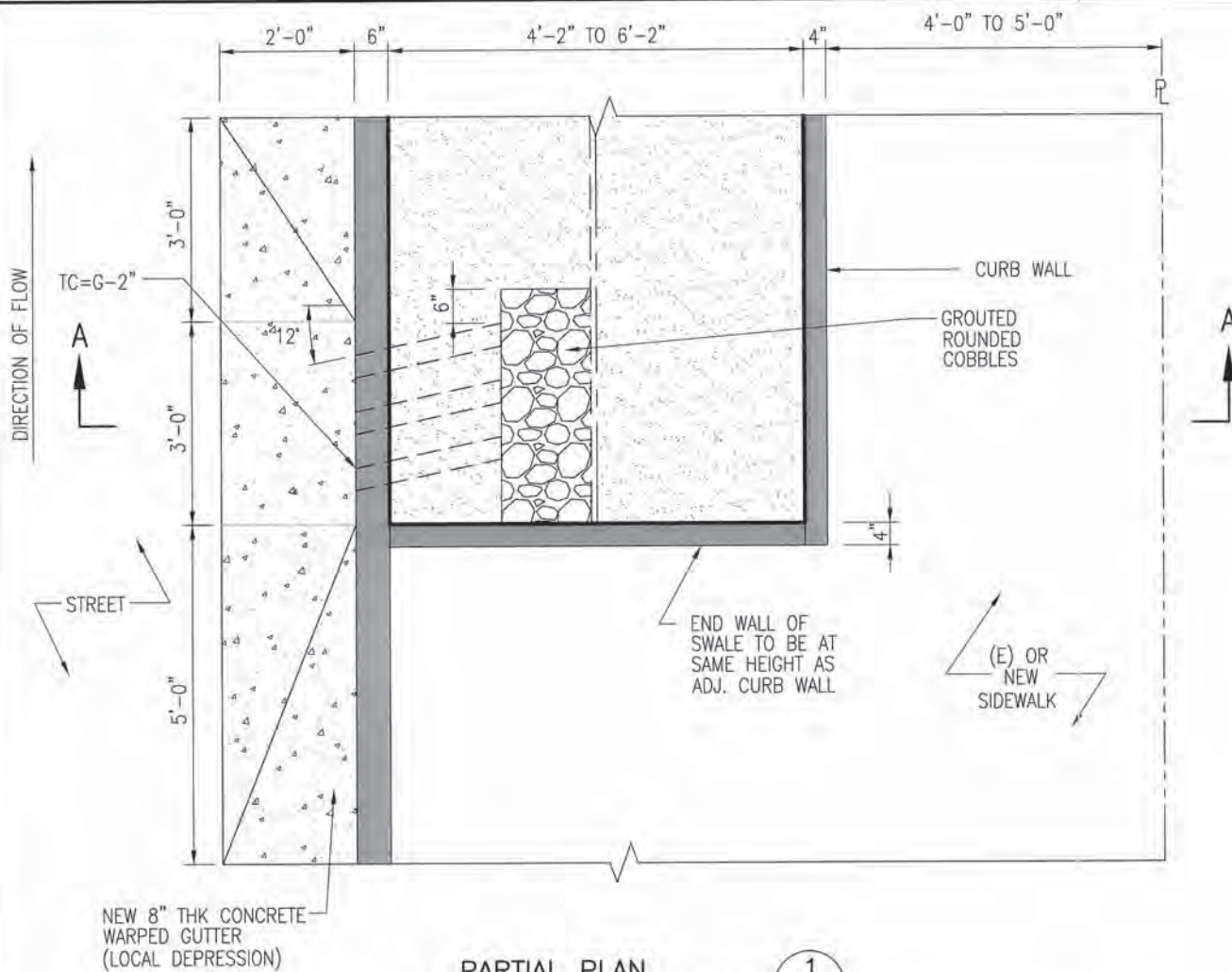
PARKWAY SWALE WITH NO STREET PARKING

(s-483-0)



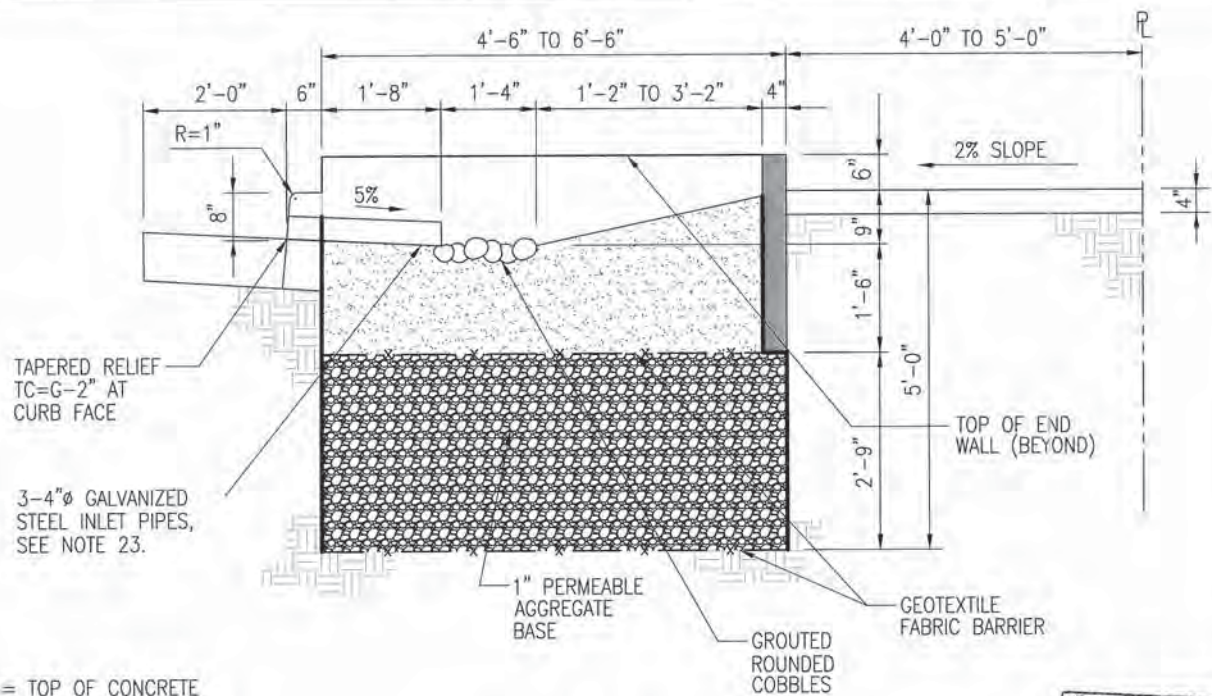


BUREAU OF ENGINEERING		DEPARTMENT OF PUBLIC WORKS		CITY OF LOS ANGELES	
PARKWAY SWALE WITH NO STREET PARKING				STANDARD PLAN S-483-0	
PREPARED	SUBMITTED	APPROVED	SUPERSEDES	REFERENCES	
ALICE GONG, CE49107 BUREAU OF SANITATION ENRIQUE C. ZALDIVAR, P.E., DIRECTOR	JEONG PARK, S.E. ENGINEER OF DESIGN BUREAU OF ENGINEERING 6/28/10	GARY LEE MOORE, P.E. CITY ENGINEER 6-29-10		S-410 S-480 S-484	
CHECKED			VAULT INDEX NUMBER		
PATRICK LEE, CE42448 BUREAU OF ENGINEERING	KEN REDD, P.E. ACTING DEPUTY CITY ENGINEER 6/29/10		B-4642		
			SHEET 1 OF 8 SHEETS		



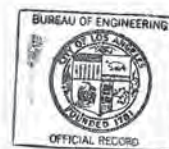
PARTIAL PLAN
SWALE INLET PLAN

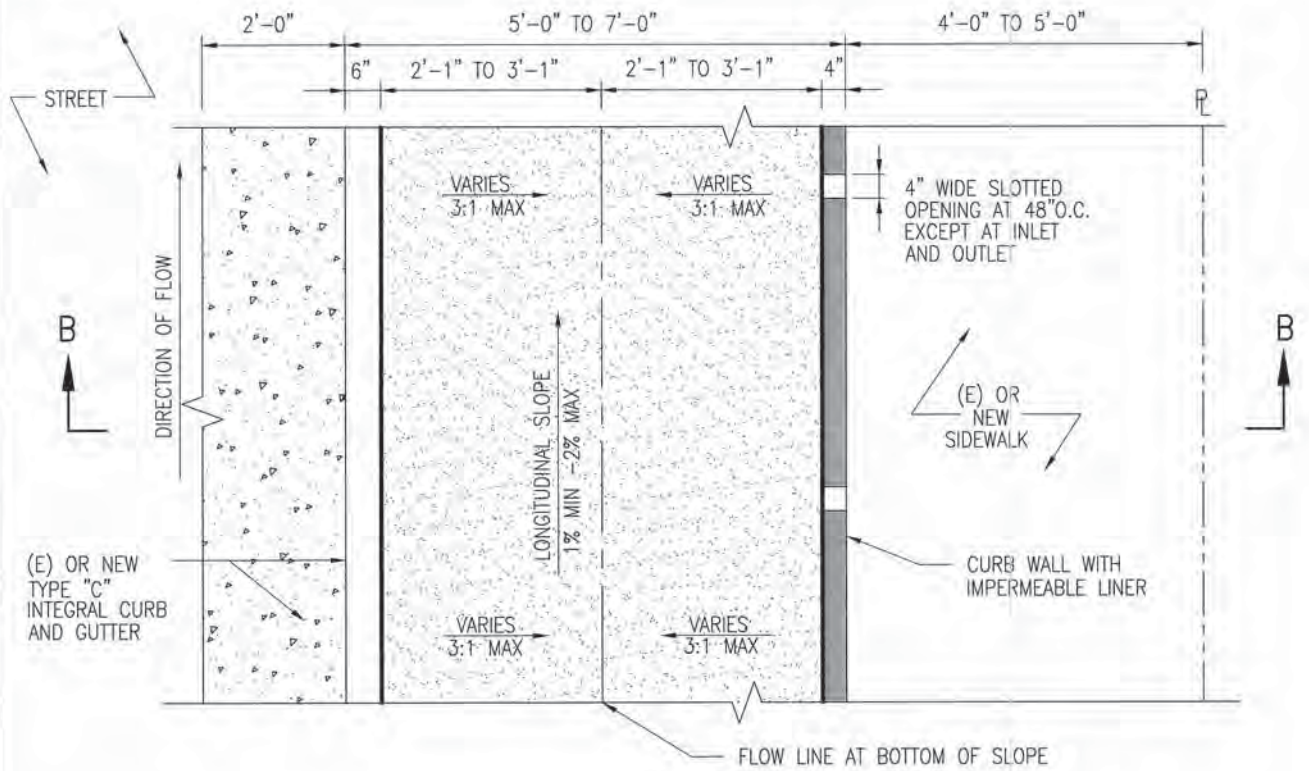
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TC = TOP OF CONCRETE
AT WARPED GUTTER
G = TOP OF (E) GUTTER

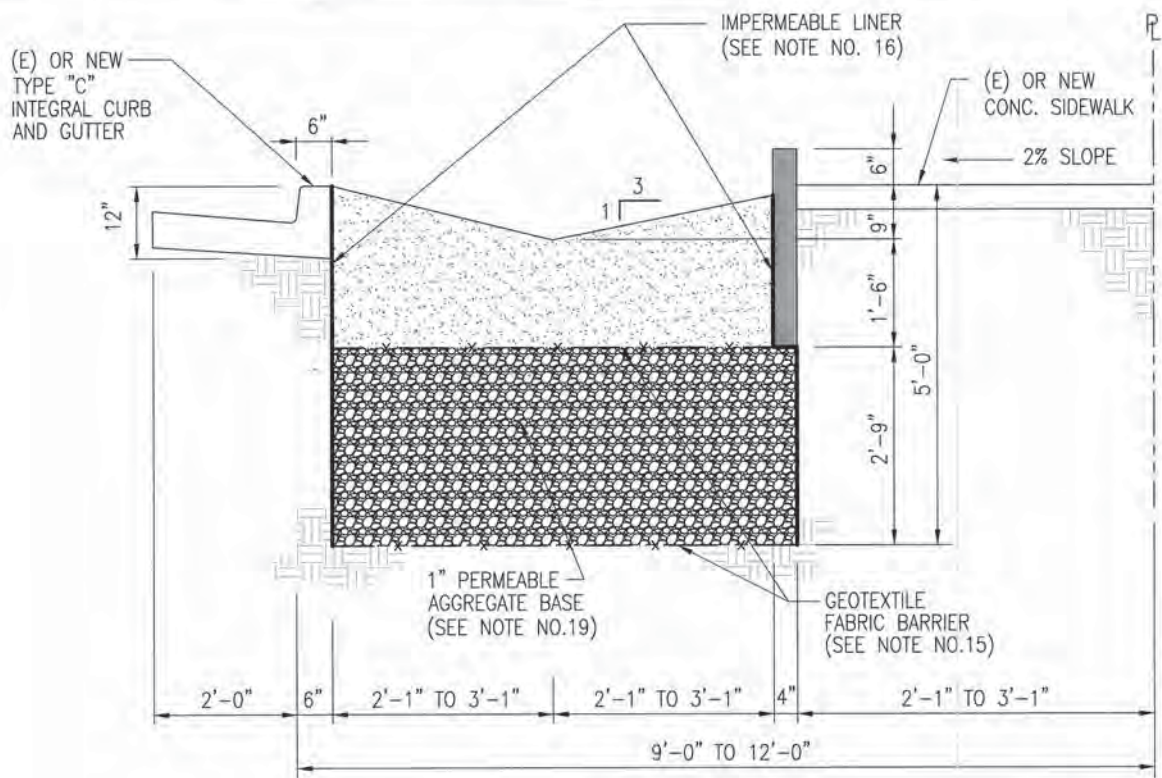
SECTION A-A
SWALE INLET SECTION





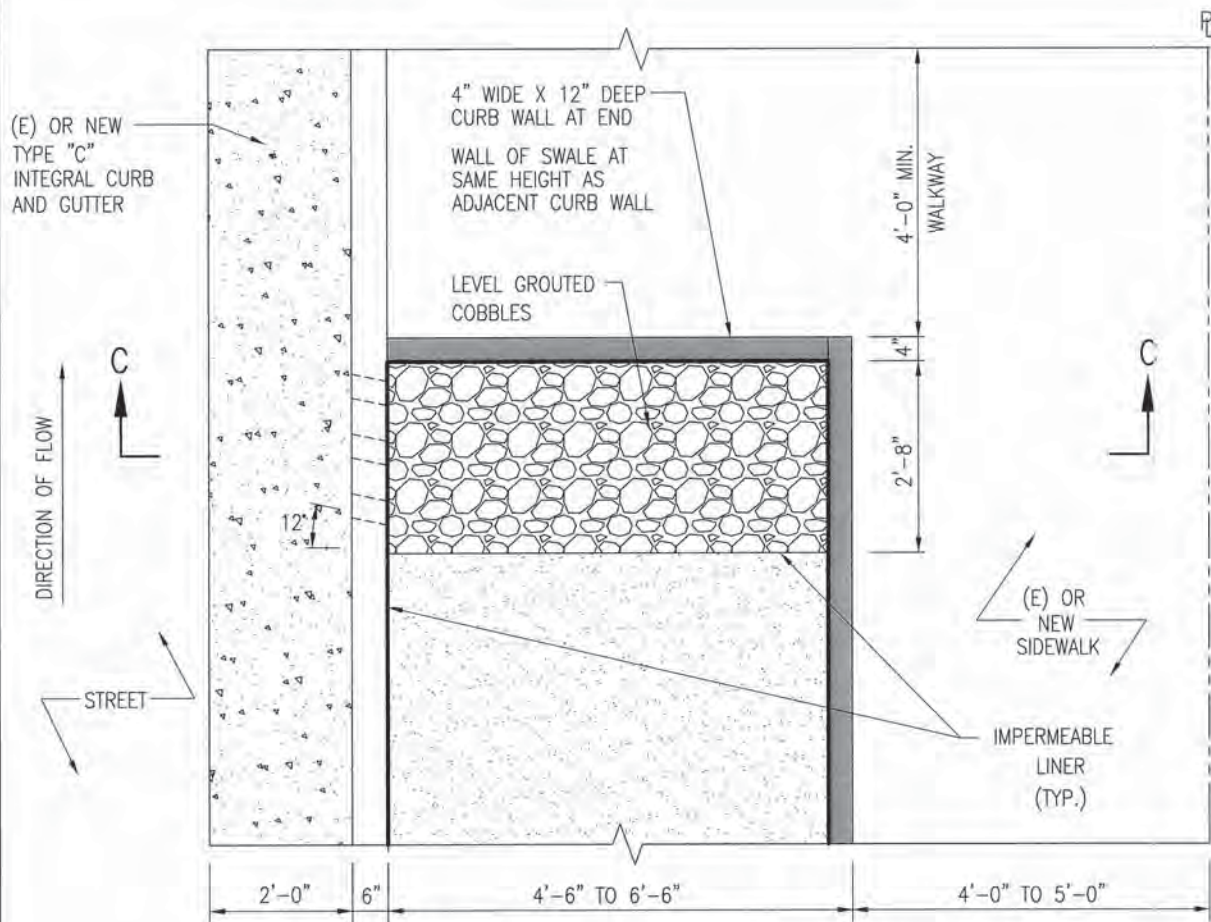
PARTIAL PLAN
TYPICAL SWALE PLAN

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SECTION B-B
TYPICAL SWALE SECTION

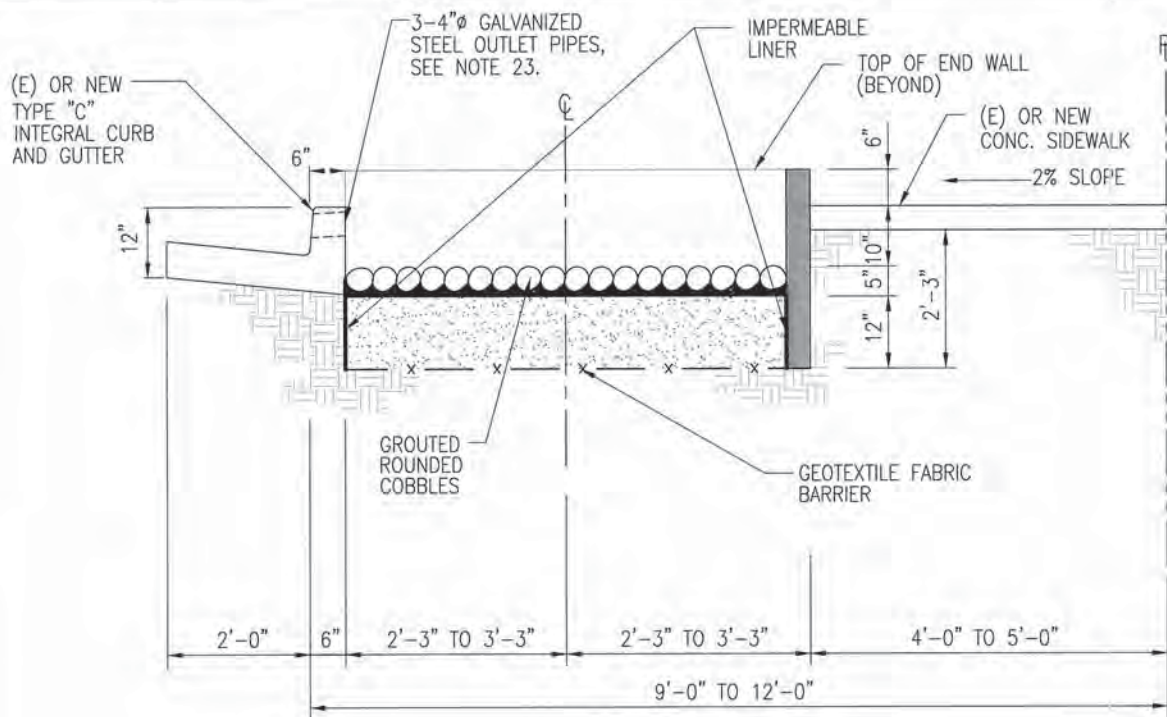




PARTIAL PLAN
SWALE OUTLET PLAN

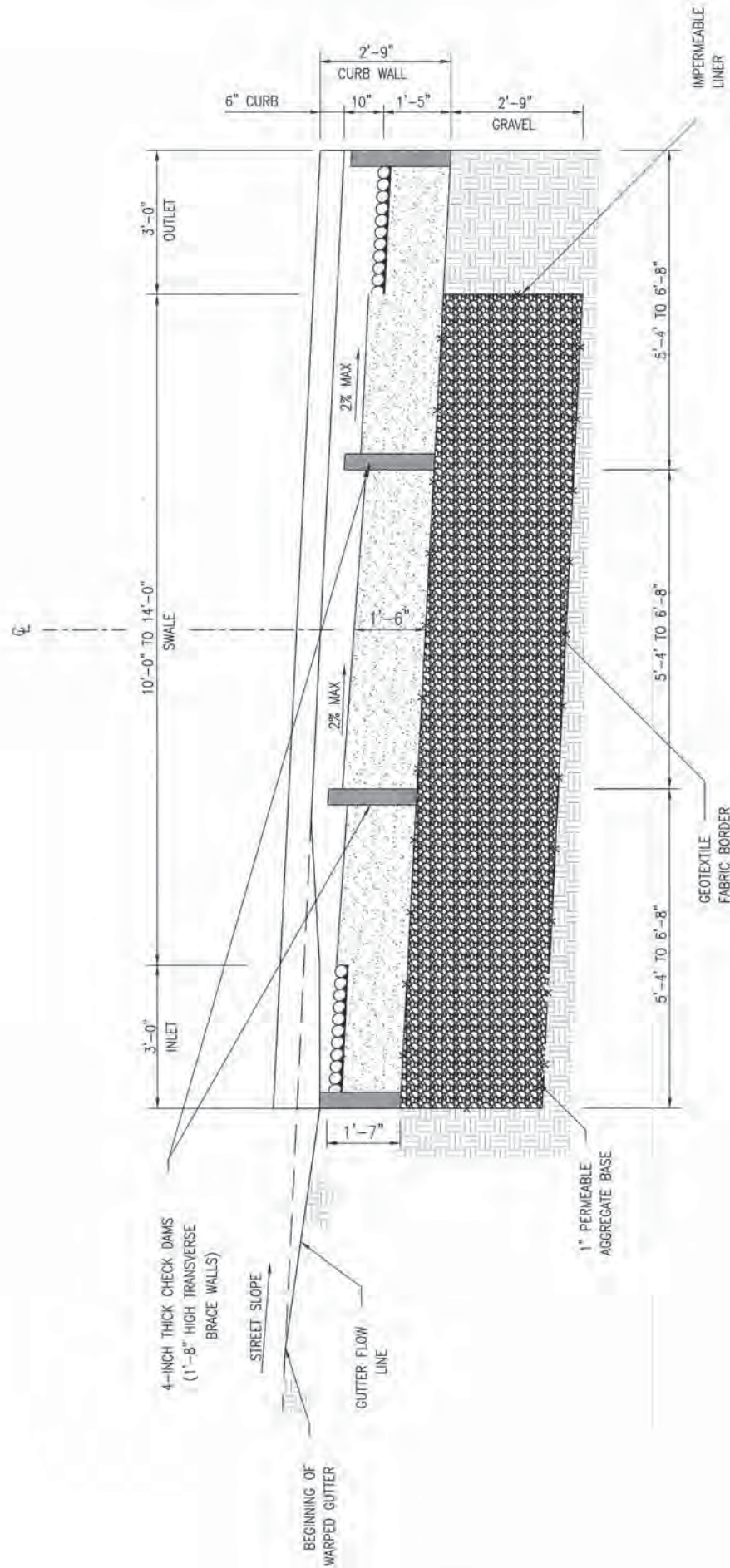
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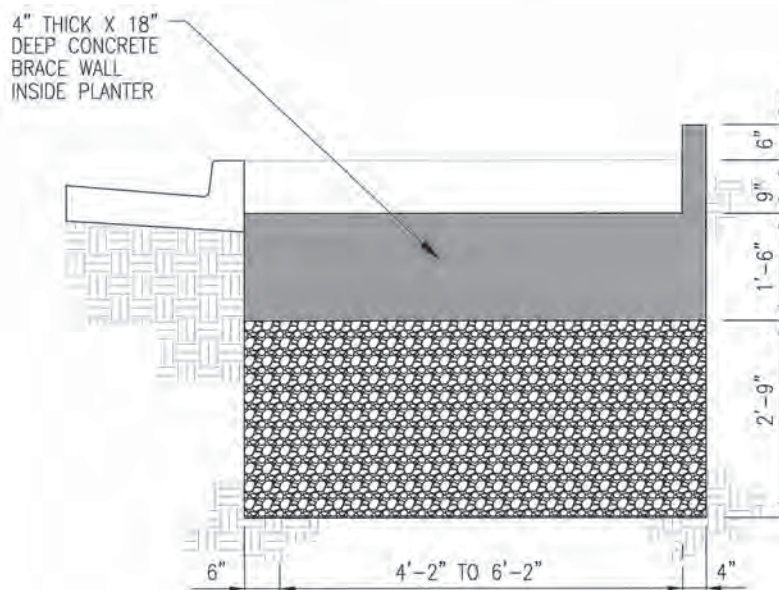
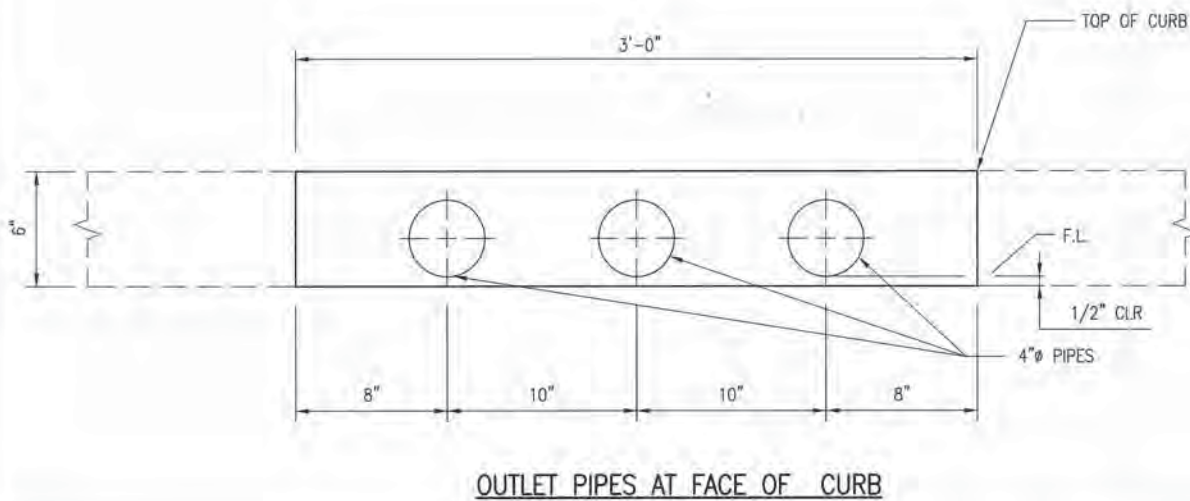
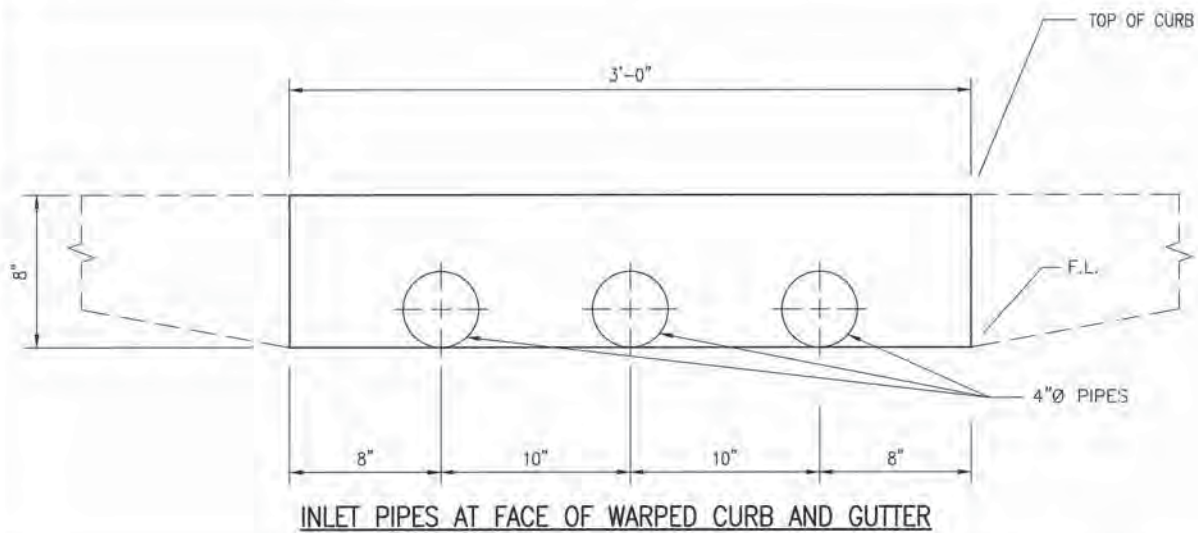
SECTION C-C
SWALE OUTLET SECTION

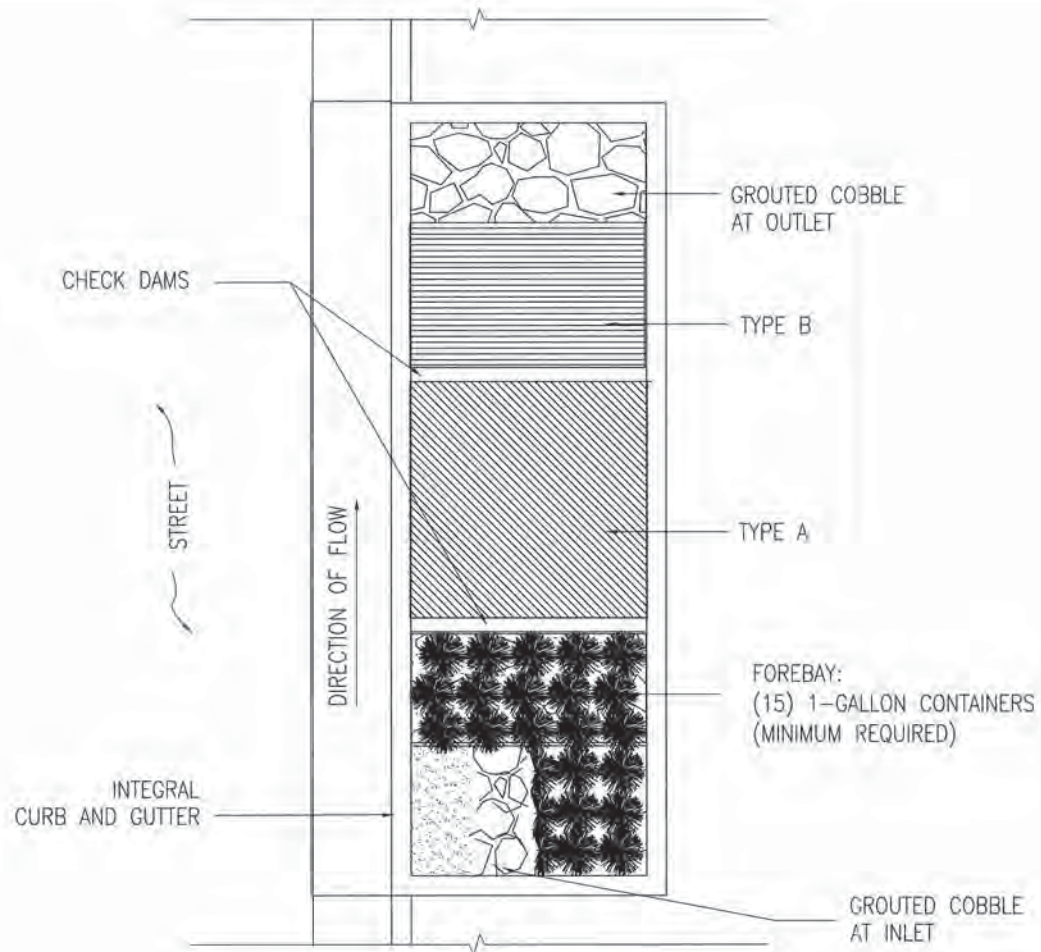




SECTION D-D
 LONGITUDINAL SECTION OF PARKWAY SWALE ON STREETS
 WITH LONGITUDINAL SLOPE OF 2% OR GREATER (5% MAXIMUM)







PLANTING TEMPLATES (SCHEMATIC ONLY*)

* SEE APPROVED PLANT MATERIAL LIST ON SHEET 9 OF STANDARD PLAN NO. S-484.
PLANTED FOREBAY WITH APPROVED TOPSOIL IS REQUIRED. PLANTING PLANS MAY BE ALTERNATED OR COMBINED.

PLANTING MATERIALS AND OBJECTIVES:



FOREBAY:
REDUCE INFLOW VELOCITY AND REDUCE EROSION.



TYPE A:
INCLUDES A PLANTED FOREBAY. USE INUNDATION TOLERANT SPECIES WITH GROWTH FORMS THAT REDUCE INFLOW VELOCITY AND ROOTS THAT ASSIST IN EROSION CONTROL. INSTALL WITH MULCH OR PEAGRAVEL.



TYPE B:
INUNDATION AND DROUGHT TOLERANT SPECIES WITH ROOT SYSTEMS THAT RESISTS EROSION. INSTALL WITH MULCH OR PEAGRAVEL.



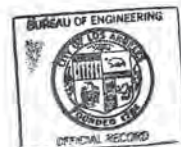
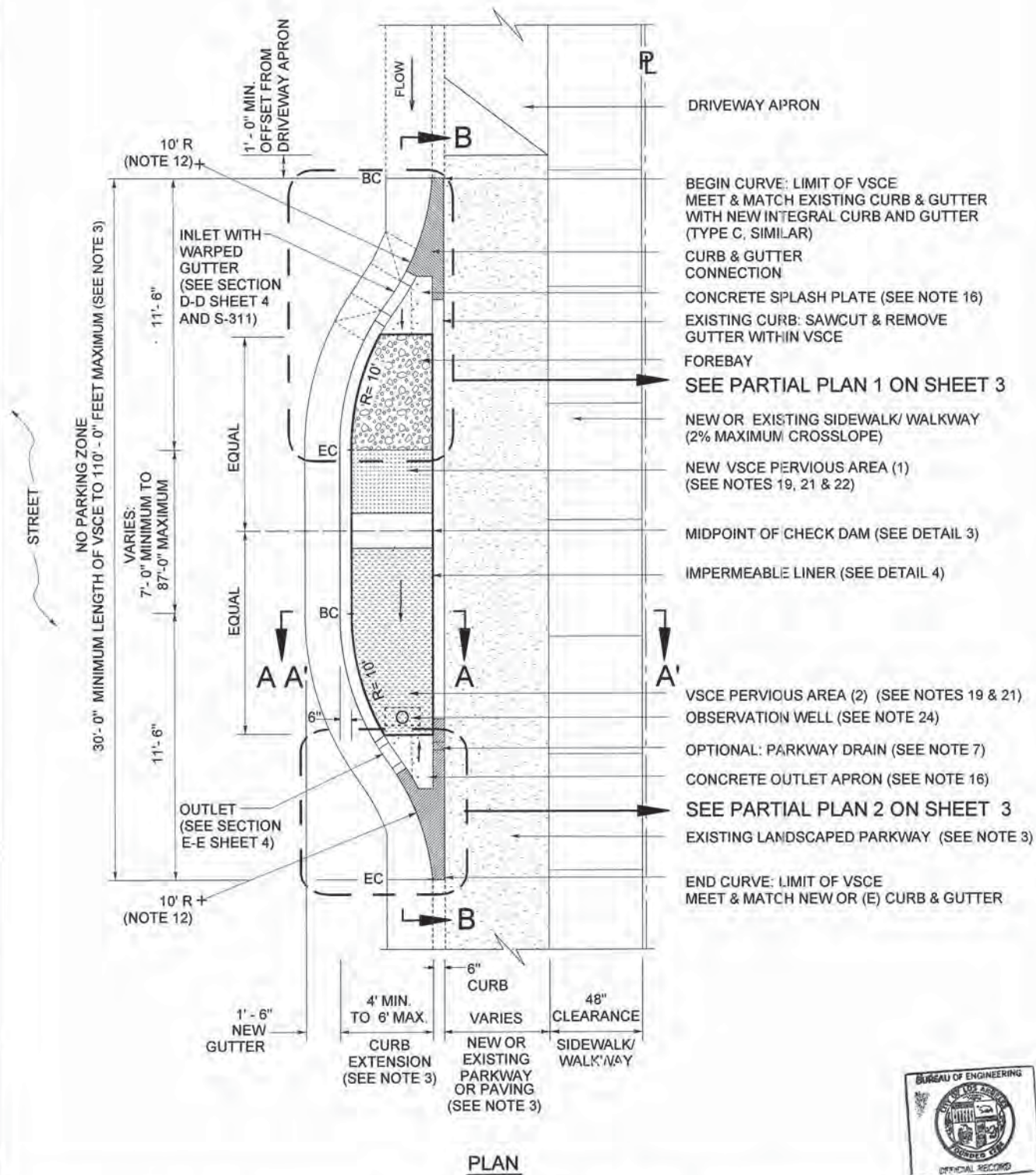
NOTES:

1. PARKWAY SWALE SHALL CONFORM TO REQUIREMENTS SPECIFIED IN STANDARD PLAN S-480, LATEST EDITION.
2. PARKWAY SWALES SHALL ONLY BE CONSTRUCTED IN AREAS WITH WELL DRAINING SOILS. THE MINIMUM SITE SOIL PERCOLATION RATE SHALL BE 0.5 INCHES PER HOUR.
3. PARKWAY SWALE STANDARD PLANS SHALL NOT BE USED IN LOCATIONS WITH A LONGITUDINAL STREET SLOPE GREATER THAN 5 PERCENT. WHERE THE STREET LONGITUDINAL SLOPE EXCEEDS 2%, USE THE TRANSVERSE BRACE WALLS AS CHECK DAMS TO LIMIT THE LONGITUDINAL SLOPE WITHIN THE SWALE TO 2% MAX. SEE LONGITUDINAL SWALE SECTION FOR ADDITIONAL INFORMATION.
4. PARKWAY SWALES SHALL BE LOCATED SO AS NOT TO REQUIRE ANY RELOCATION OF EXISTING STREET LIGHTS, TRAFFIC LIGHTS, UTILITY POLES, OR REMOVAL OF STREET TREES. SEE DWP POLE AND ANCHOR CLEARANCES PLAN FOR PARKWAY SWALE SETBACKS FROM UTILITY POLES AND ANCHOR RODS.
5. MINIMUM LENGTH OF SWALE TO BE 16 FEET AND MAXIMUM LENGTH TO BE 20 FEET.
6. CONSTRUCT CONCRETE SIDEWALK WHEN SPECIFIED ON PLAN. SIDEWALK TO BE MINIMUM 5'-0" IN CLEAR WIDTH.
7. FOR PARKWAY SWALE INSTALLATIONS IN EXISTING SIDEWALKS, REPAIR/REPLACE ANY PORTIONS OF SIDEWALKS TO REMAIN WHICH ARE DAMAGED, SEVERELY CRACKED AND/OR UPLIFTING.
8. A MINIMUM 4-FOOT WIDE CONCRETE WALKWAY SHALL BE PROVIDED AT EACH END OF SWALE FOR PEDESTRIAN TRAVEL.
9. LOCAL DEPRESSION (WARPED GUTTER) PER APWA STANDARD PLAN 313, EXCEPT FOR "K" DIMENSION AS SHOWN HEREON. PROVIDE MINIMUM 8-INCH THICK COMPACTED CRUSHED MISC. BASE BELOW WARPED GUTTER.
10. CONSTRUCT INTEGRAL CURB AND GUTTER PER STANDARD PLAN S-410 WHEN SPECIFIED ON PLANS.
11. ALL CONCRETE SHALL BE CLASS 520-C-2500 PORTLAND CEMENT CONCRETE.
12. CURB WALLS, END WALLS, AND TRANSVERSE BRACE WALLS SHALL EACH BE POURED MONOLITHIC. JOINTS BETWEEN WALLS SHALL BE SEALED PER SECT.303-1.8.7 OF THE GREEN BOOK.
13. ALL CURB, BRACE AND END WALLS TO HAVE $\frac{3}{4}$ -INCH RADIUS ROUNDED CORNERS AT TOP EDGES.
14. EXPANSION JOINTS SHALL BE PROVIDED WITH APPROVED POLYSTYRENE JOINT FILLER AND TWO-PART POLYURETHANE SEALANT.
15. PLACEMENT OF GEOTEXTILE FABRIC SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECT 300-8 OF THE GREEN BOOK.
16. IMPERMEABLE LINER TO BE A MINIMUM OF 16 MIL THICKNESS.
17. CEMENT GROUT SHALL BE COMPOSED OF ONE PART CEMENT, THREE PARTS SAND AND THE MINIMUM AMOUNT OF WATER NECESSARY FOR THE MIXTURE TO FLOW UNDER ITS OWN WEIGHT.
18. COBBLE STONES TO BE ROUNDED AND 2-INCH TO 4-INCH IN DIAMETER AND SHALL BE EMBEDDED ONE INCH MINIMUM INTO TWO INCH THICK CEMENT GROUT.
19. PLACEMENT OF GRAVEL (1-INCH PERMEABLE AGGREGATE BASE) TO BE SELF COMPACTING.
20. COMPACT TOP SOIL TO 80-85 PERCENT RELATIVE COMPACTION. TOP SOIL TO BE PLACED IN A MINIMUM OF TWO EQUAL LIFTS, IN ORDER TO MINIMIZE COMPACTION AND EXCESSIVE SETTLEMENT.
21. SOIL AMENDMENTS SHALL CONFORM TO THE REQUIREMENTS OF S-480.
22. A TEMPORARY IRRIGATION SYSTEM IS REQUIRED TO BE INSTALLED FOR PLANT ESTABLISHMENT.
23. INLET AND OUTLET PIPES SHALL BE GALVANIZED 4" DIAMETER STANDARD PIPE.



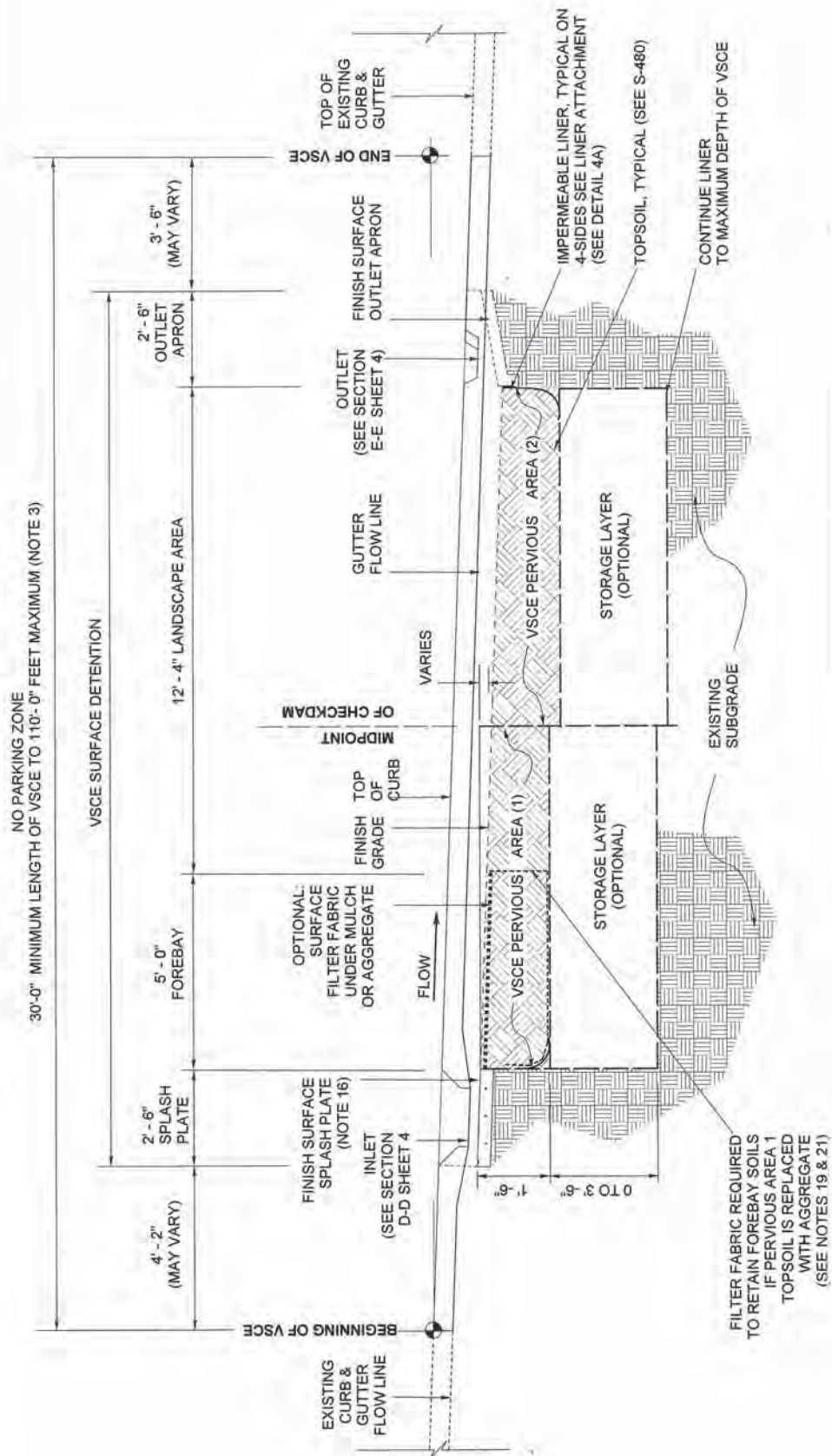
**VEGETATED
STORMWATER CURB
EXTENSION (VSCE)
(s-484-0)**

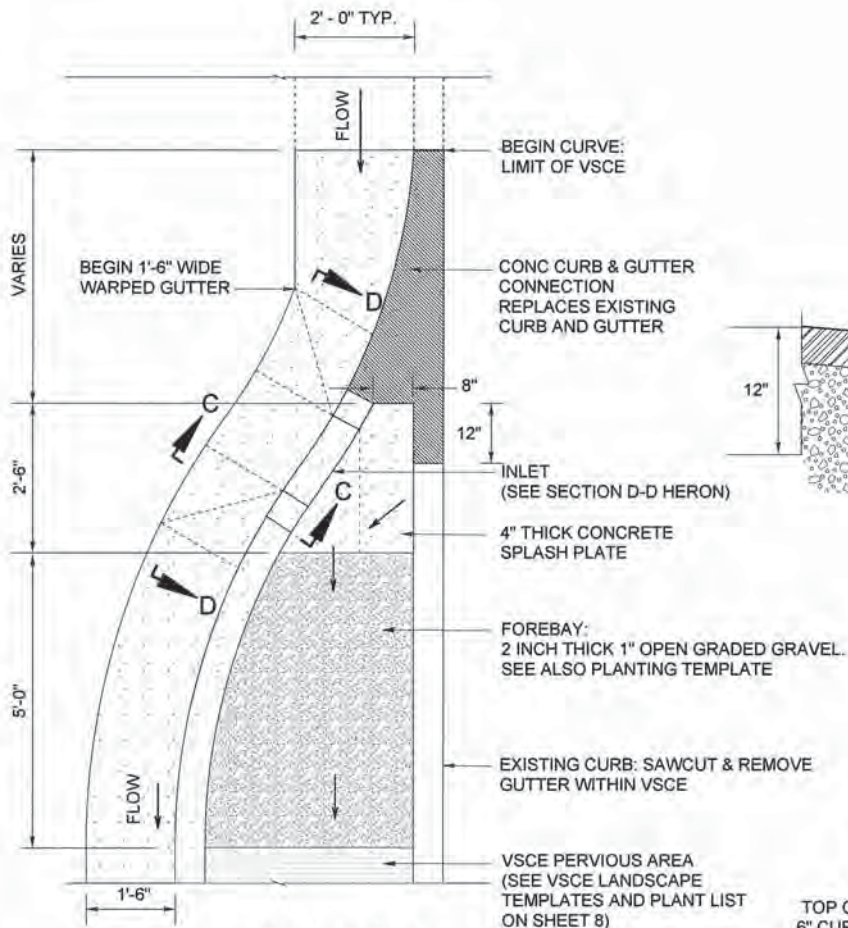




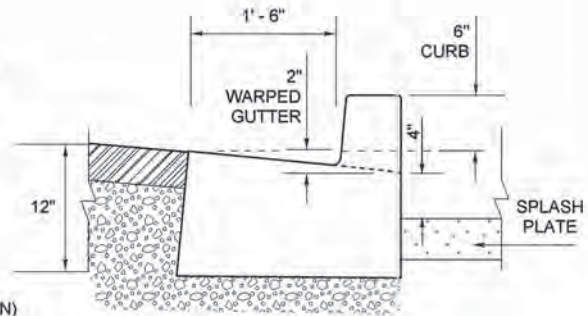
BUREAU OF ENGINEERING		DEPARTMENT OF PUBLIC WORKS		CITY OF LOS ANGELES	
VEGETATED STORMWATER CURB EXTENSION (VSCE)				STANDARD PLAN S-484-0	
PREPARED DEBORAH DEETS, RLA 4839 BUREAU OF SANITATION ENRIQUE C. ZALDIVAR, P.E., DIRECTOR	SUBMITTED <i>[Signature]</i> 6/28/10 JEONG PARK, S.E. ENGINEER OF DESIGN BUREAU OF ENGINEERING	APPROVED <i>[Signature]</i> 6-29-10 GARY LEE MOORE, P.E. CITY ENGINEER		SUPERSEDES	REFERENCES
CHECKED PATRICK LEE, CE42448 BUREAU OF ENGINEERING	<i>[Signature]</i> 6/29/10 KEN REDD, P.E. ACTING DEPUTY CITY ENGINEER				S-311 S-433 S-410 S-480 S-430 S-681
				B - 4641	
				SHEET 1 OF 11 SHEETS	





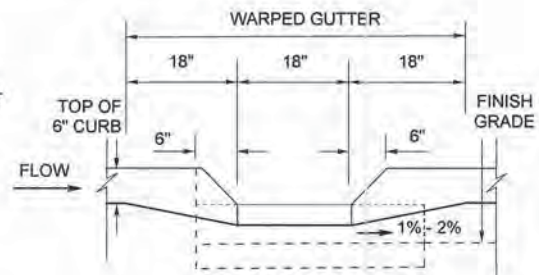


PARTIAL PLAN 1



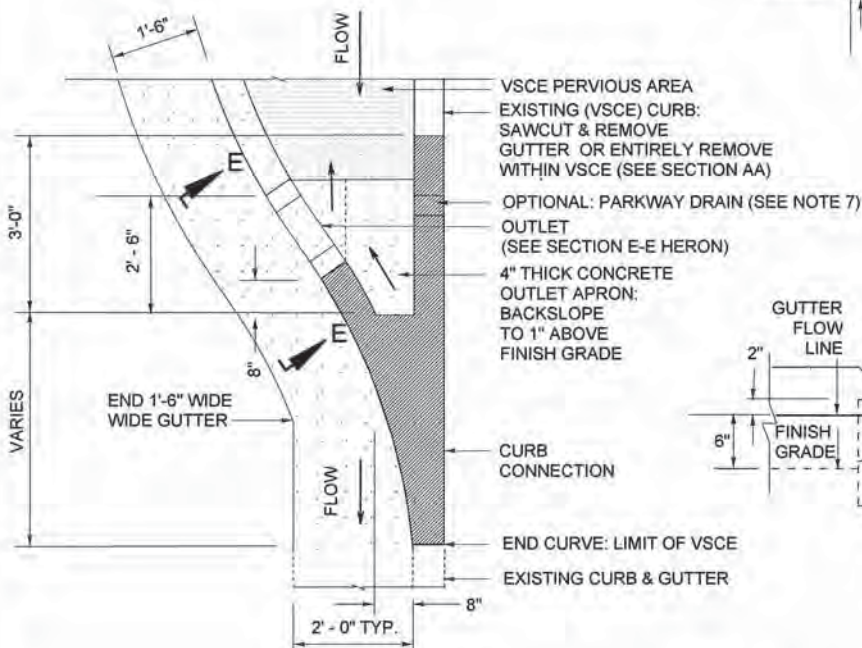
SECTION C - C

MODIFIED CURB

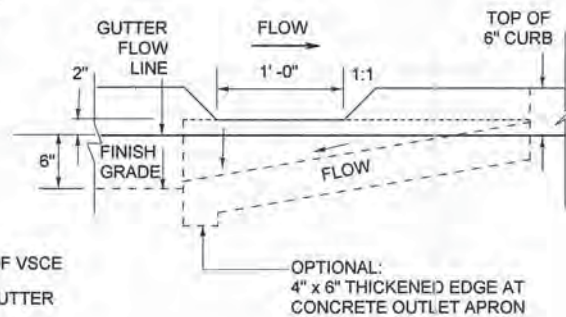


SECTION D - D

INLET

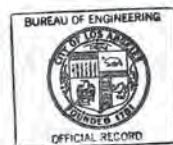


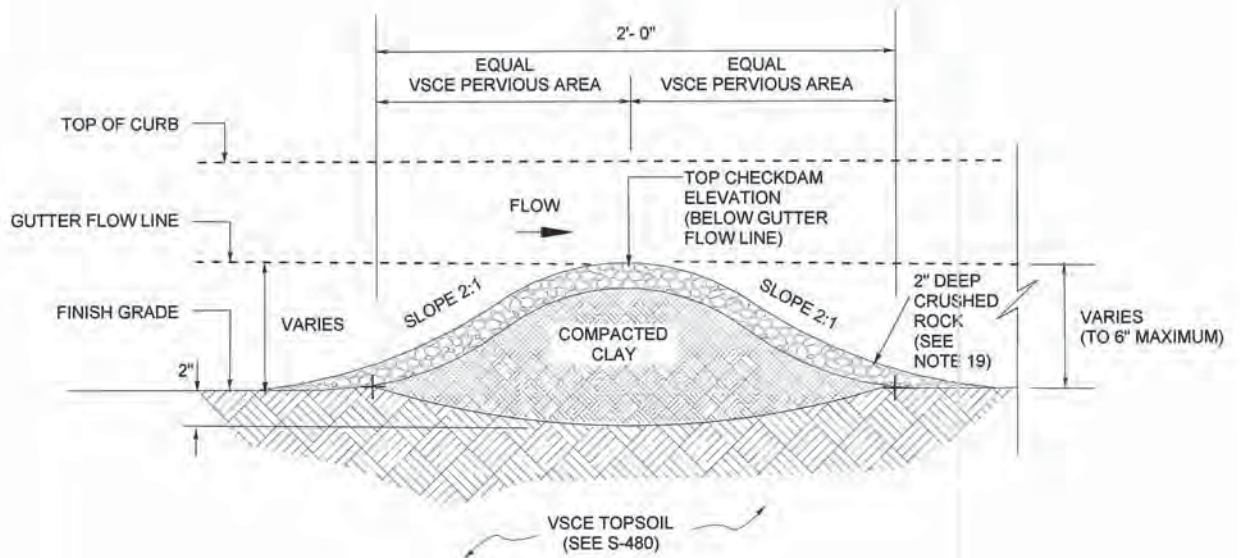
PARTIAL PLAN 2



SECTION E - E

OUTLET





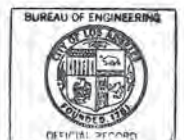
DETAIL 3
CHECKDAM OPTION 1 - CLAY

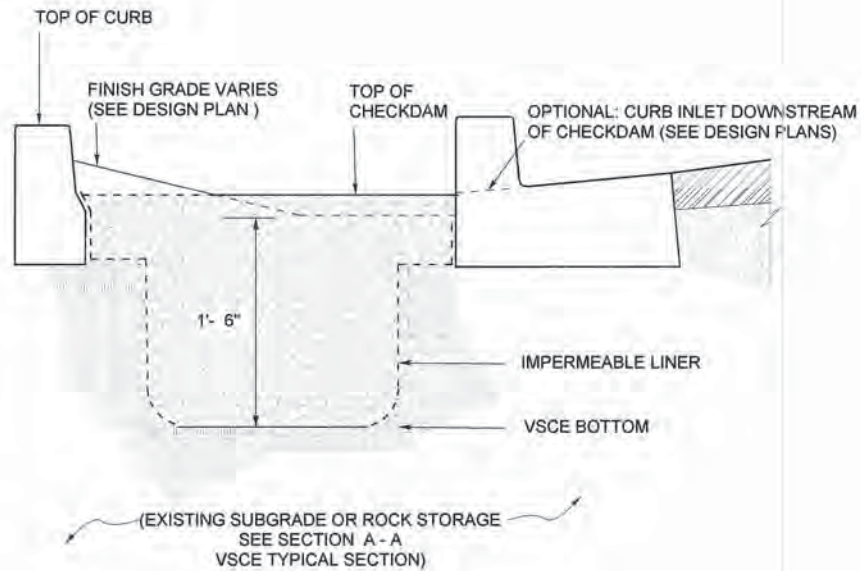
OPTIONS FOR CHECKDAMS TO BE SELECTED BY DESIGNER BASED ON SITE SPECIFICS. SELECTED CHECKDAM TYPE, LOCATION, AND ELEVATION OF CHECK DAM SHALL BE SHOWN ON DESIGN PLANS. ALL OPTIONS SHALL USE CHECK DAM SPACING TABLE BELOW.

CHECK DAM SPACING			
VSCE LENGTH (FEET)	LONGITUDINAL STREET SLOPE	# OF CHECK DAMS **	ADDITIONAL INLETS ***
30	<=1%	0	None
	>1%	1	None
31 - 50	<=1%	1	None
	>1%	2	1
51 - 70	<=1%	2	1
	>1%	3	2
71-90	<=1%	3	2
	>1%	4	3
91 -110'	<=1%	4	3
	>1%	5	4

TABLE 1

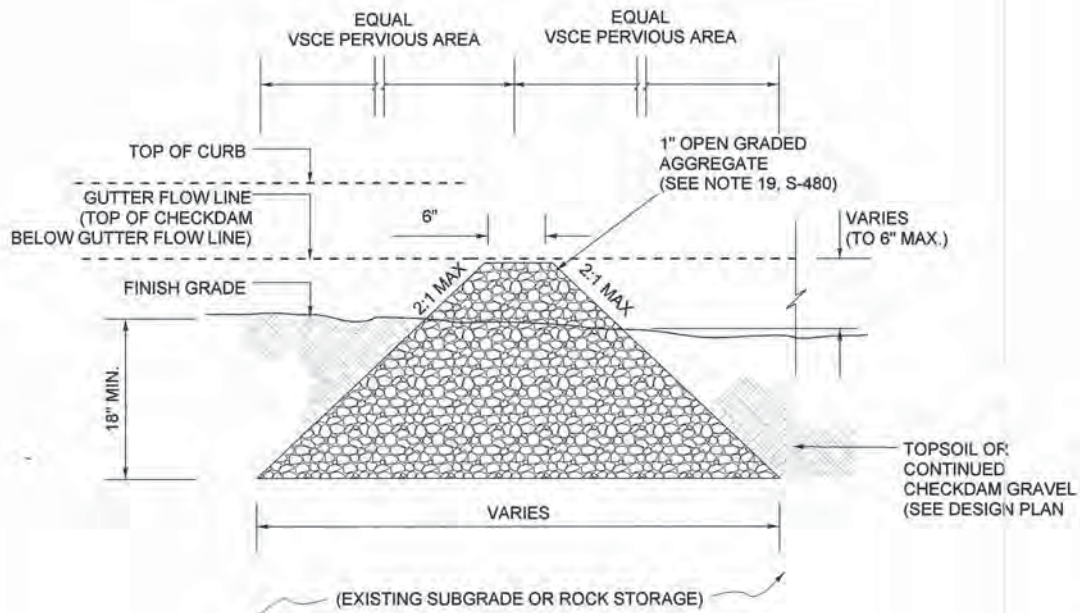
** CHECKDAMS ARE TO BE SPACED AT EQUAL DISTANCES BETWEEN INLET AND OUTLET (NOTE 3)
*** OPTIONAL: ADDITIONAL INLETS MAY BE LOCATED DOWNSTREAM OF CHECKDAMS.





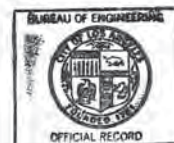
DETAIL 3

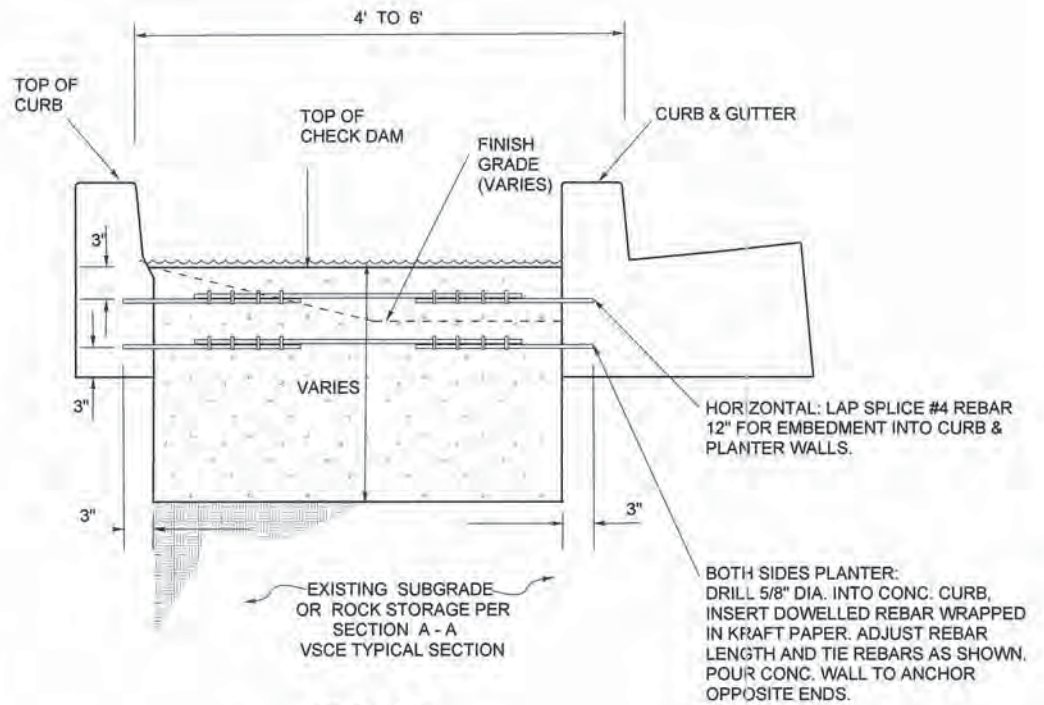
CHECKDAM OPTION 2 - GRAVEL



TYPICAL SECTION

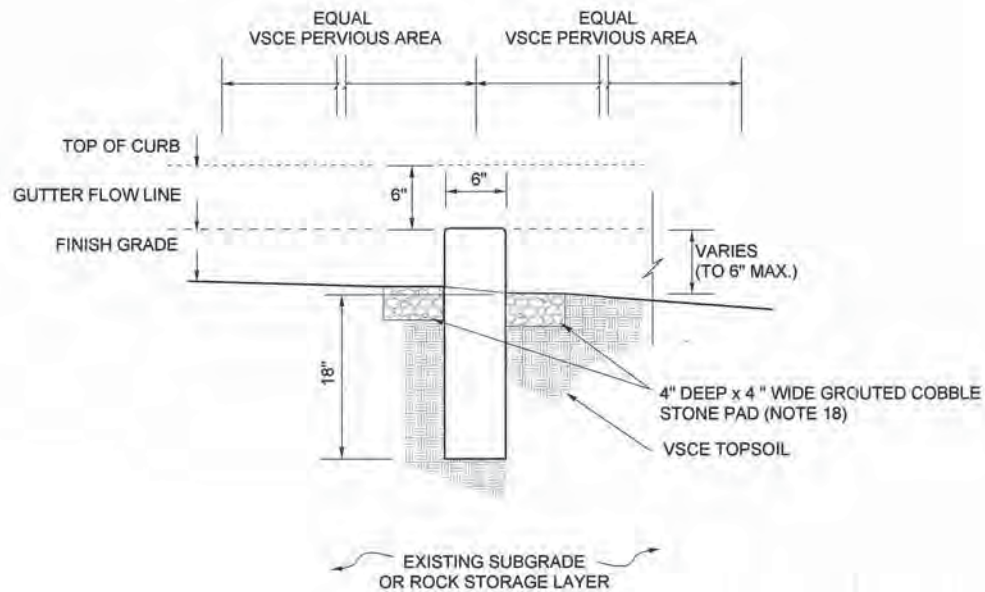
GRAVEL CHECKDAM





DETAIL 3

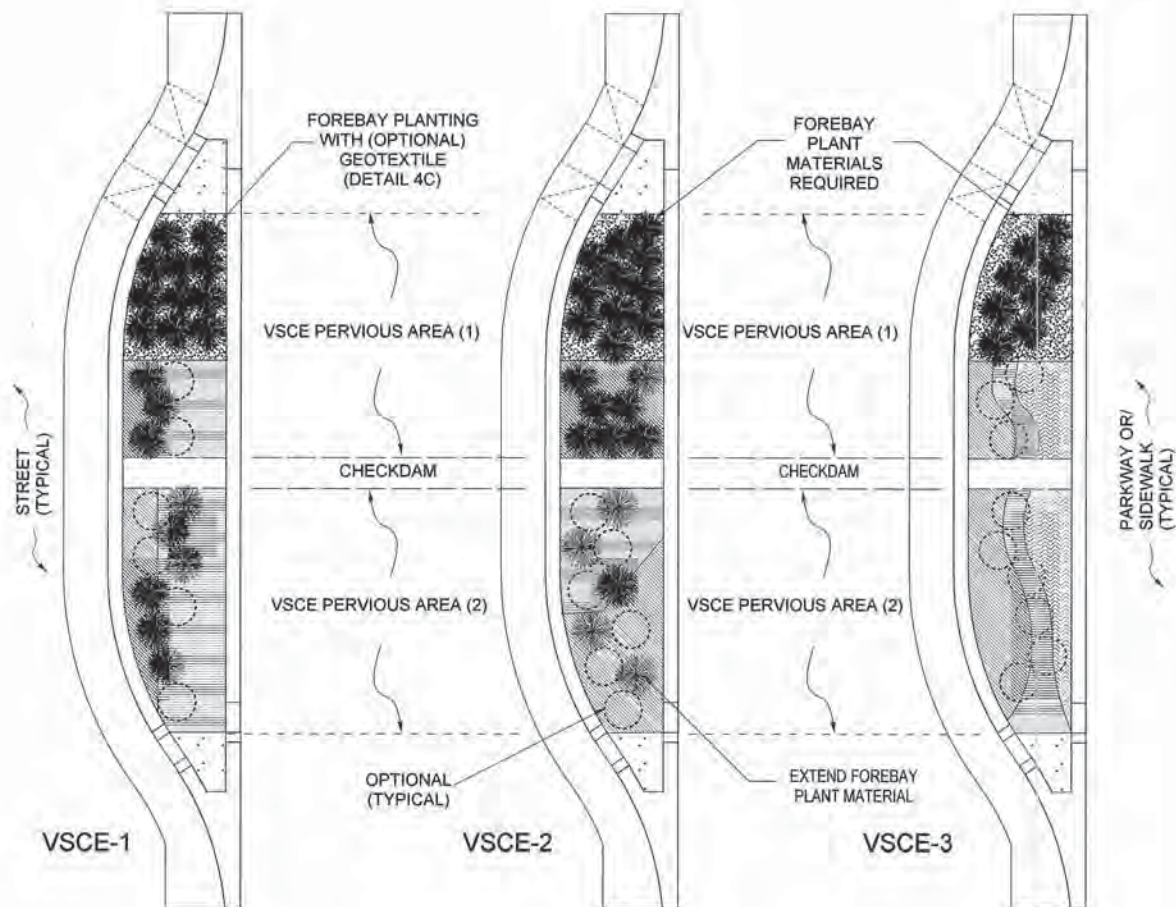
CHECKDAM OPTION 3 - CONCRETE



TYPICAL SECTION

CONCRETE CHECKDAM





VSCE PLANTING TEMPLATES (SCHEMATIC*)

* SEE DESIGN PLANS AND DETAILS FOR ACTUAL PLANTING AREAS AND LAYOUTS. MAINTAIN A 6" MINIMUM PLANTING OFFSET FROM CURB AT BENCHED EDGES. FOREBAY WITH PLANTING IN 18 INCHES OF TOPSOIL REQUIRED. VSCE PERVIOUS AREAS, AND ADDITIONAL PERVIOUS AREAS IN LONGER VSCE INSTALLATIONS (DIVIDED BY CHECKDAMS) MAY ALTERNATE OR COMBINE PLANTING TEMPLATES. ALTERNATIVE PLANTING LAYOUTS ALLOWED (NOTE 11). OPTIONAL: IN PERVIOUS AREAS OTHER THAN FOREBAYS, PLANT MATERIALS MAY BE OMITTED WHERE OPEN GRADED GRAVEL COMPLETELY REPLACES TOPSOIL.

PLANTING MATERIALS AND OBJECTIVES:

(SEE PLANT MATERIALS LIST ON SHEET 9)



VSCE FOREBAY:
REDUCE INFLOW VELOCITY, REDUCE EROSION. INSTALL WITH GRAVEL LAYER OVER 18 INCHES OF TOPSOIL AND INSTALL OPTIONAL GEOTEXTILE (NOTE 19)



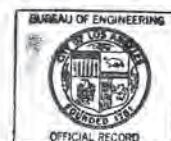
TYPE A:
INCLUDES PLANTED FOREBAY. USE INUNDATION TOLERANT SPECIES WITH GROWTH FORMS THAT REDUCE INFLOW VELOCITY AND ROOTS THAT ASSIST IN EROSION CONTROL. INSTALL WITH MULCH OR PEAGRAVEL. OPTIONAL: EXTEND FOREBAY GEOTEXTILE SEPARATION LAYER OVER ENTIRE PERVIOUS AREA TO CHECKDAM.



TYPE B:
INUNDATION AND DROUGHT TOLERANT SPECIES WITH ROOT SYSTEMS THAT RESISTS EROSION. OPTIONAL: INSTALL WITH GEOTEXTILE & MULCH OR PEAGRAVEL.



TYPE C:
(FOR VSCE's INCLUDING PARKWAYS OR VSCE TRANSITIONS BLENDING WITH TYPE 2 PLANT MATERIALS)
USE LOW GROWING GROUNDCOVERS & GRASSES THAT MERGE WITH PARKWAY PLANTING. USE DROUGHT AND/OR INUNDATION TOLERANT SPECIES PER DESIGN PLANS. MULCH REQUIRED FOR ALL AREAS OTHER THAN TURF.



PLANT MATERIALS LIST

CITY APPROVED PLANT MATERIALS. DESIGNER TO PROPOSE PLANT MATERIALS BASED ON SUITABILITY OF HYDROLOGY, SOILS, MICROCLIMATE AND IRRIGATION. SPECIES WILL BE CONTINUALLY REVIEWED FOR ADDING OR DELETING FROM LIST. SEE LATEST VERSION.

SCIENTIFIC NAME	COMMON NAME	APPROXIMATE MATURE HEIGHT	COMMENTS
VSCE FOREBAY			
<i>Carex barberae</i>	SANTA BARBARA SEDGE	12 inches	Low water
<i>Carex buechananii</i>	SLOUGH SEDGE	36 inches	Moderate water
<i>Carex elata</i> "Aurea" var. 'Bowles Golden'	GOLDEN SEDGE	30 inches	Tolerates Standing water (long duration)
<i>Juncus patens</i> spp. var. "Carmans' Grey" var. "Elk Blue"	CALIFORNIA GREY RUSH	24 inches	Standing water (moderate duration)

TYPE A

<i>Carex barberae</i>	SANTA BARBARA SEDGE	12 inches	Low water
<i>Carex buechananii</i>	SLOUGH SEDGE	36 inches	Moderate water
<i>Carex divulsa</i> (<i>C. tumicola</i>)	FOOTHILL SEDGE	18 inches	Tolerates boggy to dry conditions
<i>Carex elata</i> "Aurea" var. 'Bowles Golden'	GOLDEN SEDGE	30 inches	Tolerates Standing water (long duration)
<i>Deschampsia cespitosa</i>	TUFTED HAIR GRASS	24 inches	Moderate water. Salt tolerant varieties exist.
<i>Deschampsia elongata</i>	SLENDER HAIR GRASS	20 inches	Moist clay conditions, moderate drought tolerance
<i>Juncus mexicanus</i>	MEXICAN RUSH	24 inches	Tolerates low to standing water (moderate duration)
<i>Juncus patens</i>	CALIFORNIA GREY RUSH	24 inches	Tolerates low to standing water (moderate duration)
<i>Raoulia australis</i>	RAOULIA	2 inches	Moderate water. Spreads quickly to 36-40 inches.

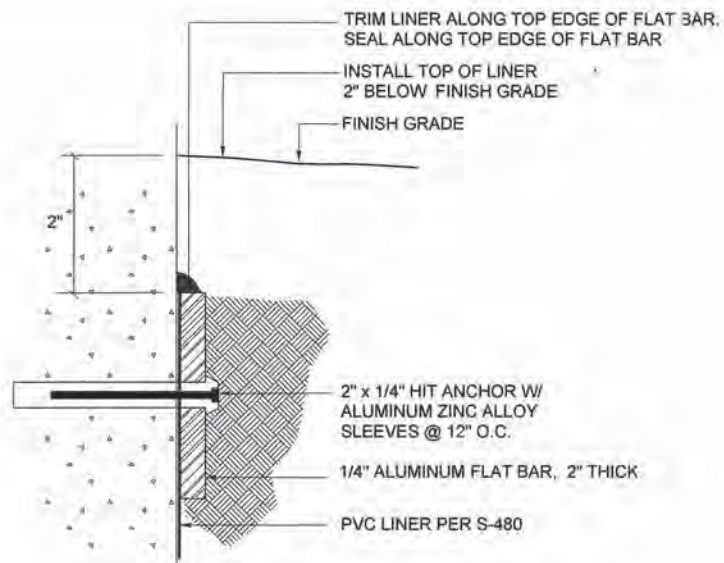
TYPE B

<i>Arctostaphylos</i> spp.	MANZANITA	(varies)	Low to moderate water. Use low growing species that naturalize.
<i>Cotula coronopifolia</i> or <i>C. purpurea</i>	COTULA	4 inches	Moderate water.
<i>Melica imperfecta</i>	COAST RANGE MELIC	12- 36 inches	Wet to dry conditions. Naturalizes.
<i>Mimulus guttatus</i> (<i>M. aurantiacus</i>)	GOLD MONKEYFLOWER	18 - 36 inches	Moist conditions. Naturalizes. Use <i>M. aurantiacus</i> for drier conditions.
<i>Muhlenbergia rigens</i>	DEERGRASS	24 - 36 inches	Moist to dry conditions. Naturalizes.
<i>Penstemon spectabilis</i> (or <i>P. heterophylla</i>)	SHOWY PENSTEMON	24 inches	Moist to dry conditions. Naturalizes.
<i>Sisyrinchium bellum</i>	BLUE-EYED GRASS	12- 18 inches	Wet to dry conditions. Naturalizes.

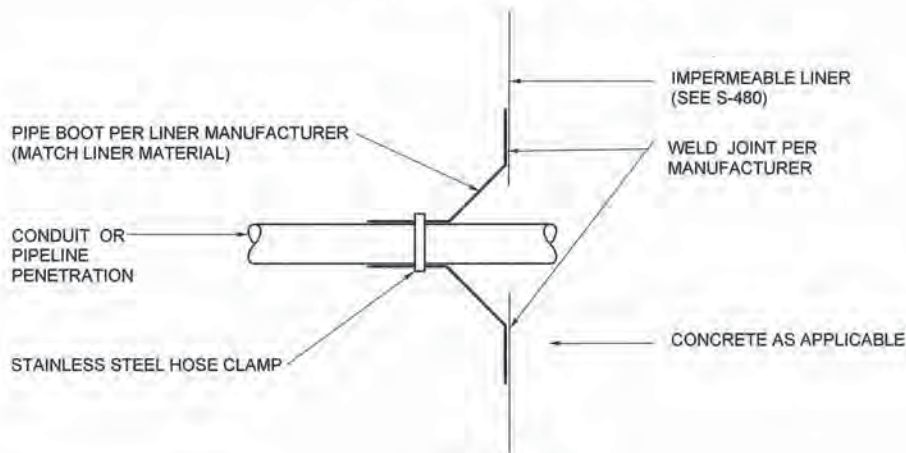
TYPE C

<i>Achillea millefolium</i>	YARROW	36 inches	Low to Moderate water.
<i>Carex praegracilis</i>	CLUSTERED FIELD SEDGE	4 -12 inches	Good turf substitute.
<i>Chamaemelum nobile</i>	CHAMOMILE	3-12 inches	Moderate water
<i>Duchesnea indica</i>	MOCK STRAWBERRY	4 inches	—
<i>Dymondia margaritae</i>	DYMONDIA	1- 2 inches	Wet to dry. Tolerates some foot traffic
<i>Festuca glauca</i>	BLUE FESCUE	12 - 24 inches	Moderate water.
<i>Festuca californica</i>	CALIFORNIA FESCUE	24 - 36 inches	Wet to dry conditions. Naturalizes.
<i>Liriope</i> spp.	LILY TURF	12- 18 inches	Regular water required.
<i>Scleranthus biflorus</i>	AUSTRALIAN ASTROTURF	2-4 inches	Low water. Full to part sun. Spreads easily to 24 inches.
<i>Sagina subulata</i>	SCOTCH MOSS	3- 6 inches	Regular water required.
<i>Thymus pseudolanuginosus</i>	WOOLY THYME	2- 3 inches	Moderate water.
TURF SPECIES	(VARIES)	(VARIES)	Low to moderate water. Preferred for pedestrian traffic areas.

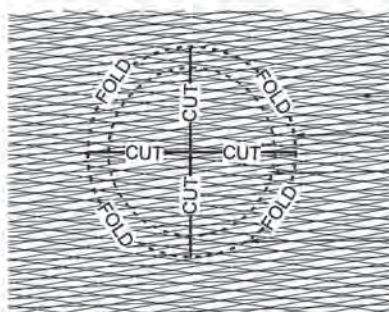




DETAIL 4 A
IMPERMEABLE LINER ATTACHMENT



DETAIL 4 B
PIPE BOOT AND PENETRATION THROUGH (IMPERMEABLE) LINER



PLAN

3/4" PEA GRAVEL
OR MULCH

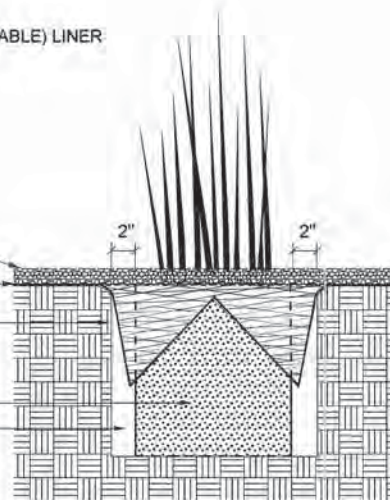
APPROVED GEOTEXTILE

PLANT PIT

CUT LINER TO
DIAMETER OF ROOTBALL

ROOT BALL

BACKFILL



SECTION

DETAIL 4 C
PLANT PIT WITH PENETRATION THROUGH (PERMEABLE) GEOTEXTILE



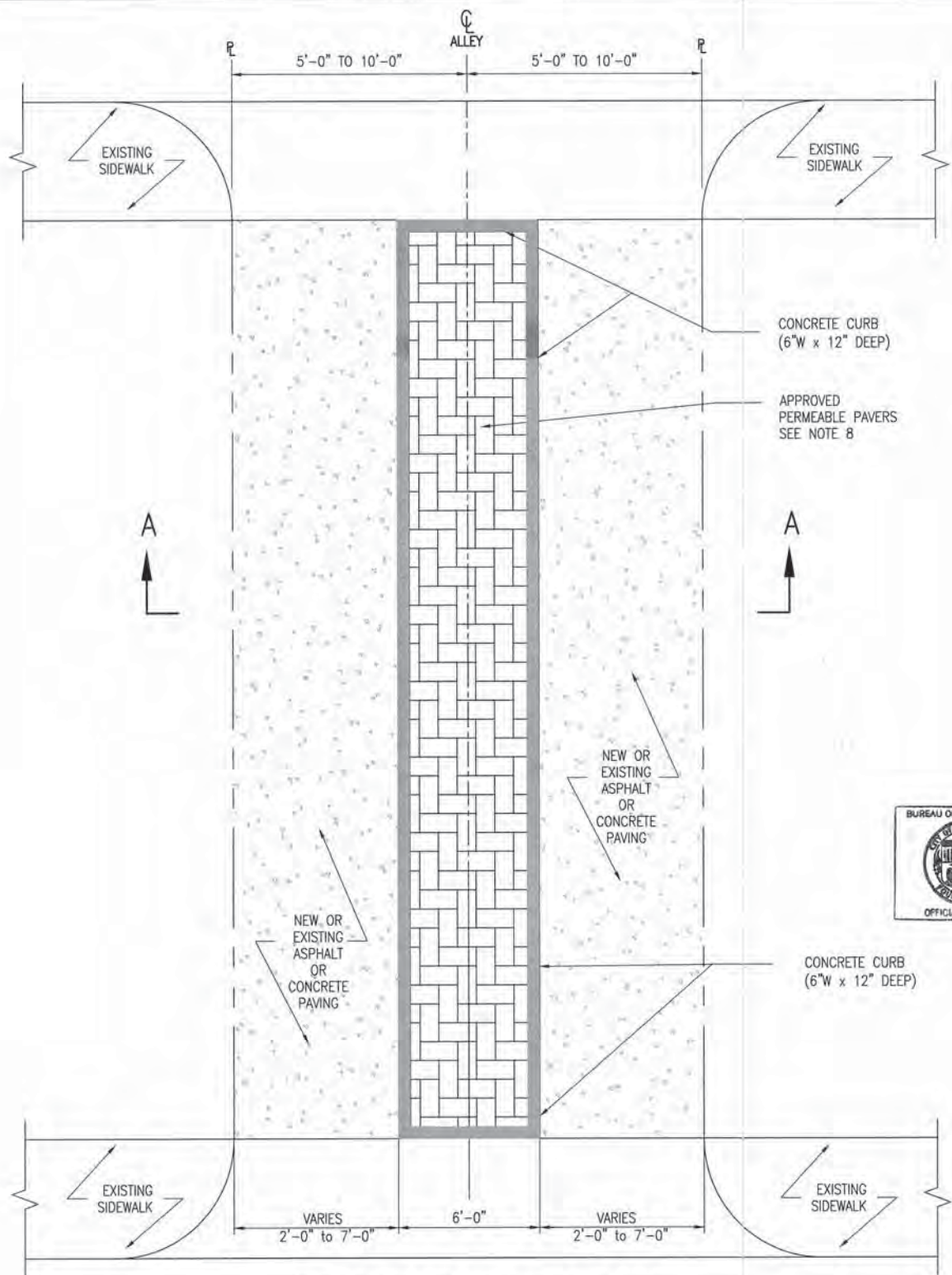
NOTES:

1. VEGETATED STORMWATER CURB EXTENSION (VSCE) SHALL CONFORM TO SSPWC AS AMENDED BY "BROWNBOOK", LATEST EDITION. SEE STANDARD PLAN S-480 FOR SETBACKS, RESTRICTIONS AND GENERAL REQUIREMENTS.
2. VSCE SHALL INSTALL SUFFICIENT CHECK DAMS TO MAINTAIN OPTIMAL FINISH GRADES BETWEEN 1% (.01) TO 2% (.02) WITHIN VSCE LANDSCAPE AREAS. MAXIMUM LONGITUDINAL STREET SLOPE TO 5% (.05).
3. WHERE STRUCTURALLY FEASIBLE AND NO PARKWAY OBSTRUCTIONS INTERFERE OR REQUIRE CURB FOR LATERAL SUPPORT, WIDTH OF VSCE SHALL REMOVE EXISTING CURB AND GUTTER TO INCORPORATE THE ADJACENT PARKWAY AND FOLLOW SECTION A'-A'. OTHERWISE THE TYPICAL SECTION MINIMUM WIDTH IS 3'-6" FROM INSIDE EXISTING AND NEW CURBS. WITH AN AVERAGE DEPTH OF 6" VSCE HAS AN ESTIMATED STORM WATER SURFACE DETENTION CAPACITY OF 31 CU. FT. IN SATURATED SOILS. MINIMUM LENGTH 30 FEET, MAXIMUM LENGTH: 110 FEET WITH ADDED CHECKDAMS ACCORDING TO TABLE 1, SHEET 5.
4. GRADED SLOPES OVER 4" DROP PER 24" HORIZONTAL REQUIRE A 6" WIDE BY 4" HIGH WARNING CURB INSTALLED AT EDGE OF WALKWAY PAVING. LOCATE 4" WIDE CURB OPENINGS WITH 1" DROPS BELOW ADJACENT FINISH SURFACE IN WARNING CURB. SEE DESIGN PLANS FOR LOCATIONS.
5. LADOT REVIEW REQUIRED FOR ALL VSCE. LOCAL SERVICE AND RESIDENTIAL STREETS SHALL BE MARKED AS "NO PARKING". ADDITIONAL REQUIREMENTS MAY APPLY IF NO EXISTING SIDEWALK OR CURB & GUTTER IMPROVEMENTS EXIST.
6. THE ADJACENT PROPERTY OWNER ASSUMES ALL RESPONSIBILITY FOR VSCE OPERATION AND MAINTENANCE.
7. INSTALL (OPTIONAL) 4 INCH NOTCHED INLET(S) IN EXISTING CURB AS NEEDED TO DRAIN PARKWAY TO VSCE. MAINTAIN 1" MIN. DROP AS FREEBOARD FOR SIDEWALKS ABOVE THE MATCHING VSCE STATION FINISH GRADE. DESIGN PLANS TO SHOW LOCATIONS OF CURB INLETS, INLETS TO PROVIDE 1" DROP BELOW ADJACENT PARKWAY FINISH GRADE. SEE DESIGN PLANS FOR LOCATIONS.
8. CURB & PAVING MODIFICATIONS MAY BE NECESSARY TO MATCH EXISTING CONDITIONS AND/OR TO AVOID UTILITY CONFLICTS INCLUDING WATER LINES, METERS, ROOF DRAINS AND FIRE HYDRANTS.
9. VSCE SHALL NOT PROJECT INTO DRIVEWAYS OR CURB RAMP AREAS AND SHALL ADHERE TO ALL STREET VISIBILITY CLEARANCE REQUIREMENTS AND UTILITY SETBACKS, INCLUDING AS INDICATED IN S-480.
10. TEMPORARY IRRIGATION SYSTEM AND/OR HAND WATERING IS REQUIRED FOR PLANT ESTABLISHMENT. SEE DESIGN PLANS FOR IRRIGATION. IRRIGATION EQUIPMENT MAY BE OMITTED IF A STREET TREE WITH HOSE BIB IS INSTALLED PER S-681 AND ONLY IF THE ADJACENT PROPERTY OWNER ASSUMES ALL RESPONSIBILITY FOR HAND WATERING OF VSCE.
11. DESIGNER TO PROPOSE PLANTING PLAN FOR EROSION CONTROL ON ALL AREAS OF TOPSOIL. STREET TREE PLANTING IN PARKWAY AREA IS TO BE PER STANDARD PLAN S-456 WITH CITY APPROVAL.
12. A STREET SIDE CURB RADIUS OF 25' IS REQUIRED FOR COMPLETE STREET SWEEPING FROM GUTTER TO FACE OF CURB. A CURB RADIUS OF 10 FEET IS ALLOWABLE TO INCREASE AREA OF THE STORAGE/DETENTION AREA ONLY IF THE ADJACENT PROPERTY OWNER ASSUMES FULL RESPONSIBILITY FOR ANY GUTTER MAINTENANCE AS MAY BE REQUIRED DUE TO LACK OF STREET SWEEPING.
13. MODIFICATIONS TO EXISTING STREET PAVING: COLD PLANE AND OVERLAY ASPHALT OR COMPLETELY RECONSTRUCT PAVING AS NECESSARY TO RESTORE A SMOOTH TRANSITION AND STREET CROWN (STANDARD PLAN S-433, SIMILAR). MATCH PAVING MATERIALS AND THICKNESS. SEE S-410 FOR STANDARD CURBS & GUTTERS, AND WARP NEW GUTTER TO JOIN INVERT AT INLET.
14. WHERE NOTED, PERMEABLE NON-WOVEN GEOTEXTILE TO BE INSTALLED BELOW MULCH OR GRAVEL FOR EROSION CONTROL. (SEE DETAIL 4-C, SHEET 10 FOR PLANTING THROUGH GEOTEXTILE).
15. CONSTRUCT CONCRETE SIDEWALK WHEN SPECIFIED ON PLAN. SIDEWALK MINIMUM CLEARANCE 48".
16. INSTALL SPLASH PLATE AND/OR OUTLET APRON TO REDUCE EROSION ENERGY AND TO MAINTAIN FLOWS. WHERE OMITTED EXTEND FOREBAY TO INLET, OR LANDSCAPING TO OUTLET. MAY BE FURTHER WARPED OR MODIFIED IN DESIGN DETAILS AS NEEDED FOR SOIL RETENTION. BOTH ENDS TO FOLLOW LONGITUDINAL AND CROSS SLOPE CONTOURS OF VSCE PER DESIGN CROSS SECTION.
17. ALL CONCRETE & SIDEWALKS SHALL BE CLASS 520-C-2500 PORTLAND CEMENT CONCRETE. INSTALL CONTRACTION, EXPANSION AND WEAKENED PLANE JOINTS IN CONCRETE PER S-480 & S-430.
18. IF CALLED FOR ON PLAN, GROUTED 1 TO 3 INCH COBBLES TO BE INSTALLED ON CONCRETE SPLASH PLATE AND APRON FOR ADDED ENERGY DISSIPATION OR AESTHETICS. CEMENT GROUT SHALL CONSIST OF ONE PART CEMENT, THREE PARTS SAND, AND THE MINIMUM AMOUNT OF WATER NECESSARY FOR THE MIXTURE TO FLOW UNDER ITS OWN WEIGHT. COBBLE STONES SHALL BE SUFFICIENTLY EMBEDDED IN GROUTING BEDS TO REMAIN PERMANENTLY FIXED AFTER CURING. WHERE COBBLES ARE USED, ADJUST BOTTOM ELEVATION OF CONCRETE TO MAINTAIN THE SURFACE ELEVATION INDICATED ON STANDARD PLAN.
19. AGGREGATES FOR USE IN FOREBAY AND CHECK DAMS SHALL CONSIST OF WASHED FRACTURED FACE SAN GABRIEL RIVER AGGREGATES CERTIFIED UNREACTIVE BY A CERTIFIED TESTING LABORATORY PER SSPWC SECTION (201-1.2.2) AND PER S-480. AGGREGATES SHALL REQUIRE ONSITE BCA INSPECTION. AGGREGATES MAY REPLACE TOPSOIL IN VSCE PVIOUS AREAS (EXCEPT FOREBAY- SEE NOTE 22). AGGREGATE SHALL BE 1" OPEN GRADED FOR STORAGE, AND PER S-480 FOR SURFACE APPLICATION AND EROSION CONTROL.
20. MINIMUM RELATIVE COMPACTION OF EARTHWORK UNDER NEW PAVING SHALL BE PER SSPWC. SEE S-480 FOR FURTHER REQUIREMENTS.
21. THE SOURCE OF IMPORT SOIL SHALL BE PER S-480 AND AS APPROVED BY THE PROJECT MANAGER PRIOR TO START OF ANY GRADING OPERATIONS. CONTRACTOR MAY BE REQUIRED TO PROVIDE AGRICULTURAL SUITABILITY (GROWTH TEST) TO ESTABLISH SOIL SUITABILITY FOR PLANTING. ANY SOILS LAB RECOMMENDED AMENDMENT OF EXISTING SOILS SHALL BE INCLUDED WITH PROJECT.
22. FOREBAY SHALL BE PLANTED WITH INUNDATION TOLERANT SPECIES FROM 1-GALLON SIZED CONTAINERS PER PLANTING TEMPLATE AND PLANT MATERIALS LIST. DESIGN PLANS MAY INCLUDE ADDED SURFACE EROSION CONTROL MEASURES SUCH AS GEOTEXTILE FABRIC UNDER MULCH OR GRAVEL AS RECOMMENDED FOR THE SPECIFIC INSTALLATION. FOREBAY REQUIRES TOPSOIL CONTAINMENT BY GEOTEXTILE IF GRAVEL REPLACES TOPSOIL IN PVIOUS AREA 1. SURFACE GRAVEL CONTAINMENT MEASURES MAY INCLUDE BUT ARE NOT LIMITED TO THE USE OF GEOTEXTILE FABRIC TO CONSTRUCT A ROLLED BERM AROUND FOREBAY ROCK MEDIA AND OVERLAY OF FOREBAY WITH GRAVEL USING THE BERM TO PREVENT THE SURFACE ROCK FROM MIGRATING INTO THE MULCH AREA. THE ENTIRE FOREBAY INCLUDING PLANTS AND SEDIMENTS SHALL BE REMOVED FOR REGULAR MAINTENANCE WHEN INFILTRATION RATES FAIL TO MEET THE MINIMUM REQUIREMENTS. ADDITIONAL DETAILS FOR ANY NECESSARY AND PROPOSED METHODS, INCLUDING PLANTING DETAILS, ARE TO BE INCLUDED ON DESIGN PLANS FOR CITY REVIEW.
23. CONSTRUCT WARNING CURB AT EXISTING CURB & GUTTER WHERE CALLED FOR ON PLANS. DRILL INTO TOP OF EXISTING CURB AND INSERT #3 REBAR WITH EPOXY AT 12" O.C. FORM AND POUR CONCRETE TO RAISE EXISTING CURB BY 6" WITH 4" WIDE DRAINAGE OPENINGS AS NEEDED. A WARNING CURB IS REQUIRED TO MEET ADA GUIDELINES ALONG WALKWAYS THAT ABUT GRADES GREATER THAN 4 INCHES VERTICAL TO 24 INCHES HORIZONTAL. INSTALL 1:1 RETURN SLOPE ON WARNING CURB AT BOTH ENDS.
24. PROVIDE OBSERVATION WELL IF DIRECTED BY CITY ENGINEER (SEE S-480).



INTERLOCKING PAVERS FOR VEHICULAR ALLEYS (s-485-0)





NEW OR EXISTING ALLEY PLAN



BUREAU OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS

CITY OF LOS ANGELES

INTERLOCKING PAVERS FOR VEHICULAR ALLEYS

STANDARD PLAN
S-485-0

PREPARED

ALICE GONG, CE49107
BUREAU OF SANITATION
ENRIQUE C. ZALDIVAR, P.E., DIRECTOR

SUBMITTED

JEONG PARK, S.E. 6/29/10
DATE
JEONG PARK, S.E.
ENGINEER OF DESIGN
BUREAU OF ENGINEERING

APPROVED

GARY LEE MOORE 6-29-10
DATE
GARY LEE MOORE, P.E.
CITY ENGINEER



CHECKED

PATRICK LEE, CE42448
BUREAU OF ENGINEERING

KEN REDD, P.E. 6/29/10
DATE
KEN REDD, P.E.
ACTING DEPUTY CITY ENGINEER

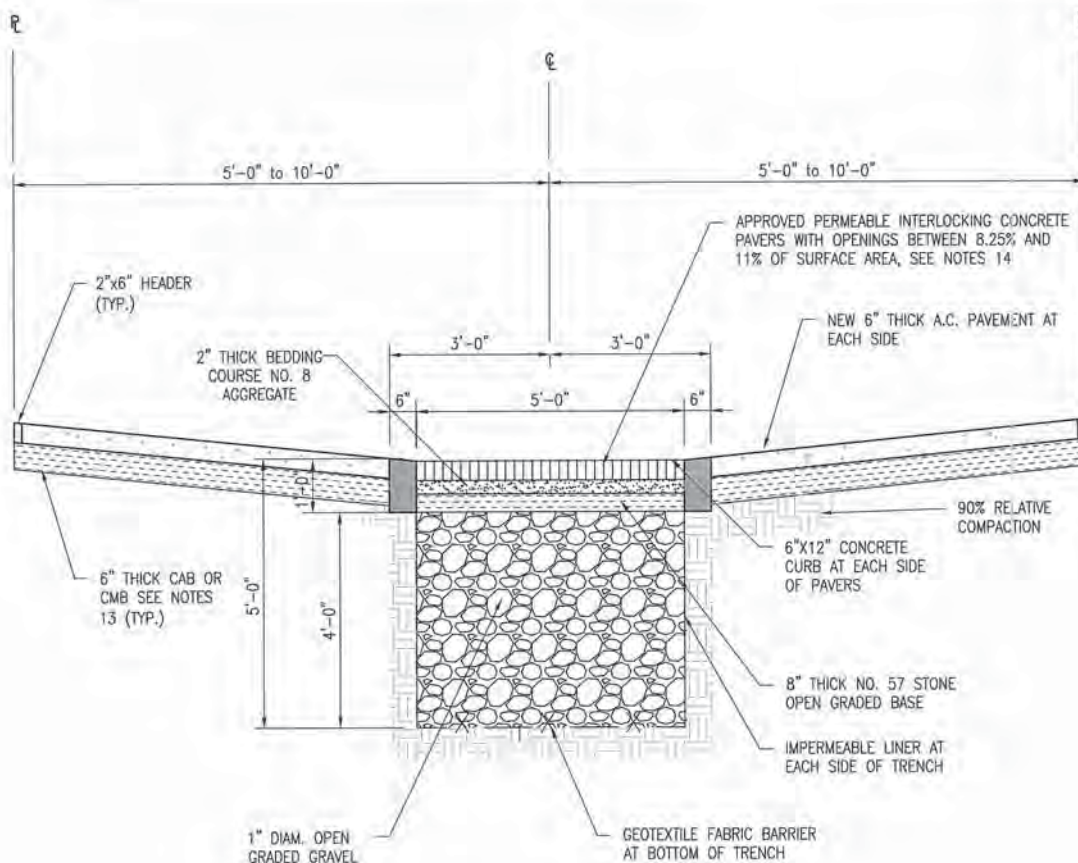
SUPERSEDES

REFERENCES

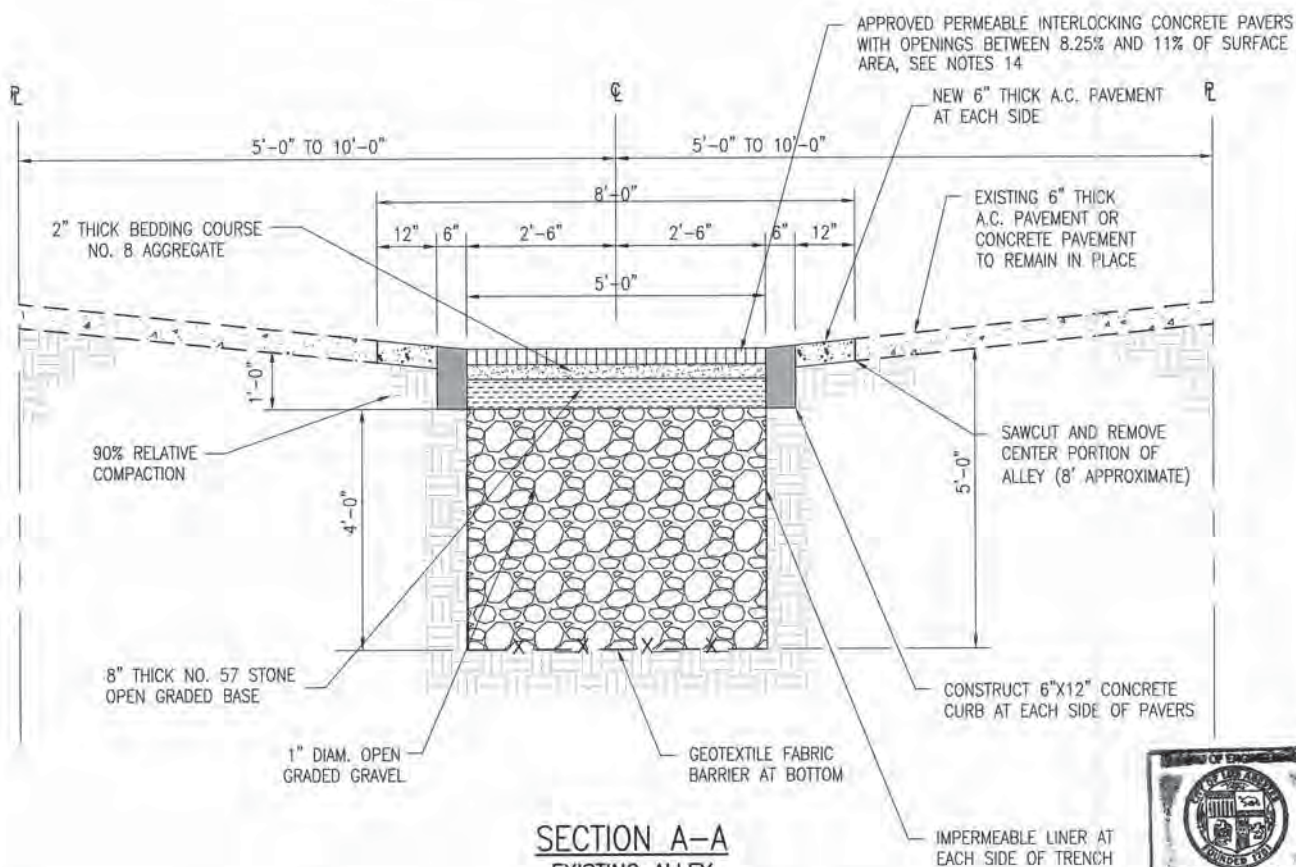
S-420
S-480
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VAULT INDEX NUMBER **B-4646**

SHEET 1 OF 3 SHEETS



SECTION A-A
NEW ALLEY



SECTION A-A
EXISTING ALLEY



NOTES:

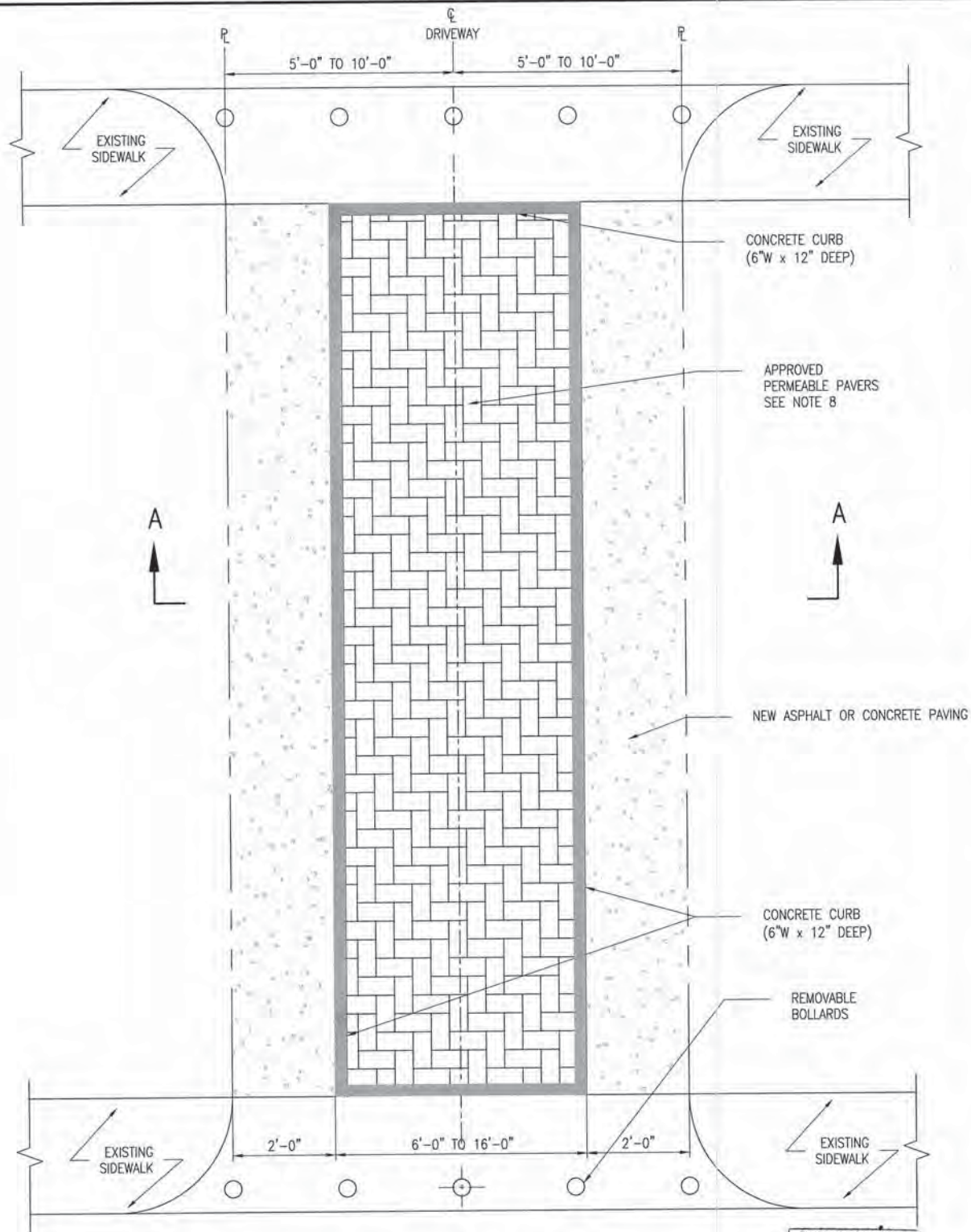
1. ALL WORKS SHALL CONFORM TO SSPWC AS AMENDED BY THE CITY'S BROWN BOOK, LATEST EDITION. FOR GENERAL REQUIREMENTS, SEE STANDARD PLAN S-480 AND S-601, LATEST EDITION.
2. PERMEABLE ALLEY GUTTERS SHALL ONLY BE CONSTRUCTED IN AREAS WITH WELL DRAINING SOILS. THE MINIMUM SITE SOIL PERCOLATION RATE SHALL BE 0.5 INCHES PER HOUR.
3. NEW AC PAVEMENT TO MATCH EXISTING PAVEMENT THICKNESS.
4. AFTER SAWCUT AND REMOVAL OF PAVEMENT (AC AND CONCRETE GUTTER) OF THE 8-FOOT CENTER PORTION OF ALLEY, EXCAVATE AND REMOVE SITE SOILS OF THE CENTER 5-FOOT WIDE SECTION OF THE ALLEY TO A DEPTH OF 5 FEET MAXIMUM.
5. EXISTING SUB-GRADE SOILS AT BOTTOM OF TRENCH EXCAVATION TO BE COMPACTED TO A MINIMUM OF 90% RELATIVE COMPACTION PER ASTM D-1557.
6. CLEAR ALL DEBRIS FROM 5'X5' TRENCH PRIOR TO PLACING GRAVEL BACKFILL. GRAVEL PLACEMENT TO BE SELF-COMPACTING.
7. BEDDING COURSE AND STONE BASE LAYER TO BE PLACED AND COMPACTED PER APPROVED PERMEABLE PAVER MANUFACTURER'S SPECIFICATIONS.
8. TYPE AND PATTERN OF PERMEABLE PAVERS TO BE APPROVED BY THE BUREAU OF ENGINEERING. APPROVED PAVERS ARE LISTED ON THE "APPROVED PRODUCTS FOR USE IN THE PUBLIC RIGHT-OF-WAY", <http://boe.lacity.org/apm/>
9. CONCRETE CURBS SHALL BE CONSTRUCTED WITH CLASS 520-C-2500 PORTLAND CEMENT CONCRETE AND SHALL HAVE EDGES ROUNDED TO A RADIUS OF 1/4-INCH.
10. PLACEMENT OF GEOTEXTILE FABRIC SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECT.300-8 OF THE GREEN BOOK AND STANDARD PLAN S-480.
11. IMPERMEABLE LINER SHALL BE A MINIMUM OF 30 MILS IN THICKNESS AND SHALL MEET THE REQUIREMENTS OF SECTION 210-2 OF THE GREEN BOOK AND STANDARD PLAN S-480.
12. AGGREGATE BASE LAYER FOR NEW ASPHALT PAVEMENT SHALL CONSIST ENTIRELY OF CRUSHED ROCK CONFORMING TO THE REQUIREMENTS OF SECTIONS 200-1.1, 200-1.2, AND 200-2.2 OF THE GREEN BOOK.
13. DRIVEWAYS AT EACH END OF ALLEYS SHALL BE RECONSTRUCTED WHERE REQUIRED (I.E. WHERE GUTTER FLOW LINE DEPTH AND/OR ALIGNMENT HAS BEEN MODIFIED). ALLEY INTERSECTION TO STREET SHALL BE CONSTRUCTED PER STANDARD PLAN S-420 WITH V=1 INCH OR LESS.
14. PERMEABLE PAVER SHALL HAVE TOTAL VOID AREA OR VOID RATIO NOT TO EXCEED 11% AND NOT LESS THAN 8.25% WITHIN ONE SQUARE FOOT OF THE INSTALLATION. NO PAVER OPENING OR COMBINATION OF JOINT AND PAVER OPENINGS SHALL EXCEED 1/2 INCH WIDE.



INTERLOCKING PAVERS FOR PEDESTRIAN ALLEYS


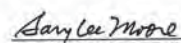


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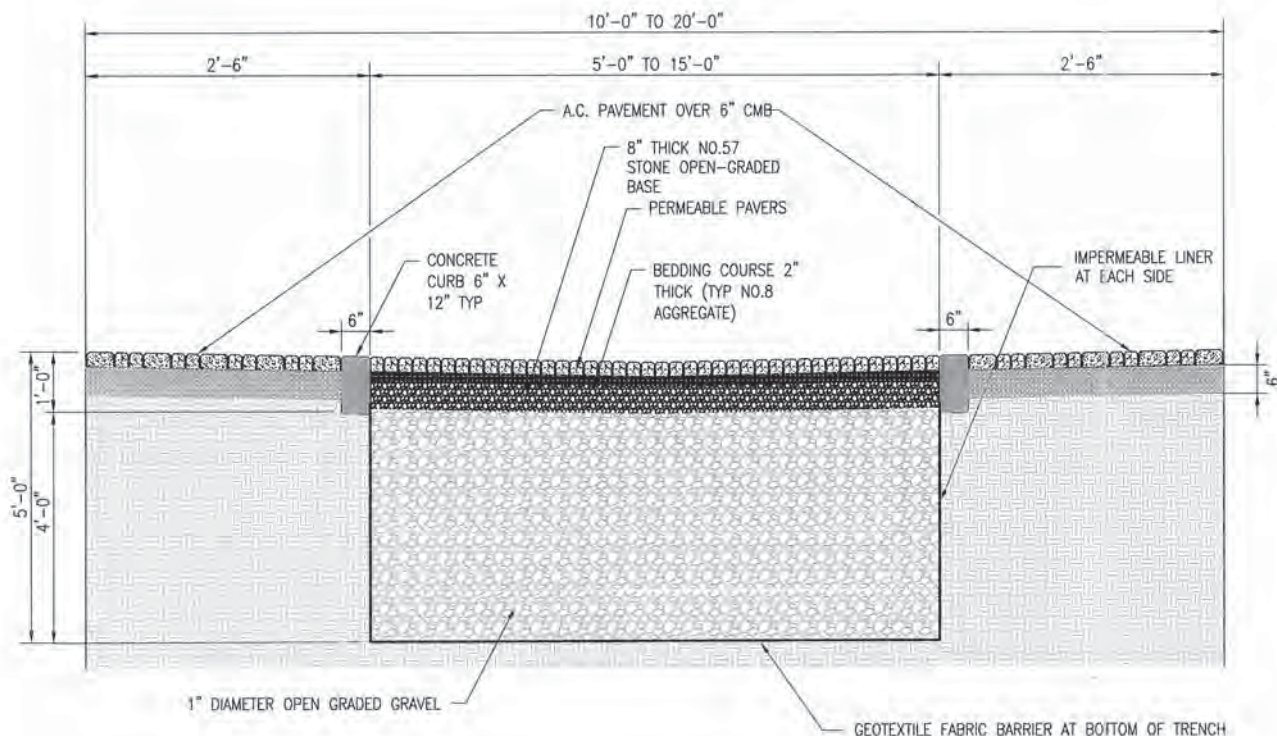




NEW ALLEY PLAN



BUREAU OF ENGINEERING		DEPARTMENT OF PUBLIC WORKS		CITY OF LOS ANGELES									
INTERLOCKING PAVERS FOR PEDESTRIAN ALLEYS				STANDARD PLAN S-486-0									
PREPARED ALICE GONG, CE49107 BUREAU OF SANITATION ENRIQUE C. ZALDIVAR, P.E., DIRECTOR	SUBMITTED  6/29/10 JEONG PARK, S.E. ENGINEER OF DESIGN BUREAU OF ENGINEERING	APPROVED  6-29-10 GARY LEE MOORE, P.E. CITY ENGINEER											
CHECKED PATRICK LEE, CE42448 BUREAU OF ENGINEERING	 6/29/10 KEN REDD, P.E. ACTING DEPUTY CITY ENGINEER	<table border="1"> <tr> <th>SUPERSEDES</th> <th>REFERENCES</th> </tr> <tr> <td></td> <td>S-420</td> </tr> <tr> <td></td> <td>S-480</td> </tr> <tr> <td></td> <td>S-601</td> </tr> </table>				SUPERSEDES	REFERENCES		S-420		S-480		S-601
SUPERSEDES	REFERENCES												
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	S-480												
	S-601												
VAULT INDEX NUMBER B-4645				SHEET 1 OF 2 SHEETS									



TYPICAL ALLEY CROSS SECTION

NOTES:

1. ALL WORKS SHALL CONFORM TO SSPWC AS AMENDED BY THE CITY'S BROWN BOOK, LATEST EDITION. FOR GENERAL REQUIREMENTS, SEE STANDARD PLAN S-480 AND S-601, LATEST EDITION.
2. PERMEABLE ALLEY GUTTERS SHALL ONLY BE CONSTRUCTED IN AREAS WITH WELL DRAINING SOILS. THE MINIMUM SITE SOIL PERCOLATION RATE SHALL BE 0.5 INCHES PER HOUR.
3. THICKNESS OF EXISTING ALLEY ASPHALT PAVEMENT SHOWN ON SHEET 2 OF THIS PLAN ARE TYPICAL. ACTUAL PAVEMENT THICKNESS MAY VARY. NEW AC PAVEMENT TO MATCH EXISTING PAVEMENT THICKNESS.
4. IN THE CENTER PORTION OF THE ALLEY (5'-0" TO 15'-0") EXCAVATE AND REMOVE SITE SOILS TO A DEPTH OF 5 FEET MAXIMUM.
5. EXISTING SUB-GRADE SOILS AT BOTTOM OF TRENCH EXCAVATION TO BE COMPACTED TO A MINIMUM OF 90% RELATIVE COMPACTION PER ASTM D-1557.
6. CLEAR ALL DEBRIS FROM TRENCH PRIOR TO PLACING GRAVEL BACKFILL. GRAVEL PLACEMENT TO BE SELF-COMPACTING.
7. AGGREGATE BASE AND SAND LAYER TO BE PLACED AND COMPACTED PER PERMEABLE PAVER MANUFACTURER'S SPECIFICATIONS.
8. TYPE AND PATTERN OF PERMEABLE PAVERS TO BE APPROVED BY THE BUREAU OF ENGINEERING. APPROVED PAVERS ARE LISTED ON THE "APPROVED PRODUCTS FOR USE IN THE PUBLIC RIGHT-OF-WAY" PAVERS LIST.
9. CONCRETE CURBS SHALL BE CONSTRUCTED WITH CLASS 520-C-2500 PORTLAND CEMENT CONCRETE AND SHALL HAVE EDGES ROUNDED TO A RADIUS OF 1/4-INCH.
10. PLACEMENT OF GEOTEXTILE FABRIC SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECT. 300-8 OF THE GREEN BOOK.
11. IMPERMEABLE LINER SHALL BE A MINIMUM OF 30 MILS IN THICKNESS AND SHALL MEET THE REQUIREMENTS OF SECTION 210-2 OF THE GREEN BOOK.
12. AGGREGATE BASE LAYER FOR NEW ASPHALT PAVEMENT SHALL CONSIST ENTIRELY OF CRUSHED ROCK AND ROCK DUST CONFORMING TO THE REQUIREMENTS OF SECTIONS 200-1.1, 200-1.2, AND 200-2.2 OF THE GREEN BOOK.
13. DRIVEWAYS AT EACH END OF ALLEYS SHALL BE RECONSTRUCTED WHERE REQUIRED (I.E. WHERE GUTTER FLOW LINE DEPTH AND/OR ALIGNMENT HAS BEEN MODIFIED). ALLEY INTERSECTION TO STREET SHALL BE CONSTRUCTED PER STANDARD PLAN NO. 420 WITH V=1 INCH OR LESS.
14. BOLLARDS INSTALLED AT BOTH ENDS OF THE ALLEY SHALL BE REMOVABLE TO ALLOW EMERGENCY AND/OR MAINTENANCE VEHICULAR ACCESS. BOLLARD DETAILS SHALL BE SUBMITTED TO THE CITY ENGINEER FOR REVIEW AND APPROVAL.

