

City of Portland

Technical Manual



Preamble

The Technical Standards contained herein have been promulgated by the Department of Public Services and the Planning and Urban Development Department pursuant to Sections 14-498 and 14-499 of the City of Portland's Land Use Code following a public hearing of the Planning Board on May 11, 2010.

The Technical Standards contained herein may be periodically updated and/or amended by the Planning Board pursuant to Section 14-506 of the City of Portland Land Use Code.

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1. TRANSPORTATION SYSTEMS AND STREET DESIGN STANDARDS

1.1. TRAFFIC STUDIES

For the purposes of this section, **passenger car equivalents (PCE)** shall be defined as the number of passenger cars or, in the case of non-passenger vehicles, the number of passenger cars that would be displaced by non-passenger vehicles. One tractor trailer combination is the equivalent of two passenger cars.

Developments that generate 100 PCE or more, thus requiring a Traffic Movement Permit (TMP), shall meet the requirements of TMP regulations of State Law, in addition to all applicable transportation site plan standards of the City Code. For more information concerning state TMP requirements, please refer to <http://www.maine.gov/mdot/traffic-counts/traffic-mvmnt-app.php> or contact the Maine Department of Transportation (MDOT). The City of Portland is the delegated reviewing authority for TMP applications.

Developments that generate less than 100 passenger car equivalents (PCE) but require a scoping meeting because they generate 25 PCE or more and are located

(1) on an arterial; and/or

(2) within ½ mile of a high crash location; and/or

(3) within ¼ mile of an intersection that has been identified in a previous traffic study as a failing intersection, with an overall level of service below level of service D,

shall meet the following standards, if a traffic study is required:

1.1.1.1. Traffic studies shall be prepared, stamped and signed by a Professional Engineer licensed in the State of Maine.

1.1.1.2. Scope of Study:

The City Transportation Engineer, in consultation with the applicant's engineer, shall determine the need for and scope of the traffic study. The requirements for the study shall be based on standard transportation engineering practices.

A typical traffic study includes the following major sections:

- A description of the development proposal
- A description of existing conditions.
- Estimated trip generation by the development and design hour volume for affected driveway(s) and study intersections.
- Trip generation will be based upon the latest edition of the ITE *Trip Generation* publication unless suitable documented local data that meets ITE methodology is available.
- Trip distribution
- Capacity analysis for adjacent roadways and for any existing or proposed driveways.
- Traffic crash analysis for adjacent roadways.
- Key findings concerning traffic impacts, problems, and deficiencies.
- Proposed traffic improvements.
- Summary of findings and recommendations for transportation improvements and other impact mitigation measures.

1.2. Reserved**1.3. HORIZONTAL ALIGNMENT OF STREETS**

The horizontal alignment of all proposed streets shall conform to the following standards:

- Horizontal curves shall have centerline radii of not less than 110 feet.
- The alignment centerline shall be straight for at least 100 feet between reverse curves whenever either curve has a centerline radius of less than 200 feet.
- When two streets intersect and one street is an arterial or collector street, or both streets are arterial or collector streets, the angle of intersection shall be 90 degrees. When two streets intersect and neither street is an arterial or collector street, the angle of intersection shall be at least 75 degrees and no greater than 105 degrees.
- When two streets intersect, adjoining right-of-way lines shall be connected by a circular arc with radius of at least ten (10) feet. The connecting arc shall be tangent to the right-of-way lines on both streets. When the angle of intersection is other than 90 degrees, a radius greater than ten (10) feet may be required.
- All dead-end streets shall provide for a turnaround at the end of the street, subject to approval by the reviewing authority. Turnarounds shall be designed to facilitate future street connectivity and shall always be designed to the right (refer to Figure I-5).
- Street intersections with more than four (4) legs shall be prohibited.

- The minimum distance between intersections on any street shall be as follows unless the City Engineer determines that unique conditions of the site necessitate a lesser length. The distance between intersections shall be measured from the intersection of street centerlines at one intersection to the intersection of street centerlines at the other intersection. Streets shall be classified in accordance with the Federal Highway Administration Functional Classification Guidelines.

Local Street and Local Street Intersection	300 feet
Local Street and Collector Street Intersection	300 feet
Local Street and Arterial Street Intersection	500 feet
Collector Street and Collector Street Intersection	500 feet
Collector Street and Arterial Street Intersection	500 feet
Arterial Street and Arterial Street Intersection	500 feet

1.4. STREET GRADES

1.4.1. Street grades shall conform to the following standards:

- The maximum grade for the centerline of all streets shall not exceed eight (8) percent.
- The minimum grade for the centerline of all streets shall not be less than one-half (0.5) percent.
- The cross slope for local streets shall be 0.03. The cross slope for other street classifications shall be 0.02.
- Cross slopes for sidewalks shall be 0.02, sloping down and away from the street line to the top of the curb at the gutter line.
- Street grades at intersections shall not be more than three (3) percent for a distance of one hundred (100) feet from the center of the intersection.

1.5. VERTICAL ALIGNMENT

Where two adjacent street segments are proposed to have different straight line centerline finish grades, vertical curves shall be used to connect the adjacent street segments. Vertical curves shall be parabolic and tangent to each of the adjacent

grades. The minimum vertical curve length, “L”, shall be calculated based on the following formula

$$L = K \times A$$

where “A” is the absolute value of the algebraic difference between the beginning grade and the ending grade of the vertical curve, with both grades expressed in percent, and “K” is a factor whose value depends on street design speed, which is related to street classification. The design speeds, in miles per hour, for this section’s street classifications are as follows:

Local Street	25 mph
Collector Street	30 mph
Arterial Street	35 mph

The K values corresponding to the minimum vertical curve lengths for the above street classifications and vertical curve types (sag curve or crest curve) are as follows:

Local Streets

Crest Vertical Curves: K = 20

Sag Vertical Curves: K = 30

Collector Streets

Crest Vertical Curves: K = 30

Sag Vertical Curves: K = 40

Arterial Streets

Crest Vertical Curves: K = 50

Sag Vertical Curves: K = 50

1.6. SIGHT DISTANCE

Where driveways or new streets enter an existing street, vehicular sight-distance shall conform to standards established by the Maine DOT as contained in their publication, Chapter 299, Highway Driveway and Entrances Rules and noted below for entrances with standard vehicles. For driveways frequently accessed by large vehicles, greater sight distance will be required according to Maine DOT guidelines.

Speed Limit (mph)	Measured Distance (feet)
25	200
30	250
35	305
40	360
45	425
50	495
55	570
60	645

1.7. DRIVEWAY DESIGN

1.7.1. Residential development with nine (9) parking spaces or less:

Minimum/maximum driveway width: Any site shall have a minimum driveway width of ten (10) feet and a maximum width of twenty (20) feet measured at the property line.

Location of driveway: A driveway shall be located on the lot in a manner to provide a minimum distance of twenty (20) ft spacing between it and adjacent driveways. This spacing shall be measured between edge of driveways at the property line. If the development is a Level III site plan with frontage on an arterial roadway, the standards listed in the table under section 1.6.1.7 shall apply.

No more than one (1) driveway shall be permitted.

1.7.2. Multi-Family Residential with 10 (ten) parking spaces or more, Commercial and Industrial shall meet the following standards:

1.7.2.1. All driveways shall be designed to connect perpendicular to the street, where feasible. In no case shall the angle of intersection be less than 75 degrees or greater than 105 degrees.

1.7.2.2. Minimum driveway width (one-way): Any site with driveway access to a street shall have a minimum 12 foot wide driveway (at the property line) for one-way ingress or egress. Driveways shall permit traffic to enter and leave the site simultaneously without conflict in aisles, parking or maneuvering areas. If parking is adjacent to the property line, then the appropriate aisle width shall apply. Both the entrance and exit drives shall be identified with appropriate signage.

1.7.2.3. Minimum driveway width (two-way): Any site with driveway access to a street shall have a minimum width of 20 feet for two-way ingress and egress, with a preferred width of 24 feet.

1.7.2.4. **Maximum driveway width (two-way):** The maximum width of a driveway will be based upon site conditions or vehicle characteristics that warrant a wider access (e.g., dedicated turn lanes at exits) and will require approval of the reviewing authority. Maximum widths shall not exceed the following, although confirmation of exact capacity requirements will be necessary:

- Commercial -24 feet
- Industrial – 30 feet

1.7.2.5. **Curbing of driveways:** Where driveways enter on an existing street, the full radius of the driveway shall be designed and constructed of granite curb. The radius size shall be based upon information in the following tables. The radii listed below are recommended standards. A vehicle template analysis may be submitted for review as an alternative to the use of the following table:

Passenger Car	12 foot or less departure lane	12 to 14 foot departure lane	14 to 16 foot departure lane	16 to 18 foot departure lane
12 foot or less receiving lane	15ft	15ft	15ft	15ft
12 to 14 foot receiving lane	15ft	15ft	15ft	15ft
14 to 16 foot receiving lane	15ft	15ft	15ft	15ft
SU-30 Truck	12 foot or less departure lane	12 to 14 foot departure lane	14 to 16 foot departure lane	16 to 18 foot departure lane
12 foot or less receiving lane	35ft	30ft	30ft	30ft
12 to 14 foot receiving lane	30ft	30ft	30ft	30ft
14 to 16 foot receiving lane	30ft	30ft	30ft	30ft
WB-50 Truck	12 foot or less departure lane	12 to 14 foot departure lane	14 to 16 foot departure lane	16 to 18 foot departure lane
12 foot or less receiving lane	45ft	45ft	45ft	45ft
12 to 14 foot receiving lane	35ft	35ft	35ft	35ft
14 to 16 foot receiving lane	25ft	25ft	25ft	25ft
WB-62 Truck	12 foot or less departure lane	12 to 14 foot departure lane	14 to 16 foot departure lane	16 to 18 foot departure lane
12 foot or less receiving lane	85ft	85ft	85ft	85ft
12 to 14 foot receiving lane	85ft	85ft	85ft	85ft
14 to 16 foot receiving lane	65ft	65ft	65ft	65ft

1.7.2.6. Maneuvering: The area within the site to which a driveway provides access shall be of sufficient size to allow all necessary functions for loading, unloading and parking maneuvers to be carried out on the site and completely off the street right-of-way. Backing out of vehicles from the driveway is prohibited. The design vehicle used in the analysis shall be the predominant vehicle type and shall be approved by the reviewing authority.

1.7.2.7. Location and spacing of driveways: The location and spacing of driveways shall be determined as follows:

- The angle of intersection between an access driveway and the right of way shall be 90 degrees where feasible and shall in no case be less than 75 degrees or greater than 105 degrees.
- Along local streets, access driveways to corner lots shall be located a minimum of thirty-five (35) feet from the intersection of the projection of right-of-way lines to the center line of the driveway, except as provided hereinafter.
- Along arterial and collector streets, access driveways to corner lots shall be located a minimum of one hundred fifty (150) feet from the intersection of the projection of right-of-way lines to the center line of the driveway except as provided for hereinafter.
- Along arterial, collector and local streets, minimum acceptable spacing between double or multiple driveways for driveways on adjacent lots or on the same parcel shall meet the criteria below:

Speed Limit (mph)	Minimum Separation* (feet)
25 or less	100
30	125
35	150
40	185
45	230

Spacing of driveways shall be measured from center of driveway to center of driveway **and shall include driveways on both sides of the street.*

1.7.2.8. Number of driveways:

No more than two (2) driveways shall be permitted for ingress and egress purposes to any commercial, industrial or residential (with 10 or more parking spaces) site.

A joint access driveway shall be considered as adequate access for any adjacent sites and shall be encouraged. An easement for joint access shall be required.

1.7.2.9. Off-street vehicular circulation:

An off-street facility shall have full internal vehicular circulation and storage.

Vehicle circulation shall be completely contained within the facility, and vehicles located within one portion of the facility shall have access to all other portions without using the adjacent street system.

1.7.3. Auxiliary Lanes:

Ingress left-turn lanes requirements: A left-turn lane with appropriate storage and transition shall be provided where a submitted engineering analysis indicates a need.

Ingress right-turn lanes: For any site, a right-turn lane with appropriate storage and transition shall be provided where a submitted engineering analysis indicates a need.

1.8. SIDEWALKS AND DRIVEWAY APRONS

1.8.1. Driveway Aprons

Any driveway, or section thereof, located within any public street right-of-way shall be designed and built with a permanent, erosion resistant, surface, such as hot mix asphalt pavement or brick, as illustrated in Figures I-10 through I-12.

1.8.2. Sidewalk Construction and Materials.

Sidewalks shall be brick, concrete or hot mix asphalt. The City Sidewalk Materials Policy (Appendix-1 of this manual) shall be consulted to determine the appropriate type of sidewalk and driveway construction to use on various streets and in different areas of the City. Sidewalk and driveway construction details are illustrated in Figures I-10 through I-15.

All new concrete sidewalks which abut existing concrete sidewalks must be doweled in prior to pouring.

1.8.3. Sidewalk Design for Accessibility.

The minimum sidewalk width shall be five (5) feet. Where obstructions, such as utility poles, are located in sidewalks, a minimum clear path width of five (5) feet shall be required between the obstruction and one edge of the sidewalk.

The maximum allowed vertical level change at any point is ¼-inch. A level change of ¼-inch to ½-inch shall be formed with a beveled slope no steeper than 26.6 degrees (2:1). Level changes greater than ½-inch shall be designed as ramps.

Sidewalks shall be designed with a running slope no greater than the adjacent street slope.

Sidewalks shall be designed with a cross slope of 2%.

Accessible sidewalk ramps shall be required on all projects involving construction of new streets or new sidewalks and all projects involving major alteration, including repaving, of existing streets and sidewalks.

1.1.1. Sidewalk Ramp Design:

Ramps, flares, landings and approaches shall be designed as follows:

- (1) Maximum ramp running slope shall be 8.33% for new construction. In retrofit situations, ramp slope may be between 8.33% to 10% for a rise of up to six (6) inches and 10% to 12.5% for a rise of up to three (3) inches. Ramp cross slope shall be 2% or less.
- (2) Minimum ramp width shall be four (4) feet in new construction and three (3) feet for retrofits.
- (3) Sidewalk ramps adjacent to all public streets shall be constructed with truncated dome detectable warning surface panels. The detectable warning panel shall be located so that the edge nearest the curb line is 6 inches minimum or 8 inches maximum from the curb line. The panel shall be oriented to the direction of travel as identified by the point of egress. The panel shall extend 24 inches minimum up the ramp in the direction of travel. The panel shall extend the full width of the ramp.
- (4) Detectible warning panels shall be composite wet set (replaceable) as manufactured by ADA Solutions, Inc ([www. Adatile.com](http://www.Adatile.com)), or equivalent.
- (5) Distinct standards for curb ramp construction apply for locations (1) within and immediately adjacent to Historic Districts and/or Historic Landscapes (Figure I-7A) and (2) all other locations within the City (Figure I-7).
 - For locations within Historic Districts and Historic Landscapes and the areas immediately adjacent where detectible warning panels are required, “Dark Gray” (#36118) panels shall be used (Figure I-7A).
 - For all other areas, “Federal Yellow” (#33538) panels shall be used (Figure I-7).
- (6) Flares shall be designed with a maximum slope of 10% provided that a landing area at least 48 inches x 48 inches is provided at the top of the ramp. If the landing area is less than 48 inches x 48 inches, the maximum slope of the flares shall be 8.33%.

- (7) Landings shall be at least 48 inches by 48 inches for new construction and at least 36 inches x 36 inches for retrofits. Landings shall be designed with slopes in both directions that are no greater than 2%.
- (8) Approaches shall be designed with a cross slope no greater than 2% and a running slope that does not exceed the slope requirements for sidewalk ramps.

1.8.5. Sidewalk Ramp Location and Orientation:

Sidewalk ramps shall be designed as perpendicular ramps with the direction of travel on the ramp perpendicular to the curb line and parallel to the crosswalk. Where existing conditions (such as narrow right of way width) preclude such layouts, parallel ramps or diagonal ramps may be approved.

Diagonal ramps are located in the middle of a section of circular curb at a corner, where the ramp is at an angle of about 45 degrees to one or two marked crosswalks. In such cases, the crosswalks shall be laid out to encompass a 48 inch by 48 inch landing and wheelchair maneuvering area at the base of the ramp in the street.

1.9. Reserved

1.10. SURFACE AND AGGREGATES

1.10.1. Aggregates used in concrete mixes and in the construction of streets, sidewalks and aprons shall meet the requirements in SECTION 703 - AGGREGATES of the *State of Maine Department of Transportation Standard Specifications Revision of December 2002* with the following additions and modifications:

703.02 Coarse Aggregate for Concrete:

Designated Aggregate Size

Sieve Size	Percent Passing Sieve				
	2 in.	1½ in.	1 in.	¾ in.	½ in.
2 in.	95-100	100	-	-	-
1-1/2 in.	-	95-100	100	-	-
1 in.	50-70	-	90-100	100	-
3/4 in.	-	50-70	-	90-100	100
1/2 in.	15-30	-	25-60	-	90-100
3/8 in.	-	10-30	-	20-55	-
No. 4	0-5	0-5	0-10	0-10	0-15
F.M. (+0.20)	7.45	7.20	6.95	6.70	6.10

1.10.2. Aggregate used in concrete shall not exceed the following maximum designated sizes:

- 2 inches for mass concrete
- 1-1/2 inch for piles, pile caps, footings, foundation mats, and walls 8 inches or more thick
- 3/4 inch for slabs, beams, and girders.
- 1/2 inch for fireproofing on steel columns and beams
- 1 inch for all other concrete

1.10.3. 703.06 (a) Aggregate Base:

Aggregate base - crushed, type "B" shall not contain particles of rock which will not pass a two inch (2") square mesh sieve, and shall conform to the type "B" aggregate, as listed in the subsection of the Standard Specifications.

"Crushed" shall be defined as consisting of rock particles with at least 50 per cent of the portion retained on a 1/4 inch square mesh sieve, having a minimum of 2 fracture faces.

1.10.4. 703.06 (b) Aggregate Subbase:

Sand subbase shall not contain particles of rock which will not pass a one inch (1") square mesh sieve, and shall conform to the type "F" Aggregate, as listed in this subsection of the Standard Specifications.

Gravel subbase shall not contain particles of rock which will not pass a three inch (3") square mesh sieve, and shall conform to type "D" Aggregate, as listed in this subsection of the Standard Specifications.

1.10.5. 703.18 Common Borrow:

Common borrow shall not contain any particle of bituminous material.

1.10.6. 703.19 Granular Borrow:

Granular borrow shall contain no particles which will not pass a three inch (3") square mesh sieve.

1.10.7. 703.20 Gravel Borrow:

Gravel borrow shall not contain particles of rock which will not pass a three inch ("3") square mesh sieve.

1.10.8. 703.31 Crushed Stone for Pipe Bedding and Underdrain:

"Crushed Stone" shall be defined as rock of uniform quality and shall consist of clean, angular fragments of quarried rock, free from soft disintegrated pieces, vegetable matter, lumps or balls of clay, and other unsuitable substances.

Crushed stone used as a bedding material for pipe and underdrain shall be uniformly graded and shall meet the gradations listed in the tables below. The stone shall be free from vegetable matter, lumps or balls of clay, and other unsuitable substances.

Sieve Designation	Percentage by Weight Passing
3/4 – inch	100
3/8 – inch	20 - 55
No. 4	0 - 10

For pipe sizes 42 inches and larger	
Sieve Designation (square mesh sieve)	Percentage by Weight Passing
1-1/4 – inch	100
3/8 – inch	20-55
No. 4	0-10

Minimum thicknesses for pavement structure materials:

Street Classification	Minimum Materials Thicknesses (Inches)			
	Wearing Course Pavement	Base Course Pavement	Agg. Base Course	Agg. Subbase Course
Minor Residential	1 ½	2	3	15
Residential	1 ½	2	3	15
Collector	1 ½	2 ½	3	18
Commercial/Industrial	2	3	3	18

Minimum placement temperatures for hot mix asphalt pavement:

Base Temp. °f	Mat Thickness, Inches					
	½	¾	1	1 ½	2	3+
40 - 50*	--	--	--	--	285	275
50 - 60	--	310	300	295	280	270
60 - 70	310	300	290	285	275	265
70 - 80	300	290	285	280	270	265
80 - 90	290	280	275	270	265	260
90+	280	275	270	265	260	255

* Surface course pavement shall not be placed when the air or road base temperature is less than 50 degrees F.

1.11. STREETS ON ISLANDS IN CASCO BAY

Reserved.

1.12. PARKING STUDY

Parking studies shall be produced by a licensed transportation professional engineer.

Where a parking study is required, data shall be determined by values contained in the most up to date version of the Institute of Transportation Engineers (ITE) publication titled Parking Generation, or through local, regional or other pertinent national data. If local or regional data is to be used, the scope and methodology of the parking study shall be coordinated with the City Transportation Engineer.

Where a parking study is required, the applicant's engineer shall have a scoping meeting with the City Transportation Engineer or their designee to determine the need for and required scope of the study. The requirements for the study shall be based on standard transportation engineering practices.

1.13. TRANSPORTATION DEMAND MANAGEMENT (TDM)

All TDM Plans shall include specific provisions for the following:

1.13.1. Transportation Narrative:

Every TDM plan shall describe how the project fits within the multimodal transportation system serving the district in which the development is located. The narrative should address the specifics of the use, occupants, visitors, and location of the development and how it is anticipated to relate to its transportation context.

1.13.2. Identify a TDM Coordinator to administer the TDM plan:

Every TDM Plan needs to identify the plan administrator and establish the roles and responsibilities of the administrator.

1.13.3. Employee and Customer Survey:

The TDM plan shall develop and use an employee and/or customer survey format that:

- Is specifically designed to reflect the use mix within the development.
- Is electronically tabulated.

- Produces comparable data from year to year
- Allows for compilation of data from multiple employers by third party.
- Allows for data use by employees to foster car pooling and ride sharing.
- Identifies barriers to or best practices in public transit, bicycle, and pedestrian transportation.
- Can be conducted periodically (typically annually) and can be used to monitor program effectiveness and provide the basis for periodic plan adjustment (see monitoring section below).

1.13.4. Set Parking and Trip Reduction Target:

The TDM plan shall use ITE trip generation and parking demand projections as the basis to establish a projected transportation demand and/or impact of the development. Alternatively, project-specific parking and trip generation projections may be used in place of ITE standards, if estimated by a licensed professional engineer and approved by the City. A project specific demand analysis may be advantageous to projects that can demonstrate reduced parking demand and trip generation based on approved assumptions in their TDM and Site Plan.

The TDM plan must use the specific use, location, local alternative transportation opportunities, and initial survey results to establish an achievable percentage reduction in transportation demand for the project. The TDM plan will utilize the stated parking and trip reduction targets as the basis for reduced infrastructure and contribution requirements for the Planning Board's evaluation.

1.13.5. Customize Parking and Trip Reduction Strategies:

Every TDM plan must be customized to reflect the specific mix of use proposed for the development. For example, A residential development will utilize a very different approach to reducing project generated parking and trips than an office building. Likewise, the administration of the TDM plan and the role of the TDM Coordinator must adequately respond to the scale of the development, the uses in the development, as well as the ownership framework and management of the facility.

1.13.6. Education:

The TDM plan shall, at a minimum include provisions for the following. All educational information and programs shall be readily accessible to all project occupants.

- Transit maps and schedules. These shall be posted and updated by the TDM Coordinator, as necessary.

- Access to Information concerning transportation providers and guaranteed ride home services such as: car pooling list serves and/or van pool providers.
- Internal information sharing such as posting a “Ride Board” or employee email list-serve to facilitate car pooling and to share the results of employee and customer surveys.
- Educational and promotional materials that describe and identify the advantages and cost saving opportunities of using alternative transportation, including specific incentives offered by the employer.
- Recognition of employees who reduce the traffic impact of the development through newsletter, email, bulletin board, or other announcements.
- Information on bicycling routes, parking infrastructure and locations and other amenities or incentives that may be available.

1.13.7. Monitoring:

All TDM plans must include provisions for monitoring program effectiveness over time to establish whether trip reduction targets are being met.

Responsibility: TDM Coordinators and/or plan administrators are responsible for monitoring the efficacy of the TDM plan periodically over time and making adjustments to the plan needed to achieve trip reduction targets.

Methods: The methods and scheduling of monitoring shall be outlined in the TDM plan and shall follow accepted transportation engineering. Monitoring methods will typically involve use of the periodic survey combined with direct observation.

Reporting: TDM plan monitoring shall be compiled into a report that compares the results to trip reduction targets and parking demand projections. The monitoring results shall be provided to the Reviewing Authority according to the monitoring schedule established in the TDM plan.

1.13.8. Project Specific Standards:

Individual TDM Plans shall assess the following topics on a site-specific basis tailored to the transportation needs of the development.

1.13.8.1. Infrastructure:

On-site and off-site infrastructure improvements may be incorporated to achieve trip reduction targets and may include the following:

- **Public Transit Access:** The TDM plan shall identify how occupants and/or visitors will access public transit. Pedestrian links to bus routes and other transit links shall be identified and their usability assessed for

sidewalk condition, ADA accessibility, street lighting, cross walk facilities, wayfinding, and general safety and attractiveness. The nearest sheltered public transit facility shall be identified. Deficiencies in the links to public transit that constitute barriers to its use shall be addressed in the TDM plan and in the site plan.

- **Bicycle Parking:** Minimum bicycle parking is a site plan requirement according to Section 14-526 of the Land Use Code. The TDM plan may incorporate additional bicycle parking, bicycle wayfinding, and/or covered parking to further encourage bicycle use.
- **On-site Shower and Locker Facilities:** Access to showers and locker facilities may be incorporated into the TDM Plan in order to encourage human powered transportation alternatives.
- **TDM Bulletin Board or Kiosk:** TDM plans shall identify to occupants where information and educational material will be provided within the development a visible and convenient facility such as a transportation bulletin board and/or kiosk. In multi-tenanted facilities, transportation information shall be provided in the lobby of the structure or other such location that is accessible and frequented by a significant majority of occupants and visitors to the facility. The TDM coordinator shall be responsible for keeping all material current and available, as needed.

1.13.8.2. **Incentives:** Incentives available to users and/or occupants of the development may be incorporated to achieve trip reduction targets and may include the following:

- **Parking “Cash Out”:** TDM plans may include “parking cash out” incentives where employees have the choice of receiving monetary payments in lieu of provided parking. The efficacy of these programs will need to be carefully assessed and the method of monitoring must be described in the TDM plan.
- **Public Transit Passes/Van Pool vouchers:** Free or reduced price bus passes or van pool vouchers may be used as an incentive in the TDM plan. The use of transit options should be incorporated into the employee/customer survey and incorporated into the plan monitoring program. Transit payment options may be combined with parking cash out incentives, where appropriate.
- **Preferred parking for car pool:** Car pooling employees may be provided with more convenient and attractive parking, if available. If this option is incorporated into the TDM plan, the location of preferred parking shall be identified on the site plan and signed accordingly.
- **Car sharing:** Residential developments may incorporate shared car services or jointly owned vehicles into the TDM plan. Commercial development TDM plans may identify use of a shared vehicle for use by employees for either commercial or personal trips through the work day as a means to encourage

alternative commuting to work.

- Telecommuting, flex time, and other flexible work scheduling mechanisms that promote fewer employee trips to work or promote alternative transportation travel.

*Other incentives infrastructure improvements and/or methods as may also be appropriate to the development.

1.14. PARKING LOT AND PARKING SPACE DESIGN

Refer to Division 20 of the City Land Use Code (Sections 14-331 to 14-350) for zoning ordinance requirements concerning the number of parking spaces required for off-street parking.

Parking spaces shall meet the following dimensional requirements:

- Standard parking space: 9 feet wide by 18 feet long.
- Compact parking space: 8 feet wide by 15 feet long.
- Motorcycle/motorized scooter parking space: 4 feet wide by 8 feet long.

Any parking lot with 10 or fewer spaces shall contain standard sized parking spaces. Parking lots with greater than 10 spaces may be comprised of up to 20% compact parking spaces.

Parking lot layout shall conform to Figures I-28 thru I-32.

Vehicular access shall be provided by one or more aisles. Minimum widths of aisles are illustrated in Figures I-28 thru I-31.

1.15. BICYCLE PARKING

Refer to Division 20 of the City Land Use Code (Sections 14-332.1) for zoning ordinance requirements concerning the number of bicycle parking spaces required.

Bicycle parking shall:

- Provide secure, durable racks that maintain bicycles in an upright position and to which bicycles can be affixed with customary lock and cable mechanisms. Fence-type (“wheel bender”) racks designed to secure the front wheel only are prohibited.
- Be installed on a hard surface.
- Be separated from car parking by a physical barrier such as curbing, wheel stops, parking bollards or similar features.

- Be adequately illuminated where nighttime use is anticipated.

1.15.1. Bicycle parking intended for long-term use (residential or full-time employee parking) shall be provided under covered areas and/or in secure storage lockers.

1.15.2. Placement of off-street bicycle parking racks shall conform to the Bicycle Parking Rack Placement Criteria (drawn from the *Bicycle Facility Design Guide of the District Department of Transportation, 2006*) as illustrated in Figure I-33.

1.15.3. Commercial, Industrial (requiring more than ten (10) bicycle parking spaces):

- A minimum of ten percent (10%) of required bicycle parking shall be provided within fifty (50) feet of the main egress point of the structure, or shall be no further from such entry than the nearest five (5) non-handicapped parking spaces.
- Where there is more than one structure on a site, or where a structure has more than one main entrance, the parking shall be distributed to adequately serve all structures or main entrances.

1.15.4. Directional Signage: If bicycle parking is not directly visible from the public right of way, directional signage shall be provided indicating the availability and location of bicycle parking facilities.

1.15.5. Approved Bicycle Racks:

Private property: A variety of commercially available racks are acceptable for installation on private property, including but not limited to those catalogue listings identified herein (Figures I-34 and I-35).

In the Public Right-of-Way: Where site conditions cannot reasonably accommodate bicycle parking on private property, it may be located within a public sidewalk area either adjacent to or within reasonable walking distance of the site, if such areas are available that meet the Bicycle Parking Rack Placement Criteria of this chapter (*drawn from the Bicycle Facility Design Guide of the District Department of Transportation, 2006*) – see Figure I-33. If no such location is available, a financial contribution commensurate with the cost for purchase and installation of the required number of bicycle racks shall be made to a City infrastructure account.

The following approved brands, installed according to company specifications, shall be permitted in the public right of way. Equivalent bicycle racks by other manufacturers are acceptable upon approval by the reviewing authority.

- DERO ‘Downtown Rack’ Inverted U-Rack (Figure I-35)
- DERO ‘Bike Hitch’ (Figure I-34)
- Old Port District, including Commercial Street: DERO Bike Hitch only (Figure I-34)

Bicycle racks in the public right of way shall become the property of the City of Portland.

Bicycle racks in the public right of way shall match the designated street furniture color for that location as described in the Municipal Street Lighting Standards in this manual. Where there is no designated street furniture color, bicycle racks in the public right of way shall be black (manufacturer's specification).

1.16. BICYCLE ROUTES AND LANES

The City has developed a Bike Route Network Map (Figure I-35) to show present and proposed bike routes on City streets. These routes are typically accomplished by providing either dedicated lanes or "Share the Road" methodology. Positive identification of the lanes shall be provided by pavement markings, bike lane symbols, and signage. The following standards shall be applied to the installation of bike lanes on City streets:

- Vehicular travel lanes and bicycle lanes shall be separated by a six (6) inch solid white painted edge line. At intersections the white edge line shall be a dotted line (two (2) foot painted length by four (4) foot opening) across the intersection.
- Bike lanes shall have a minimum width of five (5) feet. Where sufficient shoulder width is provided, a second edge line shall be painted off the face of the curb at one (1) or two (2) feet. This edge line shall not extend across intersections. See Figure I-36
- When bike lanes are provided on streets with on-street parking, the bike lane shall be a minimum of six (6) feet wide delineated by edge lines on either side of the bike lane. See Figure I-37
- Bicycle lanes shall be marked with appropriate stenciled symbols; see Figure I-38 for two examples.
- Bike routes shall be identified by appropriate signage as found in the FHWA 'Manual of Uniform Traffic Control Devices'. See Figure I-38 for examples.

1.17. Reserved.

1.18. MOTORCYCLE / MOPED PARKING (ON-STREET):

To distinguish motorcycle/moped parking spaces from standard parking spaces the spaces shall be painted and delineated with signage. These painted spaces shall be angled and shall be four (4) feet wide by eight (8) feet long. The dimensions for on-street motorcycle/moped parking are outlined in Figure I-31.

On-street motorcycle and moped parking may also be located where standard vehicle parking would be prohibited because of sight restrictions, such as, adjacent to a crosswalk or an approach to a traffic control device. Motorcycles/mopeds do not have the same sight impediment as a standard vehicle.

1.19. TRAFFIC SIGNALS

New or modified traffic signals require the submission of a traffic signal plan including location of all equipment, underground utilities, a phasing and timing plan and a specific list of all traffic signal hardware. For new or modified traffic signal installations, a new plan shall be submitted to the reviewing authority for review and approval before installation can proceed.

Listed below are the traffic signal items required for traffic signal installations. These items or an approved equivalent shall be provided.

1.19.1. Controller Equipment:

- Controllers shall be compatible with existing Naztec Street Wise ATMS Software
- Traffic control cabinets shall be Naztec Model M34 or P44 TS2 Type 1 Series only
- Secondary traffic controllers shall be Naztec Model 980 TS2 Type 1 Series only
- Master controllers shall be Naztec Model 981 Series only
- Malfunction management units shall be Naztec Model MMU-516E only

1.19.2. Video Detection Equipment:

- Video detection units shall be Traficon Model VIP3.1 & VIP3.2 Series only
- Video detection cameras shall be Traficon approved models only

1.19.3. Signal Equipment:

- Signal housings shall be McCain Model MTSTA or MTSTP Series only
- LED modules for vehicle indications shall be GELcore Model DR6 Series only
- LED modules for pedestrian indications shall be GELcore Model PS7 Series only
- Accessible Pedestrian Signals shall be Campbell Advisor Series only

1.19.4. Traffic Structures:

- Mast arms shall be Valmont SM16 or CB16 Series only
- Strain poles shall be Valmont SW56 Series only.

1.20. PUBLIC CROSSWALKS

Public crosswalks shall meet the requirements of The Manual on Uniform Traffic Control Devices (MUTCD), unless City standards specify a stricter measure. Public improvements may include but shall not be limited to any one or combination of the following:

- Crosswalks;
- Curb Bump Outs or Curb Extensions;
- Pedestrian Crossing Signs (curbside, overhead or in the street);
- Pedestrian Activated Yellow Flashing Warning Lights;
- Pedestrian Activated Traffic Control Signal (Red, yellow, green);
- Medians

1.20.1. Critical Physical Factors:

Walking Speed:

- This factor is applicable at signalized intersections and affects the length of the pedestrian clearance (flashing “don’t walk”) interval.
- Average walking speed is generally measured as three and a half (3.5) feet per second. In areas with elderly or young children pedestrians, a rate of three (3) feet per second is appropriate.

Vehicular Sight Distance:

- Sight distance shall be based on the posted speed plus 5 miles per hour or the 85th percentile travel speed as tabulated below.

Table 1	
Stopping Sight Distances (1)	
Speed (mph)	Stopping Sight Distance (feet) *
25	155
30	200
35	250
40	305
45	360
50	425

*Assumes level grade

Source: AASHTO Policy reference 1, Exhibit 3-1 of that publication.

- Sight distance shall be based on a driver eye height of 3.5 feet and a pedestrian height of 2.0 feet.
- Parking shall be prohibited within twenty (20) feet from the centerline of a crosswalk and within thirty (30) feet at signalized and STOP sign locations.

1.20.2. General Standards for Crosswalk Installation:

1.20.2.1. The Manual on Uniform Traffic Control Devices (MUTCD) provides guidance for placement of crosswalks. In addition, crosswalks should:

- Occur where substantial pedestrian/vehicle conflicts exist. (See The Federal Highway Administration notebook titled “Traffic Conflict Techniques for Safety and Operations” which provides methods for conflict evaluation.)
- Occur at points of pedestrian concentration that can meet applicable standards or where pedestrians may not recognize the appropriate place to cross (e.g., loading islands, mid-block pedestrian crossings).
- Maintain suitable separation (approximately 300 feet) between non-intersection or mid-block crosswalks.
- Be installed based on an engineering study if located other than at a STOP sign or traffic signal. For mid-block locations, a study shall evaluate factors of need including but not limited to school crossings, age of pedestrians, and nearest alternative crosswalk location as well as safety issues such as traffic speed, volume, and sight lines.
- Consider advance warning signage if installed at uncontrolled locations and allow for restriction of parking for adequate visibility of the advance signage.
- No crosswalk spacing requirements are to be imposed at intersection locations. Other engineering factors are to be reviewed in the determination of suitability of the location.

1.20.2.2. The Crosswalk Installation Guidelines (Figure I-24) provide criteria for guiding evaluations of when crosswalks may be desirable at uncontrolled locations based on pedestrian and vehicular volumes. Crosswalks at uncontrolled locations shall be placed where these criteria are met; or where special requirements and/or plans exist that support the installation of a crosswalk.

1.20.2.3. Crosswalks proposed at signalized intersections shall include pedestrian signal indications for substantial pedestrian crossings.¹ Each proposed location shall be evaluated based on through traffic volumes, turning vehicle volumes and signal phasing to determine which legs of the intersection are most appropriate for pedestrian crossings. The default assumption is that crosswalks shall be provided on all intersection approaches and supplemental analysis must be provided that identifies specific engineering conclusions on why this cannot be accomplished.

1.20.2.4. Marked crosswalks across stop controlled intersection approaches shall

¹ Design and Safety of Pedestrian Facilities, 1998, ITE Technical Committee 5A-5

be considered where vehicular traffic may block pedestrian traffic². This will be assessed based on a visual observation of vehicular and pedestrian traffic flow at the intersection to determine if there is sufficient vehicular traffic to block the pedestrian crossing path for a significant period of time.

1.20.3. Design Criteria:

Street Markings: Crosswalks on public streets shall use a minimum of eight (8) inch wide solid white lines, which should be spaced to provide a minimum overall width of eight (8) feet. Wider line width is required for locations with higher posted speeds as shown in Table 2. Paint, wherever used, shall meet Maine Department of Transportation (Maine DOT) specifications. Additional designs may consist of longitudinal lines. Figure I-21 illustrates these typical crosswalk markings and Table 2 provides dimensions utilized in the City of Portland for various applications.

Table 2 Crosswalk Dimensions			
Type	Overall Width	Line Width	Spacing
Standard Crosswalk Marking (two lines) Posted Speed ≤ 35 mph Posted Speed > 35 mph	8' 8'	8" 12"	N.A.
Crosswalk With Longitudinal Lines (block style) (See Table 4)	8'	24"	Spacing 4' o.c.

The longitudinal or block style striping of crosswalks should be reserved for use at the following locations (see Table 4):

- Uncontrolled locations of special significance, such as school walking routes, trail/shared-use paths and mid-block crossings;
- High volume pedestrian locations with at least 25 pedestrian crossings for each 4 hours or 40 crossings during the peak hour; and
- High vehicle speed (> 35 mph posted speed) crossings.

1.20.3.1. Street Lighting: Crosswalk locations shall be adequately illuminated for night-time use.

1.20.3.2. Signage: Select crosswalk locations may need to be accentuated through the use of signage mounted curbside, overhead, or on the road centerline, as described below:

² Pedestrian Facilities Users Guide, March 2002, USDOT - FHWA

1.20.3.3. **Curbside Signs:** There are three standard curbside signs consisting of a crosswalk warning sign, a school crossing warning sign, and an advance warning pedestrian crossing sign. The City of Portland also installs “yield for pedestrians” signs at crosswalks, as shown in Figures I-22 and I-23. Crosswalk signs shall be placed directly adjacent to crosswalks and advance warning signs shall be placed in accordance with the MUTCD guidelines as shown on Table 3.

Table 3 Advance Warning Sign Placement (2)	
85th Percentile Speed* (mph)	Advance Placement (feet)
25	125**
30	125**
35	125**
40	125
45	175

*or the posted speed when a speed study is not available.

**recommended minimum for the City of Portland

Source: Table 2C-4 of the MUTCD.

1.20.4. Standard signs shall be black legend on a yellow background. The MUTCD also allows the use of a yellow-green fluorescent high grade reflective background for increased visibility. These higher grade signs shall be used where locations meet at least one of the following criteria:

- Vehicle 85th percentile speeds or the posted speed is greater than or equal to 35 mph;
- Pedestrian crossing volume of at least 25 per hour for four hours or 40 during the peak hour; or
- School crossing.

1.20.4.1. **Overhead Signs and Flashing Warning Lights:** Overhead signs supplemented with pedestrian activated flashers may be placed at high volume pedestrian crossing locations or where specific pedestrian safety issues have been identified.

1.20.4.2. **Centerline Signs:** Centerline signs shall be able to withstand vehicle impact without damage to the vehicle and with minimal damage to the device and shall be anchored in place. Note that these devices must be removed without damaging the pavement prior to the start of winter season. The City recommends a device with a base anchored to the pavement with epoxy and a flexible upright paddle that is replaceable. The following criteria should be considered for these devices to be utilized:

- Presence of a high crash location (HCL) as defined by Maine DOT:
 Both of the following criteria must be met in order to be classified as an HCL:
 - A critical rate factor of 1.00 or more for a three year period.
 (A Critical Rate Factor (CRF) compares the actual accident

- rate to the rate for similar intersections in the State; and
 - A minimum of eight (8) accidents over a three (3) year period.
- Principal or minor arterial, as identified in Figure -24.
- At least 25 pedestrian crossings per hour for four (4) hours or 40 pedestrian crossings for the peak hour.

1.20.5. Traffic Control Signals: The following provides general guidance concerning installation of a pedestrian activated red-yellow-green traffic control signal. The MUTCD should be consulted for specific details:

- The location is a school crossing and a traffic engineering study reveals that there are not adequate gaps in the traffic stream; or
- There are 107 pedestrian crossings for each of four (4) hours or 133 crossings during any one hour and under both conditions for high volume roadways. Higher rates of pedestrian crossings are necessary for lower volume streets. The number of pedestrians may be reduced by 50% where they are predominantly elderly or young children to include crossing locations along school walking routes for elementary and middle school students.

1.20.6. Specific Guidelines for Crosswalk Use: The City of Portland has established the following guidelines for pedestrian street crossing devices (Table 4):

Table 4: Pedestrian Crossing Devices	
Device	Use *
Crosswalk –	
a. 8" lines, 8' total width	Where volume criteria of Figure I-25 are met and speeds are less than 35 mph and at signalized intersections.
b. 12" lines, 8' total width	At all unsignalized locations where volume criteria of Figure I-25 are met and speeds are between 35 and 45 mph.
c. 24" block style lines, 8' width	At mid-block locations where volume criteria of Figure I-25 are met and speeds are between 35 and 45 mph, at all school and trail/shared-use path crossings and as noted in (Design Criteria) above, subsection 1.17 or at uncontrolled locations as determined by the Traffic Engineer.
Curbside signs –	
a. Advance Crossing Signs	For all mid-block crosswalks and other uncontrolled locations as determined by Traffic Engineer.
b. Crossing Signs	
1. Standard Grade	At all locations where crosswalk lines alone are not sufficient to define the crossing location to motorists at the discretion of the Crosswalk Committee.
2. High Grade	Speed greater than or equal to 35 mph; or 25 pedestrians crossing per hour for four hours or 40 pedestrians crossing for the peak hour
3. School	In accordance with MUTCD

Table 4: Pedestrian Crossing Devices (cont.)	
Device	Use *
Overhead Signs/Flashers	On arterial roadways or roadways with at least two lanes of traffic in at least one direction
Centerline Signs	As noted in 1.17.4.2, above.
Traffic Control Signal	Consider at locations meeting MUTCD warrants for school crossings or pedestrian volume crossings.

*All speeds are 85th percentile speeds for off-peak daytime periods or the posted speed.

1.21. PUBLIC TRANSIT FACILITIES

Where required, public transit facilities shall meet the following standards:

1.21.1. Transit Pullout Bays:

- 1.21.1.1. Transit pullout bays shall be located in the City right of way along the property frontage; or
- 1.21.1.2. Where space constraints prevent locating a transit pullout bay along the property frontage, within reasonable walking distance of the site.
- 1.21.1.3. The design of the pullout bay shall provide adequate space for vehicles to maneuver through facilities without causing damage to either the vehicles or facilities, as detailed in Section I of the Technical Manual.

1.21.2. Transit Shelters:

- 1.21.2.1. Transit shelters shall be located within the site, directly adjacent to the right-of-way on which the public transportation route is established; or
- 1.21.2.2. Where site constraints prevent locating a transit shelter on the site, it shall be located within a public sidewalk area along the property frontage. If a transit shelter is to be located within a public sidewalk area, City sidewalk clearance requirements.
- 1.21.2.3. Where space constraints prevent locating a transit shelter within a public sidewalk area along the property frontage, it may be located within reasonable walking distance of the site.
- 1.21.2.4. Installation and ongoing maintenance of transit shelters on private property shall be the responsibility of the property owner. Ongoing maintenance of transit shelters located in the City right of way shall be the responsibility of the City or of the local or regional transit authority serving the facility.

- 1.21.3. Where necessary, developments shall provide easements to the City, sufficient in size to accommodate public transit infrastructure.

1.22. CONSTRUCTION PERMITTING AND TRAFFIC CONTROL PLANS

1.22.1. Construction activity in the public right-of-way is controlled by Chapter 25 Article VII of the City Code of Ordinances. Required licenses and permits, restrictions on activity, and fees & charges are all outlined in that Chapter. Rules and Regulations for Excavation Activity are available through the Street Opening Clerk at the Department of Public Services.

1.22.2. Sewer and stormwater system connections are controlled by Chapters 24 and 32 of the City Code of Ordinance. Required permits for new connections and/or abandonment of existing connections are available through the Street Opening Clerk at the Department of Public Services. Rules and Regulations for these utility systems are available through the City Engineer's office of the Department of Public Services. See also Section II of the Technical Manual for lateral abandonment requirements associated with demolition permits.

1.22.3. Traffic Control Plans: Construction activity that impacts the existing public street system must be controlled to protect the safety of the construction workers and all modes of the traveling public. Projects that will occur along arterial and/or collector streets are required to submit a satisfactory 'maintenance of traffic' (MOT) plan prior to any site plan, subdivision, or street opening permit approval.

Maintenance of Traffic (MOT) plans shall provide for the safe passage of the public through or along the construction work zone. On a case-by-case basis applicants may be allowed to close a street and/or detour a mode of traffic when absolutely necessary for safety. MOT plans shall employ the appropriate techniques and devices as called for in the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD). In addition:

- Construction speed signing may be used as needed to slow traffic
- Traffic Control signs shall not be placed where they are an obstruction to bicycles or pedestrians.
- In extreme situations, flaggers may be required to allow for safe pedestrian and bicycle movement

1.22.4. All existing modes of travel in the work zone area shall be accommodated if impacted by the activity. The safe passage of pedestrians, bicyclists, transit providers, and motorists are of equal importance when planning out the work zone; no pre-existing travel mode may be eliminated without the express approval of the Department of Public Services.

- Traffic control for bicycle and pedestrian facilities or routes through work zones shall be maintained until the bicycle and pedestrian facilities or routes are ready for safe operation. Traffic control will not be removed to allow auto travel at the expense of bicycles and pedestrians.
- Barrier systems utilized to separate the construction activity from the public

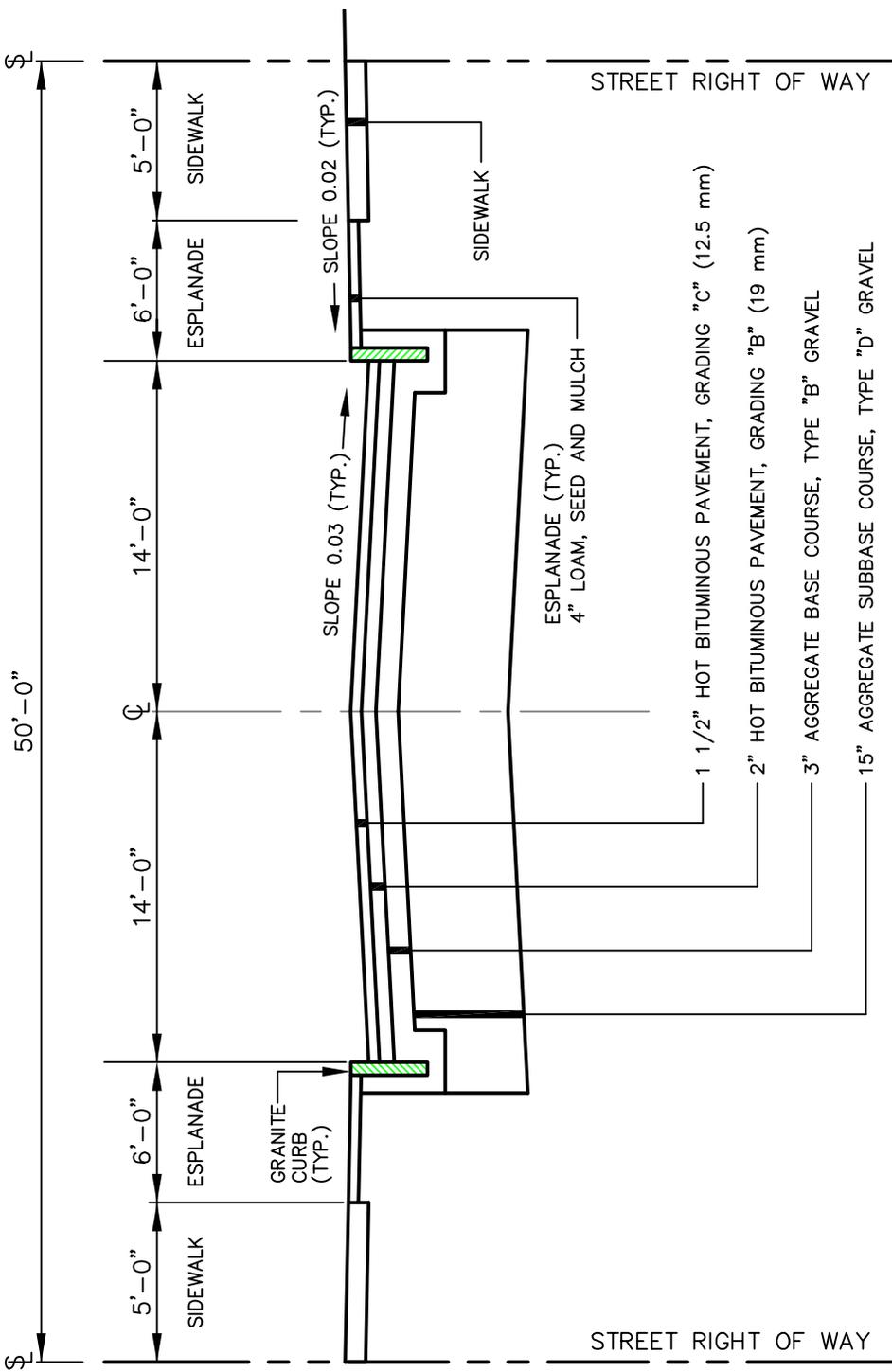
street and/or sidewalk shall not inhibit sight distances, particularly for visibility of pedestrians and bicyclists.

- 1.22.5. Use of public parking spaces or the blockage of any portion of sidewalk for the purpose of construction activity shall require an occupancy permit and appropriate fee as assessed by the Department of Public Services.

1.23. INFRASTRUCTURE CONTRIBUTIONS

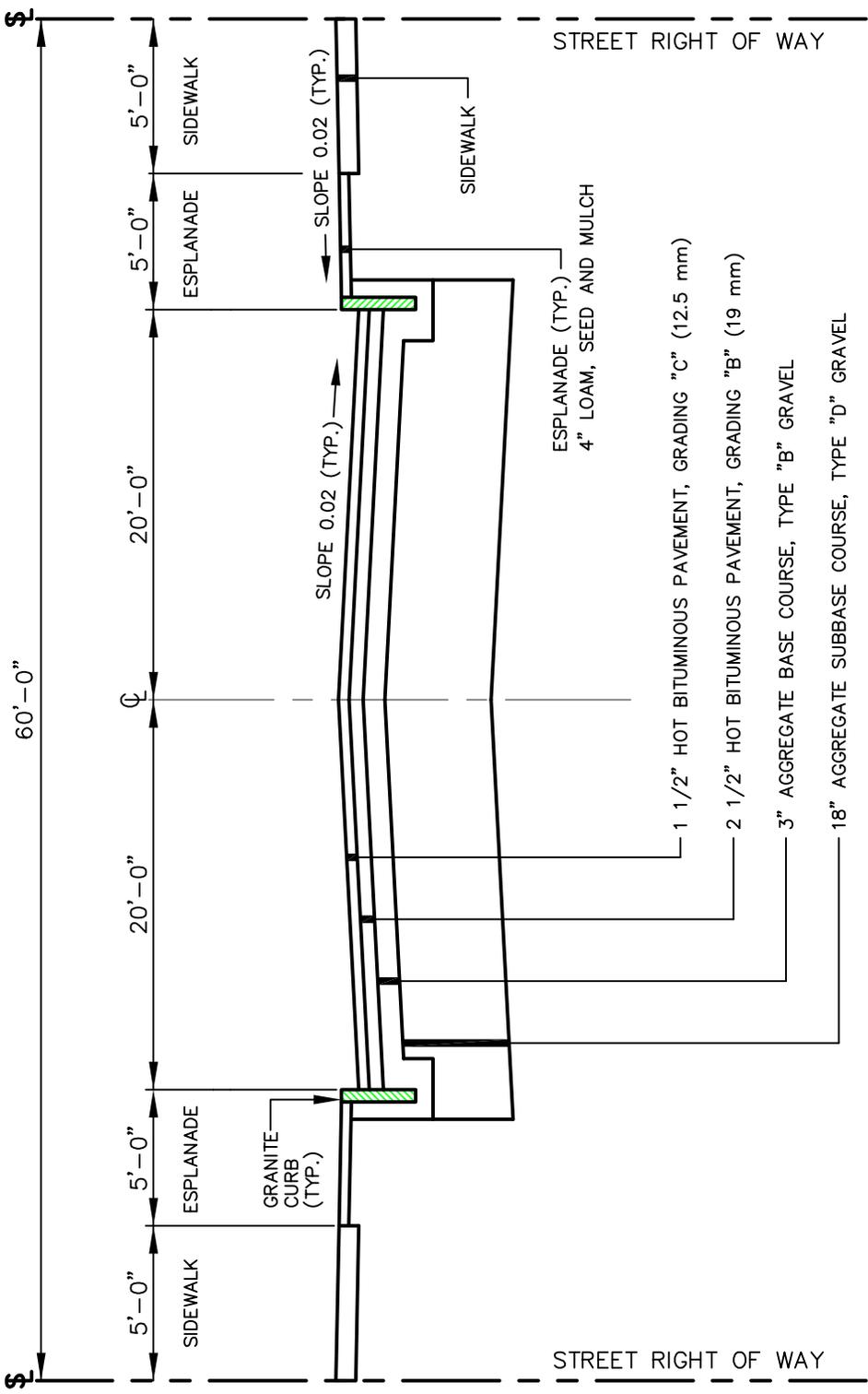
Projects that generate traffic, which impacts roadways and intersections already operating at substandard levels of service E or F or adds traffic to improvement districts within the City (**as identified on the attached map - Figure I-39**) shall contribute towards future improvements. A contribution is not required when the applicant implements improvements to fully mitigate a project's impact.

The contribution amount shall be based upon the percentage impact of the project during the Weekday PM peak hour. Specifically, a percentage calculation of the trip generation increase as compared to No-Build traffic levels multiplied by the capital cost of implementing an improvement plan. If an improvement plan has not been identified for complex locations, the applicant shall fund a study that identifies required improvements.



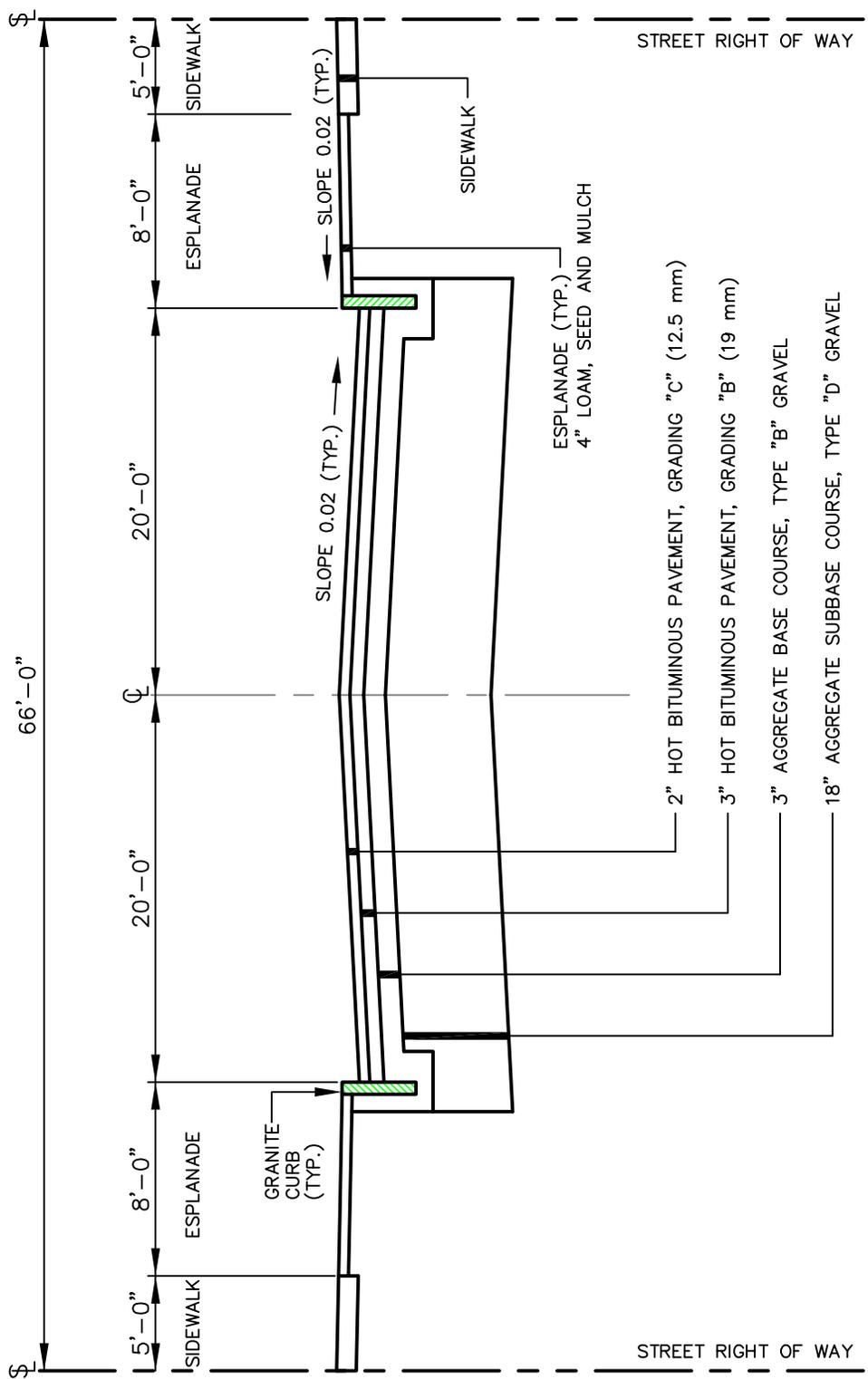
LOCAL STREET CROSS SECTION
 NOT TO SCALE

DATE: AUGUST 2009 REVISED:	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	TRANSPORTATION SYSTEMS AND STREET DESIGN SECTION I	FIGURE:
LOCAL STREET CROSS SECTION			I-1



COLLECTOR STREET CROSS SECTION
 NOT TO SCALE

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COLLECTOR STREET CROSS SECTION			I-2



ARTERIAL STREET CROSS SECTION

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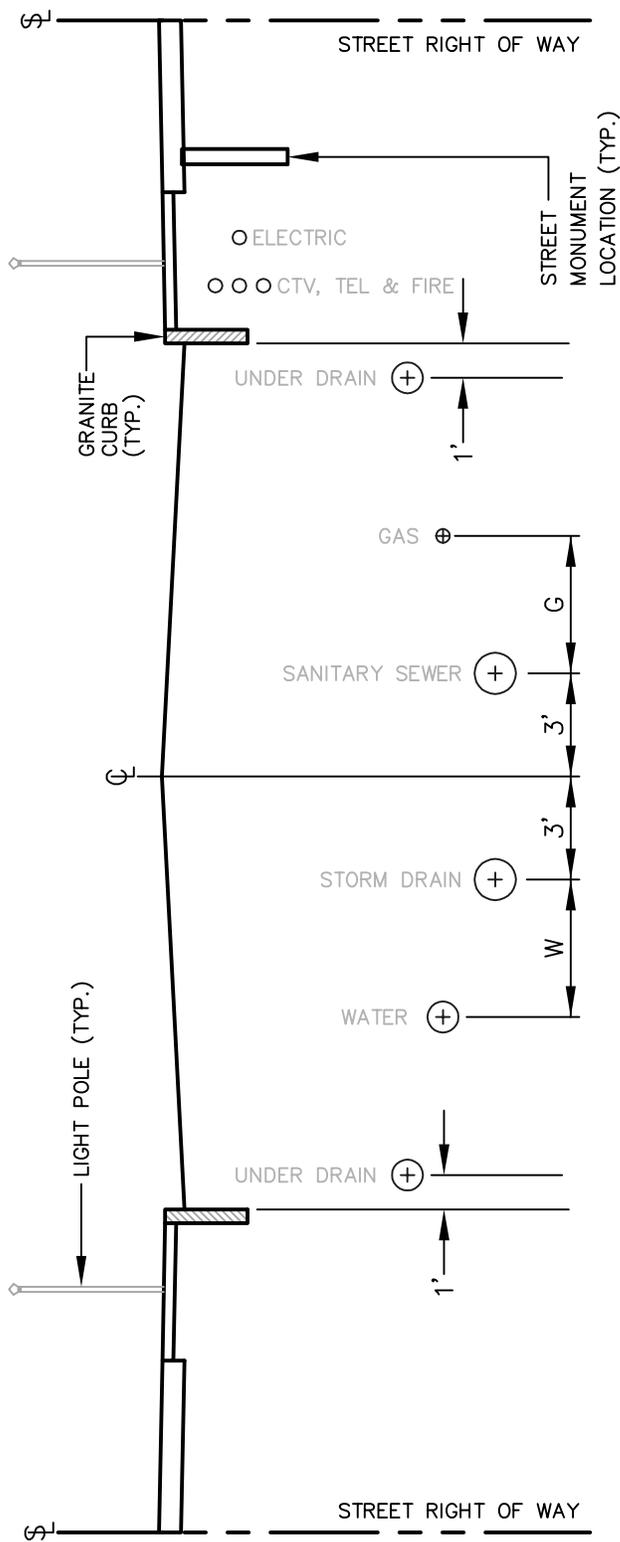
CITY OF PORTLAND, MAINE
 TECHNICAL STANDARDS MANUAL

**TRANSPORTATION SYSTEMS
 AND STREET DESIGN**
 SECTION I

FIGURE:

ARTERIAL STREET CROSS SECTION

I-3



STREET CLASSIFICATION	R.O.W. WIDTH (ft.)	UTILITY LOCATION DIMENSIONS	
		W (ft.)	G (ft.)
LOCAL	50	5	5
COLLECTOR	60	7	7
ARTERIAL	66	8	8

- NOTES:
1. DEPTH OF SANITARY SEWER AND STORM DRAIN PER CITY ENGINEER.
 2. DEPTH OF UNDER DRAIN SHALL BE 3'-6" FROM GUTTER LINE TO PIPE INVERT.
 3. DEPTHS OF ELECTRIC, TELEPHONE, CABLE TELEVISION AND FIRE TO BE AT LEAST 36 INCHES BELOW FINISH GRADE. DEPTHS OF OTHER UTILITIES PER REQUIREMENTS OF APPLICABLE UTILITY COMPANY. **WHEN TREES ARE PROPOSED FOR THE ESPLANADE, THE UTILITIES DESIGNATED FOR THAT LOCATION SHALL MAKE NECESSARY PROVISIONS.**
 4. APPLICABLE WARNING TAPE SHALL BE PLACED OVER EACH UTILITY.
 5. RIGID PVC CONDUIT IS REQUIRED FOR STREET AND DRIVEWAY CROSSINGS AND OTHER PAVEMENT CROSSINGS MORE THAN 12 FEET IN LENGTH. CONDUITS CROSSING STREETS SHALL BE ENCASED IN CONCRETE.

UTILITY LOCATIONS IN STREETS

NOT TO SCALE

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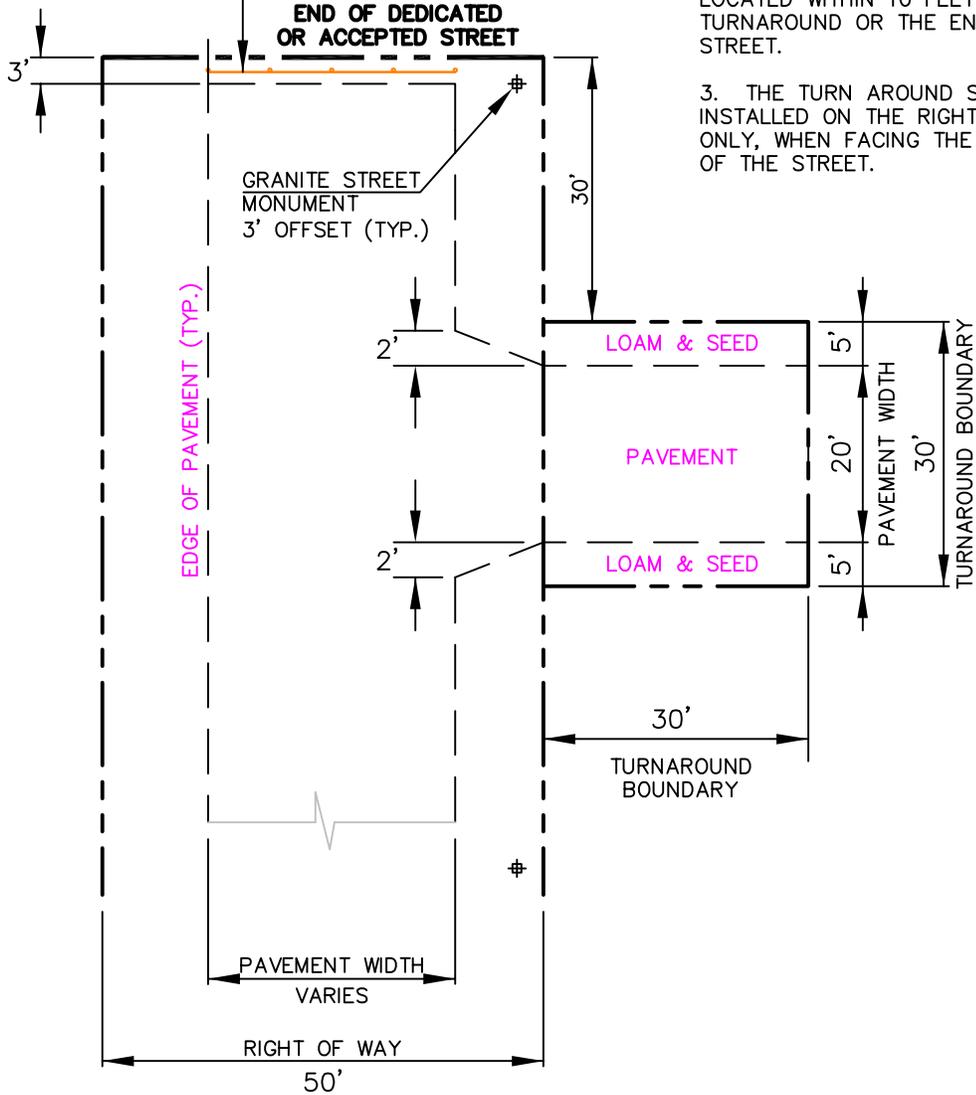
TRANSPORTATION SYSTEMS
 AND STREET DESIGN
 SECTION I

FIGURE:

UTILITY LOCATIONS IN STREETS

I-4

GALVANIZED STEEL OR PRESSURE TREATED WOOD GUARDRAIL WITH OM4-2 END OF ROADWAY MARKER SIGN OR APPROVED EQUAL



NOTES

1. A TURNAROUND EASEMENT SHALL BE CONVEYED TO THE CITY.
2. NO DRIVEWAYS SHALL BE LOCATED WITHIN 10 FEET OF THE TURNAROUND OR THE END OF THE STREET.
3. THE TURN AROUND SHALL BE INSTALLED ON THE RIGHT SIDE ONLY, WHEN FACING THE DEAD END OF THE STREET.

TURNAROUND ON DEAD END STREET
 NOT TO SCALE

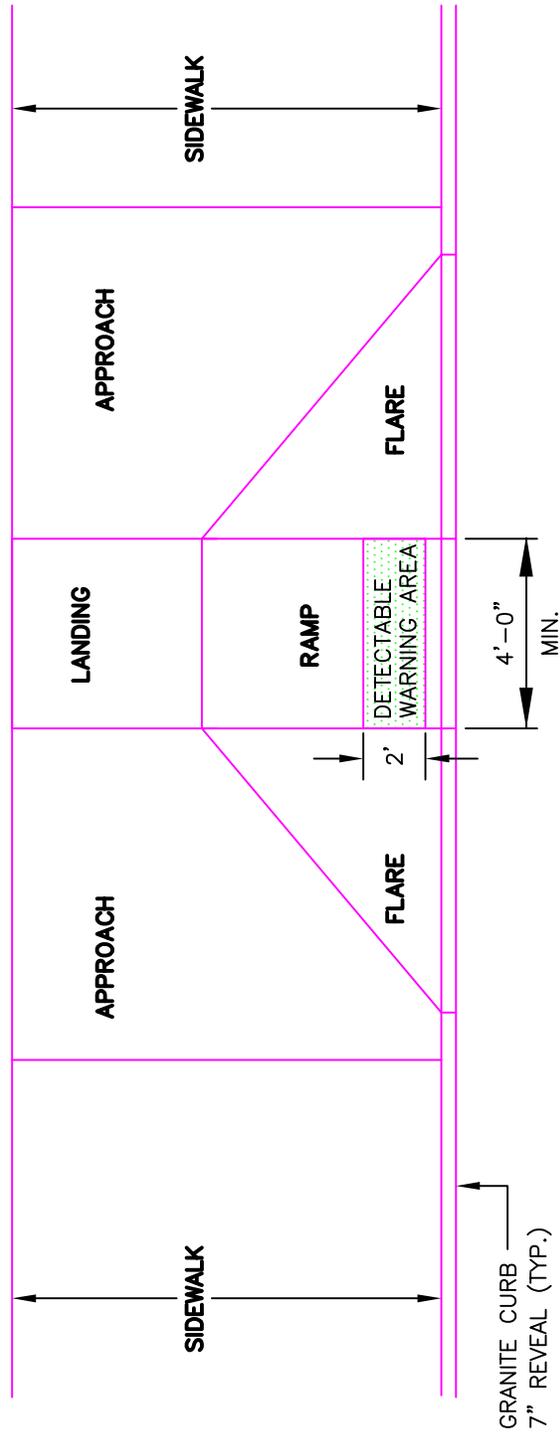
DATE: AUGUST 2009 REVISED:	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	TRANSPORTATION SYSTEMS AND STREET DESIGN SECTION I	FIGURE:
<p style="text-align: center;">TURNAROUND ON DEAD END STREET</p>			<p style="text-align: center; font-size: 2em;">I-5</p>

NOTES:

ALL RAMP SHALL COMPLY WITH ADA STANDARDS.

GRANITE CURB ADJACENT TO RAMP SHALL BE FLUSH WITH STREET.

DESIGN ELEMENT	SLOPE	IN DIRECTION OF TRAVEL	CROSS SLOPE
APPROACH	8.33% MAXIMUM		2%
LANDING	2%		2%
RAMP	8.33% MAXIMUM		MATCH STREET GRADE
FLARE	10% MAX. AT CURB FACE		-
SIDEWALK	MATCH STREET GRADE		2%



PLAN VIEW

**PERPENDICULAR ADA RAMP LAYOUT FOR
 WIDE SIDEWALK WITH NO ESPLANADE**

NOT TO SCALE

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 SECTION I

FIGURE:

**PERPENDICULAR RAMP FOR
 WIDE SIDEWALK WITH NO ESPLANADE**

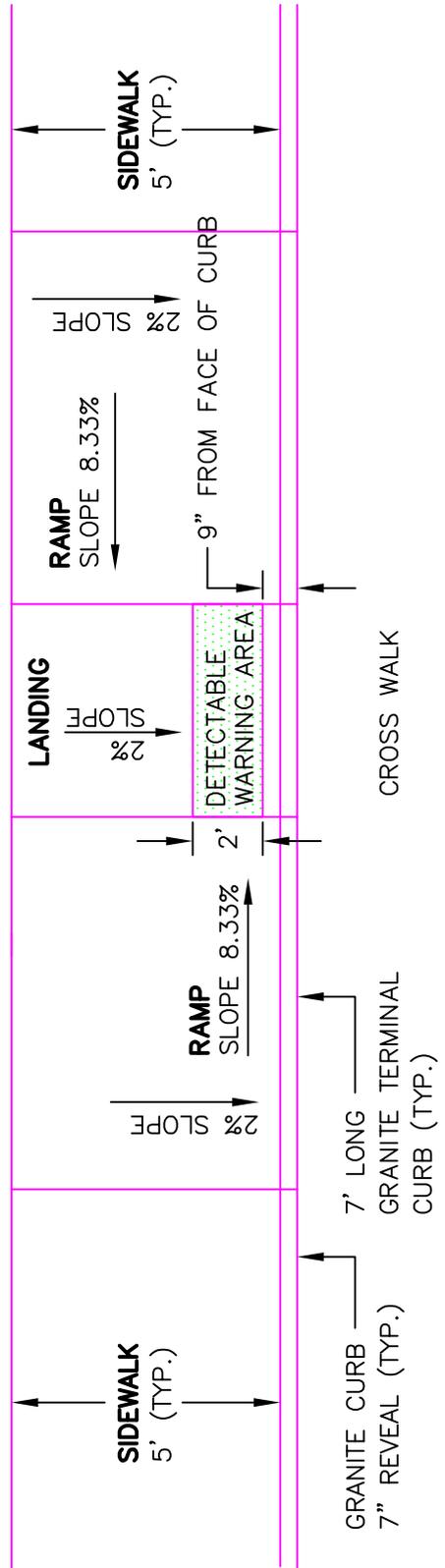
I-6A

NOTES:

ALL RAMPS SHALL COMPLY WITH ADA STANDARDS.

GRANITE CURB ADJACENT TO LANDING SHALL BE FLUSH WITH STREET.

SIDEWALK MATERIAL PER CITY SIDEWALK MATERIAL POLICY.



PLAN VIEW

PARALLEL SIDEWALK RAMP LAYOUT FOR NARROW SIDEWALK WITH NO ESPLANADE

NOT TO SCALE

DATE:
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 AND STREET DESIGN
 SECTION I

FIGURE:

PARALLEL ADA RAMP LAYOUT FOR NARROW SIDEWALK WITH NO ESPLANADE

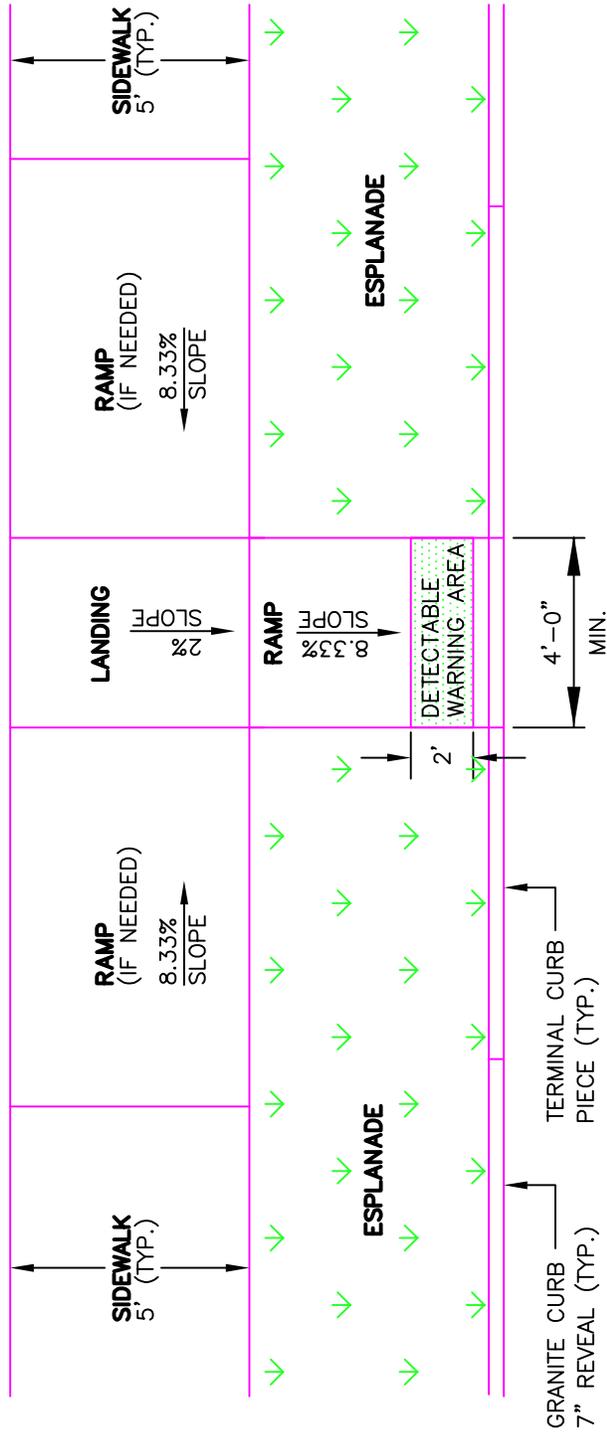
I-6B

NOTES:

ALL RAMPS SHALL COMPLY WITH ADA STANDARDS.

GRANITE CURB ADJACENT TO LANDING SHALL BE FLUSH WITH STREET.

SIDEWALK MATERIAL PER CITY SIDEWALK MATERIAL POLICY.



PLAN VIEW

**PERPENDICULAR ADA RAMP LAYOUT FOR
 NARROW SIDEWALK WITH ESPLANADE**

NOT TO SCALE

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 AND STREET DESIGN**
 SECTION I

FIGURE:

**PERPENDICULAR RAMP FOR
 NARROW SIDEWALK WITH ESPLANADE**

I-6C

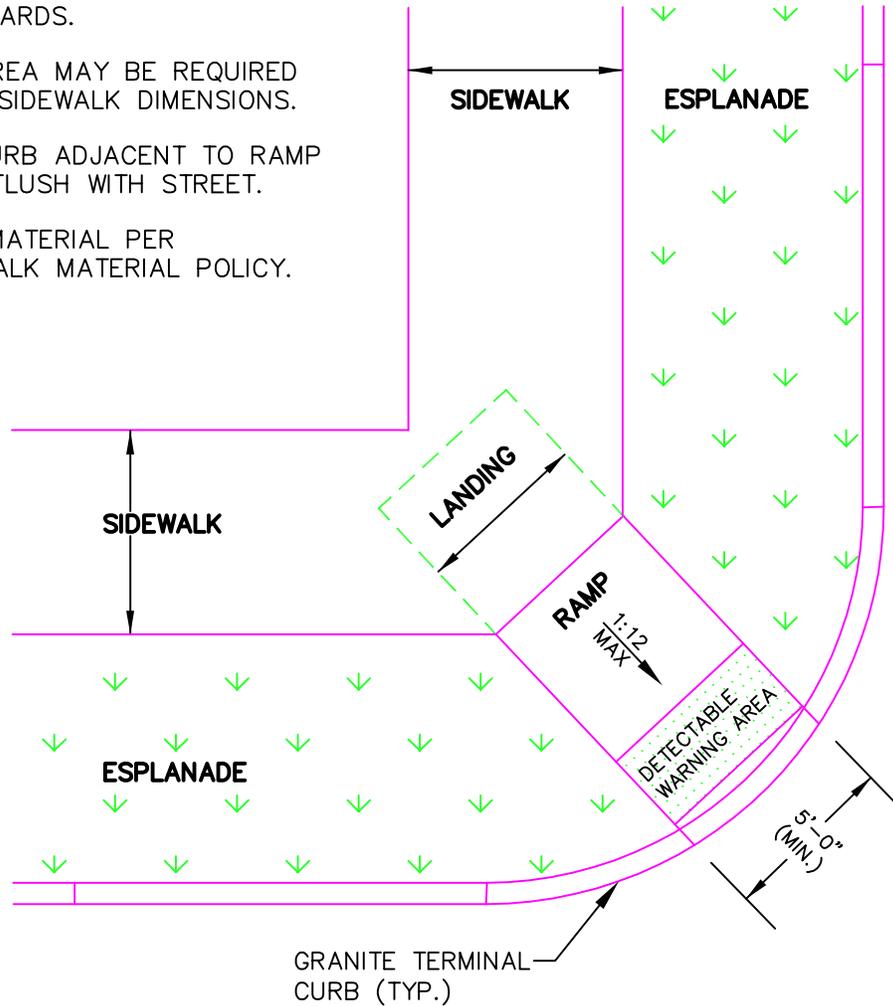
NOTES:

ALL RAMPS SHALL COMPLY WITH ADA STANDARDS.

LANDING AREA MAY BE REQUIRED BASED ON SIDEWALK DIMENSIONS.

GRANITE CURB ADJACENT TO RAMP SHALL BE FLUSH WITH STREET.

SIDEWALK MATERIAL PER CITY SIDEWALK MATERIAL POLICY.



DIAGONAL SIDEWALK RAMP LAYOUT AT INTERSECTION
 FOR SIDEWALK WITH ESPLANADE

NOT TO SCALE

(REQUIRES WAIVER)

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FIGURE:

**DIAGONAL SIDEWALK RAMP LAYOUT AT
 INTERSECTION FOR SIDEWALK WITH ESPLANADE**

I-6D

City of Portland Technical Manual

NOTES:

ALL RAMPS SHALL COMPLY WITH ADA STANDARDS.

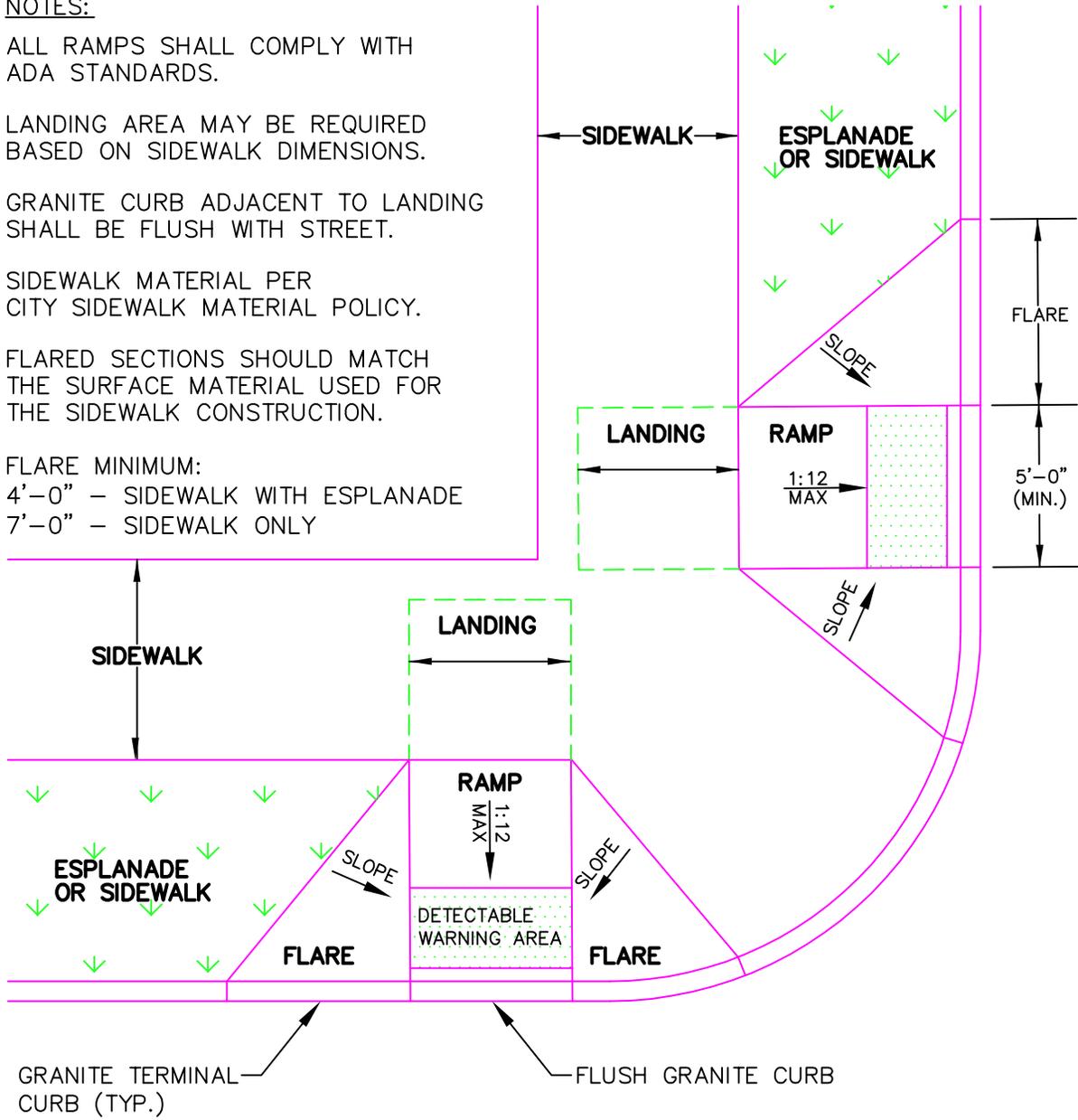
LANDING AREA MAY BE REQUIRED BASED ON SIDEWALK DIMENSIONS.

GRANITE CURB ADJACENT TO LANDING SHALL BE FLUSH WITH STREET.

SIDEWALK MATERIAL PER CITY SIDEWALK MATERIAL POLICY.

FLARED SECTIONS SHOULD MATCH THE SURFACE MATERIAL USED FOR THE SIDEWALK CONSTRUCTION.

FLARE MINIMUM:
 4'-0" - SIDEWALK WITH ESPLANADE
 7'-0" - SIDEWALK ONLY



PREFERRED SIDEWALK RAMP AT INTERSECTION
 NOT TO SCALE

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**TRANSPORTATION SYSTEMS
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 SECTION I

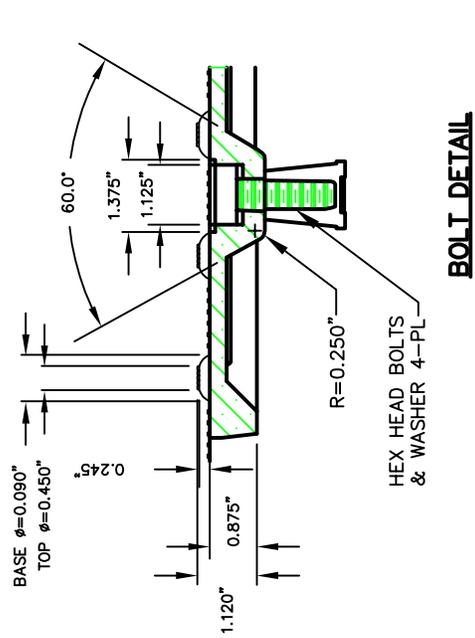
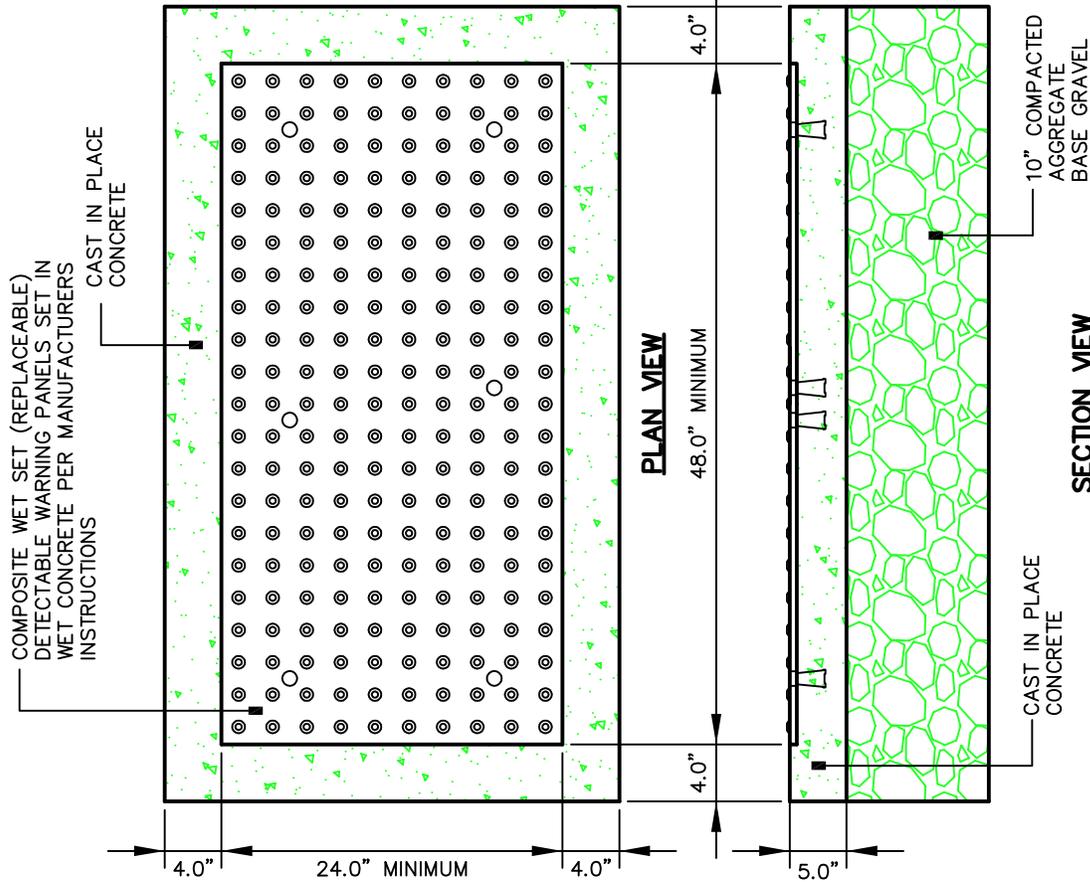
FIGURE:

**PREFERRED SIDEWALK RAMP LOCATION
 AT INTERSECTION**

I-6E

NOTES:

1. COMPOSITE WET SET (REPLACEABLE) DETECTABLE WARNING PANELS SHALL BE AS MANUFACTURED BY ADA SOLUTIONS, INC. (WWW.ADATILE.COM), OR APPROVED EQUAL.
2. CAST IN PLACE CONCRETE SHALL MEET SPECIFICATIONS FOR MAINE D.O.T. CLASS A STRUCTURAL CONCRETE, MINIMUM COMPRESSIVE STRENGTH 4,000 PSI. THE CONCRETE SHALL BE SEALED PRIOR TO SETTING PANELS. THE EXPOSED CONCRETE BORDER SHALL RECEIVE A GROOVED EDGE BETWEEN THE PANEL AND CONCRETE, ALONG WITH A UNIFORM BROOM FINISH PERPENDICULAR TO THE FLOW OF PEDESTRIAN TRAFFIC.
3. TRUNCATED DOMES SHALL BE ALIGNED IN ROWS, PARALLEL AND PERPENDICULAR TO THE PREDOMINANT DIRECTION OF TRAVEL. TRUNCATED DOME BRICKS AND GRANITE PAVERS ARE NOT ALLOWED.
4. FOR ALL DETECTABLE WARNING PANELS (EXCEPT AS SPECIFIED IN FIGURE 1-7A AND TECHNICAL MANUAL SECTION 1.8.4.), FEDERAL YELLOW COLORED (#33536) PANELS SHALL BE USED. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION.
5. SIZE: THE DETECTABLE WARNING PANEL(S) SHALL EXTEND 24 INCHES MINIMUM IN THE DIRECTION OF TRAVEL AND THE FULL WIDTH OF THE CURB RAMP, LANDING, OR BLENDED TRANSITION TO THE STREET.
6. ORIENTATION: THE DETECTABLE WARNING PANEL SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS 6 INCHES MINIMUM AND 8 INCHES MAXIMUM FROM THE CURB LINE. THE PANEL SHALL BE ORIENTED TO THE DIRECTION OF TRAVEL AS IDENTIFIED BY THE POINT OF EGRESS.



SIDEWALK RAMP DETECTABLE WARNING PANEL

NOT TO SCALE

DATE:
 JUNE 3, 2010
 REVISED:
 MARCH 2, 2011
 JUNE 23, 2011

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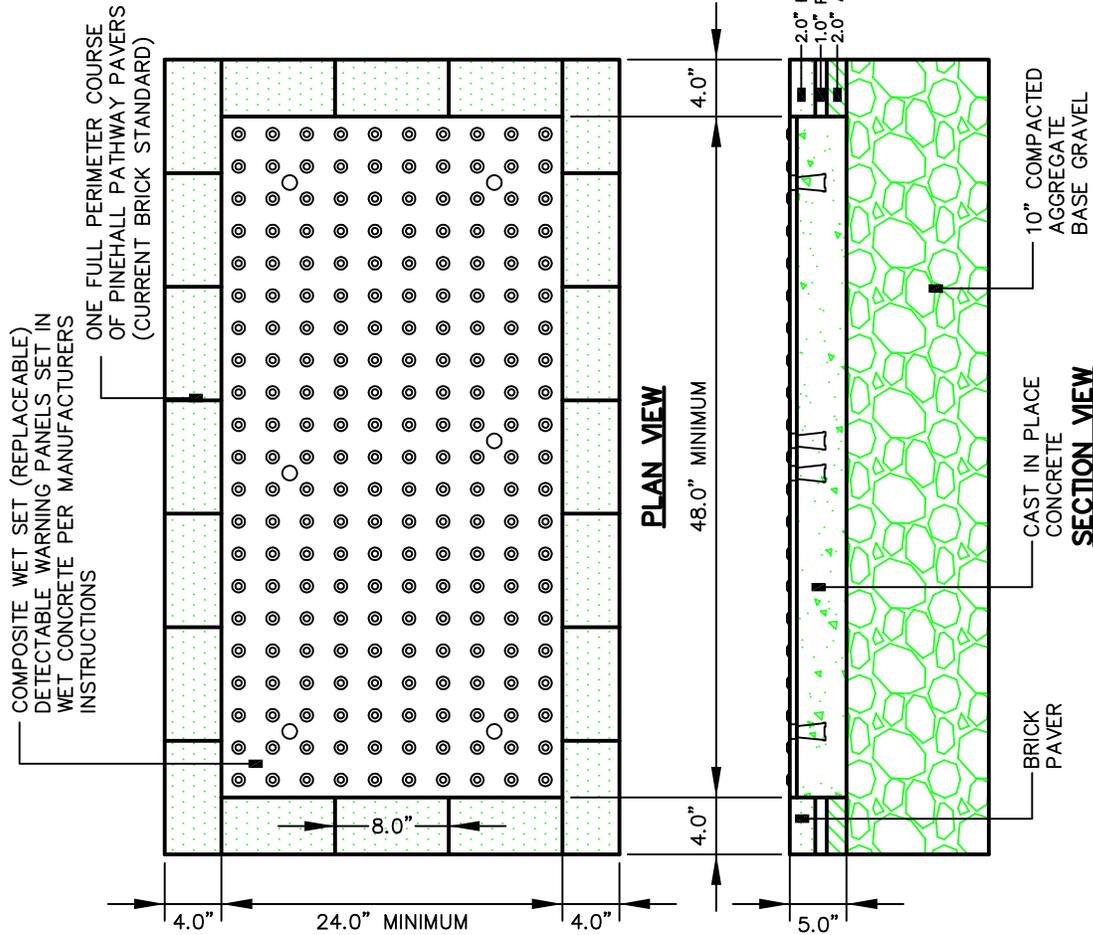
FIGURE:

SIDEWALK RAMP DETECTABLE WARNING PANEL

I-7

NOTES:

1. COMPOSITE WET SET (REPLACEABLE) DETECTABLE WARNING PANELS SHALL BE AS MANUFACTURED BY ADA SOLUTIONS, INC. (WWW.ADATILE.COM), OR APPROVED EQUAL.
2. CAST IN PLACE CONCRETE SHALL MEET SPECIFICATIONS FOR MAINE D.O.T. CLASS A STRUCTURAL CONCRETE, MINIMUM COMPRESSIVE STRENGTH 4,000 PSI. THE CONCRETE SHALL BE SEALED PRIOR TO SETTING PANELS.
3. TRUNCATED DOMES SHALL BE ALIGNED IN ROWS, PARALLEL AND PERPENDICULAR TO THE PREDOMINANT DIRECTION OF TRAVEL. NO OTHER DETECTABLE WARNING DESIGN OR CONFIGURATION IS ALLOWED.
4. FOR ALL DETECTABLE WARNING PANELS, WITHIN OR ABUTTING HISTORIC DISTRICTS AND HISTORIC LANDSCAPES, "DARK GRAY" COLORED (#36118) PANELS SHALL BE USED. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION.
5. THE DETECTABLE WARNING PANEL SHALL HAVE ONE FULL COURSE OF PINEHALL PATHWAY PAVERS (THE CURRENT BRICK STANDARD) AROUND THE FULL PERIMETER OF THE PANEL. THIS PERIMETER COURSE SHALL BE SET USING PORTLAND MORTAR CEMENT TO CREATE A FLUSH SURFACE BETWEEN THE BRICK AND THE PANEL.
6. SIZE: THE DETECTABLE WARNING PANEL(S) SHALL EXTEND 24 INCHES MINIMUM IN THE DIRECTION OF TRAVEL AND THE FULL WIDTH OF THE CURB RAMP, LANDING, OR BLENDED TRANSITION TO THE STREET.
7. ORIENTATION: THE DETECTABLE WARNING PANEL SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS 6 INCHES MINIMUM AND 8 INCHES MAXIMUM FROM THE CURB LINE. THE PANEL SHALL BE ORIENTED TO THE DIRECTION OF TRAVEL AS IDENTIFIED BY THE POINT OF EGRESS.



SIDEWALK RAMP DETECTABLE WARNING PANEL (HISTORIC DISTRICTS AND LANDSCAPES)

NOT TO SCALE

DATE:
 JUNE 23, 2011
 REVISED:

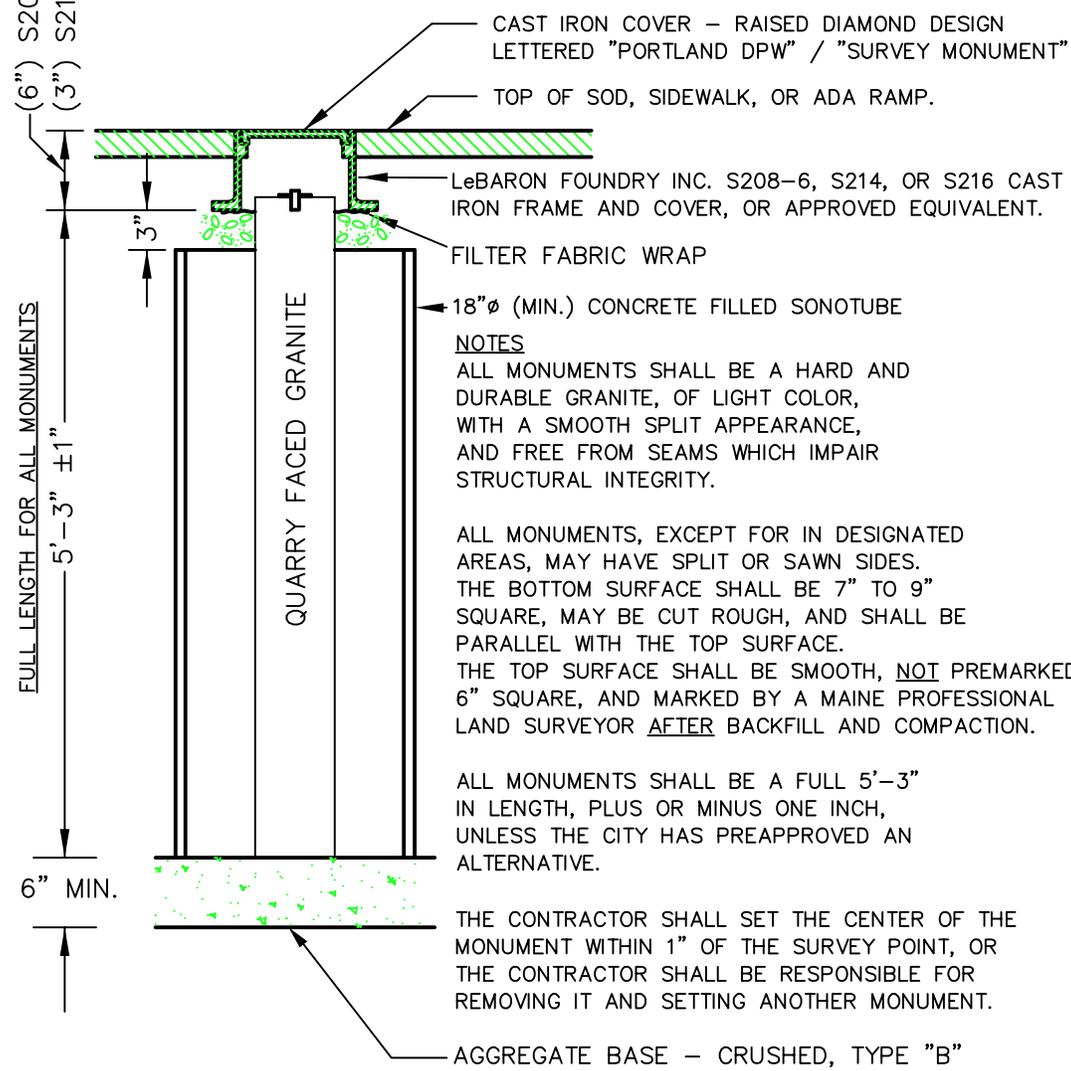
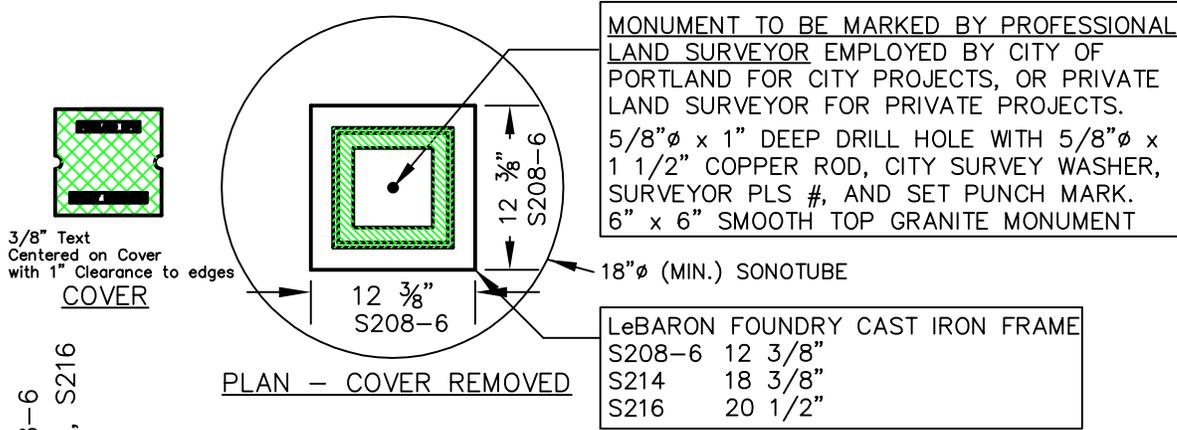
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FIGURE:

**SIDEWALK RAMP DETECTABLE WARNING PANEL
 (HISTORIC DISTRICTS AND LANDSCAPES)**

I-7A



GRANITE STREET MONUMENT
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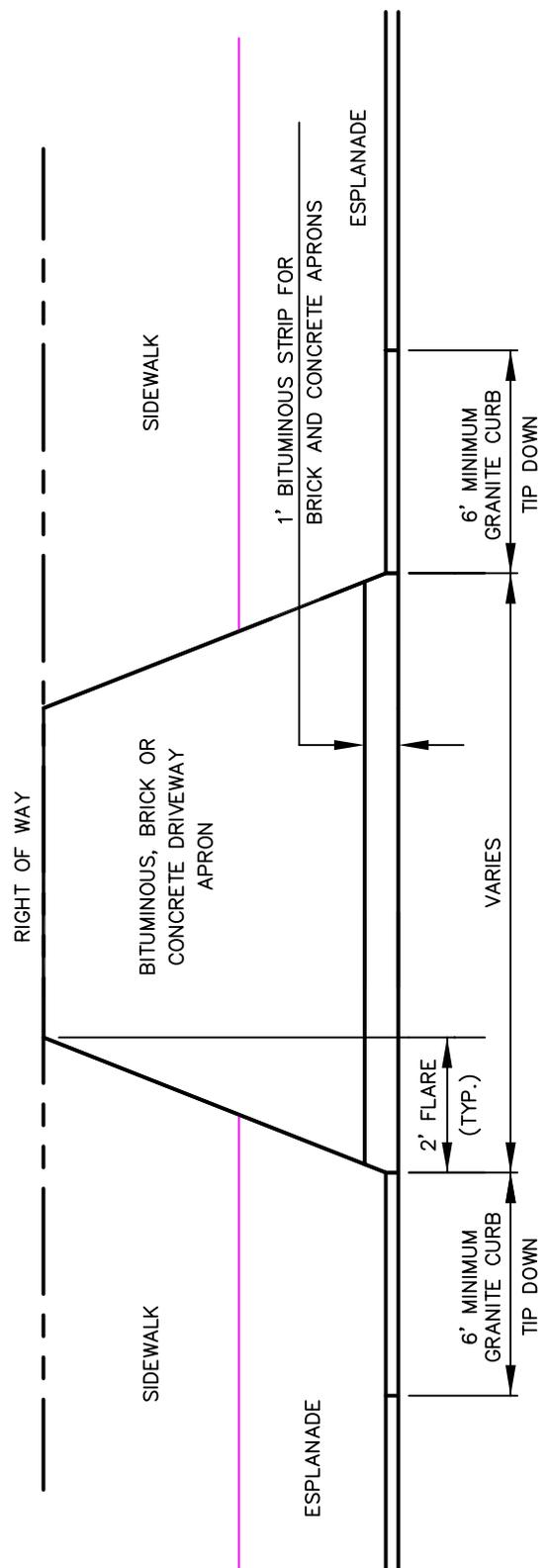
**TRANSPORTATION SYSTEMS
 AND STREET DESIGN**
 SECTION I

FIGURE:

GRANITE STREET MONUMENT

I-8

NOTE:
 MATCH GRADE OF EXISTING DRIVEWAY
 AT R. O. W. LINE, EXCEPT WHEN
 DIRECTED OTHERWISE BY CITY ENGINEER.



DRIVEWAY APRON LAYOUT
 NOT TO SCALE

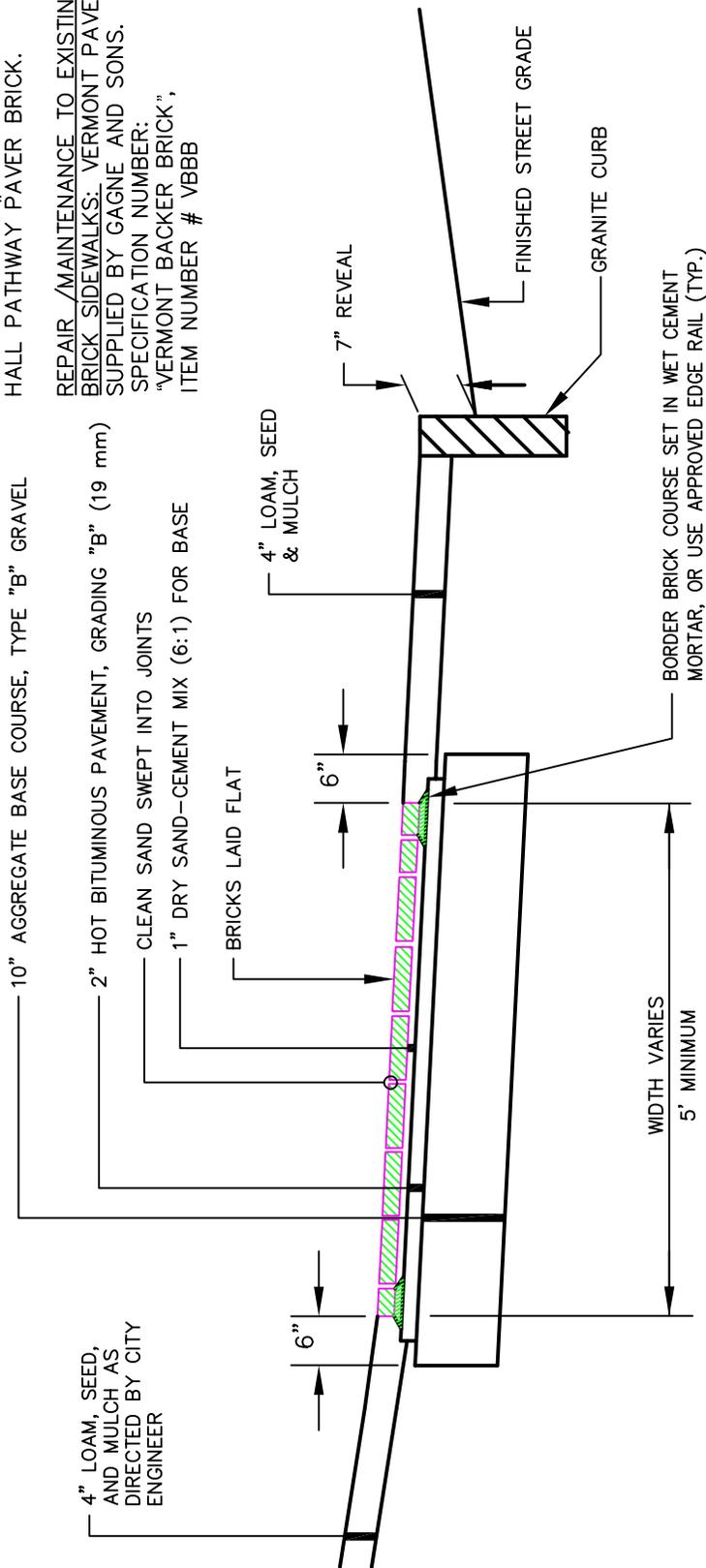
DATE: AUGUST 2009 REVISED:	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	TRANSPORTATION SYSTEMS AND STREET DESIGN SECTION I	FIGURE:
DRIVEWAY APRON LAYOUT			I-9

BRICKS TO BE USED:

NEW CONSTRUCTION:

4"x8" PINE HALL PATHWAY PAVER BRICK; MFG. BY PINE HALL BRICK CO., MADISON, NORTH CAROLINA. LACHANCE ITEM # 193623, PINE HALL PATHWAY PAVER BRICK.

REPAIR / MAINTENANCE TO EXISTING BRICK SIDEWALKS: VERMONT PAVER; SUPPLIED BY GAGNE AND SONS. SPECIFICATION NUMBER: "VERMONT BACKER BRICK", ITEM NUMBER # VBBB



BRICK SIDEWALK WITH BITUMINOUS BASE

NOT TO SCALE

DATE:
AUGUST 2009

REVISED:

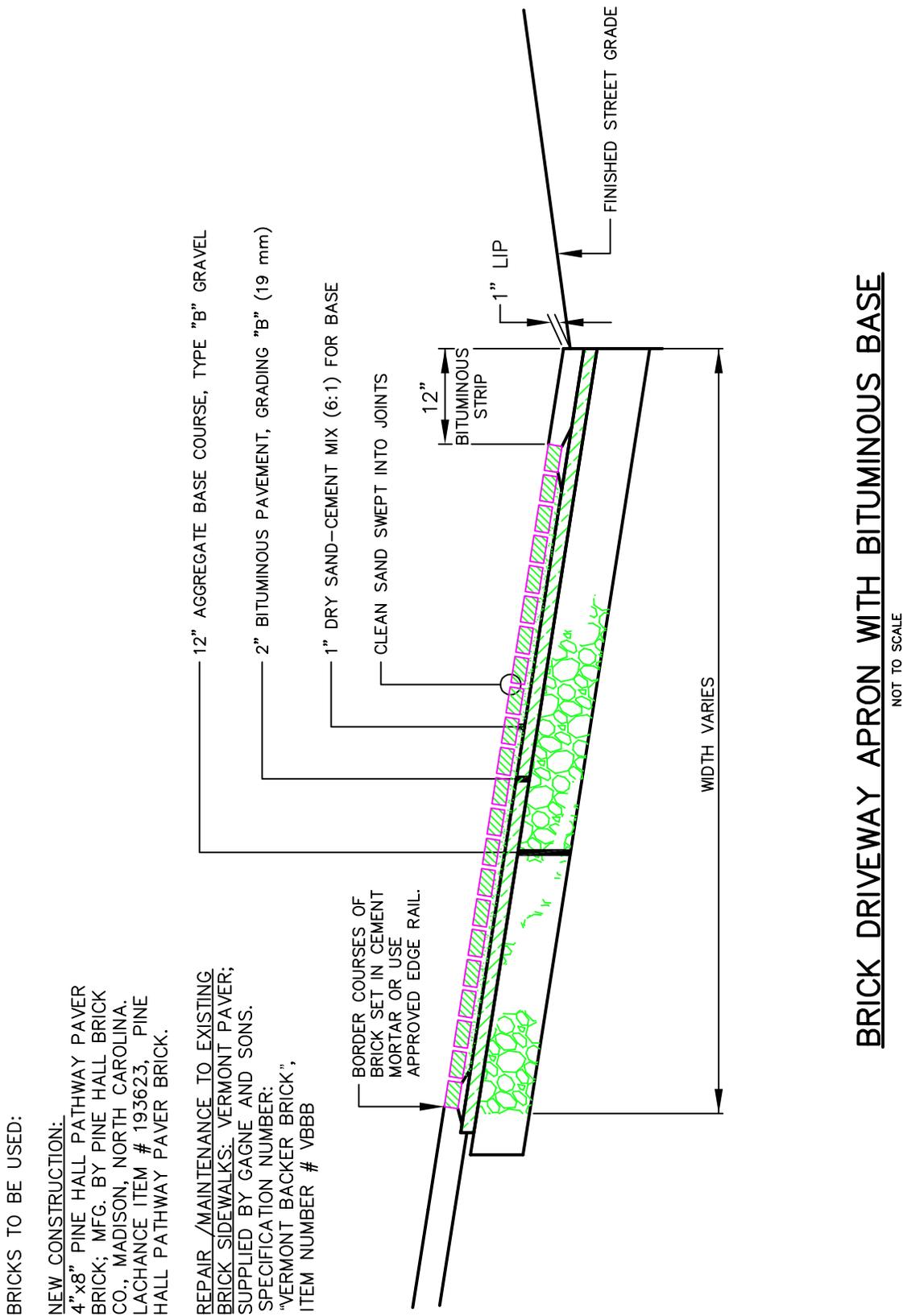
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FIGURE:

BRICK SIDEWALK WITH BITUMINOUS BASE

I-10



DATE:
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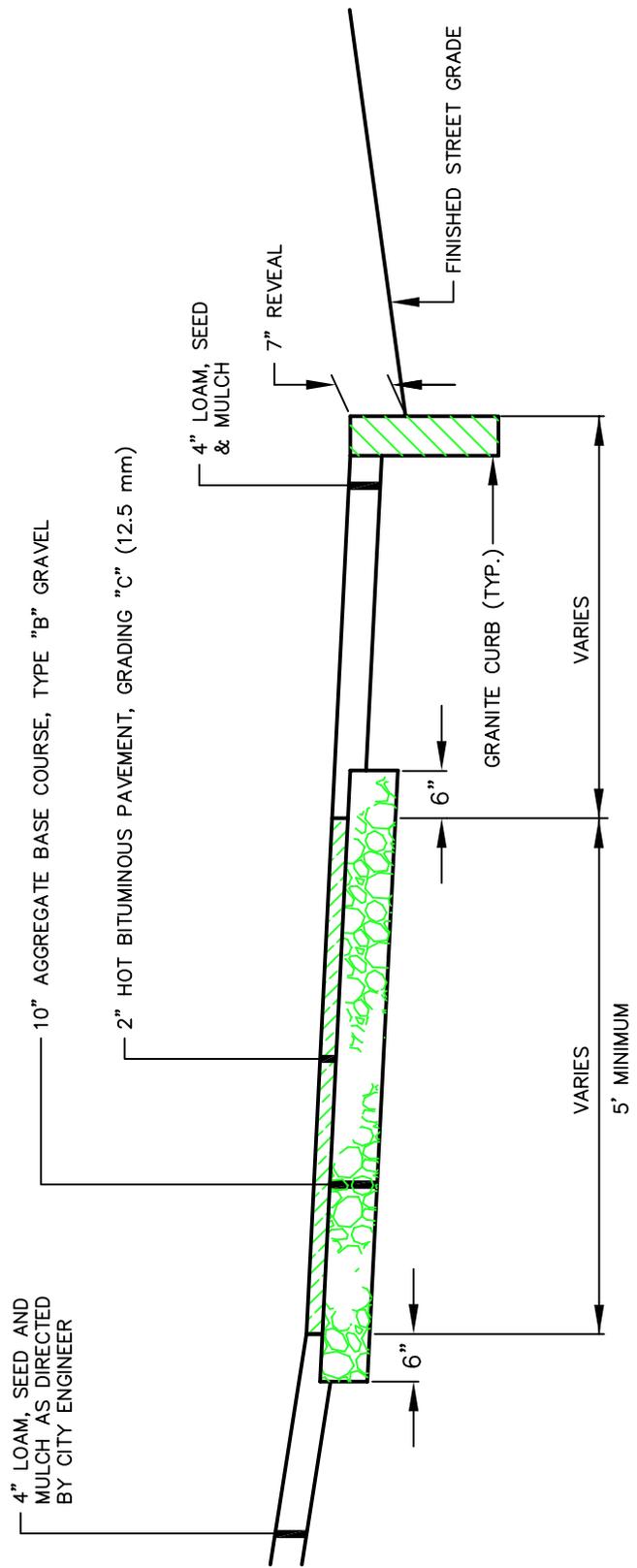
CITY OF PORTLAND, MAINE
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**TRANSPORTATION SYSTEMS
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 SECTION I

FIGURE:

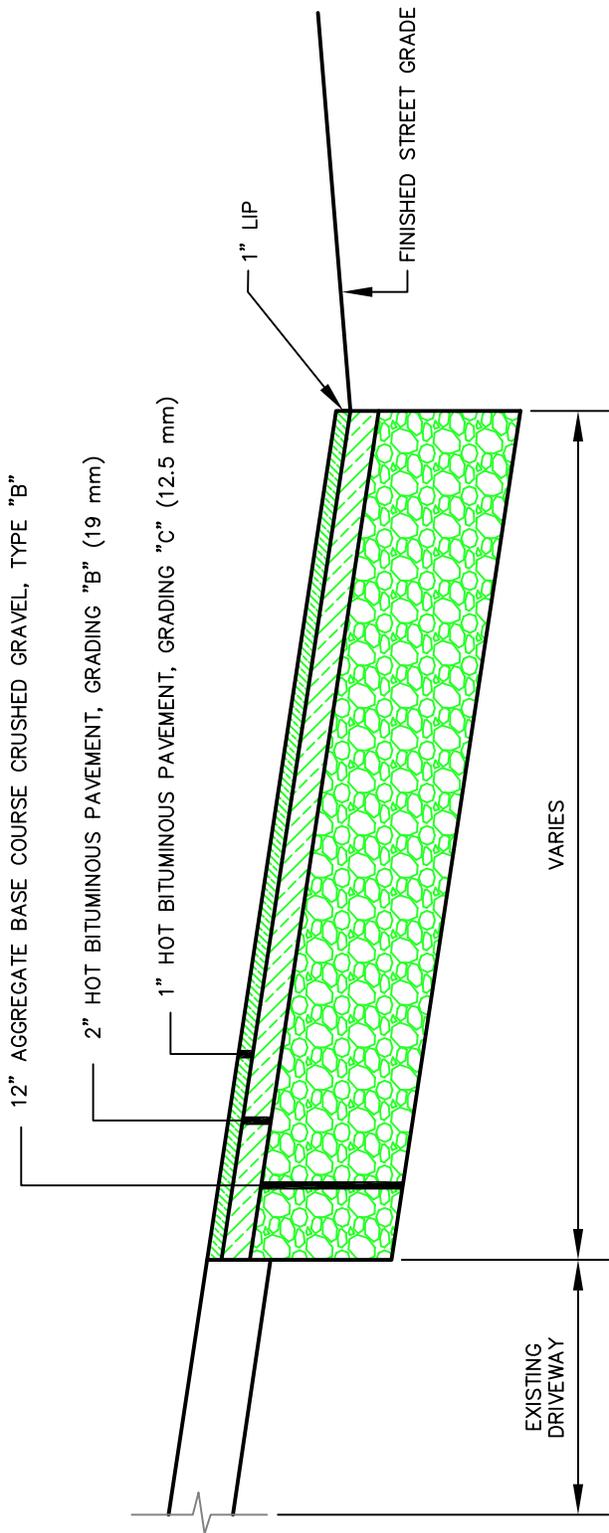
**BRICK DRIVEWAY APRON
 WITH BITUMINOUS BASE**

I-11



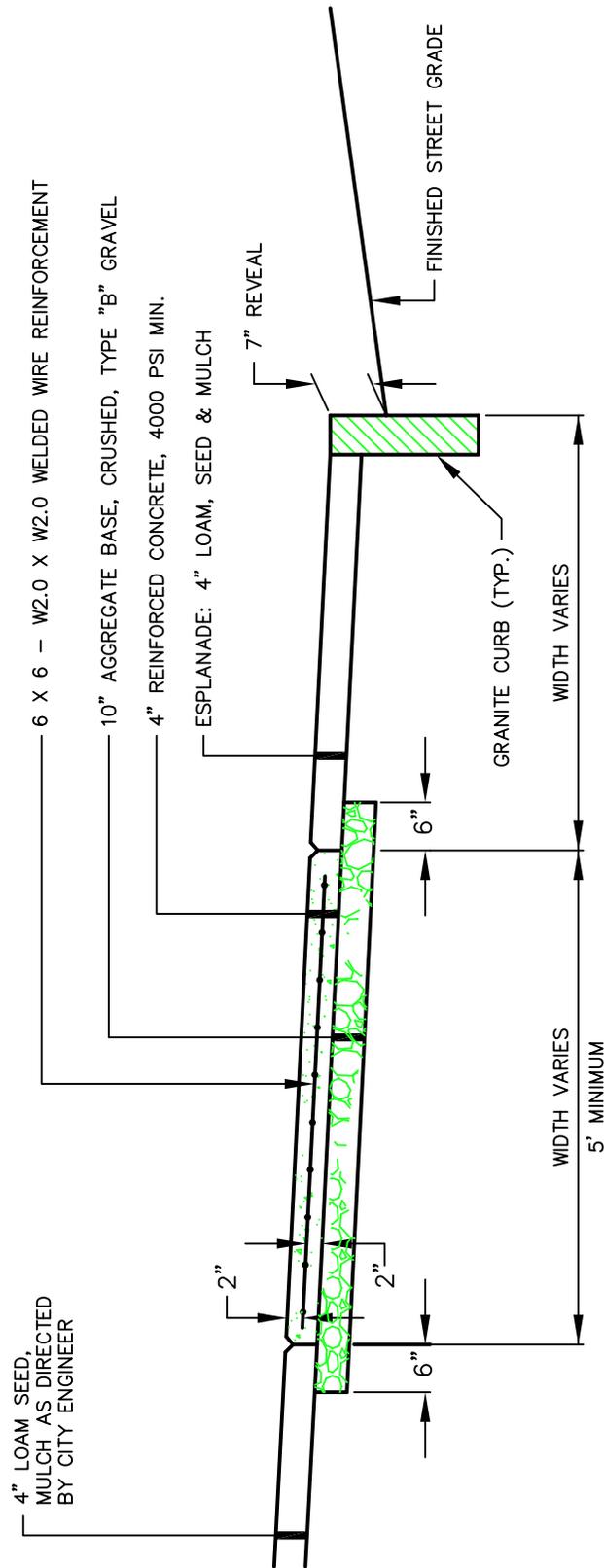
BITUMINOUS SIDEWALK
 NOT TO SCALE

DATE: AUGUST 2009 REVISED:	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	TRANSPORTATION SYSTEMS AND STREET DESIGN SECTION I	FIGURE:
<p align="center">BITUMINOUS SIDEWALK</p>			<p align="center">I-12</p>



BITUMINOUS DRIVEWAY APRON
 NOT TO SCALE

DATE: AUGUST 2009 REVISED:	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	TRANSPORTATION SYSTEMS AND STREET DESIGN SECTION I	FIGURE:
<p align="center">BITUMINOUS DRIVEWAY APRON</p>			<p align="center">I-13</p>



REINFORCED CONCRETE SIDEWALK

NOT TO SCALE

DATE:
AUGUST 2009

REVISED:

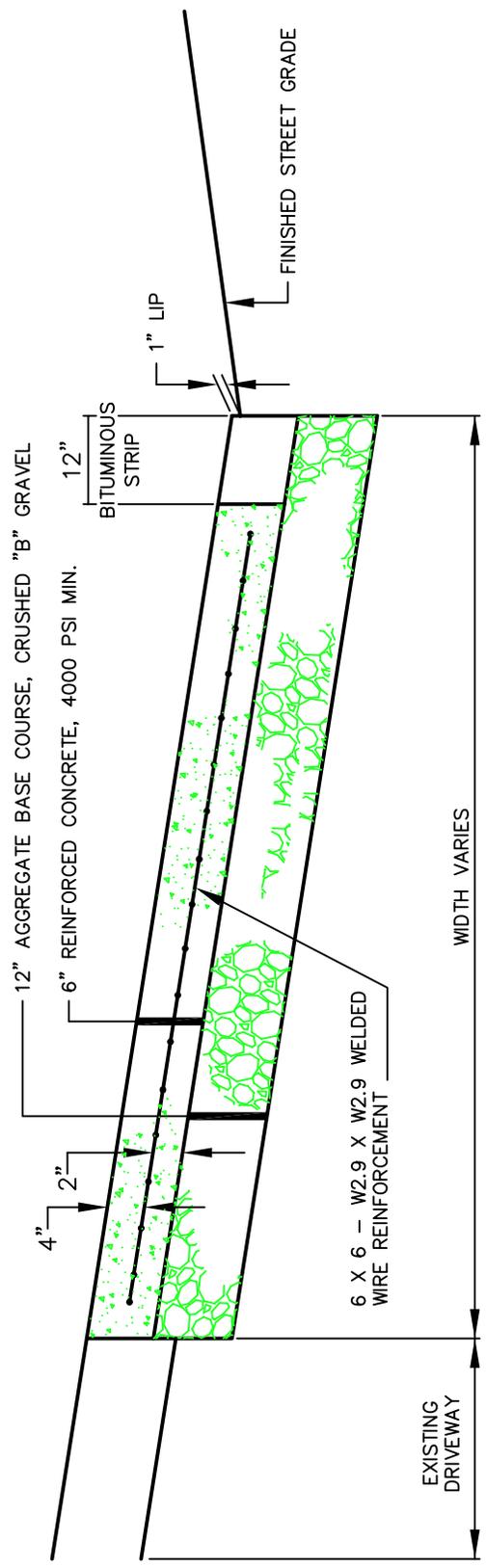
CITY OF PORTLAND, MAINE
 TECHNICAL STANDARDS MANUAL

**TRANSPORTATION SYSTEMS
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 SECTION I

FIGURE:

REINFORCED CONCRETE SIDEWALK

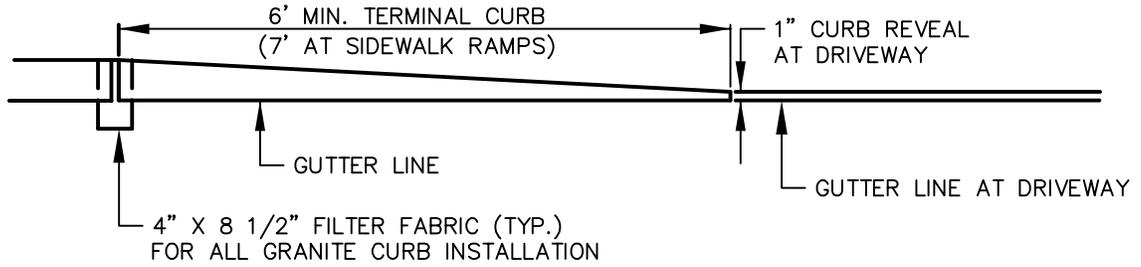
I-14



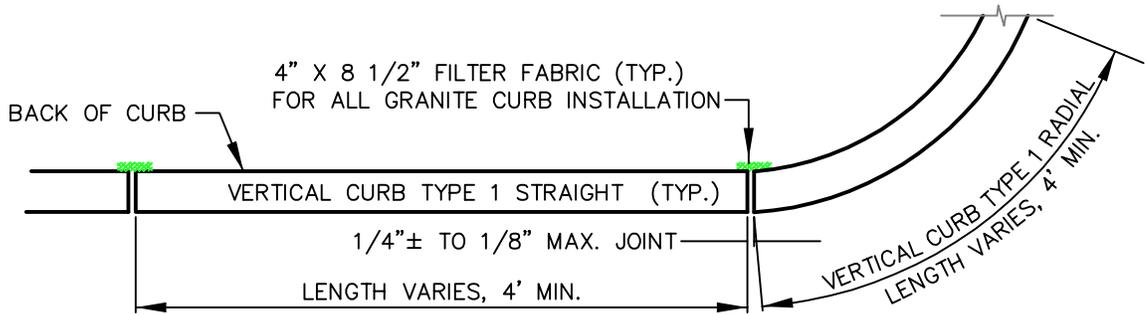
REINFORCED CONCRETE DRIVEWAY APRON

NOT TO SCALE

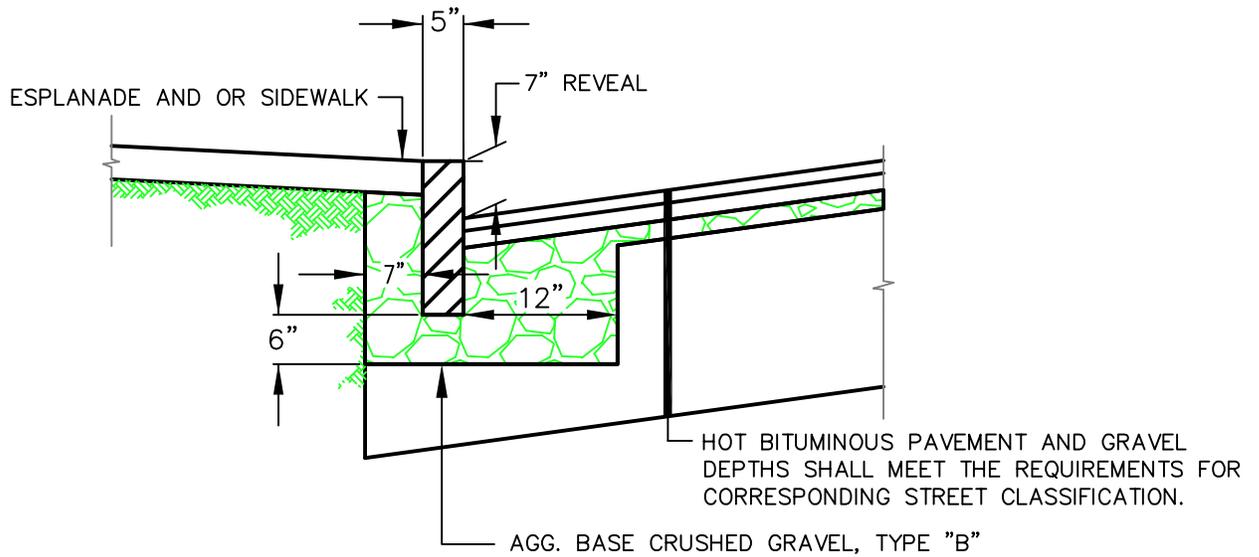
DATE: AUGUST 2009 REVISED:	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	TRANSPORTATION SYSTEMS AND STREET DESIGN SECTION I	FIGURE:
REINFORCED CONCRETE DRIVEWAY APRON			I-15



TERMINAL CURB PROFILE



VERTICAL GRANITE CURB PLAN VIEW



VERTICAL GRANITE CURB CROSS SECTION

VERTICAL GRANITE CURB
FULL DEPTH STREET CONSTRUCTION

NOT TO SCALE

DATE:
AUGUST 2009

REVISED:

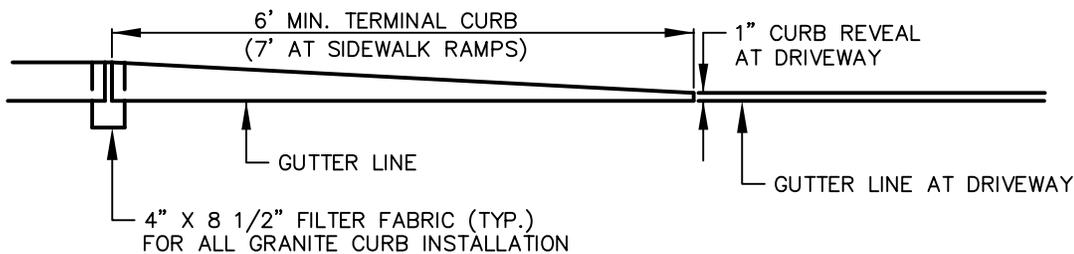
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**TRANSPORTATION SYSTEMS
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 SECTION I

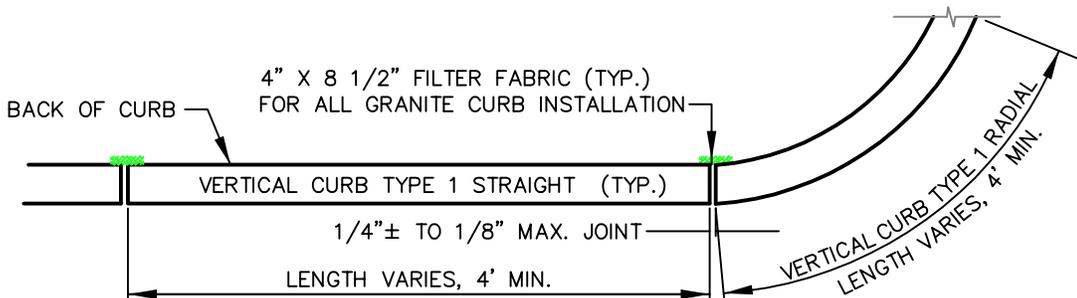
FIGURE:

VERTICAL GRANITE CURB
FULL DEPTH STREET CONSTRUCTION

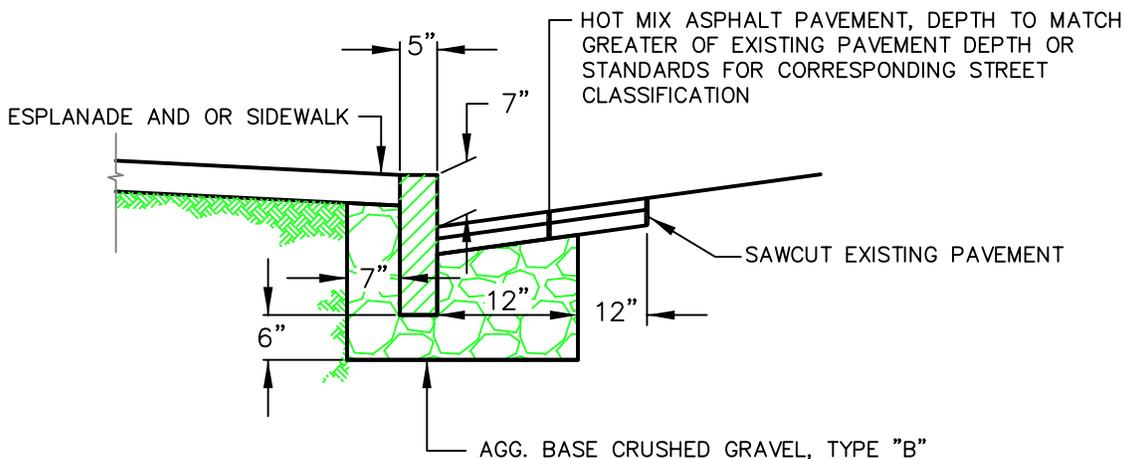
I-16
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TERMINAL CURB PROFILE



VERTICAL GRANITE CURB PLAN VIEW



VERTICAL GRANITE CURB CROSS SECTION

**VERTICAL GRANITE CURB
 INSTALLATION IN EXISTING STREETS**

NOT TO SCALE

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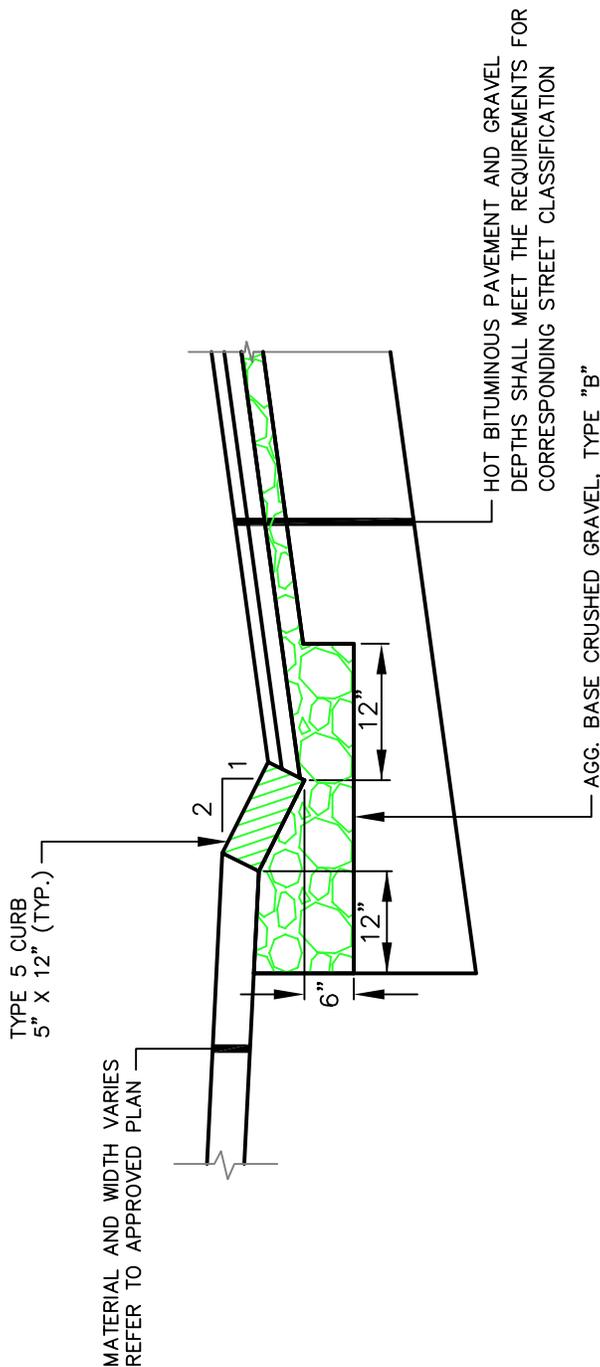
**TRANSPORTATION SYSTEMS
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FIGURE:

**VERTICAL GRANITE CURB
 INSTALLATION IN EXISTING STREETS**

I-17

NOTE:
 INDIVIDUAL PIECES OF CURB SHORTER THAN 4 L.F. ARE
 NOT ALLOWED, WITH THE EXCEPTION OF RADIAL CURB.



SLOPED GRANITE CURB – FULL DEPTH STREET CONSTRUCTION

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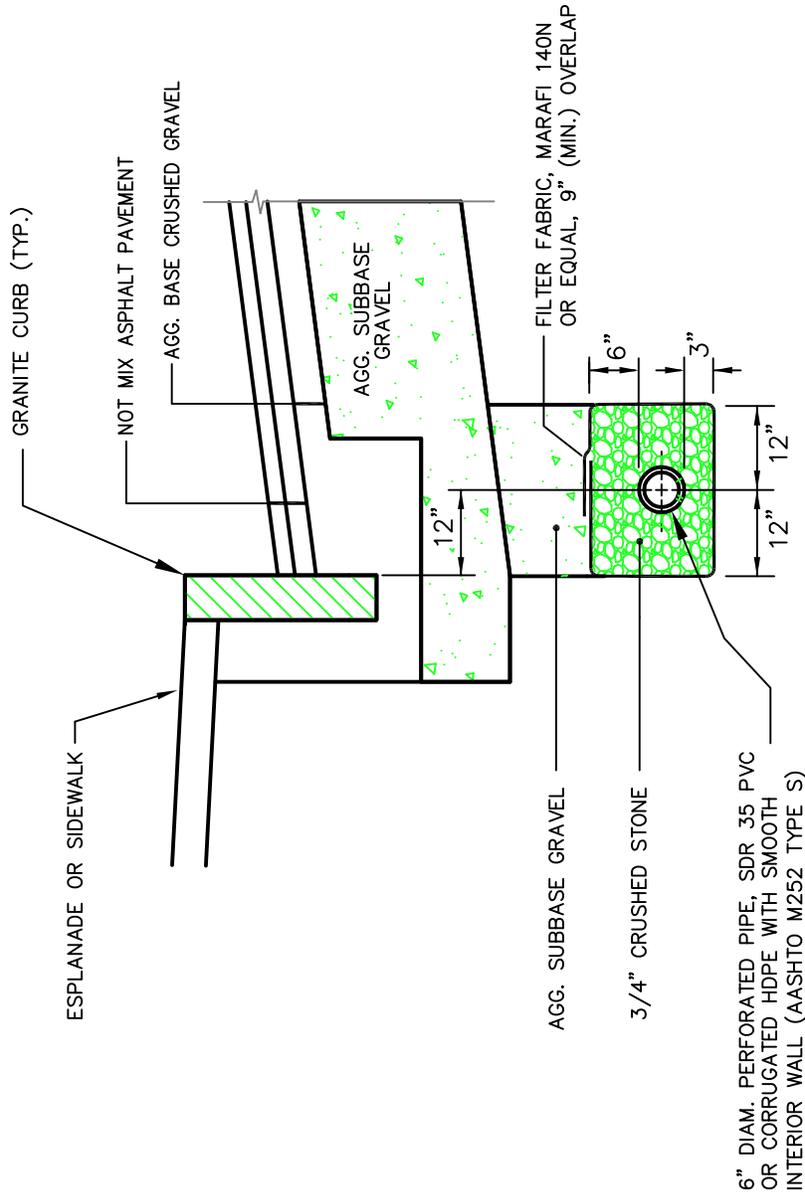
**TRANSPORTATION SYSTEMS
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FIGURE:

**SLOPED GRANITE CURB
 FULL DEPTH STREET CONSTRUCTION**

I-18

- NOTES
1. UNDERDRAIN PIPE INVERT ELEVATIONS SHALL BE AT LEAST 42 INCHES BELOW GUTTER GRADES.
 2. PERFORATIONS IN UNDERDRAIN PIPE SHALL BE ORIENTED DOWN.



TYPE "B" UNDERDRAIN INSTALLATION DETAIL – ALTERNATIVE "A"

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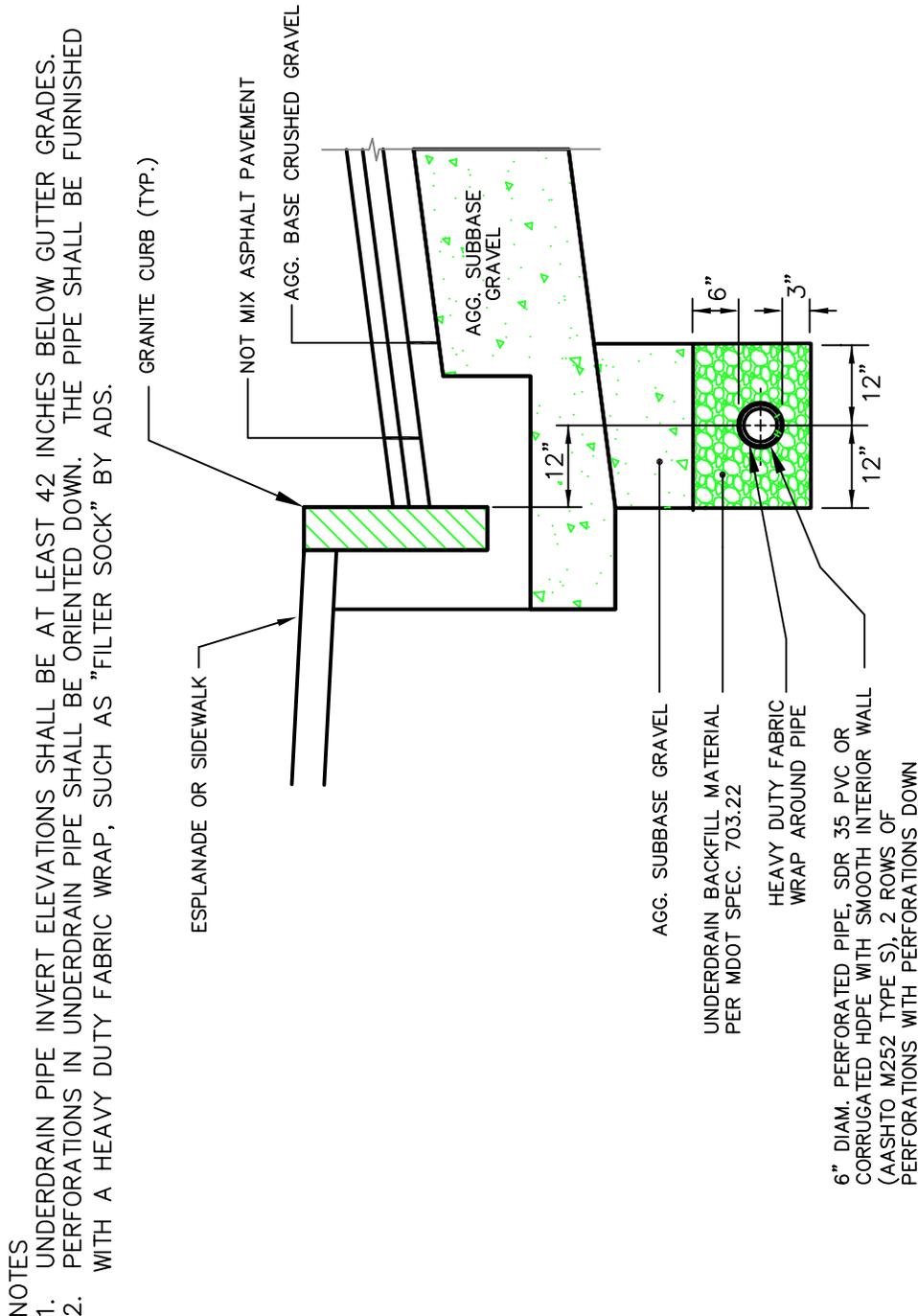
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FIGURE:

**UNDERDRAIN INSTALLATION
 ALTERNATIVE A**

I-20



UNDERDRAIN INSTALLATION -- ALTERNATIVE "B"

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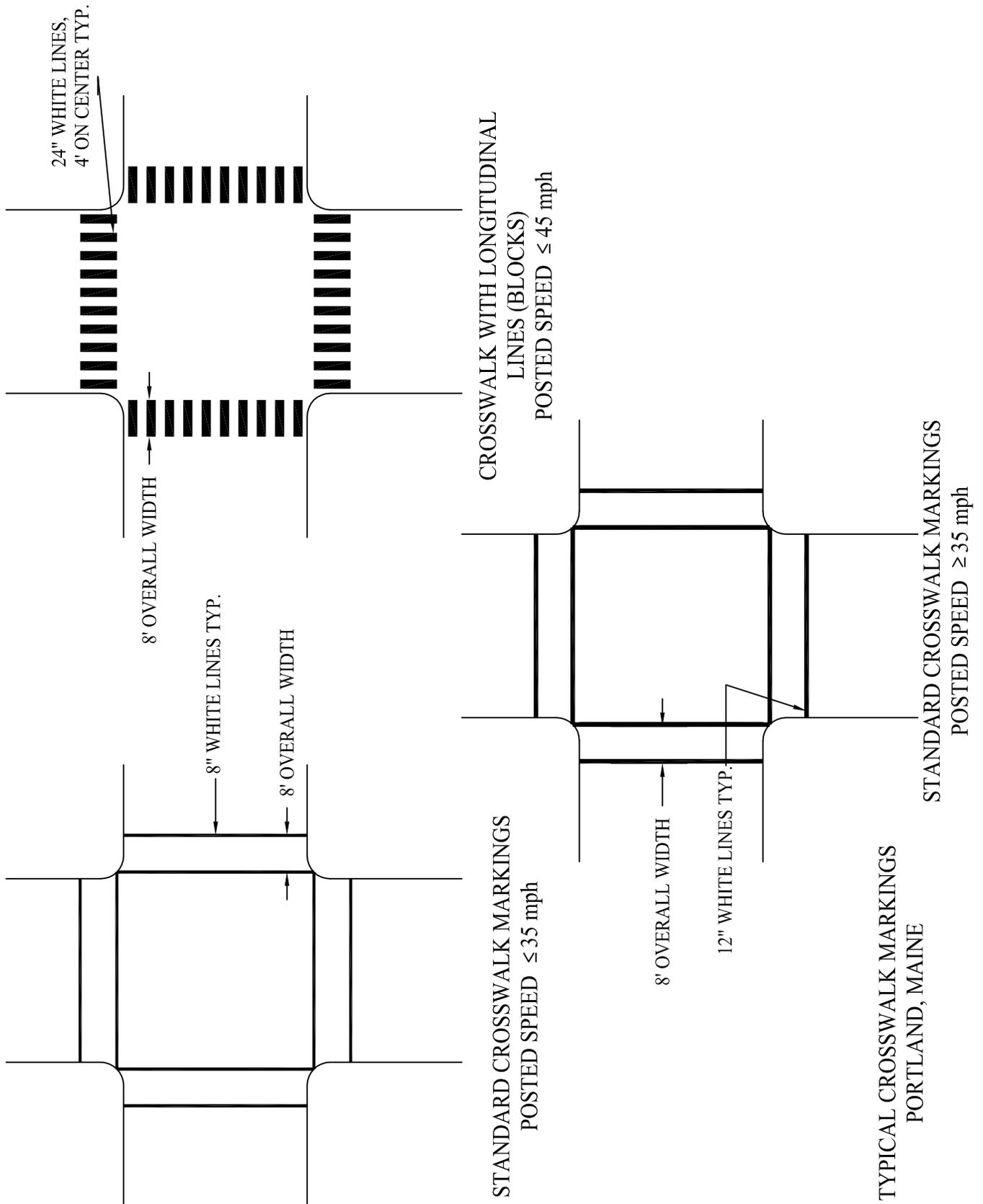
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FIGURE:

**UNDERDRAIN INSTALLATION
 ALTERNATIVE B**

I-21



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FIGURE:
 I-22

TYPICAL CROSSWALK MARKINGS



R1-5



R1-5a



R1-6

Unsignalized Pedestrian Crosswalk Signage

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FIGURE:

UNSIGNALIZED PEDESTRIAN CROSSWALK SIGNAGE

I-23

School Advance
Warning Assembly



S1-1



W16-9p

OR



W16-2a

OR



W16-2

School Crosswalk
Warning Assembly



S1-1



W16-7p



W11-2

PEDESTRIAN CROSSING
SIGN

SCHOOL AREA CROSSING
SIGNS

Typical Crosswalk Signage

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FIGURE:

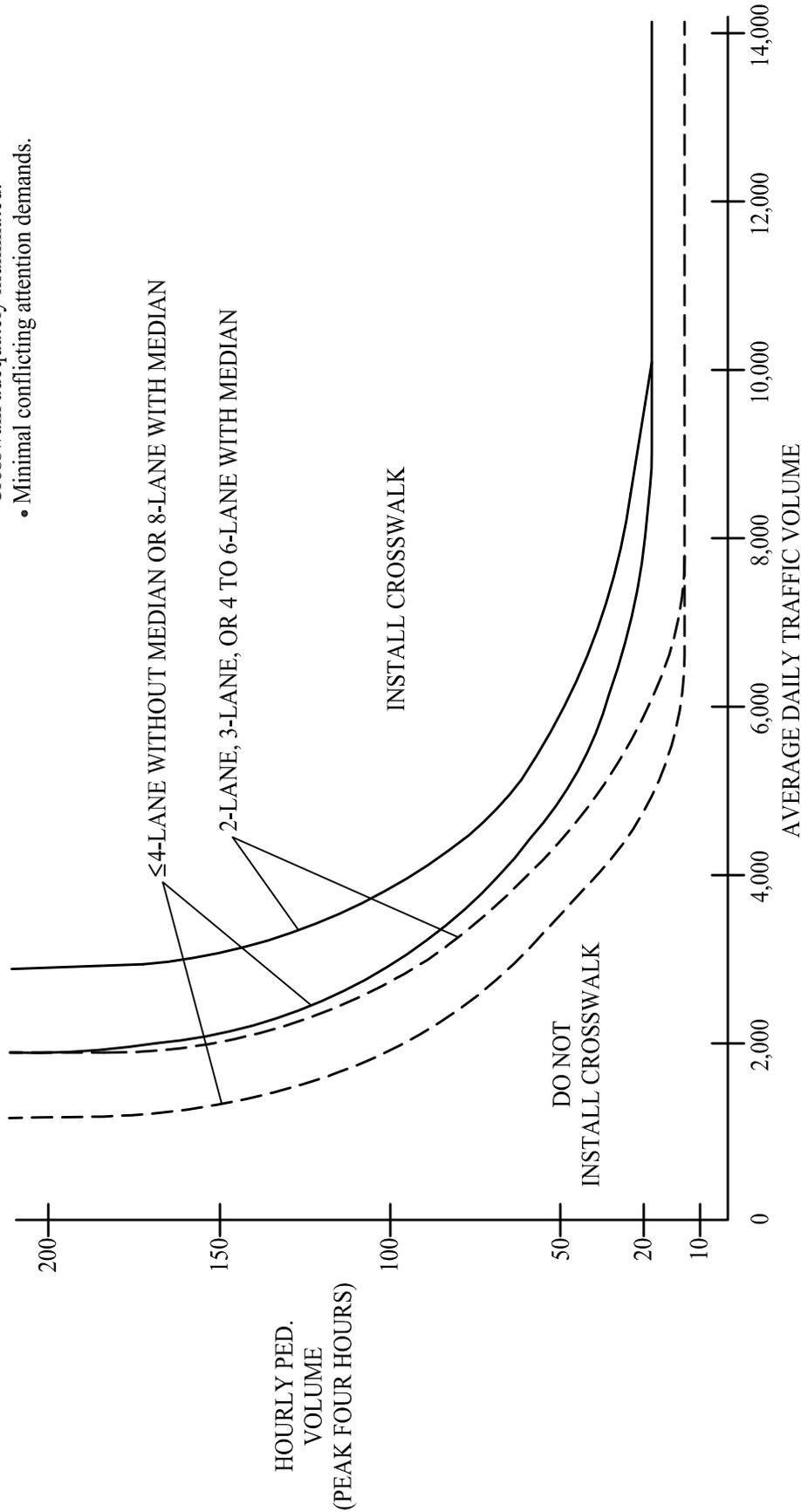
I-24

TYPICAL CROSSWALK SIGNAGE

BASIC CRITERIA

- Speed limit ≤ 45 mi/h.
- Adequate stopping sight distance.
- For midblock, preferred block length $\geq 600'$.
- Crosswalk adequately illuminated.
- Minimal conflicting attention demands.

- - - = Locations with predominately young, elderly or handicapped pedestrians.
- = Other locations



1. If using only the peak hour, threshold must be increased by 1.5.
2. For streets with median, use one-way (directional) ADT volume.

GUIDELINES FOR CROSSWALK INSTALLATION AT UNCONTROLLED INTERSECTIONS AND MID-BLOCK CROSSINGS.

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FIGURE:

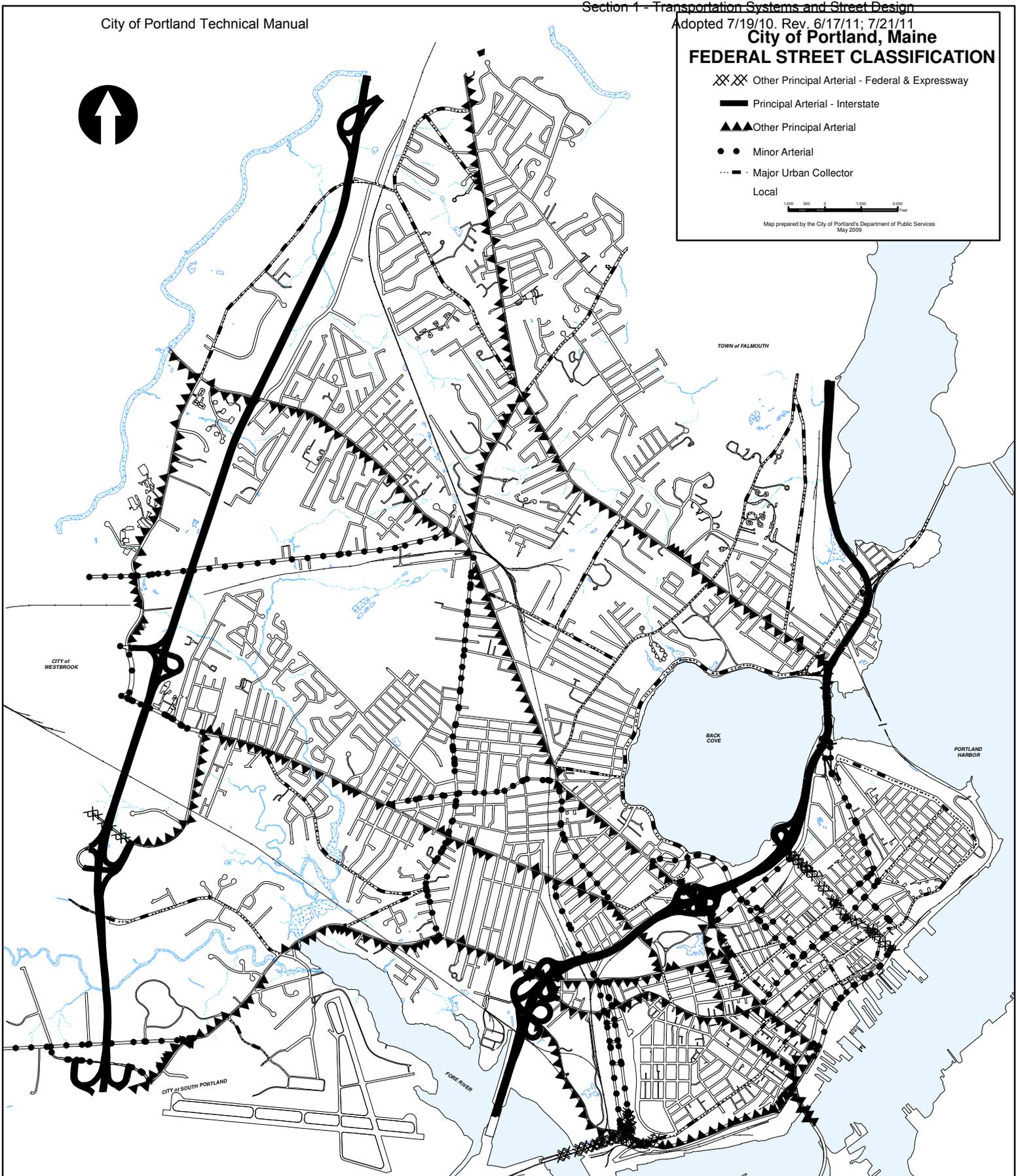
**GUIDELINES FOR CROSSWALK INSTALLATION AT
 UNCONTROLLED INTERSECTIONS AND
 MID-BLOCK CROSSINGS**

FEDERAL STREET CLASSIFICATION

- XX XX Other Principal Arterial - Federal & Expressway
- Principal Arterial - Interstate
- ▲▲▲ Other Principal Arterial
- ● Minor Arterial
- Major Urban Collector
- Local



Map prepared by the City of Portland's Department of Public Services
May 2009



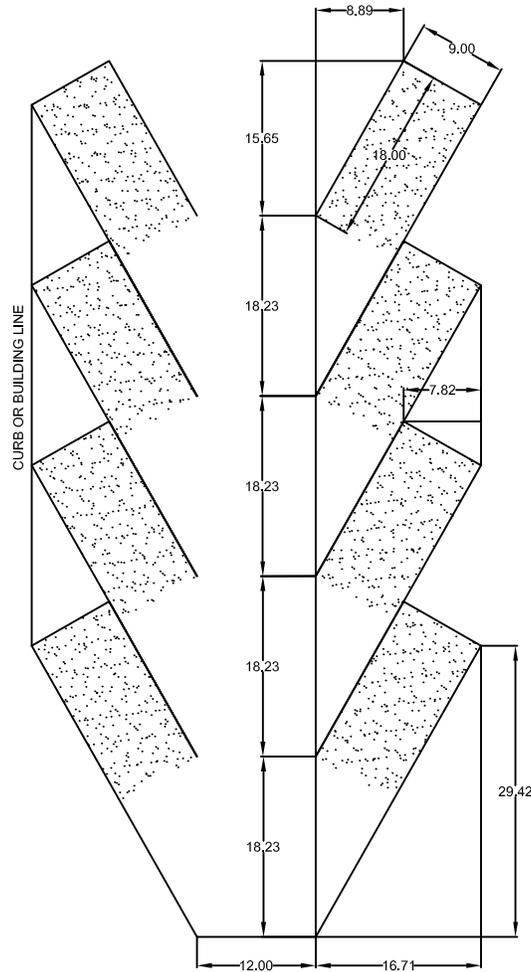
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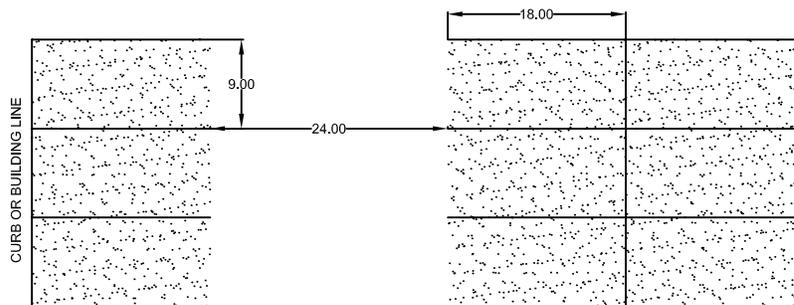
TRANSPORTATION SYSTEMS
AND STREET DESIGN
SECTION I

FIGURE:

FEDERAL STREET CLASSIFICATION



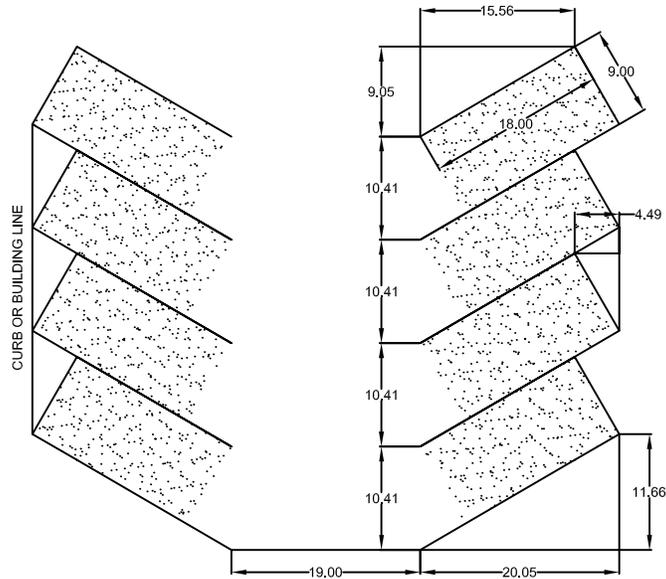
30° PARKING @ 9' x 18'



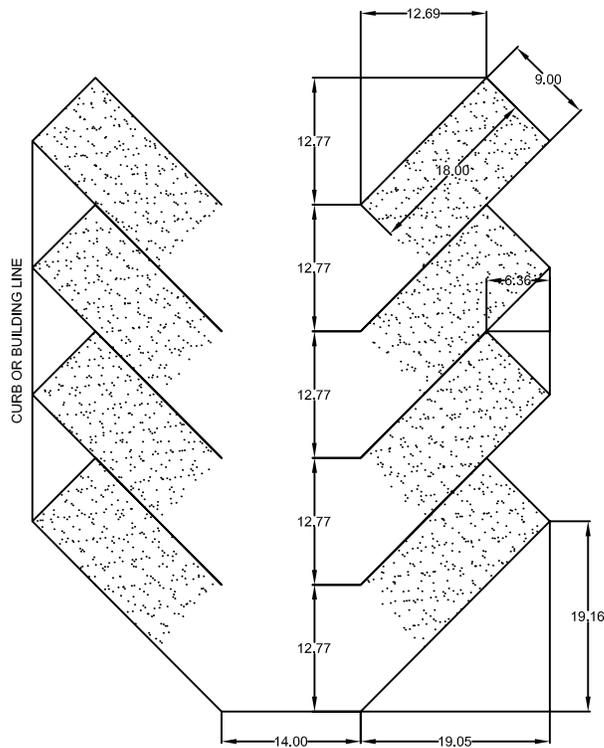
90° PARKING @ 9' x 18'

STANDARD PARKING SPACES

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REVISED:	STANDARD PARKING SPACES		I-27 60



60° PARKING @ 9' x 18'



45° PARKING @ 9' x 18'

STANDARD PARKING SPACES

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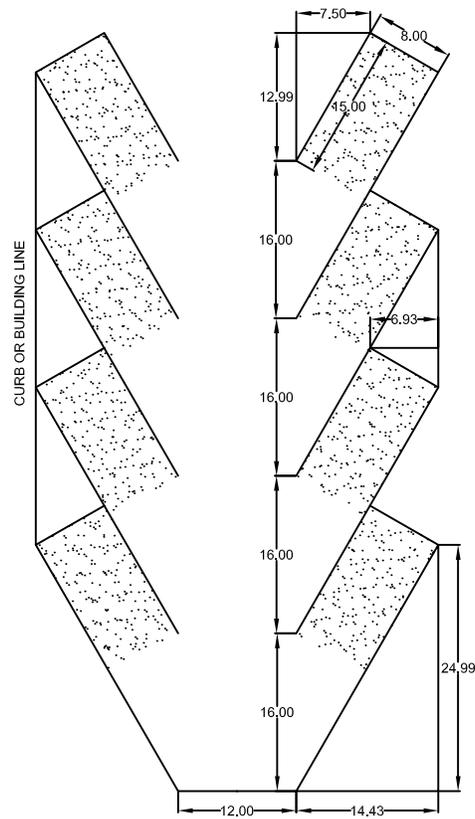
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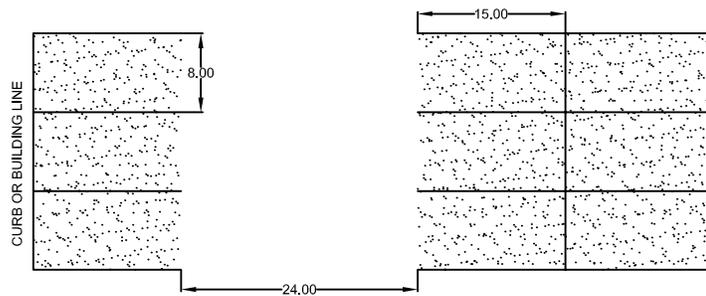
FIGURE:

STANDARD PARKING SPACES

I-28
 61



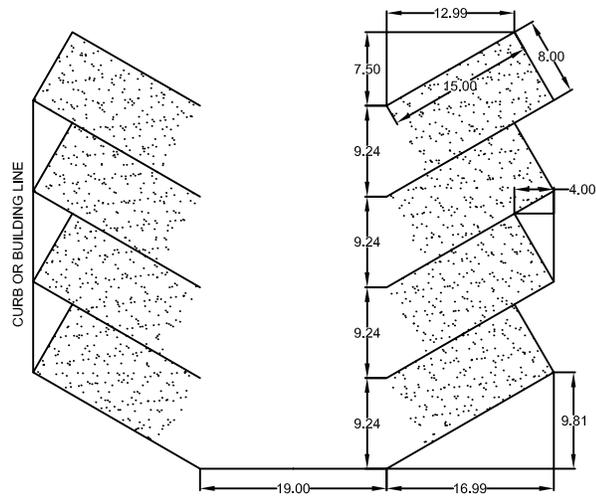
30° PARKING @ 8' x 15'



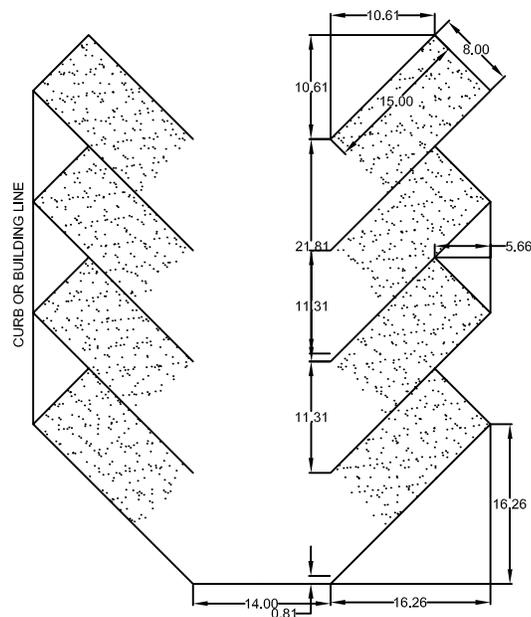
90° PARKING @ 8' x 15'

COMPACT PARKING SPACES

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COMPACT PARKING SPACES			I-29 62



60° PARKING @ 8' x 15'



45° PARKING @ 8' x 15'

COMPACT PARKING SPACES

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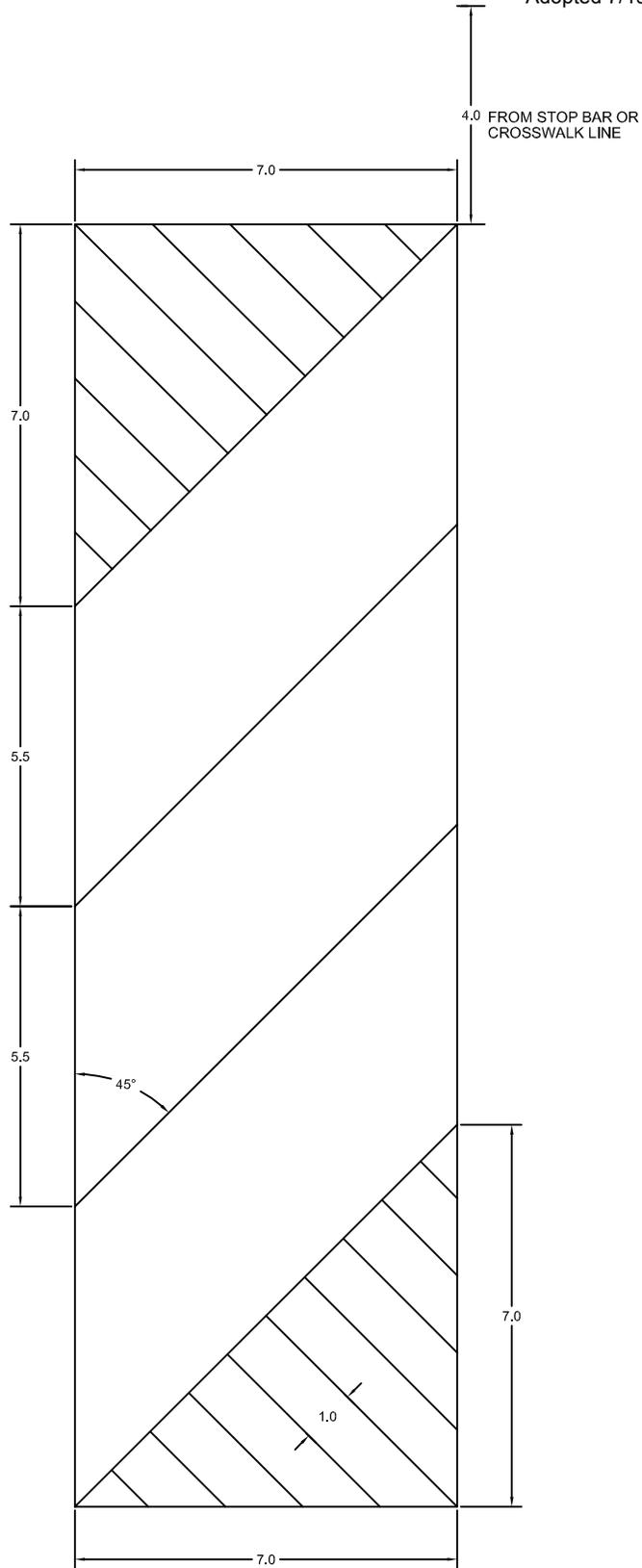
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FIGURE:

COMPACT PARKING SPACES

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MOTORCYCLE PARKING

*ALL PAVEMENT MARKINGS SHALL BE 4 INCH WIDE WHITE LINES.

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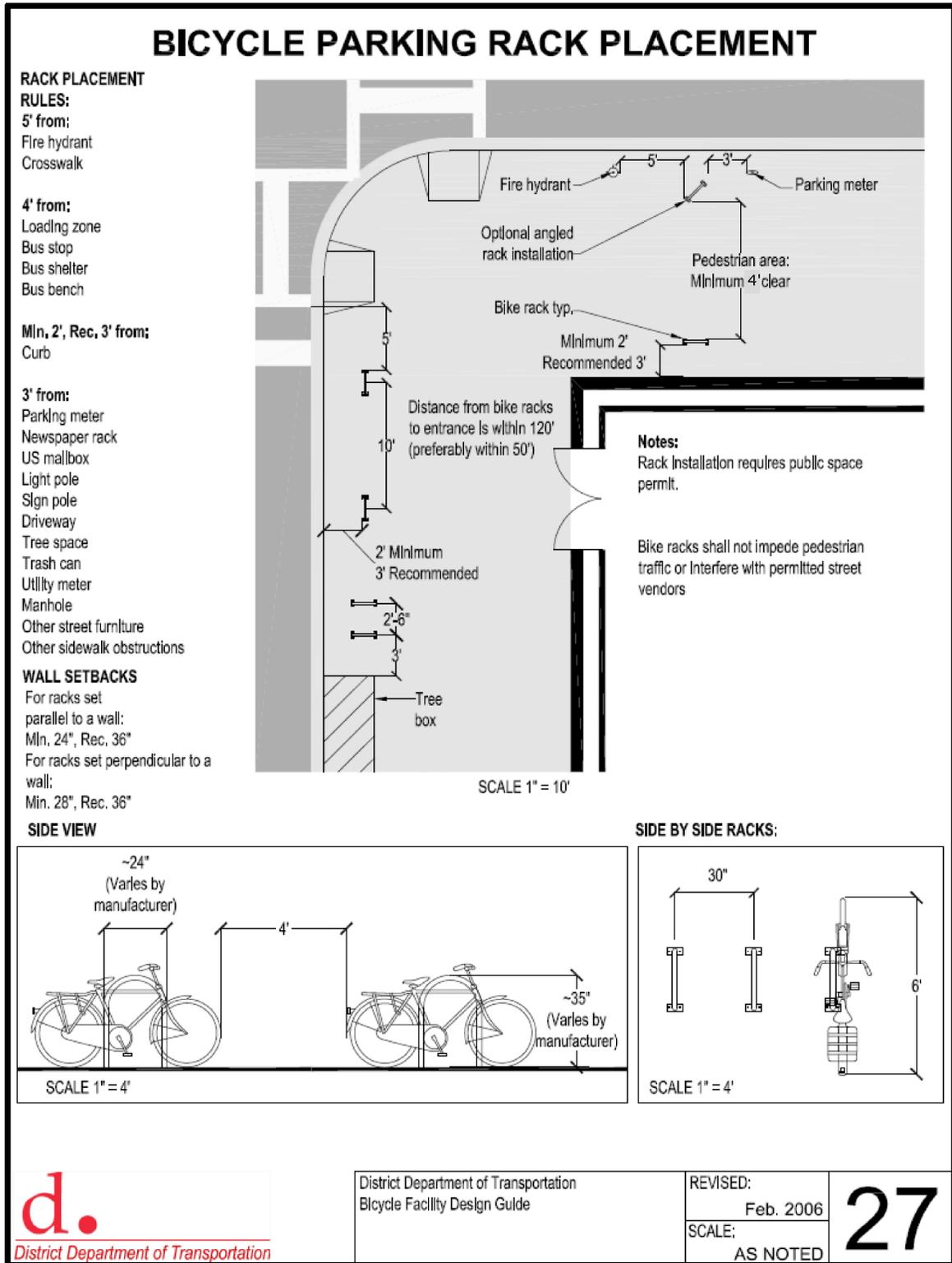
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FIGURE:

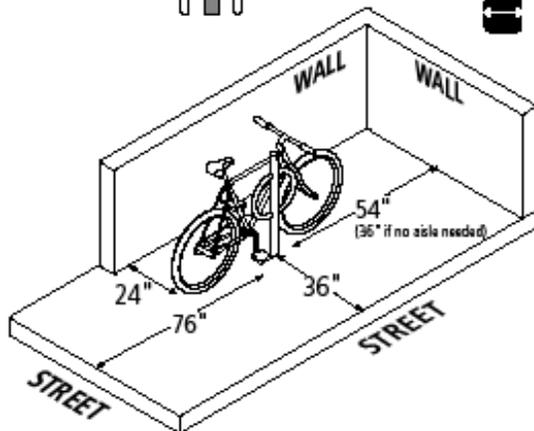
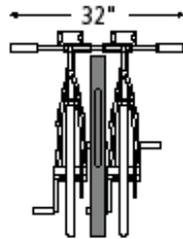
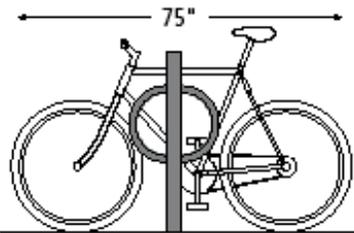
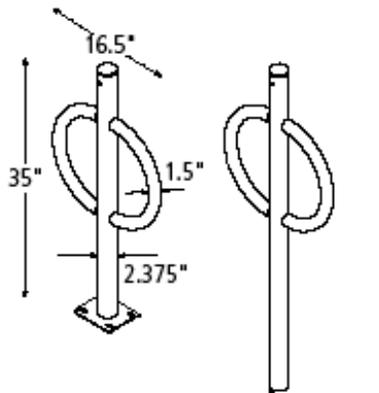
MOTORCYCLE PARKING

I-31



BIKE HITCH

Specifications and Space Use



Product Dero Bike Hitch
 As manufactured by Dero Bike Racks

Capacity 2 Bikes

Materials Centerbeam: 2" schedule 40 pipe (2.375" OD)
 Ring: 1.5" OD 11 gauge tube

Finishes An after fabrication hot dipped galvanized finish is standard. 250TGIC powder coat colors, a thermoplastic coating and a stainless steel option are also available.

Our powder coat finish assures a high level of adhesion and durability by following these steps:

1. Sandblast
2. Iron phosphate pretreatment
3. Epoxy primer electrostatically applied
4. Final thick TGIC polyester powder coat

Stainless Steel: 304 grade stainless steel material finished in either a high polished shine or a satin finish.

A rubbery PVC Dip is also available

Installation Methods In-ground mount is embedded into concrete base. Surface mount has one 5" x 6" foot which is anchored to the ground with four anchors (Included with rack).

Space Use and Setbacks **Wall Setbacks:**
 For racks set parallel to a wall:
 Minimum: 12"
 Recommended: 24"

For racks set perpendicular to a wall:
 Minimum: 35" (centerline measurement)
 Recommended: 38" (54" if aisle is needed between bike and wall)

Distance Between Racks:
 Minimum: 24"
 Recommended: 38"

Street Setbacks:
 Minimum: 36"



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FIGURE:

BICYCLE RACK SPECIFICATION - BIKE HITCH

I-33a



BIKE HITCH

Installation Instructions - Surface Mount

Tools Needed for Installation

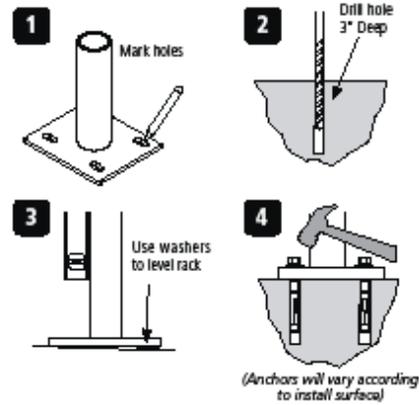
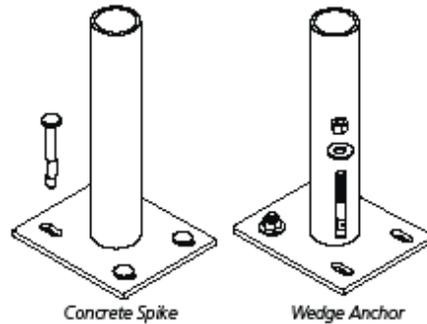
- Tape Measure
- Marker or Pencil
- Masonry Drill Bit
- Drill (Hammer drill recommended)
- Hammer
- Wrench 9/16"
- Level
- Washers (for leveling if necessary)

Recommended Base Materials:

Solid concrete is the best base material for installation. Ask your Dero Rack representative which anchor is appropriate for your application to ensure the proper anchors are shipped with your rack. Be sure nothing is underneath the base material that could be damaged by drilling.

Installation:

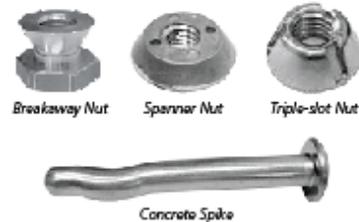
3/8" anchors are shipped with the rack. Place the rack in the desired location. Use a marker or pencil to outline the holes of the flange onto the base material. Drill the holes in accordance with the specifications shipped with the anchors. Make sure the holes are at least 6" away from any cracks in the base material.



Tamper Resistant Fasteners

The concrete spike is a permanent anchor. The top of the wedge anchor can also be pounded sideways after installation so that it cannot be removed. Other tamper resistant fasteners are also available for purchase.

When using the special tamper resistant nuts, always set and first tighten the anchors. Once the rack is installed, replace two nuts from the bracket (opposite sides from each other) with the tamper resistant fastener. DO NOT OVERTIGHTEN the tamper resistant nut.



If you have any questions about installation or other features of the Bike Rack, please call us toll free at 1-800-298-4915



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FIGURE:

BICYCLE RACK SPECIFICATION - BIKE HITCH

I-33b



BIKE HITCH

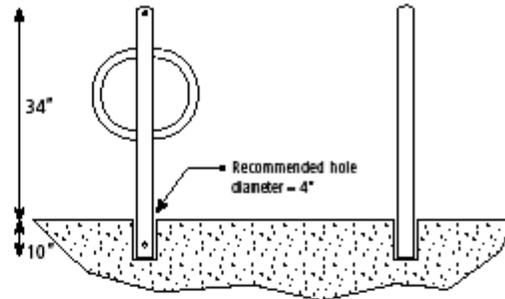
In-ground Installation Instructions

Tools needed for installation

- | | |
|-------------------|--|
| Level | Hole coring machine with 4" bit |
| Cement mixing tub | Access to water hose |
| Shovel | Materials to build brace (see "Install Tip" at bottom of page) |
| Trowel | |

Installing into Existing Sidewalk

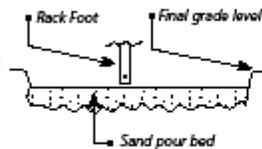
Core holes no less than 3" diameter (4" recommended) and no less than 6" deep into sidewalk. Place Bike Hitch into hole making sure the rack is level. Fill hole with Por-Rok or epoxy grout. 34-36" of the Bike Hitch should remain above the surface. Make sure Hitch is level and held in place until the grout has completely set.



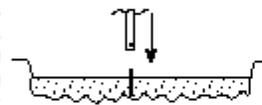
Installing into a New Sidewalk:

Stake Method:

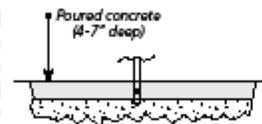
1 Use rack to measure exact location in pour bed.



2 Pound stake into pour bed where end of rack will sit. Slide rack end onto stake. You may need to dig the end of the rack into the sand to make sure the rack sits at least 35" above final grade level. The stake keeps the rack straight while the concrete is being poured.

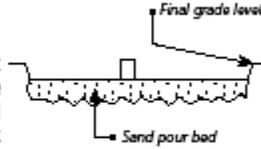


3 Make sure the rack is level and true. Pour concrete around the rack. Make sure the rack is not touched until the concrete has completely set.

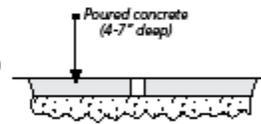


Sleeve Method:

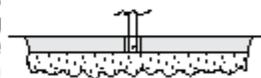
1 Place corrosion resistant sleeve (min. 3" inside diameter) in sand pour bed in exact location where rack will be installed. Make sure top of sleeve is at same level as desired finished concrete surface. Fill sleeve with sand to keep it in place and prevent it from filling with concrete.



2 Pour concrete and allow to cure.

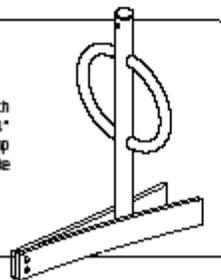


3 After appropriate cure time, dig out sand from sleeves and insert racks, making sure they are level and at the appropriate height. Pour in Por-Rok or epoxy grout and allow to set.

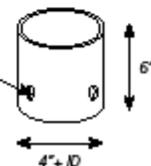


INSTALL TIP

An easy way to brace the Bike Hitch while the grout sets is to bolt two 1x4" boards together at one end and clamp them onto the legs of the Bike Hitch like a clothes pin.



Note: Sleeve should have profile to keep it from coming loose from hardened concrete.



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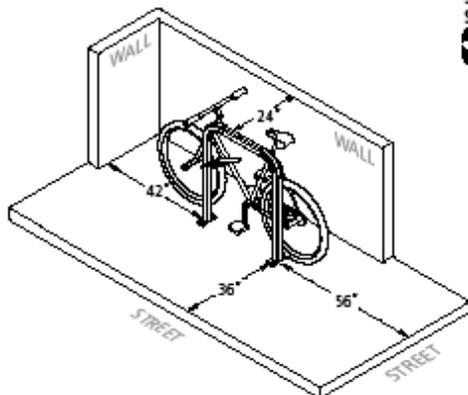
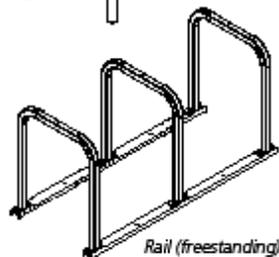
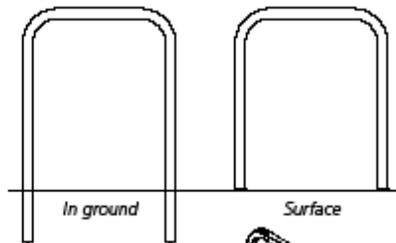
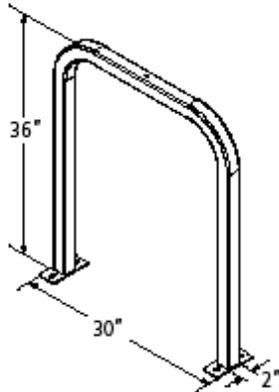
FIGURE:

BICYCLE RACK SPECIFICATION - BIKE HITCH

I-33c
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DERO DOWNTOWN RACK

Specifications and Space Use



Product Dero Downtown Rack
 As manufactured by Dero Bike Racks

Capacity 2 Bikes

Materials 2" x 2" x 3/16" tube

Finishes An after fabrication hot dipped galvanized finish is standard. 250 TGIC powder coat colors, a thermoplastic coating and a stainless steel option are also available.

Our powder coat finish assures a high level of adhesion and durability by following these steps:
 1. Sandblast
 2. Iron phosphate pretreatment
 3. Epoxy primer electrostatically applied
 4. Final thick TGIC polyester powder coat

Stainless Steel: 304 grade stainless steel material finished in either a high polished shine or a satin finish.

A rubbery PVC Dip is also available

Installation Methods
In ground mount is embedded into concrete base. Specify **In ground mount** for this option.
Foot Mount has two 2.5"x6"x.25" feet with two anchors per foot. Specify **foot mount** for this option.
Rail Mounted Downtown Racks are bolted to two parallel rails which can be left freestanding or anchored to the ground. Rails are heavy duty 3"x1.4"x3/16" thick galvanized mounting rails. Specify **rail mount** for this option.

Space Use and Setbacks
Wall Setbacks:
 For racks set parallel to a wall:
 Minimum: 24"
 Recommended: 36"
For racks set perpendicular to a wall:
 Minimum: 28"
 Recommended: 42"
Distance Between Racks:
 Minimum: 24"
 Recommended: 36"
Street Setbacks:
 Minimum: 24"
 Recommended: 36"

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FIGURE:

BICYCLE RACK SPECIFICATION - DOWNTOWN RACK

I-34a
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DERO DOWNTOWN RACK

Installation Instructions - Surface Mount

Tools Needed for Installation

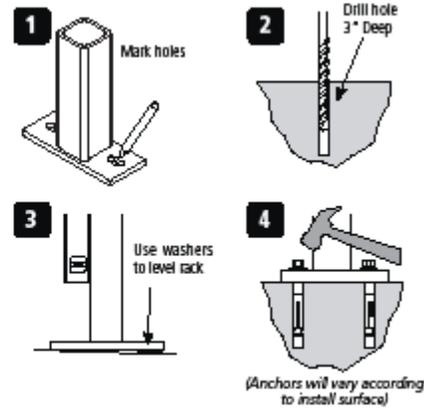
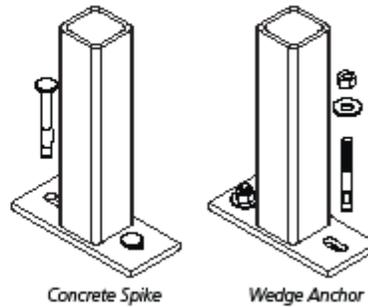
- Tape Measure
- Marker or Pencil
- Masonry Drill Bit
- Drill (Hammer drill recommended)
- Hammer
- Wrench 9/16"
- Level

Recommended Base Materials:

Solid concrete is the best base material for installation. To ensure the proper anchors are shipped with your rack, ask your Dero Rack representative which anchor is appropriate for your application. Be sure nothing is underneath the base material that could be damaged by drilling.

Installation:

3/8" anchors are shipped with the rack. Place the rack in the desired location. Use a marker or pencil to outline the holes of the flange onto the base material. Drill the holes in accordance with the specifications shipped with the anchors. Make sure the holes are at least 3" away from any cracks in the base material. Use washers to level rack if necessary. Tap in anchors and follow your specific anchor instructions provided with the rack.



Tamper Resistant Fasteners

The concrete spike is a permanent anchor. The top of the wedge anchor can also be pounded sideways after installation so that it cannot be removed. Other tamper resistant fasteners are also available for purchase.

When using the special tamper resistant nuts, always set and first tighten the anchors. Once the rack is installed, replace two nuts from the bracket (opposite sides from each other) with the tamper resistant fastener. DO NOT OVERTIGHTEN the tamper resistant nut.



 If you have any questions about installation or other features of the Downtown Rack, please call us toll free at 1-800-298-4915



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FIGURE:

BICYCLE RACK SPECIFICATION - DOWNTOWN RACK

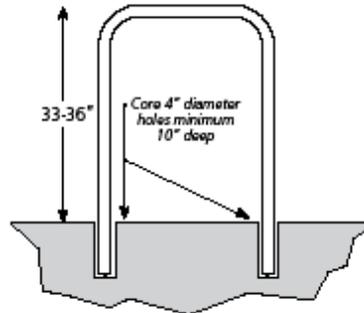
I-34b
 70

DOWNTOWN RACK

Installation Instructions - In Ground Mount

Tools Needed for Installation

- | | |
|-------------------|--|
| Level | Hole coring machine with 4" bit |
| Cement mixing tub | Access to water hose |
| Shovel | Materials to build brace (see "Install Tip" at bottom of page) |
| Trowel | |



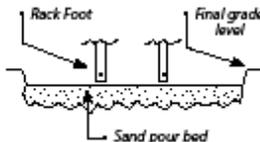
Installing into Existing Sidewalk

Core holes no less than 3" diameter (4" recommended) and no less than 6" deep into sidewalk. Fill holes with Por-Rok or epoxy grout. Place Downtown Rack into holes, making sure the rack is level. 33"-36" of the Downtown Rack should remain above the surface. If the Downtown Rack is less than 33" high, it will not support the bike adequately. Make sure the rack is level and held in place until the grout has set.

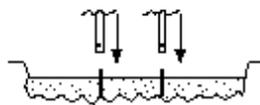
Installing into a New Sidewalk:

Stake Method:

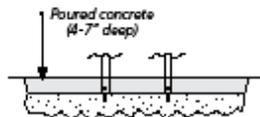
1 Use rack to measure exact location in pour bed.



2 Pound stake into pour bed where end of rack will sit. Slide rack end onto stake. You may need to dig the end of the rack into the sand to make sure the rack sits at least 35" above final grade level. The stake keeps the rack straight while the concrete is being poured.

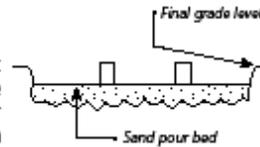


3 Make sure the rack is level and true. Pour concrete around the rack. Make sure the rack is not touched until the concrete has completely set.

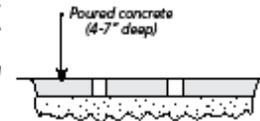


Sleeve Method:

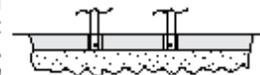
1 Place corrosion resistant sleeve (min. 4" inside diameter) in sand pour bed in exact location where rack will be installed. Make sure top of sleeve is at same level as desired finished concrete surface. Fill sleeve with sand to keep it in place and prevent it from filling with concrete.



2 Pour concrete and allow to cure.

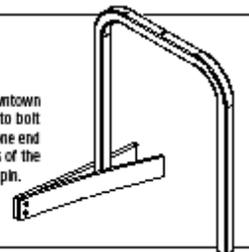


3 After appropriate cure time, dig out sand from sleeves and insert racks, making sure they are level and at the appropriate height. Pour in Por-Rok or epoxy grout and allow to set.

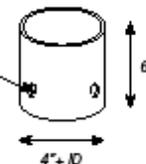


INSTALL TIP

An easy way to brace the Downtown Rack while the grout sets is to bolt two 1x4" boards together at one end and clamp them onto the legs of the Downtown Rack like a clothes pin.



Note: Sleeve should have profile to keep it from coming loose from hardened concrete.



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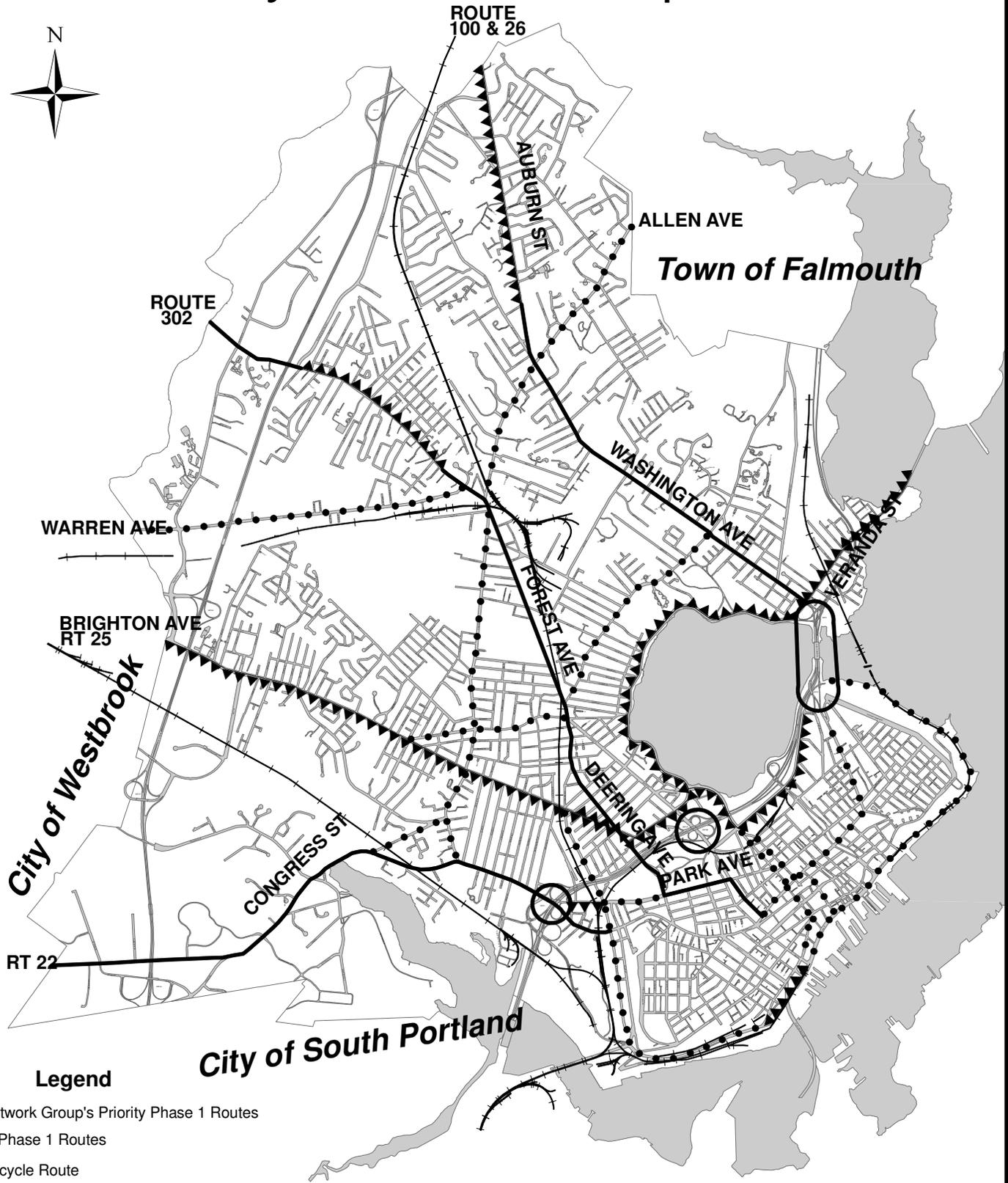
TRANSPORTATION SYSTEMS
AND STREET DESIGN
SECTION I

FIGURE:

BICYCLE RACK SPECIFICATION - DOWNTOWN RACK

I-34c
71

City of Portland, Maine Bicycle Network Map



Legend

- Bicycle Network Group's Priority Phase 1 Routes
- • Proposed Phase 1 Routes
- ▲▲ Existing Bicycle Route

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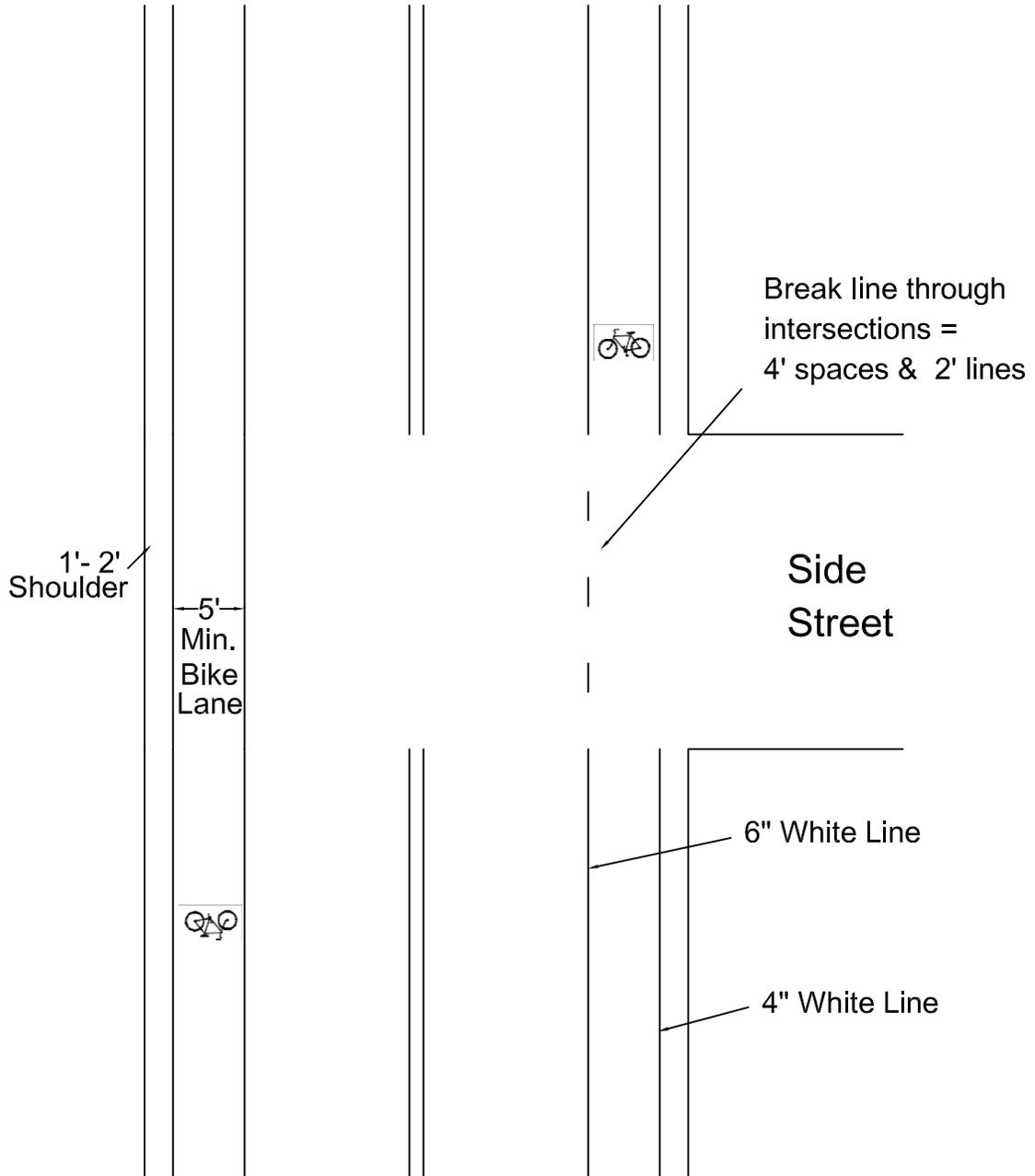
CITY OF PORTLAND, MAINE
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TRANSPORTATION SYSTEMS
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SECTION I

FIGURE:

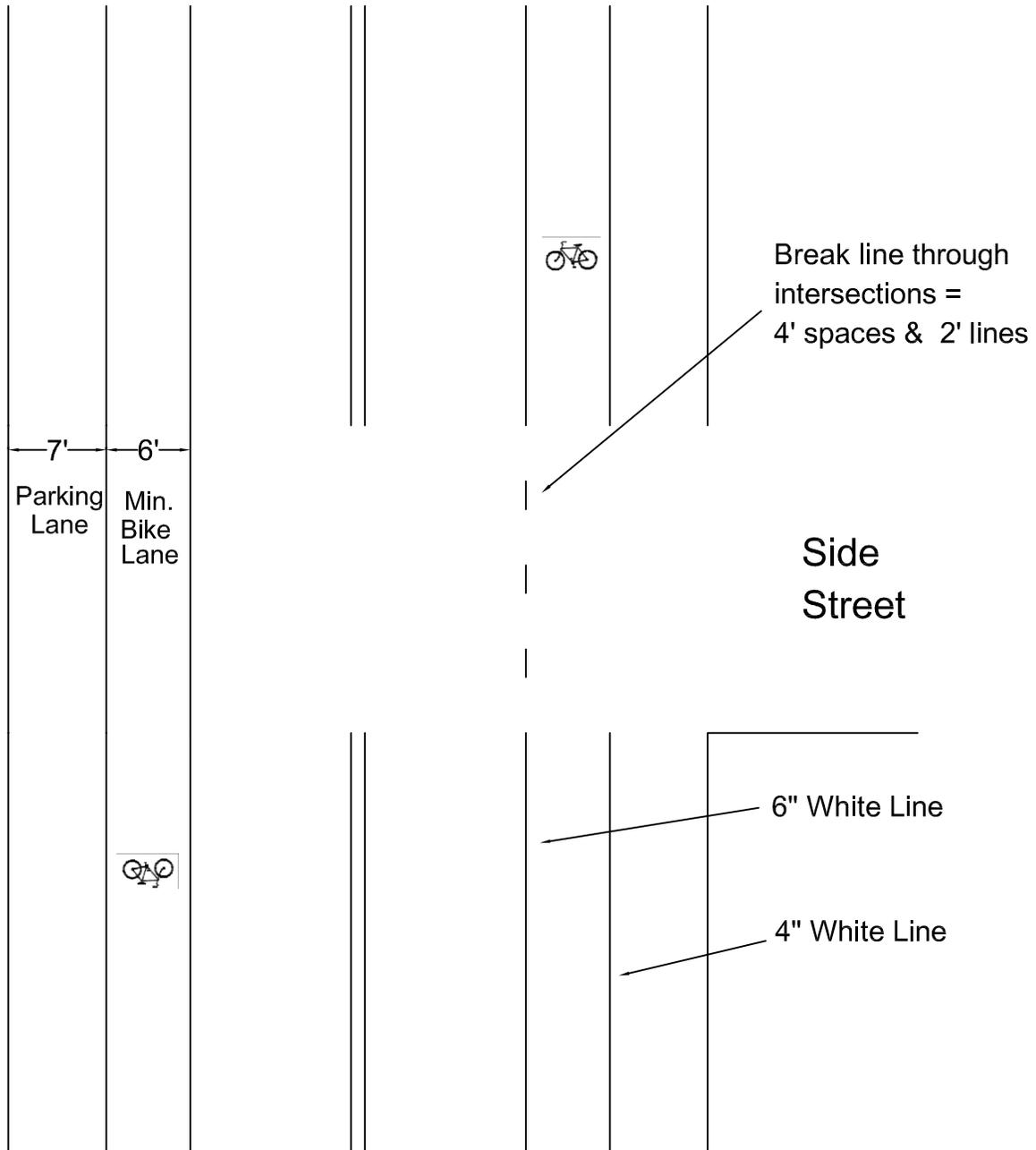
BICYCLE NETWORK MAP

I-35



City Street w/ Bike Lanes

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	TRANSPORTATION SYSTEMS AND STREET DESIGN SECTION I	FIGURE: I-36 73
REVISED:	CITY STREET W/BIKE LANES		



City Street w/ Parking & Bike Lanes

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AUGUST 2009

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CITY OF PORTLAND, MAINE
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**TRANSPORTATION SYSTEMS
 AND STREET DESIGN**
 SECTION I

FIGURE:

CITY STREET W/ PARKING & BIKE LANES

I-37
 74

TYPICAL BICYCLE LANE PAVEMENT MARKINGS



SHARED USE LANE
SYMBOL



BICYCLE LANE
SYMBOL

TYPICAL BICYCLE ROUTE SIGNAGE



R3-17
30"x24"



R3-17
30"x24"



R3-17B
30"x12"



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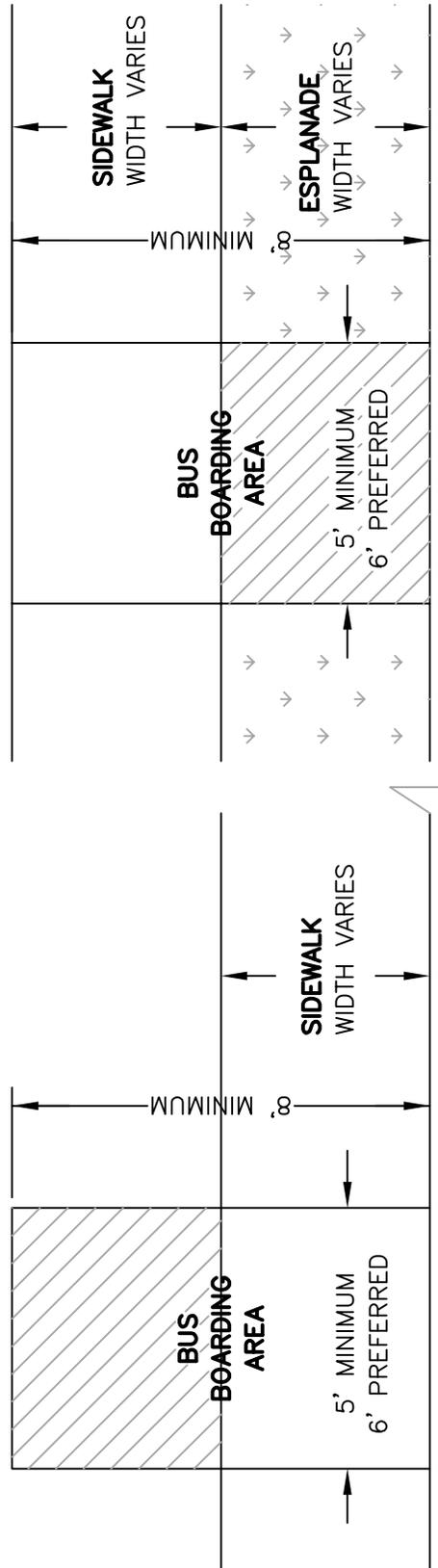
FIGURE:

**TYPICAL BICYCLE LANE PAVEMENT MARKINGS
AND BICYCLE ROUTE SIGNAGE**

I-38
75

NOTES:

- 1. SURFACE.** BUS STOP BOARDING AREAS SHALL HAVE A FIRM, STABLE SURFACE.
- 2. DIMENSIONS.** BUS STOP BOARDING AREAS SHALL PROVIDE A CLEAR LENGTH OF 8' MINIMUM, MEASURED PERPENDICULAR TO THE CURB OR VEHICLE ROADWAY EDGE, AND A CLEAR WIDTH OF 5' MINIMUM, MEASURED PARALLEL TO THE VEHICLE ROADWAY. THIS AREA SHALL BE CLEAR OF ANY OBSTRUCTIONS, INCLUDING BUT NOT LIMITED TO: BICYCLE RACKS, LIGHT POLES, UTILITY POLES, FIRE HYDRANTS, STREET SIGNS, STREET FURNITURE, NEWSPAPER BOXES OR SIMILAR OBSTACLES.
- 3. CONNECTION.** BUS STOP BOARDING AREAS SHALL BE CONNECTED TO STREETS, SIDEWALKS OR PEDESTRIAN PATHS BY AN ADA ACCESSIBLE ROUTE.
- 4. SLOPE.** PARALLEL TO THE ROADWAY, THE SLOPE OF THE BUS STOP BOARDING AREA SHALL BE THE SAME AS THE ROADWAY, TO THE MAXIMUM EXTENT PRACTICABLE. PERPENDICULAR TO THE ROADWAY, THE SLOPE OF THE BUS STOP BOARDING AREA SHALL NOT EXCEED 2%.



GRANITE CURB
7" REVEAL (TYP.)

GRANITE CURB
7" REVEAL (TYP.)

**BUS BOARDING AREA
WITHOUT ESPLANADE**

**BUS BOARDING AREA
WITH ESPLANADE**

NOT TO SCALE

NOT TO SCALE

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TECHNICAL STANDARDS MANUAL

TRANSPORTATION SYSTEMS
AND STREET DESIGN
SECTION I

FIGURE:

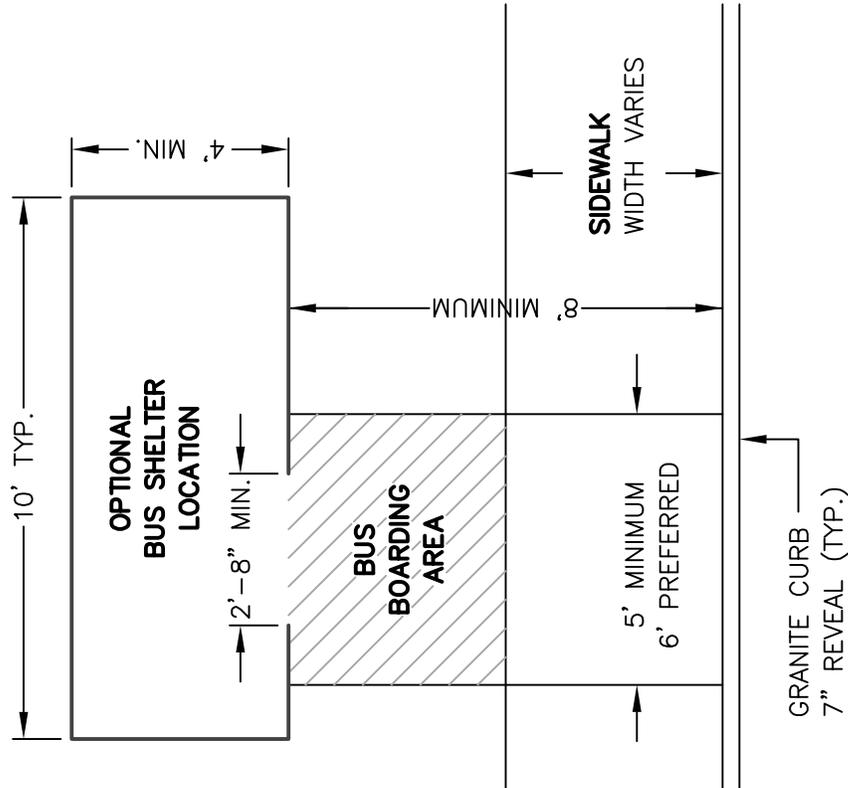
**BUS STOP BOARDING AREA LAYOUT FOR
SIDEWALK WITH OR WITHOUT ESPLANADE**

I-39

NOTES:

1. **DIMENSIONS.** MINIMUM CLEAR FLOOR INTERIOR AREA ENTIRELY WITHIN THE PERIMETER OF THE SHELTER IS 2'-6" WIDE BY 4' DEEP TO PERMIT WHEELCHAIR OR MOBILITY AID USER ACCESS. THE MINIMUM SHELTER OPENING FOR WHEELCHAIR ACCESS IS 2'-8".
2. **CONNECTION.** BUS SHELTER OPENINGS WILL BE CONNECTED TO THE BUS BOARDING AREA BY AN ADA ACCESSIBLE ROUTE.
3. **SLOPE.** PARALLEL TO THE ROADWAY, THE SLOPE OF THE BUS BOARDING AREA SHALL BE THE SAME AS THE ROADWAY, TO THE MAXIMUM EXTENT PRACTICABLE. PERPENDICULAR TO THE ROADWAY, THE SLOPE OF THE BUS BOARDING AREA SHALL NOT EXCEED 2%.

ADDITIONAL WIDENING,
AS NEEDED.



BUS SHELTER AND SHELTER SITING
WITHOUT ESPLANADE
 NOT TO SCALE

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 TECHNICAL STANDARDS MANUAL

**TRANSPORTATION SYSTEMS
 AND STREET DESIGN**
 SECTION I

FIGURE:

**BUS SHELTER AND SHELTER SITING LAYOUT
 FOR SIDEWALK WITHOUT ESPLANADE**

I-40

2. SANITARY SEWER AND STORM DRAIN DESIGN STANDARDS

2.1. STANDARDS AND SPECIFICATIONS

Sewer and Storm drain systems shall be planned and constructed in accordance with the regulations contained in Chapter 24 of the City Code of Ordinances.

- 2.1.1. The introduction of non-contaminated water such as rain water, non-contact cooling water, groundwater from foundation drains, sump pumps, surface drains or any other sources of inflow shall not be allow to discharge into as sewer which conveys sanitary waste unless approved by the City Engineer. When no other practical alternatives exist, this condition may be waived by the City Engineer. All Appeals will be considered by the Director of Public Services. (Refer to: Sec. 24-44 of the City Code - Public sewer connection limitations).
- 2.1.2. It is not permissible to backfill any excavation with frozen materials, organic materials or blasted ledge. The maximum size of backfill material shall not exceed 6". (Please refer to Division 2, Street Opening Permits in the City Code).
- 2.1.3. The Department of Public Services shall be responsible for televising all new sewer construction for acceptability as soon as backfilling has been completed and access is available. The permittee will be invoiced for these services. Information on current rates is available through the City of Portland Wastewater Maintenance Division.
- 2.1.4. The information presented below are City of Portland exceptions to the TR-16 or additional required standards
- 2.1.5. Permits to connect to the municipal stormwater and sanitary sewer system are required and may be obtained from the Department of Public Services.

2.2. TECHNICAL REFERENCE

The following technical publications are recognized by the City of Portland for use in the design, construction and testing of sanitary and stormwater sewers:

- Technical Report #16 (TR-16): *Guides for the Design of Wastewater Treatment Works*, Prepared by the New England Interstate Water Pollution Control Commission available for review at the Department of Public Services or online at www.neiwppcc.org/tr16guides.asp
- Maine Department of Transportation (MDOT) Standard Specifications for Highways and Bridges, Current Edition

2.3. MANHOLES

- 2.3.1. All manholes shall be designed in conformance with City of Portland standards as illustrated in Figure II-01.
- 2.3.2. When constructing sanitary manhole channels, if the mathematical difference between the invert elevation of the manhole channel and the invert elevation of the sewer pipe connecting to such manhole is two vertical feet (2') or greater, a standard City of Portland drop manhole shall be provided. Such drop manholes shall conform to the engineering specifications illustrated in Figure II-03.
- Drop manholes on stormwater collection systems are permitted.
- 2.3.3. Internal drop connections are prohibited unless site specific constraints warrant an exception. Where exceptional circumstances necessitate a waiver to allow for construction of an internal drop connection, a minimum of two stainless steel pipe anchors shall be used and the manhole diameter shall be five (5) feet minimum. Waiver requests will be evaluated on a case by case basis.
- 2.3.4. Service laterals shall not connect to either stormwater or sanitary manholes.
- 2.3.5. Stormwater and sanitary manholes shall include frames and covers as shown in Figure II-5 or an approved equivalent. Both the frame and riser shall be machined to assure a proper fit.
- 2.3.6. Manhole covers shall be marked "SEWER" or "DRAIN" accordingly.
- 2.3.7. Riser Rings without tabs as shown in Figure II-06 shall be used to adjust manholes to grade with approval of the Wastewater Maintenance Division.
- 2.3.8. All new sanitary manholes shall be vacuum tested before backfilling. Refer to TR-16 for testing standards.
- 2.3.9. All manholes shall have copolymer polypropylene plastic steps with 3/8" grade 60 rebar continuous throughout, spaced at one foot (1') intervals.

2.4. Reserved.

2.5. PIPES

- 2.5.1. Minimum velocities of surface water drains shall not be less than three (3.0) feet per second.
- 2.5.2. The types of allowable pipe to be used for purposes of sanitary sewers, storm sewers, catch basin drains, or underdrains shall be:

- Reinforced Concrete Pipe (RCP) with a minimum strength of Class III;
- PVC Ring Type Sewer Pipe (SDR 35 or equivalent, minimum PS-46 rating,
- P.V.C. Ring Type Sewer Pipe meeting ASTM F 789 or equal to SDR 35
- Ductile Iron Pipe (DIP).
- ADS N-12 HP triple-wall pipe meeting a minimum PS- 46.
- ADS SaniTite HP meeting a minimum PS-46.

2.5.3. The classes of pipe indicated shall be minimums, however the actual class of pipe used shall be determined by soil weight and compaction loads applied to such pipe in accordance with standard engineering design criteria and subject to the approval of the City Engineer.

2.5.4. Ribbed corrugated polyethylene pipe material, smooth wall interior, is not permitted except for underdrain installation. Underdrain diameter shall be no larger than six (6) inches.

2.5.5. All PVC connections shall be made with Solid PVC Couplings.

2.6. BUILDING SEWER LATERALS

2.6.1. All building sewer laterals shall have a minimum diameter of 4" and a minimum slope of 1/8 inch per foot installed, as shown in Figure II-12.

2.6.2. Typical Pipe Installation: Where a building sewer lateral is to be installed from the sewer main in the street to a property or building to be served, the lateral shall either extend to the building or to the street line of each lot to be served and the pipe shall be capped air-tight.

2.6.3. An accurate record of each building sewer, its location and its depth at the street line shall be kept by the developer's engineer and a true copy of the same shall be provided the City Engineer.

2.6.4. The location of the building sewer at the street line shall be physically marked by the placement of a 2 x 4 wooden stake placed at the end of the lateral end-cap and extending one foot above finished grade.

2.6.5. Each stake shall be painted with a fluorescent paint and marked as storm or sanitary sewer with the depth indicated from grade to end-cap. A ¼" thick by 6" square ferrous metal plate or equivalent shall be placed horizontally one foot below grade over the end of the storm drain.

2.6.6. Construction of building sewers and drains shall conform to Chapter 24 (Sewers) of the City Code.

2.6.7. Building sewers and drains shall be connected to the main sanitary sewer line by the use of wyes, tee/wyes, Inserta-Tees or similar approved methods as determined by the Department of Public Services. A manhole shall be installed at the sewer main to connect building laterals when the building lateral is eight (*)

inches or larger in diameter. The lateral connections shall be installed from the main toward the lot where possible.

- 2.6.8. Before connecting new pipes into an existing sewer line, the contractor shall obtain a permit from the Department of Public Services.
- 2.6.9. All new laterals connecting to a combined sewer system shall have a Back Water Valve. The valve shall be installed to assure easy access and maintenance. When a Back Water Valve is installed, it is imperative that introduction of rain water, non-contact cooling water, groundwater from foundation drains, sump pumps, surface drains or any other sources of inflow not be allowed on the building side of the valve.
- 2.6.10. All building floor drains shall discharge to the sanitary sewer system.
- 2.6.11. Plugging of Abandoned Sewer Laterals: Prior to abandoning any stormwater or sanitary sewer lateral, the applicant shall acquire a permit from the Department of Public Services. The applicant shall provide a 48 hour notice to the Sewer Maintenance Division stating the date and time the applicant wished to complete the work. The Sewer Maintenance Division will mobilize to the site and allow one hour to assist the applicant to plug the lateral in the following manner. City staff will televise the sewer main in the street to determine the location of the lateral to be plugged.

The applicant shall excavate and expose the lateral at the property line and install an inflatable plug in the lateral to be positioned where the lateral connects to the street sewer, as determined by City staff.

The plug shall be secured by a cable or chain and the lateral fill with pumped grout starting at the plug and filling out to the point of excavation.

2.7. CATCH BASINS

- 2.7.1. All catch basins and catch basin inlets shall be designed and constructed in accordance with Figures II-2 and II-8.
- 2.7.2. Catch basin drain pipes of less than ten inches (10") in diameter are not permitted.
- 2.7.3. All catch basin drains shall be supplied, laid and bedded in a minimum of six inches (6") of crushed stone.
- 2.7.4. All catch basins shall have 4' granite headstone of catch basin inlets conforming to City standards as shown in Figure II-11.
- 2.7.5. No radius catch basin stones shall be permitted.
- 2.7.6. All catch basins shall be constructed with a minimum sump of 3'.

- 2.7.7. Catch basins shall not be located in driveway openings.
- 2.7.8. No storm drain lines, with the exception of field inlets and underdrains, shall be connected into a catch basin structure.
- 2.7.9. Catch basin drains and catch basin inlet drain pipe slopes shall be such that minimum flow velocities shall not be less than 3.0 feet per second.
- 2.7.10. The base material used to support all proposed catch basin drains shall be as shown in Figure II-12.
- 2.7.11. Bee hive casting shall be used on drainage structures located at low points in grassed off road locations.

2.8. AGGREGATE SPECIFICATIONS

2.8.1. The provisions of Section 703 of the State of Maine Department of Transportation (MDOT) *Standard Specifications for Highways and Bridges* shall apply with the following additions and modifications:

703.02 Coarse Aggregate for Concrete:

Designated Aggregate Size

Sieve Size	Percent Passing Sieve				
	2 in.	1½ in.	1 in.	¾ in.	½ in.
2 in.	95-100	100	-	-	-
1-1/2 in.	-	95-100	100	-	-
1 in.	50-70	-	90-100	100	-
3/4 in.	-	50-70	-	90-100	100
1/2 in.	15-30	-	25-60	-	90-100
3/8 in.	-	10-30	-	20-55	-
No. 4	0-5	0-5	0-10	0-10	0-15
F.M. (+0.20)	7.45	7.20	6.95	6.70	6.10

2.8.1.1. Aggregate used in concrete shall not exceed the following maximum designated sizes:

- 2 inches for mass concrete.
- 1-1/2 inch for piles, pile caps, footings, foundation mats, and walls 8 inches or more thick.
- 3/4 inch for slabs, beams, and girders.
- 1/2 inch for fireproofing on steel columns and beams.
- 1 inch for all other concrete.

2.8.2. 703.06 (a) Aggregate Base:

2.8.2.1. Aggregate base - crushed, type "B" shall not contain particles of rock which will not pass the two inch (2") square mesh sieve, and shall conform to the type "B" aggregate, as listed in the subsection of the Standard Specifications.

2.8.2.2. "Crushed" shall be defined as consisting of rock particles with at least 50 per cent of the portion retained on the 1/4 inch square mesh sieve, having a minimum of 2 fracture faces.

2.8.3. 703.06 (b) Aggregate Subbase:

2.8.3.1. Gravel subbase shall not contain particles of rock which will not pass the three inch (3") square mesh sieve, and shall conform to type "D" Aggregate, as listed in this subsection of the Standard Specifications.

2.8.4. 703.18 Common Borrow:

Common borrow shall not contain any particle of bituminous material.

2.8.5. 703.19 Granular Borrow:

Granular borrow shall contain no particles which will not pass a three inch (3") square mesh sieve.

2.8.6. 703.20 Gravel Borrow:

Gravel borrow shall not contain particles of rock which will not pass three inch ("3") square mesh sieve.

2.8.7. 703.31 Crushed Stone for Pipe Bedding and Underdrain:

"Crushed Stone" shall be defined as rock of uniform quality and shall consist of clean, angular fragments of quarried rock, free from soft disintegrated pieces or other objectionable matter.

Crushed stone used as a bedding material for pipe and underdrain shall be uniformly graded and shall meet the follow gradations.

Sieve Designation	Percentage by Weight Passing Square Mesh Sieve
¾ inch	100
3/8 inch	20-55
No. 4	0-10

For pipe sizes 42 inches and larger:

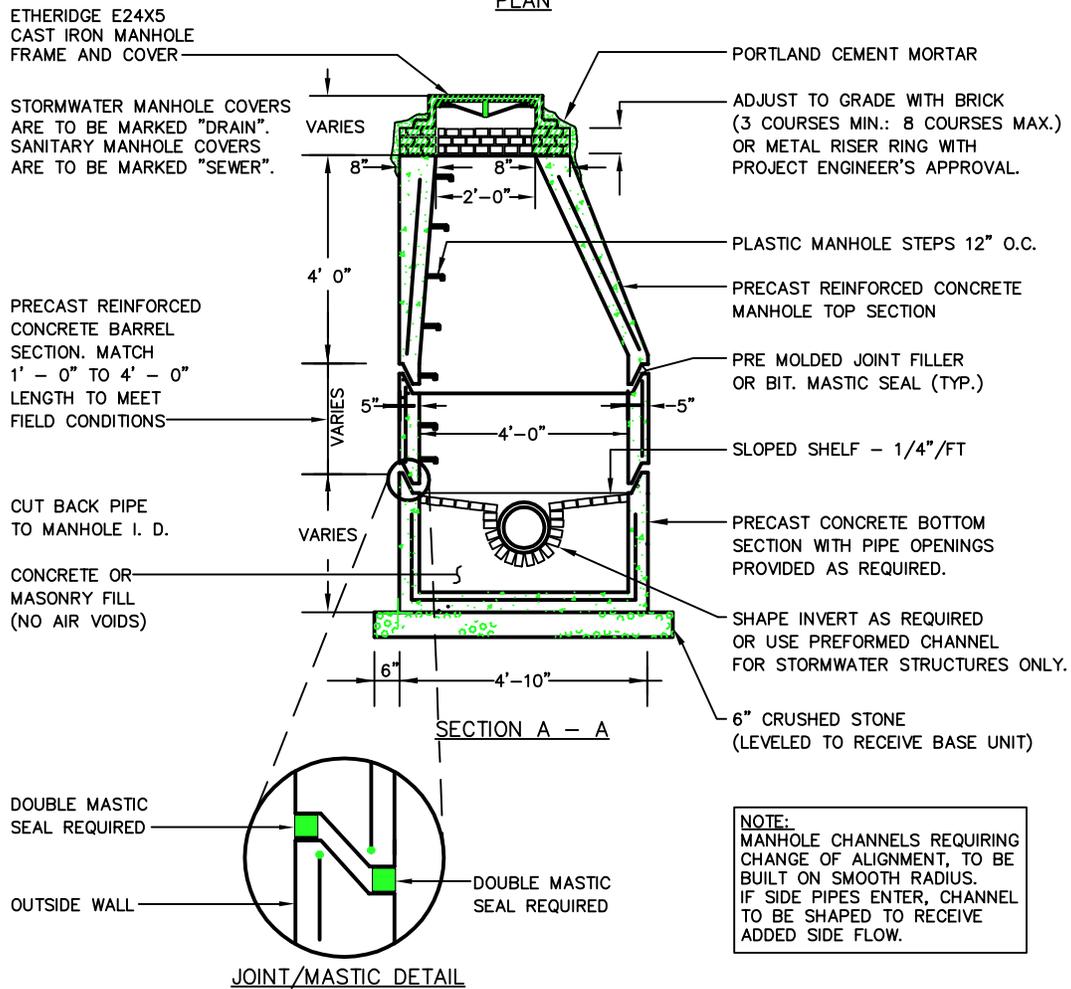
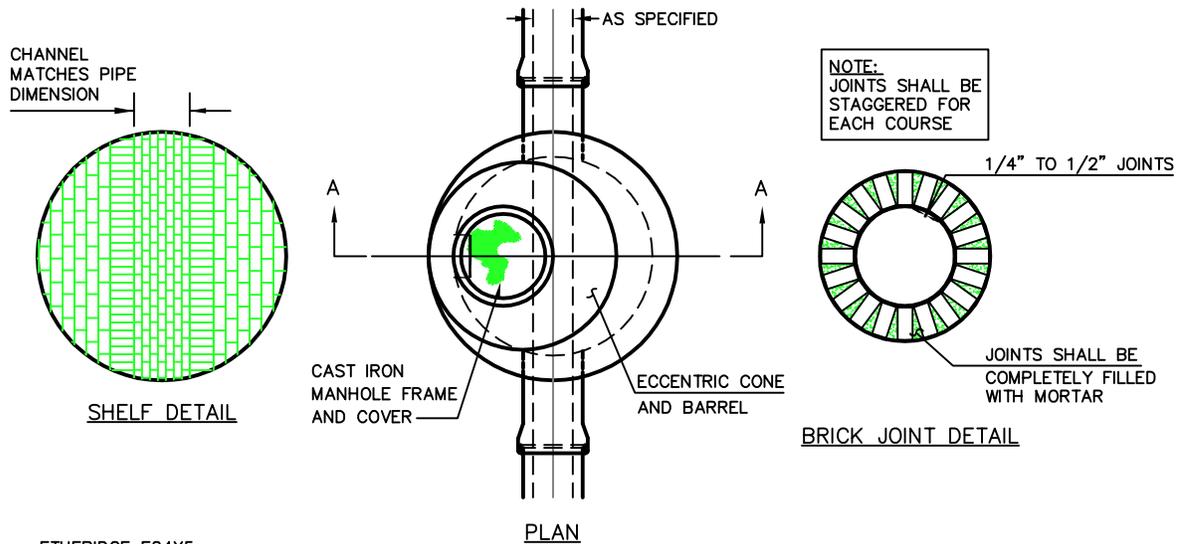
Sieve Designation	Percentage by Weight Passing Square Mesh Sieve
1 ¼ inch	100
3/8 inch	20-55
No. 4	0-10

The stone shall be free from vegetable matter, lumps or balls of clay, and other inappropriate substances.

2.9. Reserved**2.10. SUBSURFACE WASTEWATER DISPOSAL**

2.10.1. To ensure that adequate provisions have been made for subsurface wastewater disposal, developers are required to locate, design, and install all septic systems in accordance with the latest version of the Maine Subsurface Wastewater Disposal Rules, 144 CMR minimum 241, as described in Chapter 6, Section 6-18(A) of the City Code.

2.10.2. Developers are required to obtain a permit through the City of Portland Inspections Division prior to the installation of any subsurface wastewater disposal system identified on an approved site plan.



PRECAST CONCRETE MANHOLE

NOT TO SCALE

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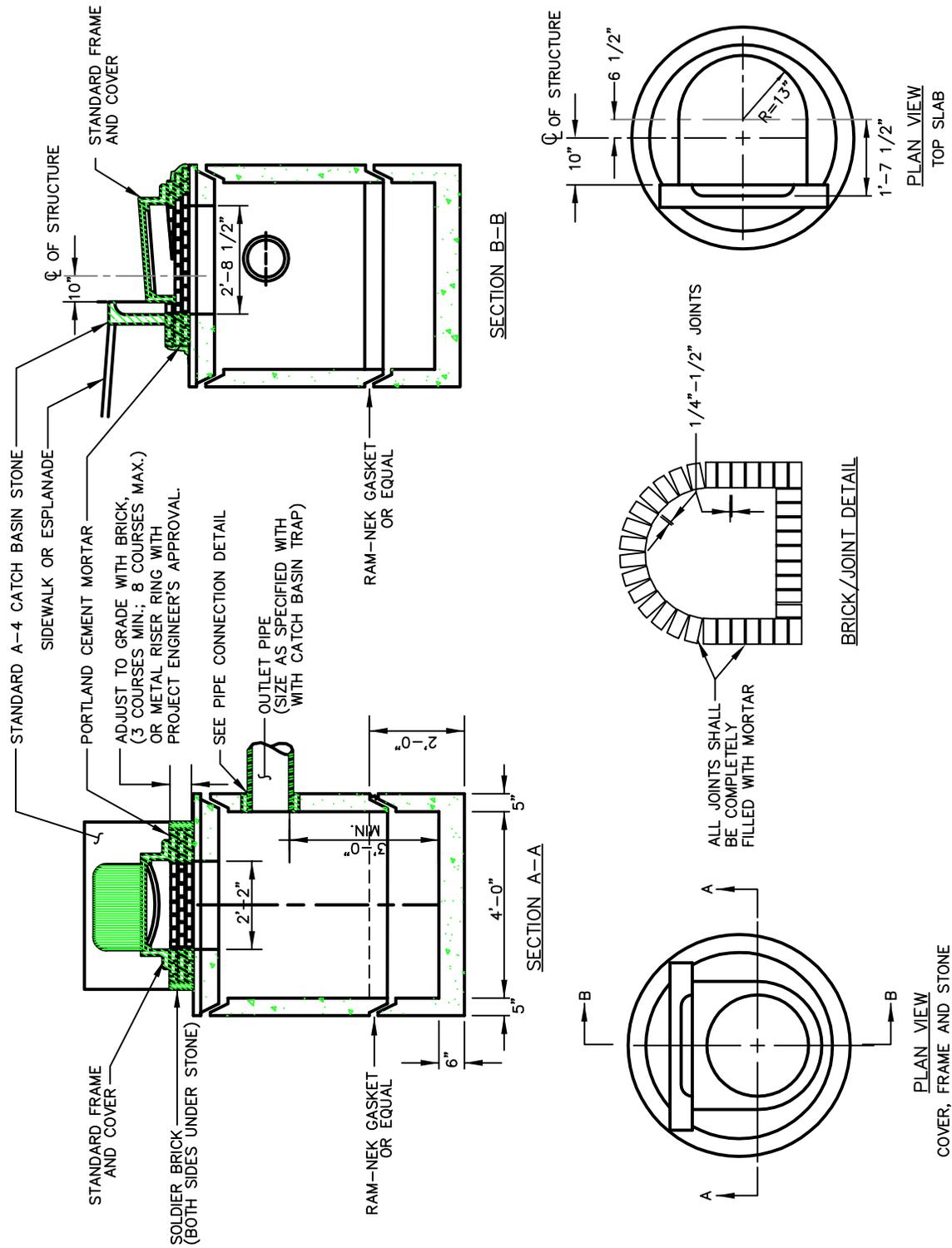
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**SANITARY SEWER AND STORM
 DRAIN DESIGN STANDARDS**
 SECTION II

FIGURE:

PRECAST CONCRETE MANHOLE

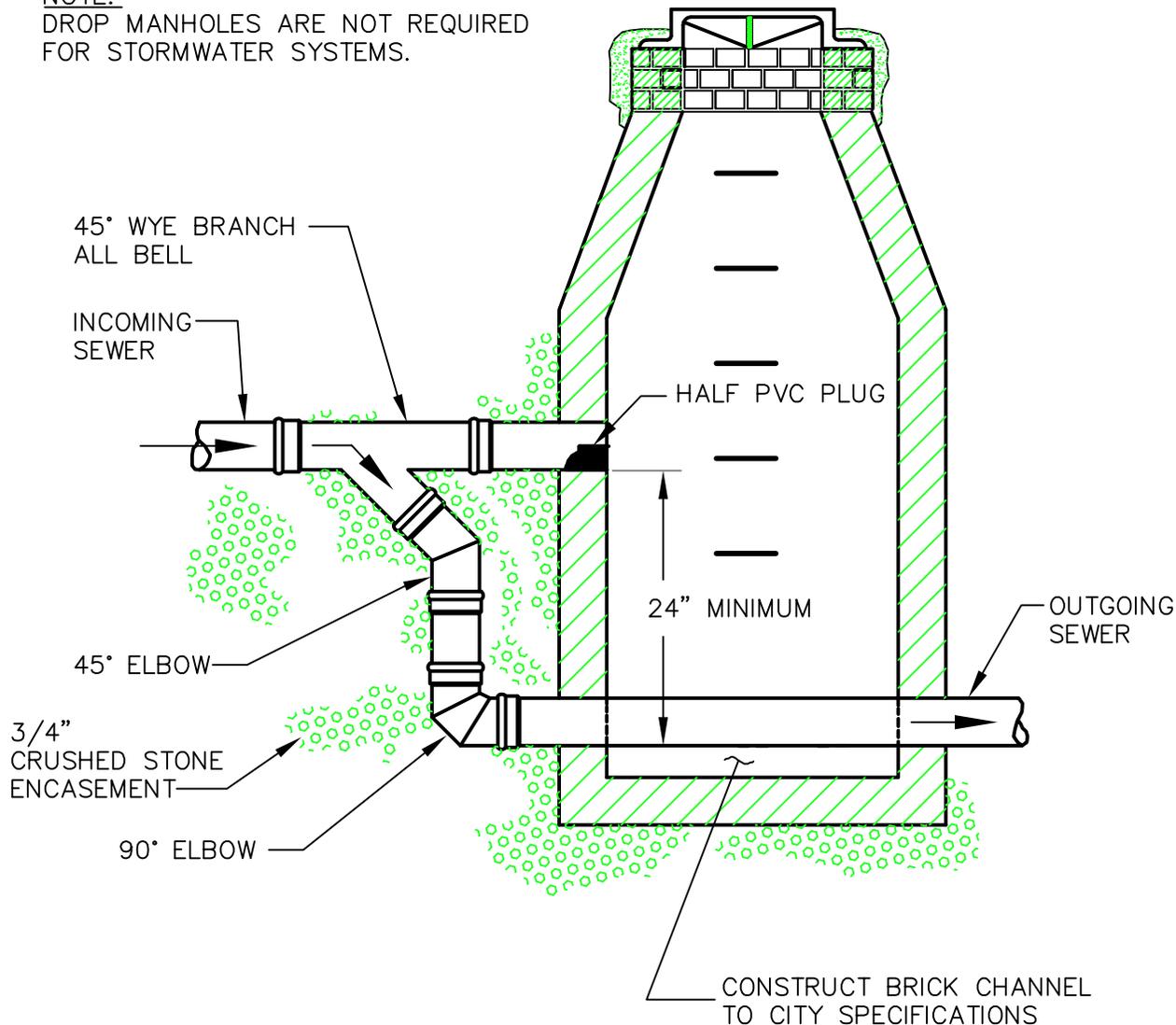
II-1



PRECAST CONCRETE CATCH BASIN - TYPE "E"
 NOT TO SCALE

DATE: DEC. 2009 REVISED:	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	SANITARY SEWER AND STORM DRAIN DESIGN STANDARDS SECTION II	FIGURE:
<p align="center">PRECAST CONCRETE CATCH BASIN</p>			<p align="center">II-2</p>

NOTE:
 DROP MANHOLES ARE NOT REQUIRED
 FOR STORMWATER SYSTEMS.



TYPICAL OUTSIDE DROP MANHOLE
 NOT TO SCALE

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**SANITARY SEWER AND STORM
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 SECTION II

FIGURE:

TYPICAL OUTSIDE DROP MANHOLE

II-3

GENERAL NOTES FOR MANHOLES AND CATCH BASINS

1. ALL CONCRETE SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 4000 lbs. PER SQ. INCH AT THE END OF 28 DAYS, UNLESS OTHERWISE NOTED.
2. MANHOLES MAY BE CONSTRUCTED OF PRECAST REINFORCED CONCRETE, OR CAST IN PLACE.
3. PRECAST REINFORCED CONE BARREL MANUFACTURED PER ASTM SPEC. C-478.
4. ALL STORM AND SEWER MANHOLE COVERS SHALL BE SOLID AND SHALL HAVE ONE 7/8" DIAMETER DRILLED PICK HOLE LOCATED 8" FROM THE CENTER OF THE COVER.
5. ALL SANITARY MANHOLE COVERS SHALL HAVE "SEWER" CAST INTO THE COVER. ALL STORMWATER/DRAIN MANHOLE COVERS SHALL HAVE "DRAIN" CAST INTO THE COVER.
6. ALL MANHOLE RISERS SHALL BE ETHERIDGE 24" OR APPROVED EQUAL.
7. SEWER BRICK SHALL CONFORM TO ASTM SPEC. DESIGNATE ON C-32-63, GRADE MA AND SA.
8. ALL SANITARY MANHOLES SHALL HAVE A WATERPROOFING COATING APPLIED TO THE EXTERIOR SURFACE.
9. CATCH BASIN FRAMES FOR TYPE A4 CATCH BASIN CURB INLETS SHALL BE ETHERIDGE DR5A OR APPROVED EQUAL.
10. CASTINGS SHALL CONFORM TO ASTM DESIGNATION A48-CLASS 35.
11. EXISTING MANHOLES, CATCH BASINS, FRAMES, AND COVERS SHALL BE SALVAGED BY THE CONTRACTOR, AND SHALL REMAIN THE PROPERTY OF THE CITY OF PORTLAND.
12. ALL CATCH BASIN OUTLETS SHALL BE INSTALLED WITH A CASCO TRAP. SEE FIGURE II-09.

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**SANITARY SEWER AND STORM
 DRAIN DESIGN STANDARDS**
 SECTION II

FIGURE:

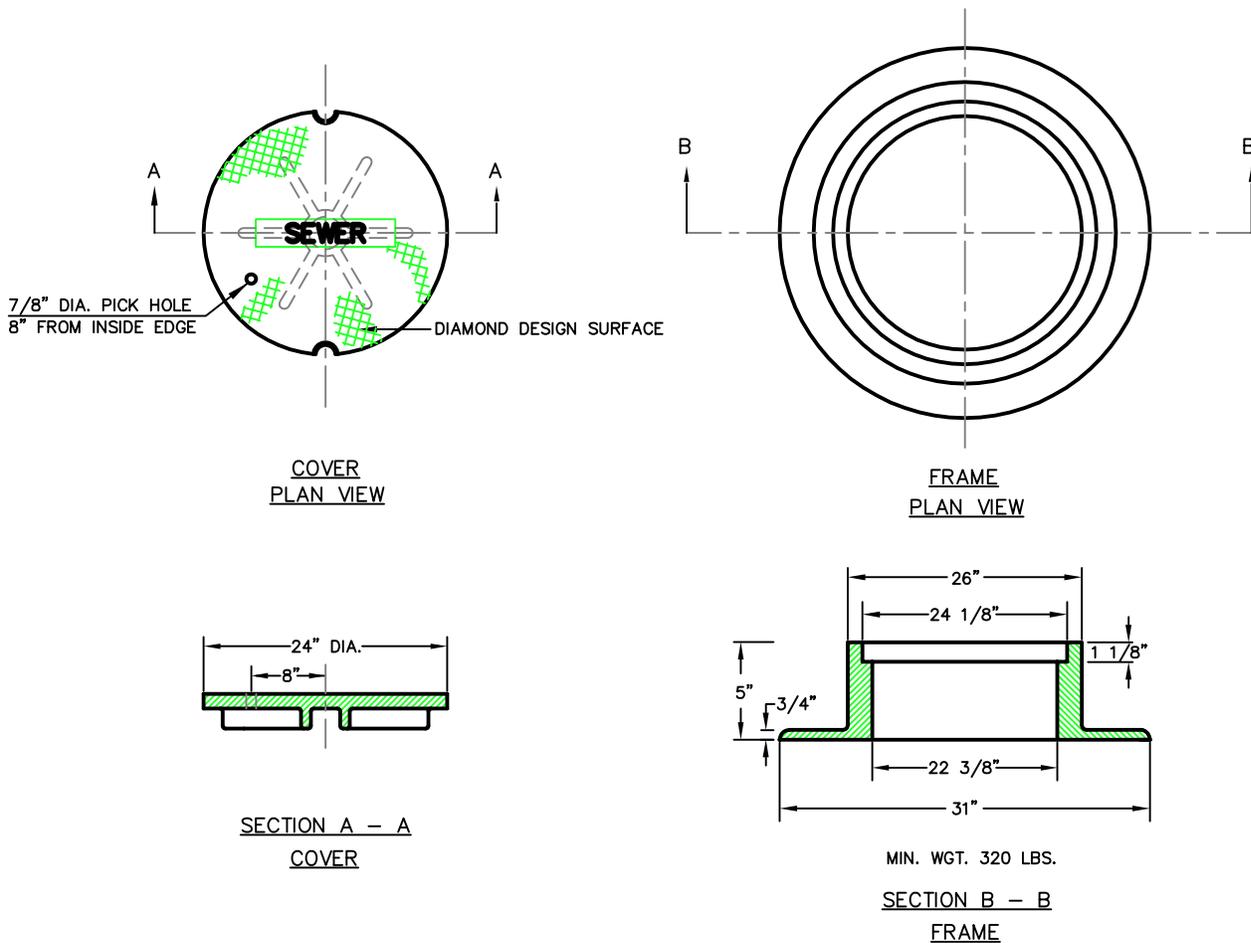
**GENERAL NOTES FOR
 MANHOLES AND CATCH BASINS**

II-4

NOTE:

ALL MANHOLE COVERS SHALL BE SOLID AND SHALL HAVE ONE 7/8" DIAMETER DRILLED PICK HOLE, LOCATED 8" FROM THE CENTER OF THE COVER.

ALL SANITARY MANHOLE COVERS SHALL HAVE "SEWER" CAST INTO THE COVER. ALL STORMWATER/DRAIN MANHOLE COVERS SHALL HAVE "DRAIN" CAST INTO THE COVER.



CAST IRON MANHOLE COVER AND FRAME

NOT TO SCALE

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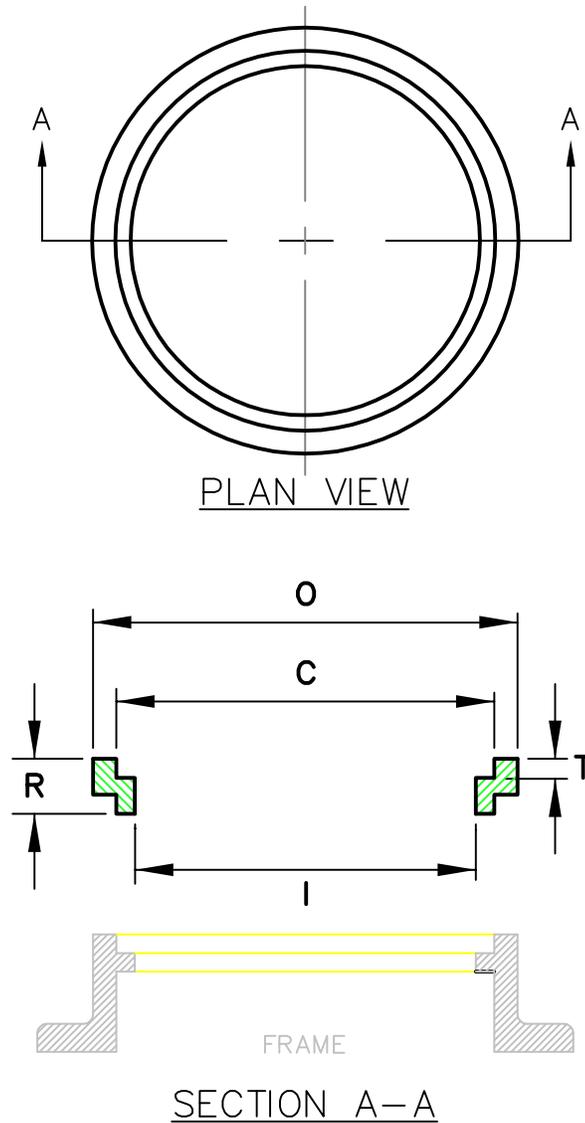
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**SANITARY SEWER AND STORM
 DRAIN DESIGN STANDARDS**
 SECTION II

FIGURE:

CAST IRON MANHOLE COVER AND FRAME

II-5



SIZE	C	R	T	O	I	Wt.
R241 1/2	24	1 1/2	1 1/8	26 1/4	22 1/2	60
R242	24	2	1 1/8	26 1/4	22 1/2	80
R242 1/2	24	2 1/2	1 1/8	26 1/4	22	100
R243	24	3	1 1/8	26 1/4	22	120

MANHOLE RISER RING

NOT TO SCALE

DATE:
 DEC. 2009
 REVISED:

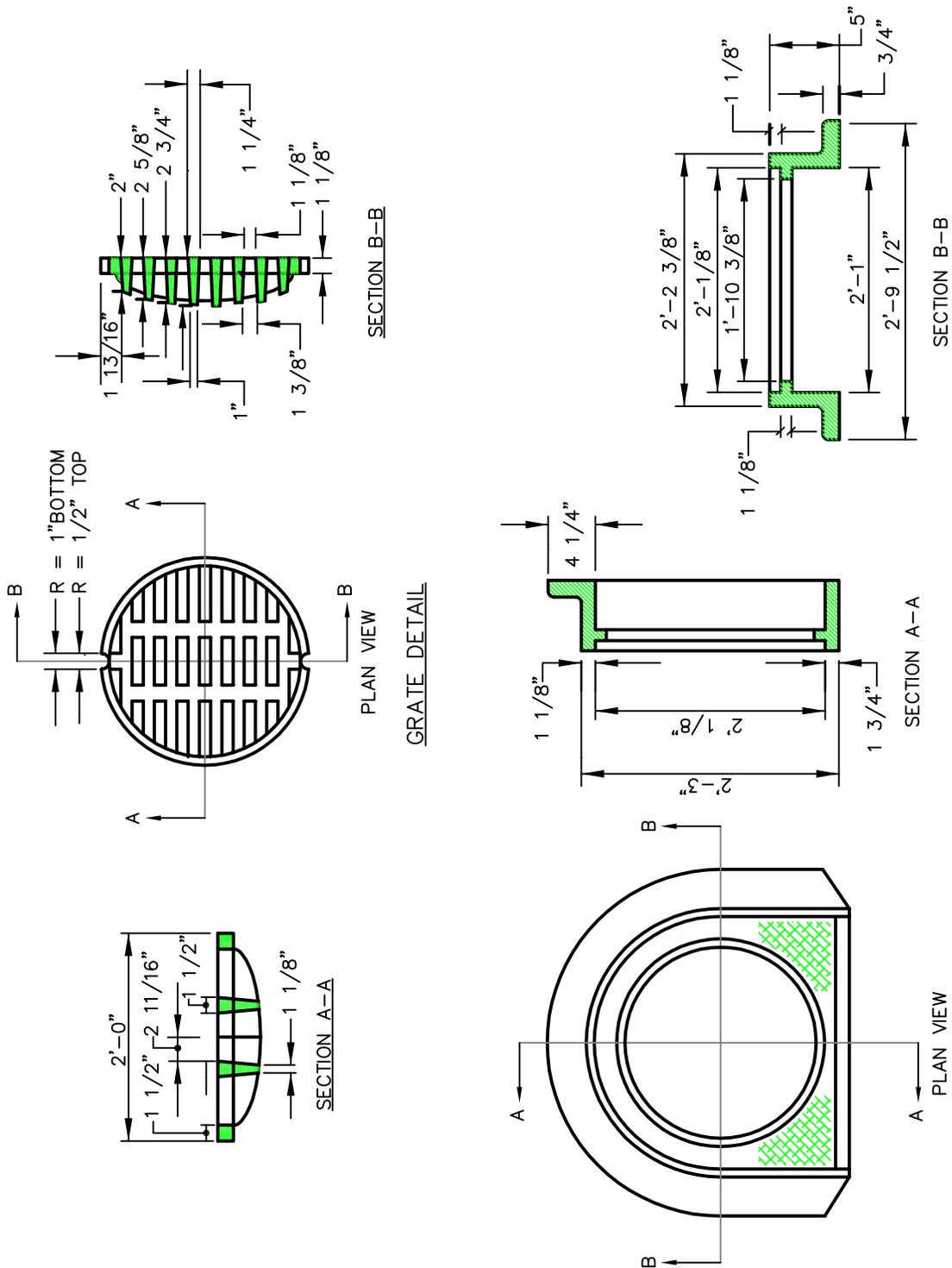
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 TECHNICAL STANDARDS MANUAL

**SANITARY SEWER AND STORM
 DRAIN DESIGN STANDARDS**
 SECTION II

FIGURE:

MANHOLE RISER RING

II-6



CATCH BASIN FRAME & GRATE

DATE:
AUGUST 2009
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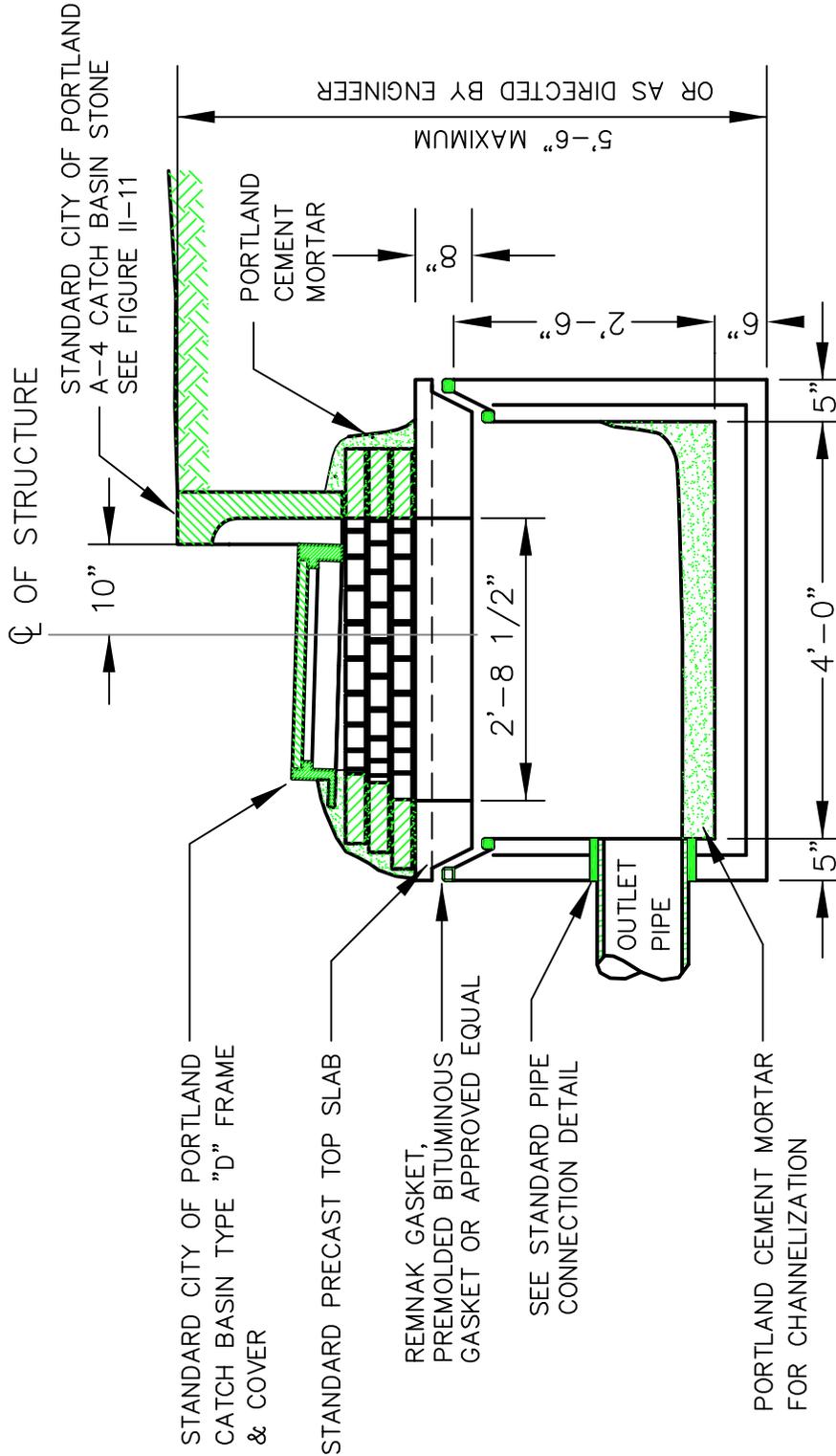
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TECHNICAL STANDARDS MANUAL

**SANITARY SEWER AND STORM
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SECTION II

FIGURE:

CATCH BASIN FRAME AND GRATE

II-7



CATCH BASIN INLET

NOT TO SCALE

DATE:
AUGUST 2009

REVISED:

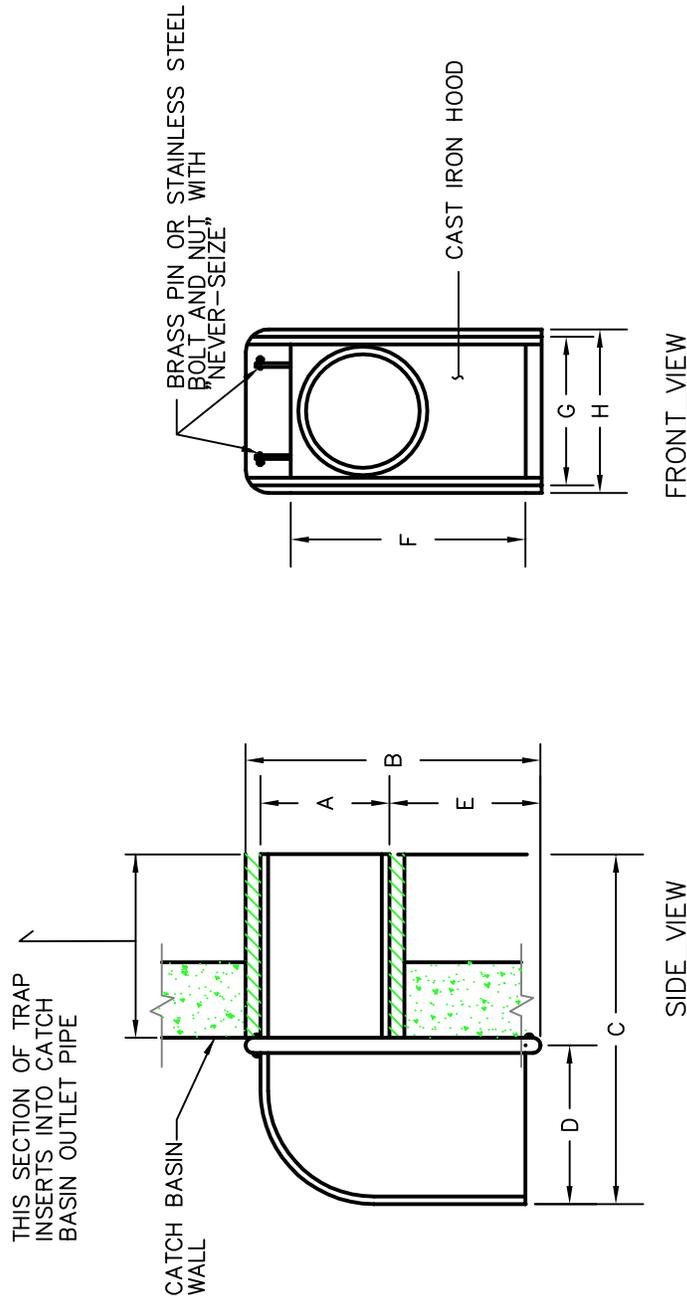
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FIGURE:

CATCH BASIN INLET

II-8



SIZE	A	B	C	D	E	F	G	H
6 in.	5 1/2"	13 3/8"	13 3/4"	5 3/8"	5 7/8"	11 5/8"	6 1/2"	7 1/4"
8 in.	7 1/2"	15"	15 3/8"	5 1/2"	5 3/8"	13 3/4"	8 3/4"	9 3/8"
10 in.	9 1/2"	16"	16 1/4"	6"	4 1/2"	14 1/8"	11 1/2"	12 3/8"
12 in.	11 1/2"	17"	22"	8"	3 1/2"	17"	12 1/2"	13 3/8"

(AS MANUFACTURED BY THE ETHERIDGE FOUNDRY IN PORTLAND, ME.)

NOTE: CONTRACTOR SHALL UTILIZE THE "CASCO TRAP" AS MANUFACTURED BY THE ETHERIDGE FOUNDRY, OR AN APPROVED EQUIVALENT AS SUPPLIED BY THE LEBARON FOUNDRY, MODEL # L, 202 "STANDARD CATCH BASIN TRAP"

CASCO TRAP
 NOT TO SCALE

DATE:
 AUGUST 2009
 REVISED:

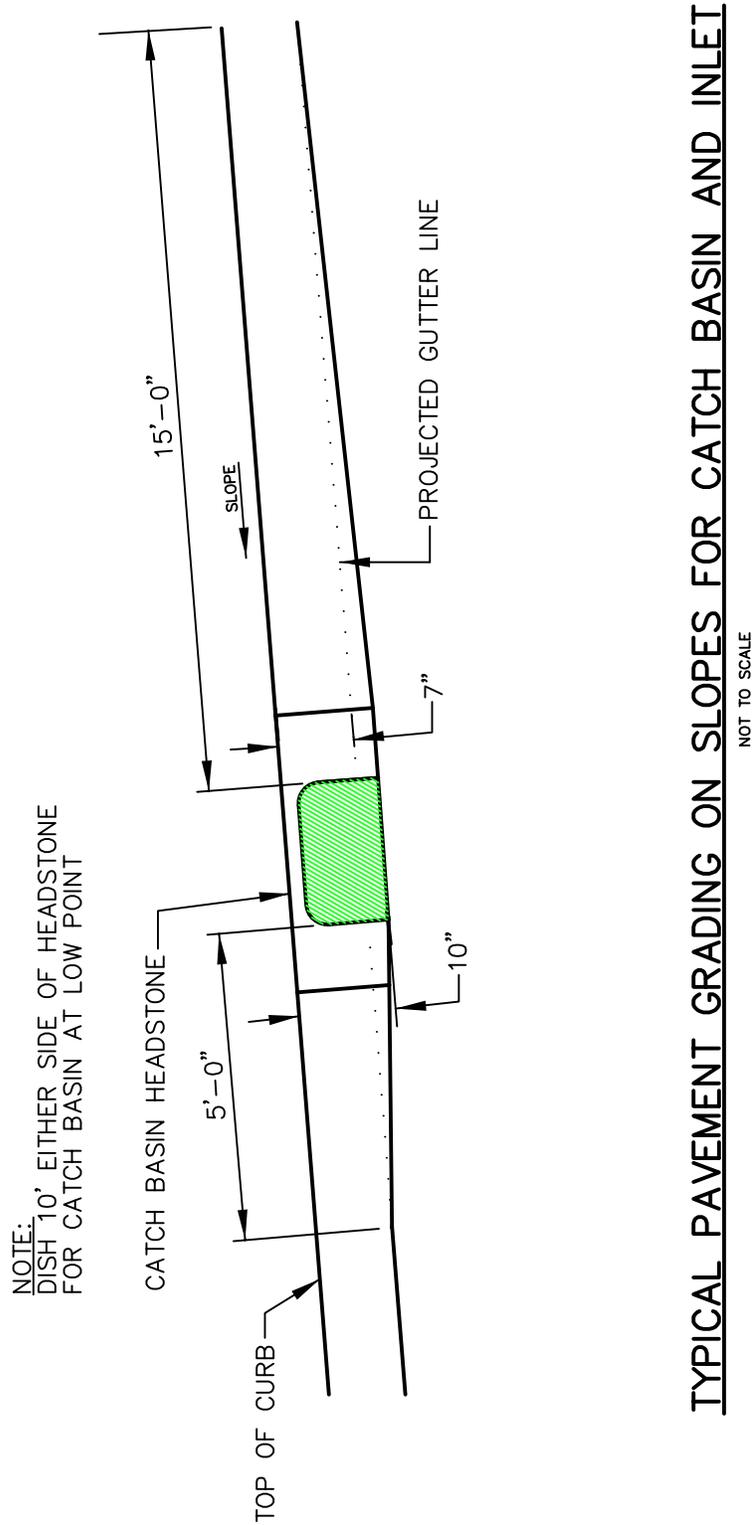
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 SECTION II

FIGURE:

CASCO TRAP

II-9



TYPICAL PAVEMENT GRADING ON SLOPES FOR CATCH BASIN AND INLET

DATE:
 AUGUST 2009
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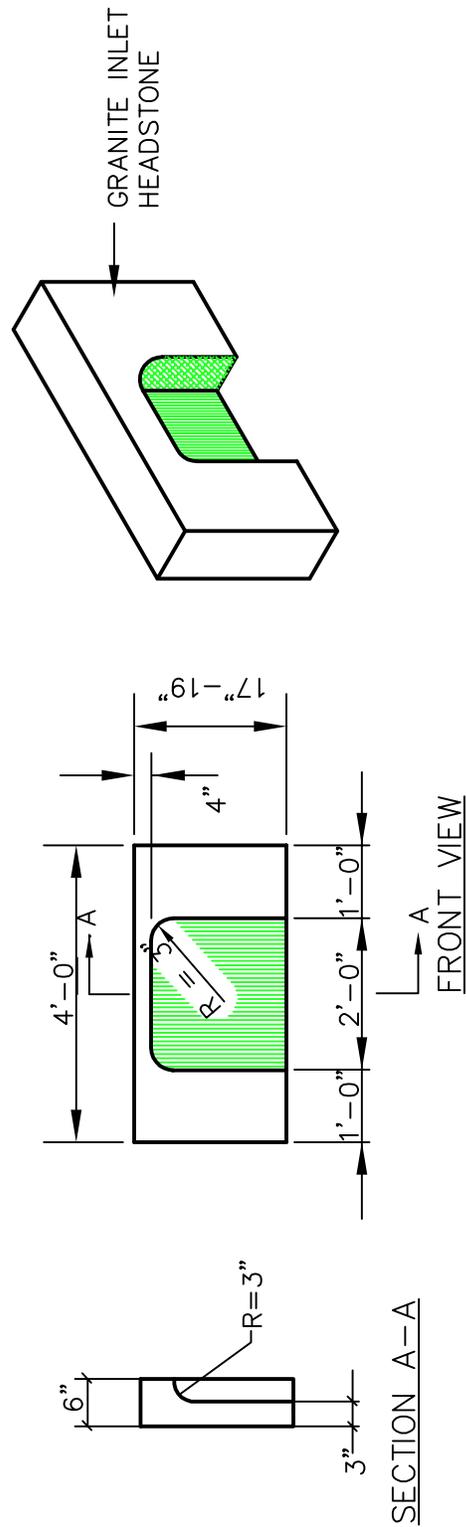
CITY OF PORTLAND, MAINE
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**SANITARY SEWER AND STORM
 DRAIN DESIGN STANDARDS**
 SECTION II

FIGURE:

**TYPICAL PAVEMENT GRADING ON SLOPES
 FOR CATCH BASIN AND INLET**

II-10



4' GRANITE HEADSTONE FOR CATCH BASIN INLET
 NOT TO SCALE

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FIGURE:

4' GRANITE HEADSTONE FOR CATCH BASIN INLET

II-11

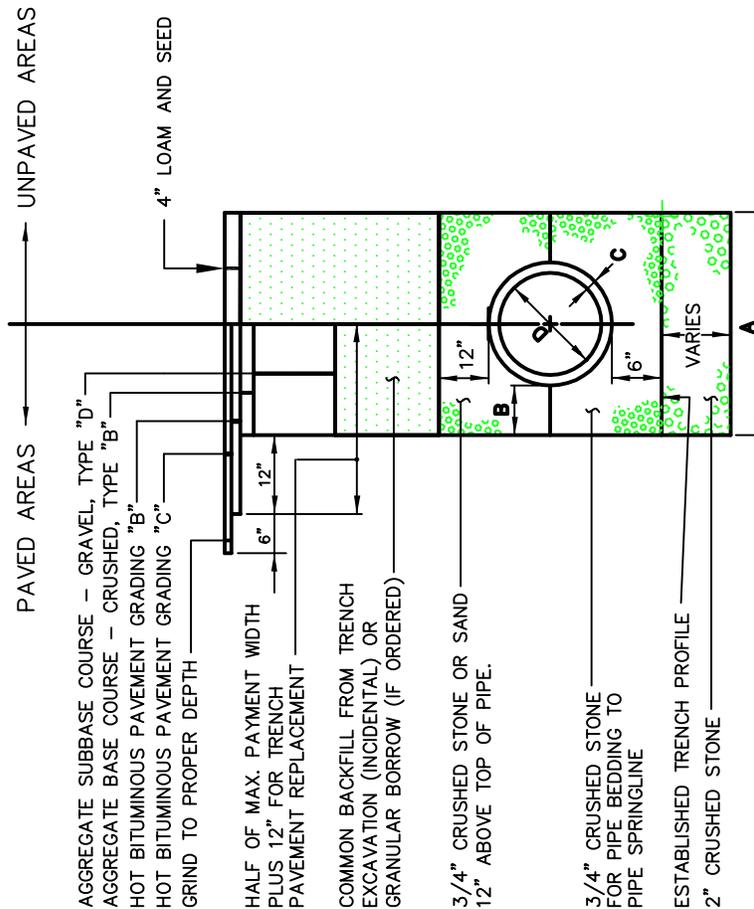
NOTES:

DEPTH OF BITUMINOUS PAVEMENT AND AGGREGATE COURSES SHALL BE DETERMINED BY STREET CLASSIFICATION.

ANY ALTERNATE TRENCHING OR PAYMENT METHODS SHALL BE APPROVED IN ADVANCE BY THE CITY OF PORTLAND, DEPARTMENT OF PUBLIC SERVICES..

NOTES:

1. ALTERNATIVE CONSTRUCTION METHODS OR PAYMENT METHODS SHALL BE APPROVED IN ADVANCE BY THE CITY. IN PAVED AREAS, DEPTHS OF GRAVEL AND HOT MIX ASPHALT PAVEMENT SHALL MATCH THE GREATER OF EXISTING CONDITIONS OR THE REQUIREMENTS FOR THE CORRESPONDING STREET CLASSIFICATION.
2. DIMENSION **B** SHALL BE SUFFICIENT TO ALLOW CRUSHED STONE BEDDING TO BE PLACED AND COMPACTED UNDER THE HAUNCHES OF THE PIPE; BUT IN ALL CASES DIMENSION **B** SHALL BE AT LEAST 9".
3. DIMENSION **A** IS THE MAXIMUM WIDTH ALLOWED FOR CALCULATING PAY QUANTITIES UNDER GRANULAR BORROW, CRUSHED STONE, STRUCTURAL EARTH EXCAVATION, AND STRUCTURAL ROCK EXCAVATION. DIMENSION **A** SHALL BE BASED ON PIPE DIAMETER **D**, AS SET FORTH IN THE FOLLOWING TABLE.



PIPE DIAMETER, D (INCHES)	MAX. TRENCH WIDTH, A (FEET)
4	-
6	-
8	4.0
10	4.0
12	4.0
15	5.0
18	5.0
21	5.0
24	6.0
27	6.0
30	6.0
36	6.0
42	6.0
48	7.0

TYPICAL PIPE TRENCH INSTALLATION

NOT TO SCALE

TYPICAL PIPE INSTALLATION – NOTES

NOT TO SCALE

DATE:
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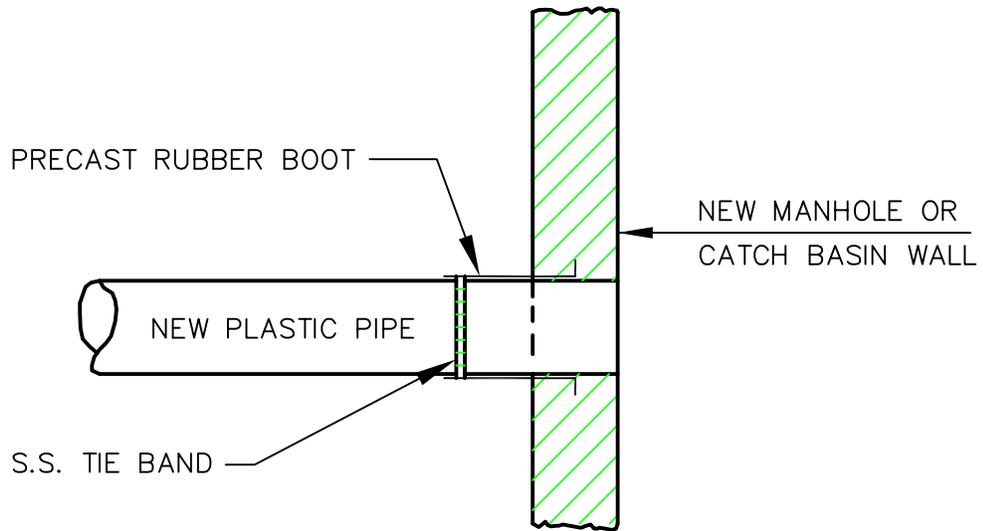
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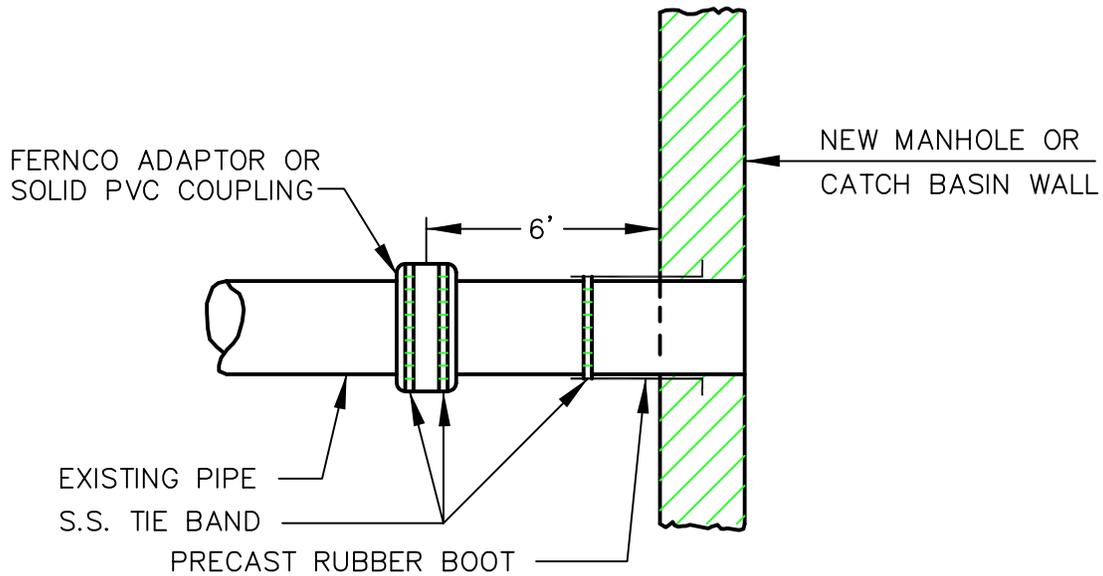
FIGURE:

TYPICAL PIPE TRENCH INSTALLATION AND NOTES

II-12



METHOD 2 — NEW CONSTRUCTION



METHOD 1 — EXISTING PIPE INTO NEW STRUCTURE

PLASTIC PIPE CONNECTIONS

NOT TO SCALE

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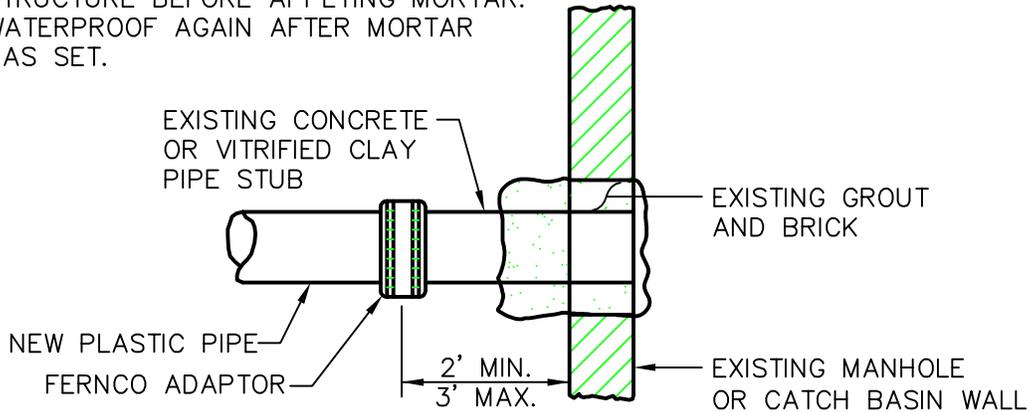
**SANITARY SEWER AND STORM
 DRAIN DESIGN STANDARDS**
 SECTION II

FIGURE:

PLASTIC PIPE CONNECTION METHODS 1 & 2

II-13

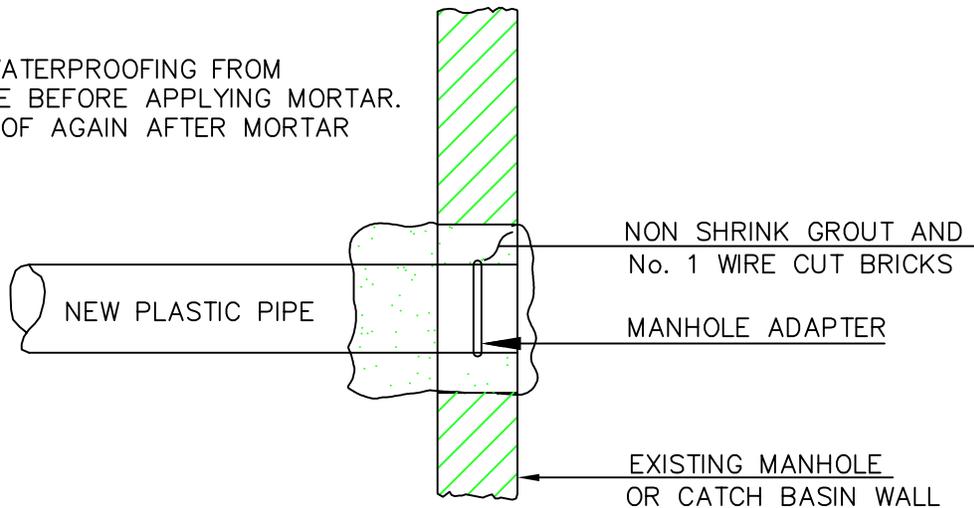
NOTE:
 REMOVE WATERPROOFING FROM
 STRUCTURE BEFORE APPLYING MORTAR.
 WATERPROOF AGAIN AFTER MORTAR
 HAS SET.



METHOD 4 – NEW PIPE TO EXISTING STRUCTURE STUB

NOTE: EXISTING MANHOLE OR CATCH BASIN SHALL BE CORE DRILLED FOR PIPE INSTALLATION. IF PIPE DIAMETER IS SO LARGE THAT CORE DRILLING IS PROHIBITED, THE CONTRACTOR MAY SAW CUT THE STRUCTURE TO CREATE PIPE OPENING. THE NEW OPENING MUST THEN BE SEALED AND WATERTIGHT BOTH INSIDE AND OUTSIDE THE STRUCTURE.

NOTE:
 REMOVE WATERPROOFING FROM
 STRUCTURE BEFORE APPLYING MORTAR.
 WATERPROOF AGAIN AFTER MORTAR
 HAS SET.



METHOD 3 – NEW PIPE INTO EXISTING STRUCTURE

PLASTIC PIPE CONNECTIONS

NOT TO SCALE

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 REVISED:

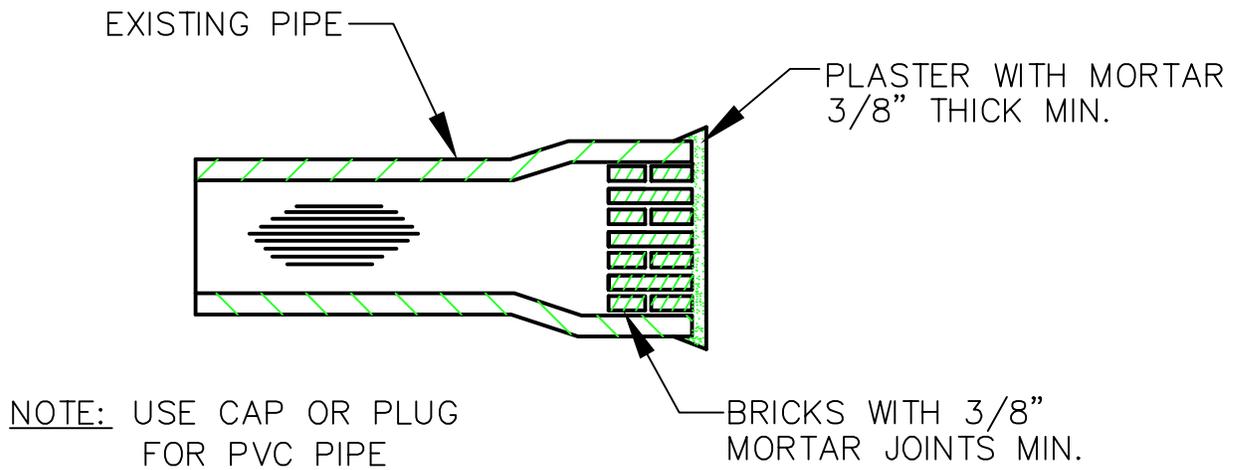
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FIGURE:

PLASTIC PIPE CONNECTION METHODS 3 & 4

II-14



MASONRY PLUG

NOT TO SCALE

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FIGURE:

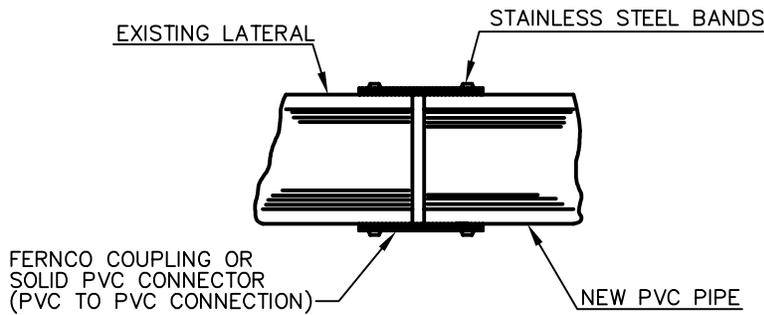
MASONRY PLUG

II-15

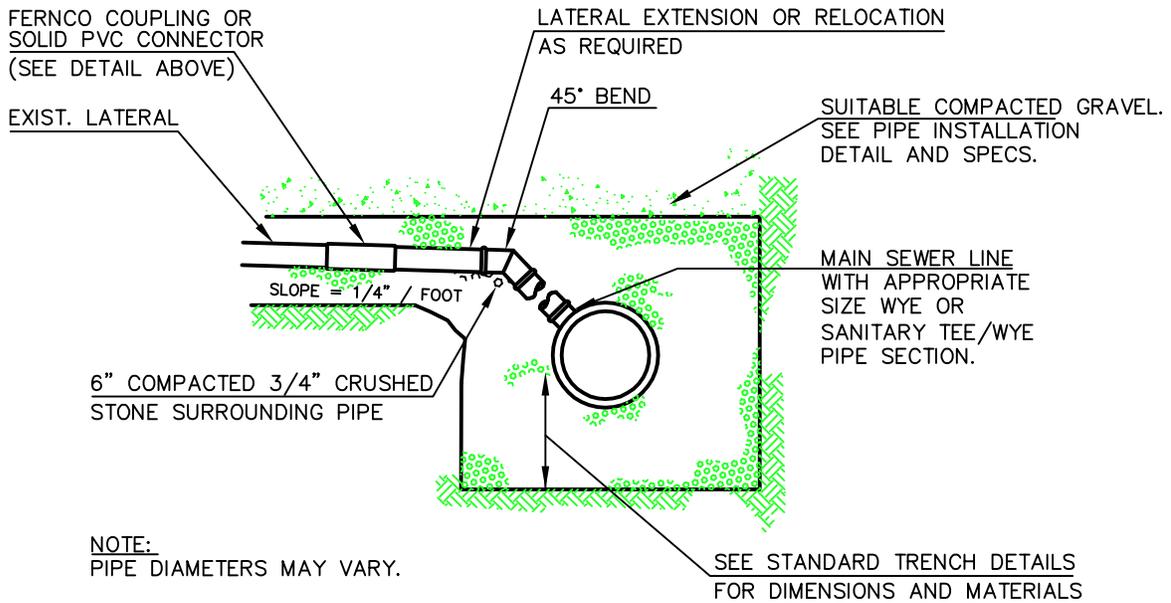
NOTE:

LOCATIONS AND ELEVATIONS OF STUBS SHOWN ON THE PLANS ARE TO BE CONSIDERED AS APPROXIMATE AND MAY BE ADJUSTED AS DIRECTED TO SUIT FIELD CONDITIONS.

HOUSE CONNECTIONS AND CATCH BASINS CONNECTIONS TO THE MAIN LINE OF THE SEWER, SHALL CONSIST OF AN APPROPRIATE "Y" BRANCH CONNECTION AS SHOWN ON THE PLANS, OR AS DIRECTED. ACTUAL "Y" LOCATIONS FOR HOUSE CONNECTIONS AND CATCH BASIN CONNECTIONS SHALL BE DETERMINED DURING CONSTRUCTION. THE CONTRACTOR SHALL KEEP A COMPLETE RECORD OF "Y" LOCATIONS WHICH SHALL BE GIVEN TO THE CITY OF PORTLAND UPON COMPLETION OF THE CONTRACT. ALL PVC TO PVC COUPLING SHALL BE "SOLID PVC COUPLINGS".



FERNCO COUPLING FOR REPAIR OR REPLACEMENT



NOTE:
 PIPE DIAMETERS MAY VARY.

SECTION

TYPICAL EXISTING LATERAL CONNECTION

NOT TO SCALE

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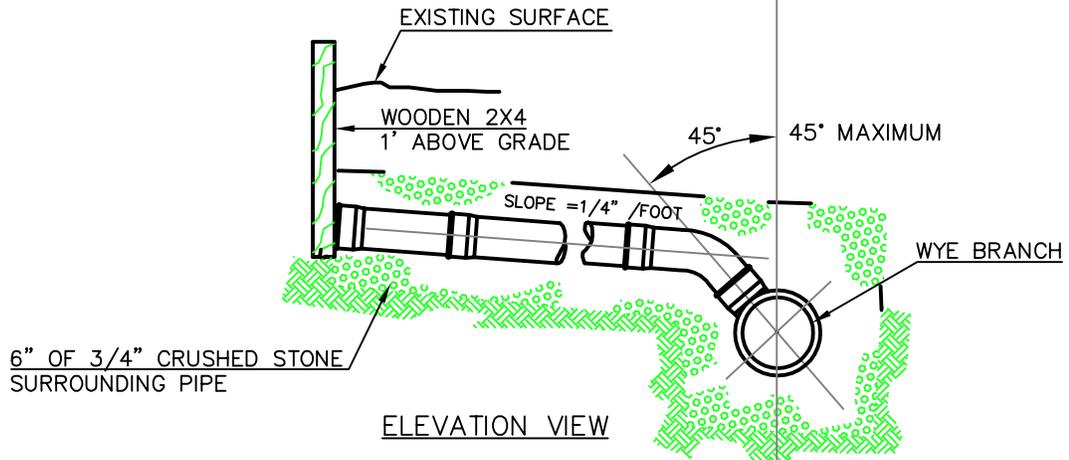
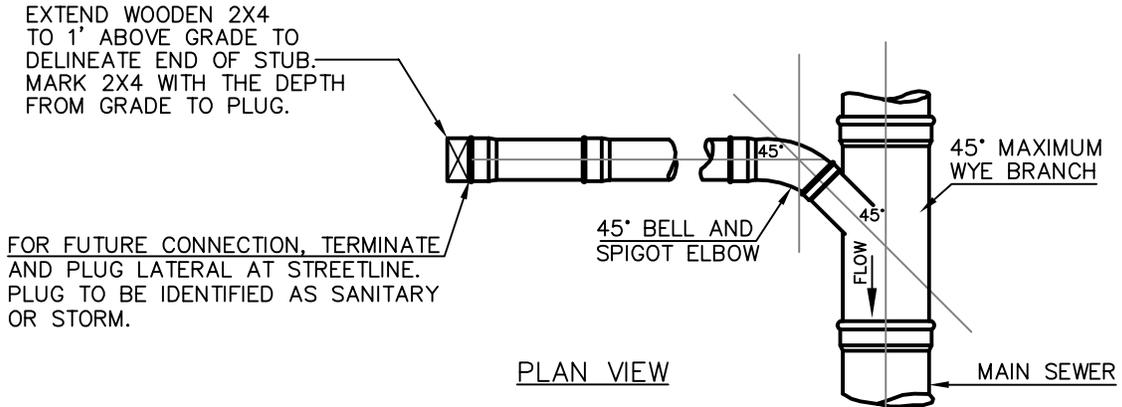
**SANITARY SEWER AND STORM
 DRAIN DESIGN STANDARDS**
 SECTION II

FIGURE:

TYPICAL EXISTING LATERAL CONNECTION

II-16

NOTE:
 LOCATION / WARNING TAPE SHALL BE
 INSTALLED OVER CENTERLINE OF PIPE AT A
 MAXIMUM OF 24 INCHES BELOW FINISH GRADE.



TYPICAL HOUSE LATERAL TEE/WYE CONNECTION
 NOT TO SCALE

DATE:
 AUGUST 2009
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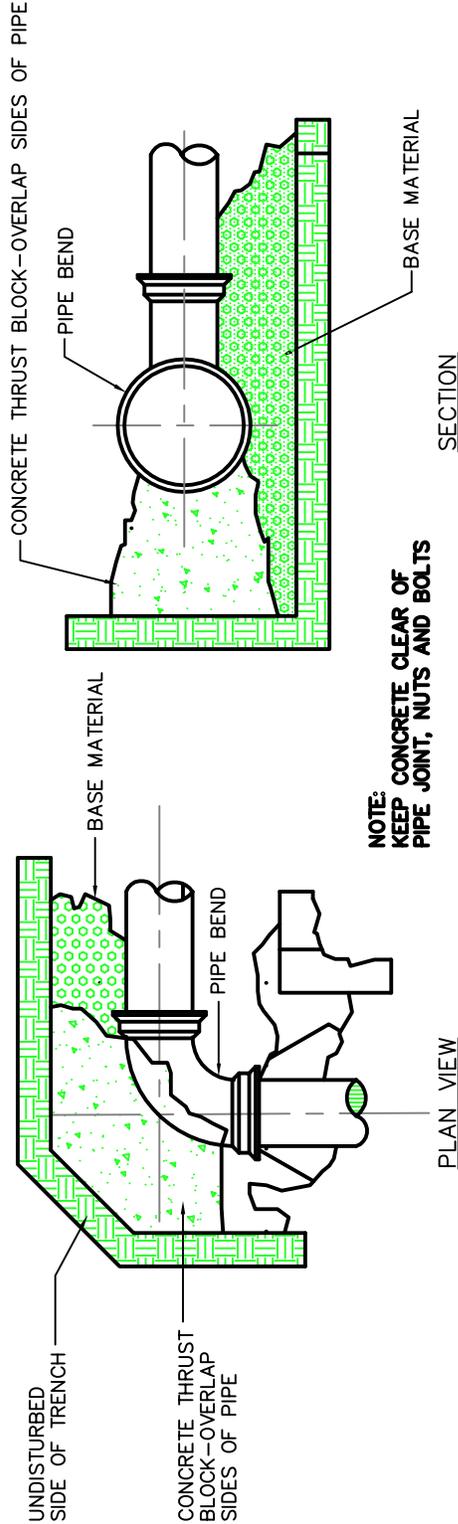
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FIGURE:

TYPICAL HOUSE LATERAL TEE/WYE CONNECTION

II-17



NOTE: CONCRETE CLEAR OF PIPE JOINT, NUTS AND BOLTS

THRUST/RETAINER SCHEDULE	
1/4 BEND (90°)	USE POURED-IN-PLACE THRUST BLOCK w/RETAINERS
1/8 BEND (45°)	THRUST BLOCK w/RETAINERS
1/16 BEND (22 1/2°)	THRUST BLOCK
1/32 BEND (11 1/4°)	THRUST BLOCK

FORCE MAIN - CONCRETE THRUST BLOCK PLACEMENT
ON VERTICAL & HORIZONTAL BENDS
NOT TO SCALE

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 SECTION II

FIGURE:

**FORCE MAIN
 CONCRETE THRUST BLOCK PLACEMENT**

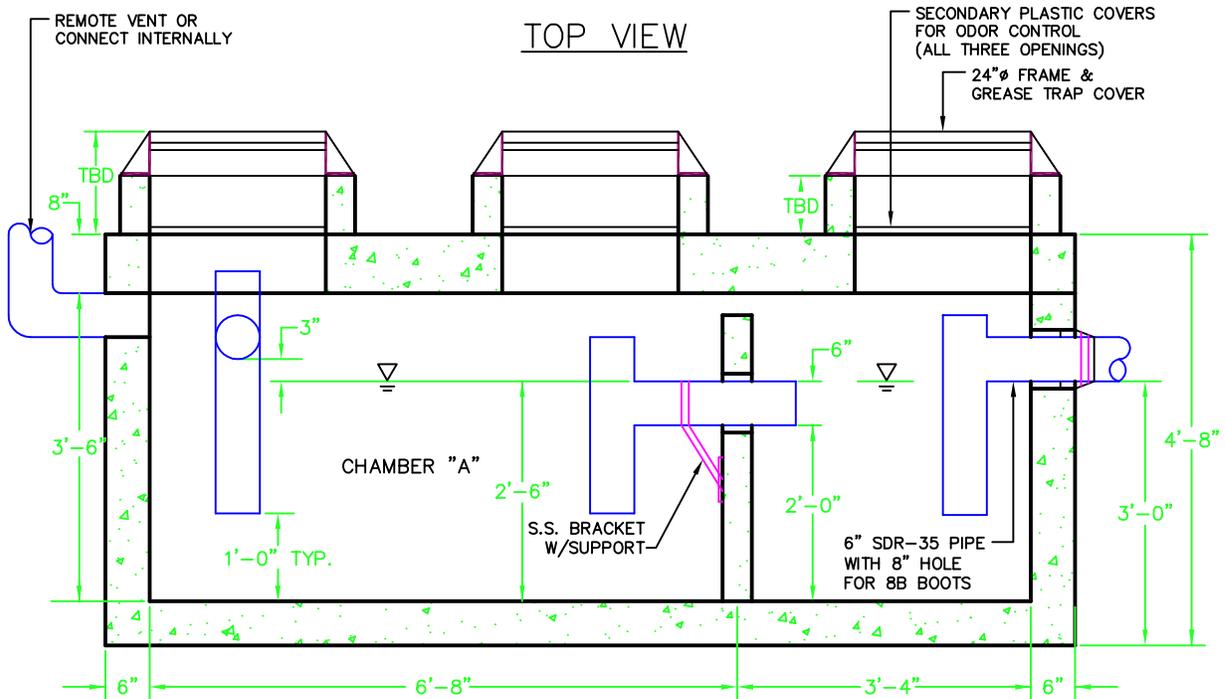
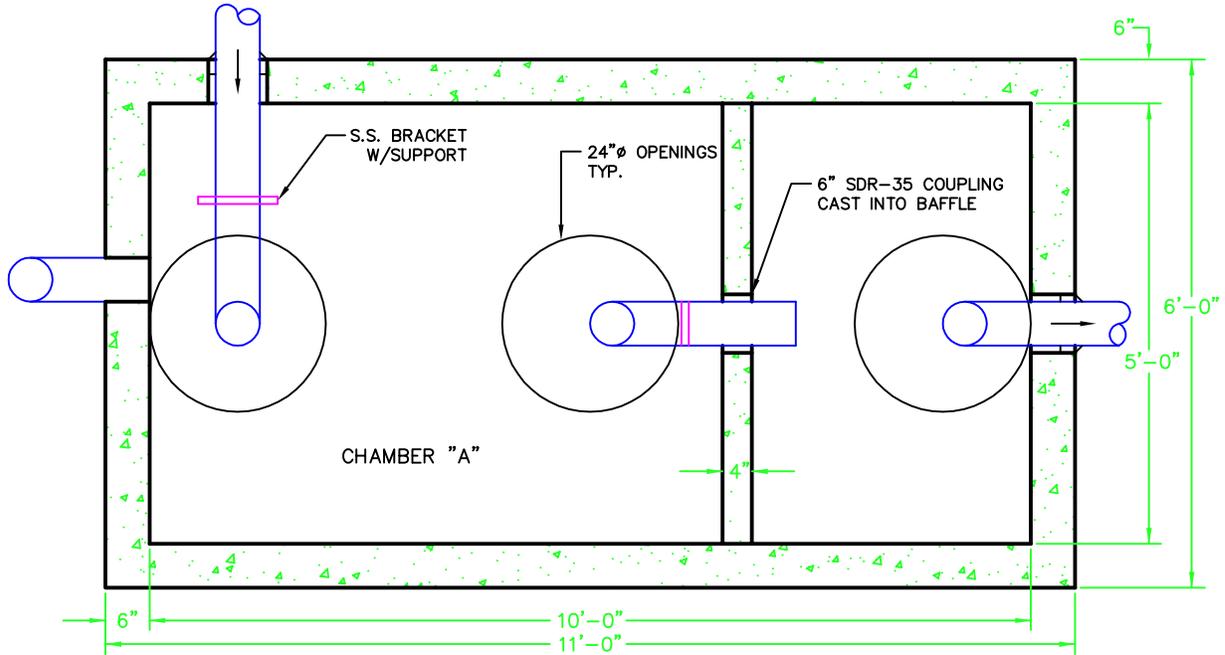
II-18

DESIGN NOTES:

1. CONCRETE 5000 PSI AT 28 DAYS.
2. H-20 LOADING
3. JOINTS SEALED WITH BUTYL RUBBER JOINT SEALANT (ASSHTO M-19)
4. ALL TEES/BAFFLES PROVIDED BY PRECAST.

THIS STRUCTURE MUST DISCHARGE TO A CITY OF PORTLAND STANDARD MANHOLE WITH CHANNEL (CONTROL/SAMPLING MANHOLE).

FORMULA FOR SIZING THE TRAP: CHAMBER "A" (2/3 OF TANK VOLUME) MUST BE EQUIVALENT TO THE AVERAGE DAILY PROCESS FLOW FROM THE FACILITY WITH NO SANITARY OR OTHER EXTRANEIOUS WASTES FLOWING THROUGH IT.



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FIGURE:

EXTERNAL GREASE TRAP DESIGN

II-19

3. PUBLIC SAFETY STANDARDS

3.1. CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED) PRINCIPLES

3.1.1. Natural Surveillance: Site plans shall be designed so that they create formal and informal natural surveillance networks on the site to increase on-site visibility and the safety of legitimate users and to deter potential offenders.

- a. Physical Features – The placement and design of physical features shall maximize visibility to allow for surveillance opportunities to and from site features such as entrances and exits, walkways, assembly areas, corridors, stairways, windows, parking lots, landscaping, fences or walls, and any other physical attributes.
- b. Lighting – The lighting of the site and building shall meet the City’s technical standards for site lighting, as detailed in Section 12 of this manual, and enable users to observe movement and activities on the site during the day and at night. Motion sensor activated lighting is permitted to provide adequate illumination of the site at night while still complying with applicable lighting curfew standards of Section 12 of the Technical Manual. Specifically, the lighting plan should satisfy the following criteria:
 - i. Create nighttime illumination of pedestrian travel paths and gathering areas, entrances and exits, and parking lots and garages by achieving the following:
 - Provide a clear view of an area from a distance and enable anyone moving in or immediately around it to be easily seen.
 - Deny potential hiding spaces adjacent to existing and proposed pedestrian travel routes.
 - Permit facial identification at a distance of at least 30’ and create the perception of being identified.
- c. Mechanical Surveillance Systems – If necessary, mechanical surveillance systems such as CCTV may be installed to monitor areas not easily observed such as parking lots and garages.

3.1.2. Access Management: Site plans shall be designed to provide visible pathways and to offer proper guidance for legitimate users to access the site and to discourage unauthorized use of the site.

- a. Orientation and Wayfinding – The site shall be designed so that the layout, features and/or signage clearly guide the movement of vehicles and pedestrians along safe and predictable paths both during the daytime and nighttime. Specifically, the site plan shall satisfy the following criteria:
 - Placement of signage, lighting fixtures, landmarks, and landscape design features shall clearly guide users to and from the facility.
 - Site features shall be designed to avoid the creation of entrapment zones that afford users no opportunity to escape or retreat from an approaching hazard.
- b. Mechanical Access Control – If necessary, mechanical access control systems may be implemented such as assigning personnel at key building entry points or establishing other procedures such as mechanical auto closing devices, key cards, gates and other locking devices.

3.1.3. **Territorial Reinforcement:** Proposed developments shall be designed to clearly delineate private, semi-private, and public space.

3.2. FIRE HYDRANT STANDARDS

- 3.2.1. All development constructed within the limits of Fire Districts 1 and 2 (as shown in Figure III-1) shall have a hydrant within five hundred (500') feet of all structures. Fire District Number 1 denotes the portion of the city with the highest density requiring increased Fire Department response. Fire District Number 2 denotes concentrations of industrial uses which may have hazardous chemicals on site.
- 3.2.2. All hydrants, private and public, shall comply with city code Chapter 10 and the Portland Water Districts standards.
- 3.2.3. Private hydrants shall be maintained by the property owner. A maintenance agreement, or other documentation if deemed acceptable by the Reviewing Authority, shall be required for all private hydrants. A follow-up will be conducted and a financial penalty will be levied for non-compliance. All compliances shall meet city code Chapter 10, which adopts by reference National Fire Protection Association (NFPA) #1 and #101.

3.3. SINGLE AND TWO FAMILY RESIDENTIAL DEVELOPMENT

- 3.3.3. As of September 16, 2010 all new construction of one and two family homes are required to be sprinkled in compliance with NFPA 13D. This is required by City Code. (NFPA 101 2009 ed.)

3.4. SITE ACCESS STANDARDS

- 3.4.1. Every dead-end roadway more than one hundred fifty (150') feet in length shall provide a turnaround at the closed end. Turnarounds shall be designed to facilitate future street connectivity and shall always be designed to the right (refer to Figure I-5).
- 3.4.2. Where possible, developments shall provide access for Fire Department vehicles to at least two sides of all structures. Access may be from streets, access roads, emergency access lanes, or parking areas.
- 3.4.3. Building setbacks, where required by zoning, shall be adequate to allow for emergency vehicle access and related emergency response activities and shall be evaluated based on the following factors:
- Building Height.
 - Building Occupancy.
 - Construction Type.
 - Impediments to the Structures.
 - Safety Features Provided.
- 3.4.4. Fire Dept. access roads shall extend to within 50' of an exterior door providing access to the interior of the structure.
- 3.4.5. Site access shall provide a minimum of nine (9) feet clearance height to accommodate ambulance access.
- 3.4.6. Elevators shall be sized to accommodate an 80 x 24 inch stretcher.
- 3.4.7. All structures are required to display the assigned street number. Numbers shall be clearly visible from the public right of way.

3.5. STANDARDS FOR EMERGENCY ACCESS LANES AND GATES

- 3.5.1. No inside turning radius shall be less than twenty-five (25') feet.
- 3.5.2. No outside turning radius shall be less than one hundred (100') feet.
- 3.5.3. New emergency access lanes shall be a minimum of sixteen (16') feet wide but may be required to be up to twenty (20') feet wide where one or more of the following conditions occur:
- The access is likely to be used by Fire Department ladder trucks to set up for buildings adjacent to the lane or;
 - The access lane is likely to be used by Fire Department Engine companies to set up pumping operations to fight a fire at buildings adjacent to the lane.

- 3.5.4. Access lanes shall be engineered and maintained to support the weight of emergency vehicles during all weather conditions.
- 3.5.5. Appropriate “No Parking” signs shall be posted in accordance with instructions from the Fire Department having jurisdiction, and a method of enforcing such provisions shall be provided.
- 3.5.6. All gates shall be located a minimum of thirty (30’) feet from the public right-of-way and shall open inward to the site.
- 3.5.7. Fire department personnel shall have ready access to locking mechanisms on any gate restricting access to a fire lane. Proposed changes to access shall be pre-approved by the Reviewing Authority.
- 3.5.8. The clear opening provided through all gates shall be two (2’) feet wider than the traveled way.
- 3.5.9. Blockading of any emergency lane shall be done by gates which are secured by chain and padlock. Padlocks shall be a “Knox” lock.
- 3.5.10. Emergency lanes shall be maintained and made accessible for emergency use at all times. No parking of vehicles or other use that might obstruct the emergency access lane shall be permitted. An access maintenance agreement or other suitable document acceptable to the Reviewing Authority shall be required (please refer to attached model access maintenance agreement at the end of this section).
- 3.5.11. The use of automatic gates such as the “Click2enter” systems requires prior approval from the Reviewing Authority.
- 3.5.12. Reserved

3.6. SUBDIVISION STANDARDS

- 3.6.1. Subdivisions shall comply with the following minimum street access requirements:
- 1-34 units: A single access road.
 - 35-67 units: Two (2) access roads or a single access road and an emergency access lane.
 - 68 or more units: Two (2) access roads.
- 3.6.2. Where residential units are provided with an approved sprinkler system designed to NFPA #13D, the following minimum street access requirements shall apply:
- 1-67 units: One (1) access road.
 - 68-99 units: One (1) access road and an emergency access lane.
 - 100 units or more: Two (2) access roads.

3.6.3. All planned building groups shall meet the requirements of NFPA 1141.

3.6.4. Reserved.

3.7. STANDARDS FOR BLASTING AND REGULATION OF EXPLOSIVES

3.7.1. Definitions

Small Blast: Trench blast or removal of under fifty (50) cubic yards of rock material.

Medium Blast: Removal of 50-300 cubic yards of rock material.

Large Blast: Removal of over 300 cubic yards of rock material.

3.7.2. Submittal Requirements:

3.7.2.1. All Blast Operations:

Applicants for all blasting operations shall obtain a blasting permit from the Planning and Urban Development Department prior to any blasting.

Application forms may be obtained through the Inspections Division or can be downloaded from the City of Portland website.

3.7.2.2. Medium Blast Operations:

For medium blast operations, the blasting contractor will also be required to submit a blasting submittal with the blasting application form. The blasting submittal must include, at a minimum, the following information:

- Description of Test Blast, Drill Pattern
- Description of Production Blasting, Drill Pattern
- Explosives to be used during wet and dry conditions
- Stemming material and depth
- Description of matting used to prevent fly rock
- Description and location of blasting signs
- Type of seismograph to be used
- Description of proposed transportation and storage of explosives
- Signature of blasting contractor testifying to the accuracy of the above information

3.7.2.3. Large Blast Operations:

For large blast operations, the blasting contractor will also be required to submit a drilling pattern and loading plan, referred to herein as a blasting plan, with the blasting application for review and approval. Blasting plans must be submitted at least two weeks prior to the start of any drilling and/or blasting operations. A model blasting plan is provided at the end of this section and shall include, at a minimum, the following information:

- The sequence and schedule of blasting rounds, including a general description of the proposed approach for developing each bedrock excavation area.
- A diagrammatic description of the typical blast pattern to be used, including pre-splitting pattern if pre-splitting is required.

- Diameter, spacing, burden, depth and orientation of each drill hole relative to the “free face”, along with details of the delay pattern.
- A diagrammatic description of the loading plan for a typical production hole including charge weights and distribution of primer, explosives and stemming within a typical hole.
- Estimation of ground vibration levels at nearest adjacent structures.
- Written evidence of the licensing, experience, and qualifications of the blaster who will be responsible for loading and firing each shot.
- A listing of the number and type of instrumentation proposed to be used to monitor vibrations and airblast overpressures.
- Safety procedures, security measures, and warning sequences.

3.7.3. Pre-Blast Survey

Pre-blast surveys are required for all blasting operations. The blasting contractor will hire an independent seismologist or blasting consultant to perform pre-blast surveys on all structures (contingent upon property owner agreement) within the distances specified below. The independent seismologist or blasting consultant shall not be an employee of the contractor, subcontractor, explosives manufacturer, or explosives distributor.

Size of Blast	Scope of pre-blast survey
Small Blast	Within 250 feet of the perimeter of the blasting site
Medium Blast	Within 500 feet of the perimeter of the blasting site
Large Blast	Within 600 feet of the perimeter of the blasting site

3.7.3.1. Pre-Blast Survey Offer Notice:

Prior to commencement of the pre-blast surveys, the contractor shall provide the following documentation to the Planning and Urban Development Department:

- A list of property owners to be contacted (in accordance with the distances listed in the table, above).
- Verification that the subject property owners were notified of the pre-blast survey work.
- A copy of the pre-blast survey offer notice.
- Whether each offer to conduct a pre-blast survey was either accepted, rejected, or there was no response.

The contractor shall retain a copy of each pre-blast survey offer notice for their records until the development project receives a final certificate of occupancy or is otherwise deemed complete by the City. Nothing herein shall be construed to discourage repeated efforts by the blasting contractor to contact eligible property owners via phone, hand delivery, or other method in addition to provision of the required offer notice letter.

3.7.3.2. Pre-Blast Survey Documentation:

All pre-blast surveys shall include documentation of interior subgrade and above grade accessible walls, ceilings, floors, roof and visible exterior as viewed from the grade level. Where significant cracks or damage exist, or for more complex structural defects, photographs or video shall be taken.

A high- quality videotape survey with appropriate audio description of the locations, conditions, and defects may substitute for a written pre-blast survey. Where necessary, notes and sketches may also be submitted as part of a video pre-blast survey in order to highlight or elaborate on certain aspects of the video documentation.

3.7.3.3. Pre-Blast Survey Conditions Report:

The pre-blast surveys shall include a conditions report for each property. The conditions report may be presented as narrative, photographs, video or a combination thereof. Conditions reports shall summarize the condition of each building and define areas of concern, including deteriorated structures or utilities, structures housing sensitive equipment, and/or manufacturing processes that are sensitive to vibrations.

3.7.3.4. Verification:

Verification that all pre-blast surveys and conditions reports have been completed shall be submitted to the Planning and Urban Development Department at least two weeks prior to commencing any drilling and/or blasting operations.

3.7.4. Notification to Neighbors

Notice of blasting operations shall be provided in accordance with the requirements listed in Section VIII of the Land Use Code. For medium and large blasts, please also refer to the additional notification requirements during construction, described in Section 3.7.8 of this section (*Blasting Schedule*).

3.7.5. Complaint Protocol

The blasting contractor shall be solely and completely responsible for the safety of all persons and property during the performance of work. The blasting contractor shall have full and complete responsibility for the handling, discharging, or settling of any and all damage or annoyance claims resulting from the blasting activities on the project.

Complaints may be submitted to the Blasting Contractor and to the Planning and Urban Development Department or to the Fire Department throughout the duration of blasting operations. If a property owner submits a complaint regarding alleged blasting- related damages, the independent seismologist or blasting consultant shall meet with the property owner within 24 hours of receiving the complaint to discuss the basis for the complaint, review applicable blasting

records, and evaluate the reasonableness of the complaint. If a reasonable basis for the complaint is verified, the independent seismologist or blasting consultant shall conduct a second condition survey of the property within 48 hours of receiving the complaint to identify any changes in the property conditions. A condition survey report summary shall be submitted to the Applicant, and verification that the condition survey was completed shall be submitted to the Planning and Urban Development Department within two weeks of the second condition survey being conducted.

3.7.6. Hours of Blasting and Storage of Explosives

3.7.6.1. Hours of blasting operations shall be limited to those defined in Chapter 14, Section VIII, *Regulation of Explosives* of the City Code of Ordinances.

3.7.6.2. Only the amount of explosives necessary for the day’s work shall be brought to the site, and explosives shall be transported and stored in approved magazines when not in use.

3.7.7. Blast Warning

3.7.7.1. International Blast Warnings shall be utilized for all blasting operations, as described below:

3 horns	5 minutes before blast
2 horns	1 minute before blast
1 horn	All clear

3.7.7.2. Large Blasts:

For large blasts, all persons within 600 feet of the blasting area shall be notified of the “warning” and “all-clear” signals through notices left in mailboxes and signs posted in the vicinity of the blasting site.

3.7.8. Blasting Schedule (Medium and Large Blasts, only)

For medium and large blasts, the blasting contractor shall prepare and submit a blasting schedule to the property owner, the general contractor and the Planning and Urban Development Department at least 10 business days prior to commencing blasting operations. The schedule shall include name and contact information for the blasting contractor, blasting area locations, planned dates and times of blasts, access restrictions to the blast areas, and warning signal protocols.

During construction, the blasting contractor shall coordinate the blasting schedule with the property owner, the general contractor, the Planning and Urban Development Department and the Fire Department on a weekly basis.

The morning of a planned detonation, the blasting contractor shall notify the Fire Department and the Planning and Urban Development Department of the planned time of the blast (+/- one hour), the location where the blasting is to occur, and the amount of explosives to be used.

At least 24 hours prior to any blast, the blasting contractor shall inform all property owners who requested notice of the blasting schedule (+/- one hour).

3.7.9. Vibration Limits and Ground Vibration Monitoring

The seismograph must be set up at the closest structure to record each blast event. Ground vibration from all blasting operations shall be measured in terms peak particle velocity (inches per second, ips) and frequency (Hertz). The permissible maximum ground vibration at existing nearby structures shall be limited to values established by the U.S. Bureau of Mines³ to avoid cracking or structural damage in residential structures. Particle velocity shall be recorded in three mutually perpendicular directions. Ground vibration for residential structures shall not exceed the following limits:

Type of Structure	Maximum PPV (ins/s)	
	Frequencies below 40 HZ	Frequencies 40 HZ or greater
Modern Homes (drywall interior)	.75	2.0
Older Homes (Plaster on wood lath for interior walls)	.50	2.0

Deteriorated structures or utilities, structures housing sensitive equipment, and/or manufacturing processes that are sensitive to vibrations may require lower PPV limits than those listed above. If information obtained from the pre-blast surveys indicates lower limits are required for certain structures, the independent seismologist or blasting consultant shall identify the limits applicable to a specific structure, and the blasting contractor shall incorporate such provisions in the features of the blasting plan.

In the event the blasting contractor's blasting round results in ground vibrations closely approaching the stated limits, the blasting operations shall be modified to reduce ground vibrations.

In the event the blasting contractor's blasting round results in ground vibrations exceeding the stated limits at structures, the blasting contractor shall cease all blasting activities and submit a written report to the property owner and the general contractor, copied to the Planning and Urban Development Department and the Fire Department. This report shall describe corrective action to be taken on the next shot. The next shot shall not be loaded until the property owner and the general contractor acknowledge, in writing, copied to the Planning and Urban Development Department and the Fire Department, that a design change is being attempted.

³ United States Bureau of Mines. *Structure Response And Damage Produced By Ground Vibration From Surface Mine Blasting*. Prepared by D.E. Siskind, M.S. Stagg, J.W. Kopp, and C.H. Dowding, Report of Investigations #8507, Appendix B, 1980.

3.7.10. Flyrock Control (Large Blasts, only)

For large blasts, blasting mats, soil, or other equally serviceable material shall be utilized for all blast rounds to prevent the throw of flyrock from the blasting area.

3.7.11. Pre-Blast Safety Meeting (Medium and Large Blasts, only)

For medium and large blasts, prior to any blasting the blasting contractor will conduct a pre-blast safety meeting with all contractors to familiarize them with blast signals and precautions.

3.7.12. Test Blasts (Large Blasts, only)

For large blasts, prior to commencing full-scale blasting, the blasting contractor shall demonstrate the adequacy of the proposed blasting plan by drilling, blasting, and excavating short test sections using small charges and the required monitoring instruments. The blasting contractor shall develop site specific scaled distance relationships from the test blast rounds to determine the allowable charge weight of explosives to be detonated per delay.

3.7.13. Personnel

All employees of the blasting contractor working on site during the blasting operation shall be trained in the use and handling of explosives.

3.7.13.1. Large Scale Blasts:

For large scale blasts, the blasting contractor shall be required to carry liability insurance (XCU) coverage in an amount no less than \$2,000,000.

For large blasts, the blasting contractor shall a company specializing in the use of explosives for breaking rock and licensed in the State of Maine. The blaster or foreman responsible for the loading and firing of each shot, as well as the person responsible for designing and directing the blasting operation, shall have at least five years of documented experience with similar work responsibilities. If controlled blasting methods are required, these individuals shall have at least five years of documented experience in controlled blasting techniques.

At least two weeks prior to the commencement of pre-blast surveys, the contractor will submit the name and qualifications of the independent seismologist or blasting consultant proposed to conduct the pre-blast surveys to the Planning and Urban Development Department and the applicant, if other than the blasting contractor.

At least two weeks prior to the commencement of drilling and blasting operations, the contractor will submit to the City of Portland and applicant the name and qualifications of the independent seismologist or blasting consultant proposed to monitor and report blasting vibrations.

3.7.14. Record Keeping and Reporting

3.7.14.1. For large blasts, Blast monitoring and analysis shall be conducted by the independent seismologist or blasting consultant. A minimum of two (2) seismograph instruments will be used to monitor vibrations and airblast pressures for each blast. The seismographs used by the seismologist or blasting consultant for blast monitoring shall comply with the following requirements:

- Velocity range: 0.005 to 10.0 inches per second.
- Seismic frequency range: 2 to 250 Hz, within zero to -3 dB of an ideal flat response.
- Acoustic frequency range: 2 to 250 Hz flat, -3 dB at 2 Hz \pm 1 dB.
- Sound range: 100 to 140 dB (linear).
- Measure, display, and provide a permanent time history record of the event, including both ground vibration and airblast.
- Measure the three mutually perpendicular components of particle velocity in directions vertical, radial, and perpendicular to the vibration source.
- The seismograph shall display and provide a record of:
 - the date and time of the event
 - identifying information concerning the company
 - the location of the seismograph and of the blast
 - trigger levels
 - verification the instrument was set for “continuous” and not “manual” readings
 - instrument serial number
 - the date of the most recent calibration
- The seismograph shall be calibrated as often as necessary, but at least once every 12 months, and must be performed to a standard traceable to the National Institute of Standards and Technology.

Blast monitoring data obtained by the independent seismologist or blasting consultant must be available for inspection on the blasting site, be submitted in writing to the Applicant within 24 hours following each blast, and be submitted to the Planning and Urban Development Department on a weekly basis. A model blast monitoring report is included at the end of this section.

3.7.14.2. Blasting Log:

A blasting log summarizing details of the round as shot, weather conditions, proximity of the blast location to nearest structures, exact locations of monitoring instruments, and the results of blast monitoring at each instrument location shall be maintained daily for every blast. The blasting log shall be available for inspection on-site, shall be submitted in writing to the Applicant within 24 hours following each blast, and shall be submitted to the City on a weekly basis.

3.7.15. Airblast Overpressure Limits

The peak airblast overpressure at any inhabited building not owned or controlled by the developer shall not be allowed to exceed 133 decibels (linear) when measured by an instrument with a high pass system and a lower frequency limit of 2 Hz.

The seismologist or blasting consultant shall monitor, record, analyze and report airblast pressure resulting from the blasting activities. In the event the blasting contractor's blasting round results in airblast overpressures approaching the stated limits, the Applicant may require the blasting contractor to modify the blasting operations to reduce airblast overpressures. In the event the blasting contractor's blasting round results in airblast overpressures exceeding the stated limits at structures, the blasting contractor shall cease all blasting activities and submit a written report to the Applicant, and copied to the City. This report shall discuss the corrective action to be taken on the next shot, and the next shot shall not be loaded until the Applicant acknowledges, in writing, that a design change is being attempted.

3.7.16. Carbon Monoxide (CO) Control

If any blasting operations are to occur within two hundred and fifty (250) feet of any structure, the blasting company shall:

- Submit a carbon monoxide (CO) management plan to the Planning and Urban Development Department with the Blasting Application for review and approval. The plan shall detail strategies that will be employed by the blasting company throughout blasting operations to prevent and mitigate the health and safety risks associated with possible CO migration away from the blast site and into abutting structures. CO management plans shall be tailored to the specific nature of blasting operations but shall include, at a minimum, two or more of the following actions:
 - Effort to determine the presence and location of one or more operable Carbon Monoxide detector(s) within abutting structures. Where operable Carbon Monoxide detectors are not present, they shall be temporarily provided and placed in the basement of the structure, or on the first floor if there is no basement, until at least 24 hours after completion of blasting operations.
 - Immediate excavation of individual shots, with holes remaining vented for an adequate time to allow any CO produced by the blast to dissipate into the atmosphere. Safe CO levels in the blast hole shall be confirmed by a CO detector before the hole is backfilled.
 - Identify and document active and abandoned sewer connection locations and sealed drains locations for abutting

structures as part of the pre-blast survey in order to identify structures that may pose an increase risk for CO migration. This information is available through the City of Portland Department of Public Services.

- Notify all commercial and residential abutters of the blast site at least 24 hours prior to the start of blasting by means of door hangers left at both front and rear primary building entrances. Reasonable effort shall be made to also provide face-to-face notification to all building owners and/or occupants of abutting buildings. Door hangers shall be provided to the blasting company by the City of Portland and are available through the Fire Department or the Inspections Division. The language provided on the door hanger is provided at the end of this section.

If a carbon monoxide detector is in alarm during blasting operations, the blasting company or building occupant shall call 911 immediately. In addition to calling 911, the blasting company shall contact the Fire Department at (207) 874-8405 to notify them of the emergency. The blast location shall be excavated immediately and shall remain open to the atmosphere until CO is no longer detectable in the blast hole.

3.8. MODEL BLASTING PLAN

Removal of over 300 cubic yards of rock material

The purpose of the Blasting Plan is to describe anticipated rock excavation requirements for the project, and outline proposed blasting operations, vibration control criteria, and monitoring/reporting protocols, and to protect surrounding properties from damage related to proposed blasting activities.

1. Project:

2. Project Location:

3. Estimated Quantity (cubic yards in-ground measurement) of Rock to be Blasted:

4. Project Description

Describe the project for which blasting is required. Include lot size, building construction type, number of units, etc. Refer to site/grading plans. Specify anticipated depth of fills and cuts.

5. Site and Subsurface Conditions

Provide a detailed description of the site, including but not limited to existing conditions, elevations, terrain character, topography, soil conditions, groundwater depths, depth of bedrock, etc.

6. Surrounding Properties, Utilities and Wells

Describe surrounding properties, specifying use and type of construction. Include a vicinity map with the outlines of existing structures located within a site radius equal to the minimum radius required for pre-blast condition surveys.

Indicate the location of all utilities in the vicinity, including water, sewer, stormwater, and natural gas.

Indicate the location of drinking wells in a 2000ft radius of the property.

7. Anticipated Project Areas Requiring Blasting

Indicate on a site plan the areas where blasting is expected to occur. Provide a narrative characterizing the blasting/excavation work, the estimated total number of cubic yards of material to be removed by blasting, and an estimate of the number of blasts required to remove the specified amount of material.

Include a proposed Bedrock Excavation Plan showing approximate bedrock excavation areas, variations in the depth of bedrock excavation requiring blasting, and areas where controlled perimeter blasting methods will be used (if any).

Describe the distance of proposed blasting to the nearest structures and underground utilities.

Attachments:

- A. Site Plan
- B. Radius Plan
- C. Proposed Bedrock Excavation Plan
- D. Model Notification Letter
- E. Model Offer of Pre-Blast Survey Notice
Blasting Log
- F. Model Blast Monitoring Report

3.9. MODEL NOTIFICATION LETTER

Date

Dear Neighbor:

We are sending you this letter to inform you that we will be blasting ledge in preparation for the _____ project on _____ Street.

As required by City Ordinance, prior to any blasting, neighbors within (250, 500, 600)feet of the blast area shall be notified in writing prior to the blast.

We will begin blasting on _____. We expect the blasting to last for _____. By City Ordinance, blasting will occur between 9:00am – 4:00pm, Monday through Friday.

The procedure for the blast will be as follows: Just before the blasting is due to begin, a horn will sound to signal people in the immediate area of the upcoming blast. The horn will blow in the following sequence:

- 3 long horns – 5 minutes before the blast
- 2 long horns – 1 minute before the blast
- 1 long horn - All clear for the blast to proceed.

Please Note: Toxic gases, including carbon monoxide (CO), are a byproduct of the detonation of explosives. Carbon monoxide is a poisonous, colorless, odorless, and tasteless gas. Exposure to raised levels of carbon monoxide can be hazardous or deadly. It is possible, in instances of incomplete combustion of explosives and where an open pathway is present, for carbon monoxide to travel from the blast site into nearby buildings. The Portland Fire Department encourages all Portland residents to install carbon monoxide detectors in their homes and workplaces to prevent exposure to hazardous levels of carbon monoxide. Carbon monoxide detectors should be installed in the basement or on the first floor of structures.

If you have any questions, please call any of the following numbers:

Blasting Contractor _____

City of Portland Fire Prevention Bureau	(207) 874-8405
City of Portland Development Review Coordinator	(207) 874-8719
City of Portland Inspections Division	(207) 874-8703

For damage complaints, please call the Fire Prevention Bureau at (207) 874-8405 to log the complaint and request inspection and documentation of the damage.

Please do not hesitate to call if you have any questions or concerns.

Sincerely,

Blasting Contractor

3.10. MODEL OFFER OF PRE-BLAST SURVEY NOTICE

Date

Dear Neighbor:

We are sending you this letter to inform you that we will be blasting ledge in preparation for the _____ project on _____ Street.

As required by City Ordinance, prior to any blasting, a pre-blast survey of all structures within (250, 500, 600)feet of the blast area shall be conducted to establish a base line against which any claims of damage caused by this blasting can be judged.

Your property is within the (250, 500, 600) ft radius. A pre-blast survey will be performed at no cost to you if you would like to have it done.

To request that a pre-blast survey be done of your residence, please complete the enclosed survey form in its entirety and mail it back in the enclosed stamped envelope no later than_____.

Pre-blast condition surveys for this project will be performed by _____. A representative from _____ will call you to set up an appointment to perform the survey. A seismologist or a qualified technician working under the direction of a seismologist from _____ will then make a videotape of the interior and exterior condition of your residence. The pre-blast survey records will be kept in a locked file for a period of _____after the completion of blasting at which time they will be destroyed.

If you have any questions, please contact _____ at _____.

Thank you,

Blasting Contractor

3.11. Door Hanger Model Language

Fact Sheet

This notice serves as a reminder that blasting operations will be occurring in your neighborhood in the next day or two. By now you should have also been notified in writing by the Blasting Company who will be doing this work. For the public's safety, the City of Portland requires contractors of blasting operations to monitor for the release of any carbon monoxide gas traveling into occupied buildings. This notice describes what carbon monoxide is, identifies potential signs of carbon monoxide build-up and steps for you to follow.

What is carbon monoxide?

Carbon monoxide (CO) is an odorless, colorless gas that can cause sudden illness or death.

Where is CO found?

CO is found in combustion fumes, such as those produced by cars and trucks, small gasoline engines, stoves, lanterns, burning charcoal and wood, and gas ranges and heating systems. **CO is also a byproduct of blasting operations in the ground.** CO from any of these sources can build up in enclosed or semi-enclosed spaces. People and animals in these spaces can be poisoned by breathing it.

Protection from CO

The best protection from CO poisoning is early detection through the installation of a working carbon monoxide detector in your home.

What are the symptoms of CO poisoning?

The most common symptoms of CO poisoning are headache, dizziness, weakness, nausea, vomiting, chest pain, and confusion. High levels of CO inhalation can cause loss of consciousness and death. Unless suspected, CO poisoning can be difficult to diagnose because symptoms mimic other illnesses. People who are sleeping or intoxicated can die from CO poisoning before ever experiencing symptoms.

Emergency Contact

If you or anybody in the building experiences any of the symptoms or your CO detector goes into alarm ***please call 911 immediately.***

If you have general questions regarding blasting operations in your neighborhood or carbon monoxide, please contact the Portland Fire Department Fire Prevention Bureau.

**Portland Fire Department
Fire Prevention Bureau
380 Congress Street
Portland, ME 04101
874-8405**

3.12. MODEL EMERGENCY ACCESS LANE MAINTENANCE AGREEMENT

IN CONSIDERATION OF the Subdivision approval granted by the Planning Board of the City of Portland to a plan entitled

dated _____, 20____ and recorded in the Cumberland County Registry of Deeds in Plan Book _____, Page _____ and pursuant to a conditions thereof,

 (Applicant, Nature of Applicant’s Business-Corporation, Partnership or sole proprietorship and principal of business)

The owner of the subject premises, does hereby agree, for itself, its successors and assigns (the “Owner”) as follows:

1. That the Owner shall be responsible for the maintenance and repair of, snow removal from, preservation of, and removal of obstructions and encumbrances including but not limited to debris, junked vehicles and other refuse, from the Emergency Access Lane depicted on the Plat (the “Emergency Access Lane”) so that the Emergency Access Lane shall remain reasonably passable for fire-fighting and preventive apparatus and vehicles and other public emergency vehicles owned or operated by or on behalf of the City of Portland.

2. That the Owner shall remove snow from Emergency Access Lane so that at no time shall the snow accumulate thereto to an average depth in excess of four (4) inches and shall also remove snow from the Emergency Access Lane of a depth of less than four (4) inches if subsequent rain, hail or temperatures below thirty-two (32°) degrees Fahrenheit shall result in the snow accumulated on the Emergency Access Lane becoming so frozen as to render the Emergency Access drive impassable by such fire-fighting and public emergency vehicles. If the Owner shall fail to remove such non-frozen snow accumulating in excess of four (4) inches in depth within twenty-four (24) hours after the cessation of the storm creating such snow, or if the Owner shall fail to remove such ice within twenty-four (24) hours after ice has accumulated or formed to the state as to render the Emergency Access Lane impassable for said purposes, or if the Owner shall fail to remove said obstructions and encumbrances on the Emergency Access Lane (that are not the result of precipitation) which render the Emergency Access Lane (that are not the result of precipitation) which render the Emergency Access Lane impassable for said purposes within thirty-six (36) hours after such obstructions and up the Emergency Access Lane and adjacent land as necessary with men and machines in order to plow and clear, or cause to be plowed and cleared, such snow and ice and to remove said obstructions and encumbrances from the Emergency Access Lane and bill the Owner for the expense of the same. The City of Portland shall submit its itemized bill for such expenses to the Owner which the Owner shall pay to the City of Portland within sixty (60) days of receipt, or such longer period of time as the City of Portland shall agree to. The expenses billed to the Owner shall include the time spent for travel to and from the Property.

This Agreement shall bind the undersigned only so long as it retains any interest in said premises, and shall run with the land and be binding upon its successors and assigns as their interests may appear.

Date at Portland, Maine this _____ day of _____, 20____

(Applicant)

BY _____

Its

State of Maine

Cumberland, ss _____, 20

Then personally appeared the above named _____,
and acknowledged the foregoing instrument to be his free act and deed in his said capacity, and the free
act and deed of said Corporation.

Before me,

Notary Public/Attorney-at-Law

(Print or Type Name)

*If the approval is of a site plan, this clause should read “IN CONSIDERATION OF THE SITE
PLAN APPROVAL granted by the Planning Board of the City of Portland to a site plan entitled _____,
dated FORMTEXT _____, 20 _____, and file with the City of Portland, Department of Planning and
Urban Development, 389 Congress Street, Portland, Maine,…”

4. LANDSCAPING AND LANDSCAPE PRESERVATION STANDARDS

4.1. DEFINITIONS:

Rare tree specimen: A tree that is (1) of a species classified as rare or endangered at either the state or federal level and/or (2) included in the most current version of the Maine Register of Big Trees, published by the Maine Department of Conservation.

4.2. PRESERVATION OF SIGNIFICANT SITE FEATURES

The applicant shall clearly identify all significant natural features on the site, as defined in Section 14-526 of the City Code, on the submitted boundary survey and site plan, and shall clarify the proposed measures for the preservation and protection of all such features both during and after construction.

4.3. PRESERVATION OF EXISTING VEGETATION

- 4.3.1. The applicant shall provide a tree survey performed by a licensed land surveyor, arborist, forester, or landscape architect. The tree survey shall clearly indicate forest type and the location, size and species of all existing trees 10" DBH or greater on the site. For sites with a high density of existing trees, the survey shall identify all existing shade and ornamental trees that may have been part of a prior landscape scheme for the site and the location, average size and species of groves of trees, and of individual trees greater than 16" DBH.
- 4.3.2. Trees or groups of trees to be preserved shall be inspected and approved by the City Arborist or their designee and shall be clearly identified on the Site Plan, Subdivision Plat, Landscape Plan and Grading Plan. Where required by the reviewing authority, property deeds shall include language and plans to help ensure that current and future landowners are aware of all preservation requirements tied to the property. The grading plan shall clearly indicate any proposed grade changes within the drip line of trees designated for preservation.
- 4.3.3. Tree Preservation efforts shall include posting of 'Tree Protection Zones' or 'Limit of Work Zones' in the form of obvious signage.
- 4.3.4. Fencing or other protective barriers shall be erected outside the drip line of individual, groupings of or perimeter trees to be preserved.
 - No storage of construction equipment, digging, trenching or other soil disturbance shall be permitted within the drip-line of trees to be preserved.
 - Areas of trees or other vegetation to be preserved shall not be used for temporary stormwater runoff storage during construction.

- Protective barriers and signage shall remain in place until completion of the project.

During the pre-construction meeting and prior to the onset of any construction including site work, the Department of Public Services or their designee shall inspect all installed protective barriers.

4.3.5. Tree preservation locations and measures to protect preserved vegetation shall be identified or noted in detail on the Landscape Plan and cross-referenced on the Site Plan, Subdivision Plat and Grading Plan.

4.3.6. Upon completion of the project, plant material that has been designated for preservation shall be subject to the maintenance and inspection requirements outlined in this section. Preserved vegetation and new plantings that show signs of construction damage within a one year period following construction, including but not limited to bark damage or excessive root damage, grade changes other than those originally indicated in the approved grading plan, soil compaction due to heavy equipment traversing closely, or general decline due to mechanical or natural conditions shall be rejected and must be replaced prior to the release of any defect guarantee. Any rejected tree will be subject to the following replacement requirements:

- For every existing tree rejected that is 16" or more in caliper DBH, two (2) replacement trees listed on the City of Portland approved native species list shall be planted on the site.
- For every existing tree rejected that is between 10" and 15" in caliper DBH, one (1) replacement tree listed on the City of Portland approved native species list shall be planted on the site.

4.3.7. The developer shall be responsible for making all contractors aware of preservation requirements prior to any construction activities. See specification IV-2 for typical tree preservation detail.

4.4. Reserved.

4.5. SITE LANDSCAPING:

4.5.1. All Landscape Design:

Site landscaping should result in attractive, low-maintenance outdoor spaces that incorporate site definition and screening and support biodiversity.

4.5.2. Screening and Buffers:

Where required, buffer areas shall be comprised of existing trees and vegetation, new landscaping or a combination thereof to create a dense, mixed buffer

incorporating both understory and tree canopy layers. While primarily of benefit from a ground level pedestrian viewpoint, such screening should also effectively provide screening when viewed from upper floors of surrounding properties, where applicable. New shrubs shall be approximately three (3) feet in mature height and shall be spaced 6-8 feet apart. Specification IV-3 provides an example of buffering between compatible uses.

Buffers between contrasting land uses may incorporate earthen berms not exceeding 4:1 slope, opaque fencing, masonry wall or a combination thereof, in addition to landscape plantings. Where fencing or masonry wall is proposed as part of a buffer, less landscaping density is acceptable; however, buffers shall still include trees, shrubs and other vegetation.

Landscaped buffers within the site shall complement and enhance and structures and site amenities, provide screening between structures, and buffer undesirable views from general public areas, from existing structures and from residents of proposed units. Accessory site elements such as parking and loading areas, utility structures, dumpsters, storage areas and other hardscaped or unvegetated areas, shall be located and screened from view from public areas and adjacent properties. Screening shall be accomplished with opaque fencing of high architectural quality, masonry wall and/or dense evergreen landscaping. Where fencing or masonry wall is proposed as part of a buffer, less landscaping density is acceptable; however, buffers shall still include trees, shrubs and other vegetation. Specification IV-7 provides an example of screening of accessory site elements.

4.5.3. Industrial and Commercial Development:

In addition to other requirements of the City Code and of this section, industrial and commercial developments shall incorporate landscaping that:

- Enhances proposed buildings with foundation plantings in the vicinity of public entrances to all buildings and in areas with uninterrupted or predominantly blank facades (Illustration VI-5 provides an example of interior site landscaping for commercial and industrial sites).
- Defines roadways and driveway entrances.

4.5.4. Planned Residential Unit Development (PRUDs):

Required trees to be planted and/or preserved shall separate and screen proposed buildings and separate and screen proposed recreational uses. Where cul de sacs are provided, landscaping consisting of native or adapted low maintenance vegetation shall be provided. See Illustration VI-4 for typical cul de sac landscaping.

4.5.5. Parking Areas:

Landscaping shall be incorporated into the development of surface parking to reduce adverse environmental and aesthetic impacts, to shade pavement to reduce heat island effect and to screen parking areas from public view. Plant materials shall be selected for appearance, durability, and tolerance to salt. Illustrations VI-6a and

VI-6b provide examples of parking lot screening.

Landscaping that abuts areas of vehicular use shall be adequately protected and separated from vehicles. Protection should be in the form of curb stops, continuous curbing or guardrails. Curbing and guardrails shall be designed with adequate visibility and durability in order to withstand normal snow plowing operations.

4.5.6. Snow Storage:

Snow storage areas shall not encroach on areas designated to meet minimum parking requirements but may be located in landscaped areas provided that appropriate landscape materials are selected which can withstand such snow storage. Snow storage shall not be located where it would adversely impact the functionality of bioretention or other stormwater management systems.

4.5.7. Walls and Fences:

Fences and walls within public view must be of high architectural quality. Chain link and wire mesh fences shall be vinyl coated, dark in color, out of direct public view and shall be complimented with landscaping.

- For residential development, chain link fence shall be a minimum of 6-gauge fence fabric.
- For commercial or industrial development chain link fence shall be 9-gauge fence fabric mounted on schedule 40 pipe posts.

Electrified or barbed fencing is not permitted. Masonry walls shall be constructed of stone, brick or other durable and attractive materials. Concrete block walls are not permitted except where variety in color, design and detailing of the materials are of high architectural quality.

4.5.8. Slope Stabilization:

Stabilization of slopes between 5% and 50% shall incorporate installation of a mixture of vegetation, organic mulch and/or erosion control mix.

Stabilization of slopes greater than 50% must incorporate biotechnical and/or structural methods including but not limited to terracing rip rap or retaining walls in addition to vegetation. Retaining walls, if four (4) feet in height or greater from the bottom of the footing to the top of the wall and/or if supporting a surcharge, must be designed by a licensed engineer and require a City of Portland Building Permit.

4.5.9. Low Impact Development (LID) Practices:

It is the City's policy to encourage Low Impact Design (LID) strategies and practices to capture and infiltrate stormwater runoff. LID is the process of developing land to mimic the natural hydrologic regime. It incorporates land planning and design practices and technologies to achieve this goal. LID is also discussed in Section V of this Technical Manual.

- 4.5.10. LID strategies and practices relating to site landscaping requirements include but are not limited to bioretention, grassed filter strips, green roofs, rain gardens and vegetated swales.

4.6. STREET TREES:

Arrangement and spacing of trees proposed in the City Right of Way shall be coordinated with the Portland City Arborist or their designee. If it is determined by the City Arborist that there is not adequate space or conditions for street trees in the public right of way or if there is a conflict between the location of proposed street trees and the location of existing or proposed underground utilities, the required number of street trees shall be provided on private property within 10 feet of the property line along the street frontage. Tree species shall be selected according to the City of Portland recommended tree list (Figure IV-1). Trees proposed in the sidewalk shall be planted with approved tree grates, as shown in figure IV-6.

4.6.1. Residential Development:

Single-family residential: Single-family residential developments shall provide a minimum of two (2) street trees per unit, planted in the City right of way unless otherwise approved and spaced twenty-five (25) to thirty-five (35) feet on center.

Multi-family residential: Multi-family residential developments shall provide a minimum of one tree per unit, planted in the City right of way unless otherwise approved and spaced thirty (30) to forty five (45) on center.

Single-family residential subdivisions: Single-family residential subdivisions shall provide a minimum of two (2) trees per lot, planted in the City right of way unless otherwise approved and spaced thirty (30) to forty five (45) feet on center.

Standards for Manufactured Housing: Where manufactured housing is proposed within traditional single family subdivision or within a manufactured housing park, landscaping for such housing shall comply with the standards as set forth in Section 14-499.5 of the City Code- Additional Requirements for Manufactured Housing Parks.

Where a single family, single component manufactured house is sited in a residential zone, landscaping and street tree requirements shall correspond to the standards for single-family residential development of the City Code and of this section.

- 4.6.2. Planned Residential Unit Developments (PRUDs): Where a manufactured housing park or subdivision is also a planned residential unit development (PRUD), the development shall provide a minimum of two (2) street trees per unit, planted within 8-10 ft of the City right of way and/or private roadway proposed as part of the development.

- 4.6.3. Commercial, Industrial and Institutional Development: Commercial, industrial and institutional developments shall provide street trees thirty (30) to forty five (45) feet apart on center in the City right of way along all street frontages unless otherwise approved.

4.7. PLANT SELECTION:

- 4.7.1. All trees and shrubs shall comply with the standards set forth by the American Standard for Nursery Stock (ANSI Z60.1 - 2004). These standards are available through the Department of Public Services and at <http://anla.org/index.cfm?area=&page=Content&categoryID=260>
- 4.7.2. All trees and shrubs shall be nursery grown, healthy, free of disease and insect pests, and shall have a well developed and compact root system. Plant material showing signs of a lack of proper nursery care or a lack of pruning or cultivation, or which is not true to name will be classified as collected stock regardless of its source and shall be rejected.
- 4.7.3. Proposed and shrubs installed as part of the landscaping plan shall be comprised of at least 50% native species.
- 4.7.4. The developer shall be responsible for preventing the spread of existing or the introduction of new invasive species on the site, as identified below. If, within one (1) year following construction, invasive species are identified on the site or if such species are pre-existing on the site but are determined to have spread by the City Arborist, the applicant shall be required to implement appropriate control measures prior to the release of the defect guarantee. Accepted mechanical and chemical control methods are provided by the Maine Natural Areas Program (MNAP) of the Maine Department of Conservation in their Invasive Plant Fact Sheets (available through the Department of Public Services and through the MNAP program website: <http://www.maine.gov/doc/nrimc/mnap/features/invasives.htm>).

The following plant species are recognized as invasive species that are characteristically adaptable, aggressive, and have a high reproductive capacity. (1) Asiatic Bittersweet (*Celastrus orbiculata*); (2) Autumn and Russian Olive (*Elaeagnus umbellata* and *Elaeagnus angustifolia*); (3) Black Swallowwort (*Cynanchum louiseae*); (4) Brazilian Waterweed (*Egeria densa*); (5) Common and Glossy Buckthorn (*Rhamnus cathartica* and *Frangula alnus*); (6) Common Reed (*Phragmites australis*); (7) Eurasian Milfoil (*Myriophyllum spicatum*); (8) Fanwort (*Cabomba caroliniana*); (9) Garlic Mustard (*Alliaria petiolata*); (10) Hydrilla (*Hydrilla verticillata*); (11) Japanese Barberry (*Berberis thunbergii*); (12) Japanese Honeysuckle (*Lonicera japonica*); (13) Japanese Knotweed (*Fallopia japonica*); (14) Japanese Stilt Grass (*Microstegium vimineum*); (15) Lesser Celandine (*Ranunculus ficaria*); (16) Mile-a-Minute Weed (*Polygonum perfoliatum*); (17) Morrow and Tartarian Honeysuckle (*Lonicera morrowii* and *Lonicera tartarica*); (18) Multiflora/Rambler Rose (*Rosa multiflora*); (19) Porcelainberry (*Ampelopsis*

brevipedunculata); (20) Purple Loosestrife (*Lythrum salicaria*); (21) Variable-Leaf Milfoil (*Myriophyllum heterophyllum*); (22) Water Chestnut (*Trapa natans*); (21) Norway Maple (*Acer platanoides*) (23) Yellow-flag Iris (*Iris pseudacorus*).

- 4.7.5. Trees selected from the Recommended Tree List of this Section shall conform, at a minimum, to the sizes specified on the list.
- 4.7.6. All upright deciduous and evergreen shrubs shall be a minimum of 3 feet tall at mature height. All spreading evergreen and deciduous shrubs shall be a minimum of 2-2.5 feet in width at maturity.
- 4.7.7. Ground covers planted in lieu of grass shall be planted at a level of coverage equivalent to one complete growing season. Grass areas shall be planted with Kentucky Bluegrass (*Poa pratensis*), Red Fescue (*Festuca rubra*), Tall Fescue (*Festuca arundinacea*) or Perennial Ryegrass (*Lolium perenne L.*). Rolled turf, erosion reducing net or suitable mulch along with landscaping shall be used in swales or other areas subject to erosion. Mulching material shall be a minimum of three (3) inch deep wood chip or bark mulch.
- 4.7.8. Inorganic mulches are not permitted.
- 4.7.9. No plantings used to satisfy City landscaping requirements shall be comprised of inorganic materials.
- 4.7.10. Landscaping, earth moving and grading activities shall be performed according to standards accepted good planting and grading procedures and in accordance with the approved Site Plan, Subdivision Plat, Grading Plan and Landscape Plan.
- 4.7.11. No plant shall be moved after the bud break unless so authorized by the City Arborist or their designee. Planting periods are between April 1st and to July 1st and/or September 1st and November 1st. Landscaping which cannot be installed prior to issuance of a Certificate of Occupancy shall be subject to a performance guarantee according to Section 14-526 of the City Code.
- 4.7.12. Tree planting and other landscaping for subdivisions that cannot be installed prior to release of the performance guarantee must be insured by a defect bond as described in Section 14-50 of the City Land Use Code.
- 4.7.13. All bare soil areas shall be vegetated and/or mulched prior to the issuance of a Certificate of Occupancy.

City of Portland Recommended Tree List									
Common Name	Botanical Name	Cultivars	Street-Tree	Native	Uses	Notes:			
Small Trees - (Mature Height < 25')									
1 Hedge Maple	Acer campestre	"Queen Elizabeth"	X		St				
2 Paperbark Maple	Acer griseum				O				
3 "Rocky Mtn Glow" Maple	Acer gridentatum	"Rocky Mtn Glow" Maple		X	N	Smaller in size than native Sugar Maple good for naturalizing in shaded areas			
4 Striped Maple	Acer pennsylvanicum		X		S/O	Interesting bark, good Fall color			
5 "Three-flower" Maple	Acer triflorum		X	X	N/O				
6 Serviceberry	Amelanchier spp.	"Cumulus", "Robin Hill Pink"			St				
7 European Hornbeam	Carpinus betulus	Upright forms available	X		St				
8 American Hornbeam	Carpinus caroliniana		X	X	St				
9 Kousa Dogwood	Cornus kousa	Many cultivars			O				
10 Thornless Cockspur Hawthorn	Crataegus crusgalli inermis		X		St				
11 Winter King Hawthorn	Crataegus viridis "Winter King"				N/O				
12 "Leprecaun" Ash	Fraxinus pennsylvanica		X		St				
13 Amur Maackia	Maackia amurensis		X		St	Single-stem			
14 Flowering Crabapple	Malus x	"Sa gent", "Spring Snow", "Donald Wyman"	X		St	"Spring Snow" - fruitless variety			
15 Magnolia	Magnolia spp.	Many cultivars			O				
16 Hop-Hornbeam	Ostrya virginiana			X	N	Tolerates shade / understory			
17 Sourwood	Oxydendrum arboreum			X	O				
18 Sargent Cherry	Prunus sargentii		X		O				
19 Japanese Tree Lilac	Syringa reticulata "Ivory Silk"		X		St				
20 Korean Stewartia	Stewartia koreana				O				
21 "Wireless" Zelkova	Zelkova Serreta - "Wireless"		X		St				
Medium Trees 25' > 45'									
1 River Birch	Betula nigra			X	O/N				
2 Yellow Birch	Betula lenta			X	O/N				
3 Hackberry	Celtis laevigata		X		St				
4 Shagbark Hickory	Carya ovata			X	N	Low availability / good native plant:			
5 Yellowwood	Cladrastis kentukea		X		S/O				
6 Turkish Filbert	Corylus colurna		X		St				
7 Katsurates	Cercidiphyllum japonicum		X		O/St				
8 Korean Mtn. Ash	Sorbus alnifolia		X		S/O				
9 Thornless Honeylocust	Gleditsia triacanthos var. inermis	"Skyline", "Halka"	X		St				
10 Corktree	Phellodendron amurense		X		St				
11 English Oak	Quercus robur	Up-right / Columnar Varieties	X		St				

DATE:
AUGUST 2009

CITY OF PORTLAND, MAINE
TECHNICAL STANDARDS MANUAL

STDS FOR LANDSCAPING AND
PRESERVATION OF EXISTING
VEGETATION
SECTION IV

FIGURE:

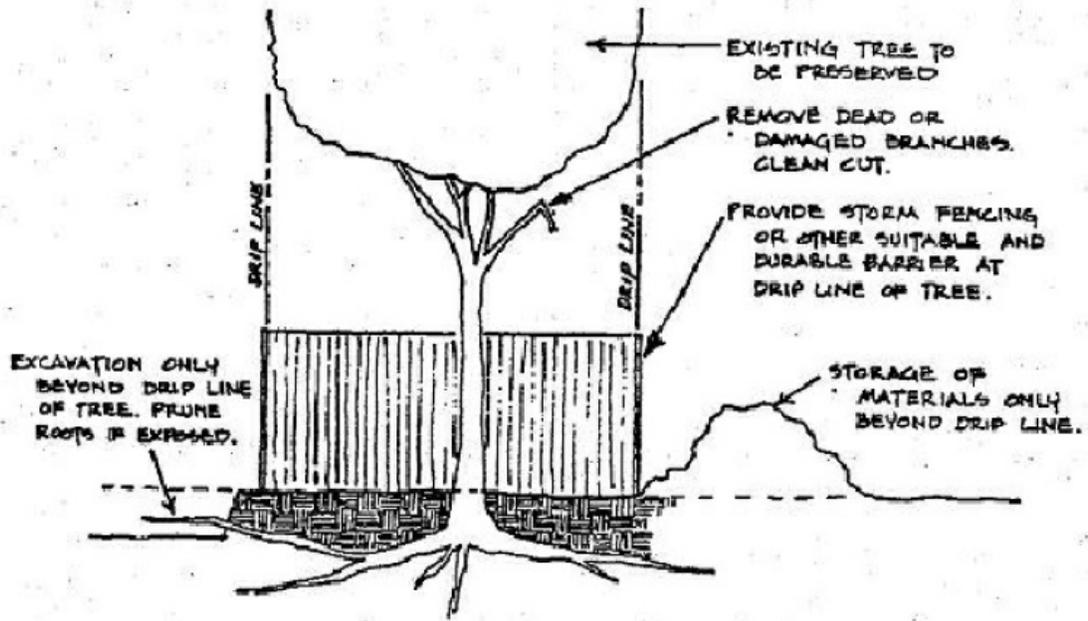
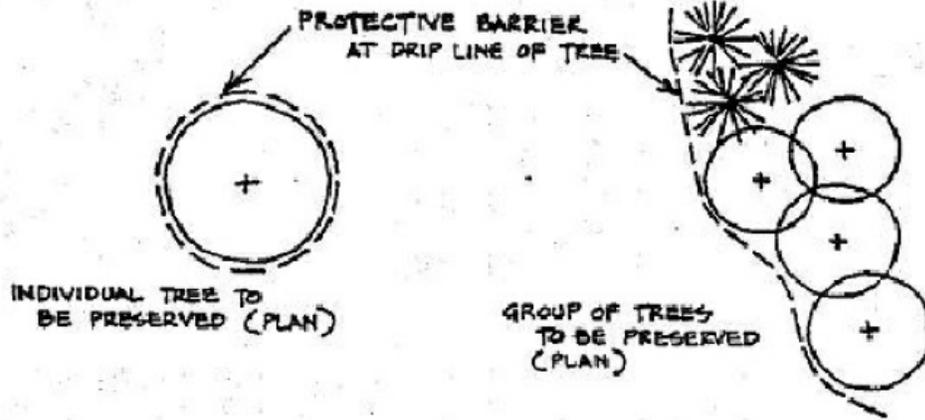
IV-1A

REVISED:

RECOMMENDED TREE LIST- PAGE 1

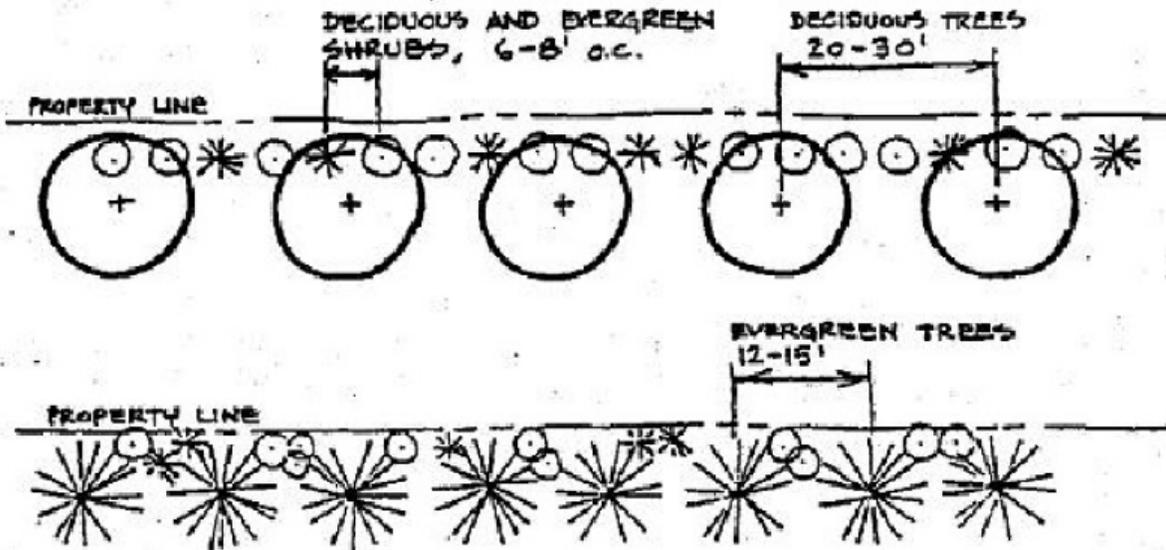
Large Trees 45'+ Common Name	Botanical Name	Cultivars	Street-Tree	Native	Uses	Notes:
1 Red Maple	Acer rubrum	"Karpick", "Red Sunset", "Armstrong", Upright	X	X	St	
2 Sugar Maple	Acer saccharum	"Green Mountain"		X	N	
3 Northern Catalpa	Catalpa speciosa		X		St	
4 American Beech	Fagus grandifolia			X	N	
5 European Beech	Fagus sylvatica				O	
6 White Ash	Fraxinus americana	upright	X	X	St	
7 Green Ash	Fraxinus pennsylvanica	"Patmore", "Summit"	X	X	St	
8 Gingko	Ginkgo biloba	"Mygal", "Autumn Gold"	X		St	
9 Cucumber Magnolia	Magnolia acuminata				O	
10 Tuliptree	Liriodendron		X		St	
11 White Oak	Quercus alba		X	X	N	
12 Swamp White Oak	Quercus bicolor		X	X	St	
13 Pin Oak	Quercus palustris	"Green Pillar"	X		St	
14 Chestnut Oak	Quercus prinus			X	N	Tolerates wind, rocky soil
15 Red Oak	Quercus rubra		X	X	St/N	
16 American Elm	Ulmus americana	"Vallisy Forge", "New Harmony", "Princeton"	X	X	St	
17 Lacebark Elm	Ulmus parvifolia		X		St/O	Interesting bark
18 Zelkova	Zelkova serrata "Green Vase"		X		St	
Conifers						
Common Name	Botanical Name	Cultivars	H'	Native	Uses	Notes:
1 Norway Spruce	Picea abies		80			
2 White Spruce	Picea glauca		60	X		
3 Red Spruce	Picea		60	X		Not widely available, native spruce
4 Atlantic Whitecedar	Chamaecyparis thyoides		35	X		
5 Red Cedar	Juniperus virginiana		15	X		
6 Eastern Larch or Tamarack	Larix laricina		50	X		Deciduous, loses needles in Fall
7 Japanese Larch	Larix kaepferi		40			Deciduous, loses needles in Fall
8 Metasequoia or Dawn Redwood	Metasequoia glyptostroboides		60			Deciduous, loses needles in Fall
9 Swiss Stone Pine	Pinus cembra		20			Sow growing stays small
10 Bosnian Pine	Pinus heldreichii		20			Sow growing stays small
11 Red Pine	Pinus resinosa		60	X		
12 Pitch Pine	Pinus rigida		40	X		
13 "Vanderwolf Pyramid" Pine	Pinus flexilis		50			Interesting blue needles, upright
14 Serbian Spruce	Picea omorika		45			Upright / good for narrow locations
15 White Cedar	Tuja occidentalis	"Darc American", "Tschny"	25	X		Can be pruned into hedge
16 Concolor Fir	Abies concolor		50			Silver blue needles
17 Balsam Fir	Abies balsamea		35	X		Christmas tree

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	STDS FOR LANDSCAPING AND PRESERVATION OF EXISTING VEGETATION SECTION IV	FIGURE:
REVISED:			IV-1B
RECOMMENDED TREE LIST- PAGE 2			

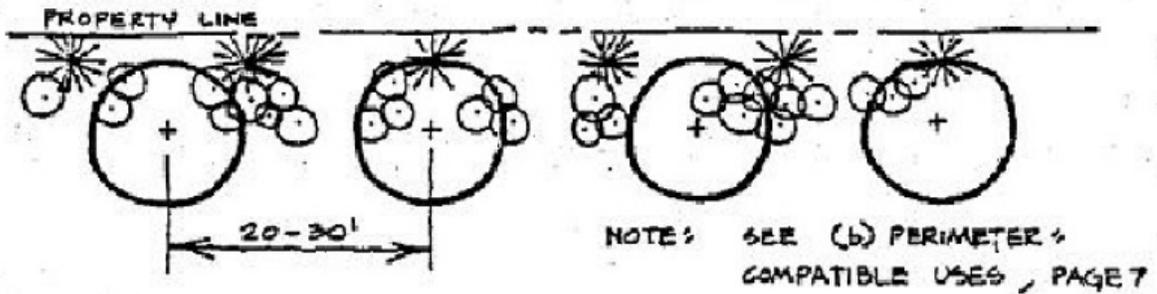


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<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>STDS FOR LANDSCAPING AND PRESERVATION OF EXISTING VEGETATION SECTION IV</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>TREE PRESERVATION DETAIL</p>		<p>IV-2</p>



A. Commercial/Industrial Screening



NOT TO SCALE

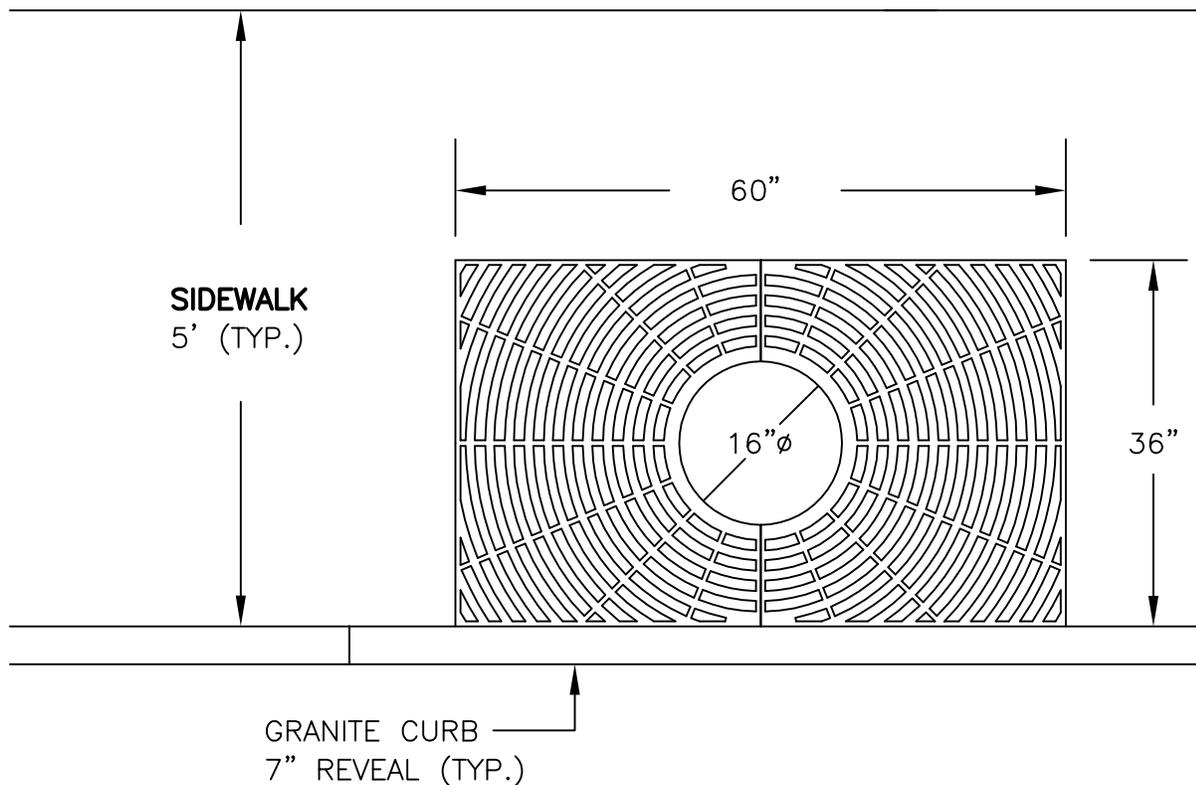
DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	STDS FOR LANDSCAPING AND PRESERVATION OF EXISTING VEGETATION SECTION IV	FIGURE:
REVISED:	LANDSCAPING BETWEEN COMPATIBLE USES		IV-3

NOTES:

16"Ø EXPANDABLE TREE OPENING. 0.25" SLOT OPENINGS.

SIDEWALK MATERIAL PER CITY SIDEWALK MATERIAL POLICY.

WHEN THE TREE GRATE IS INSTALLED IN A CONCRETE SIDEWALK, A NOTCH MUST BE INSTALLED ALONG THE EDGE TO HOLD THE GRATE, WHEN INSTALLED IN A BRICK SIDEWALK IT REQUIRES A FRAME TO BE INSTALLED TO HOLD THE GRATE IN PLACE.



PLAN VIEW

EXPANDABLE TREE GRATE
NEENAH MODEL R-8810

NOT TO SCALE

<http://www.nfco.com/literature/TreeGrateCatalog22/Avenue.pdf>

DATE:
MARCH 2011

REVISED:

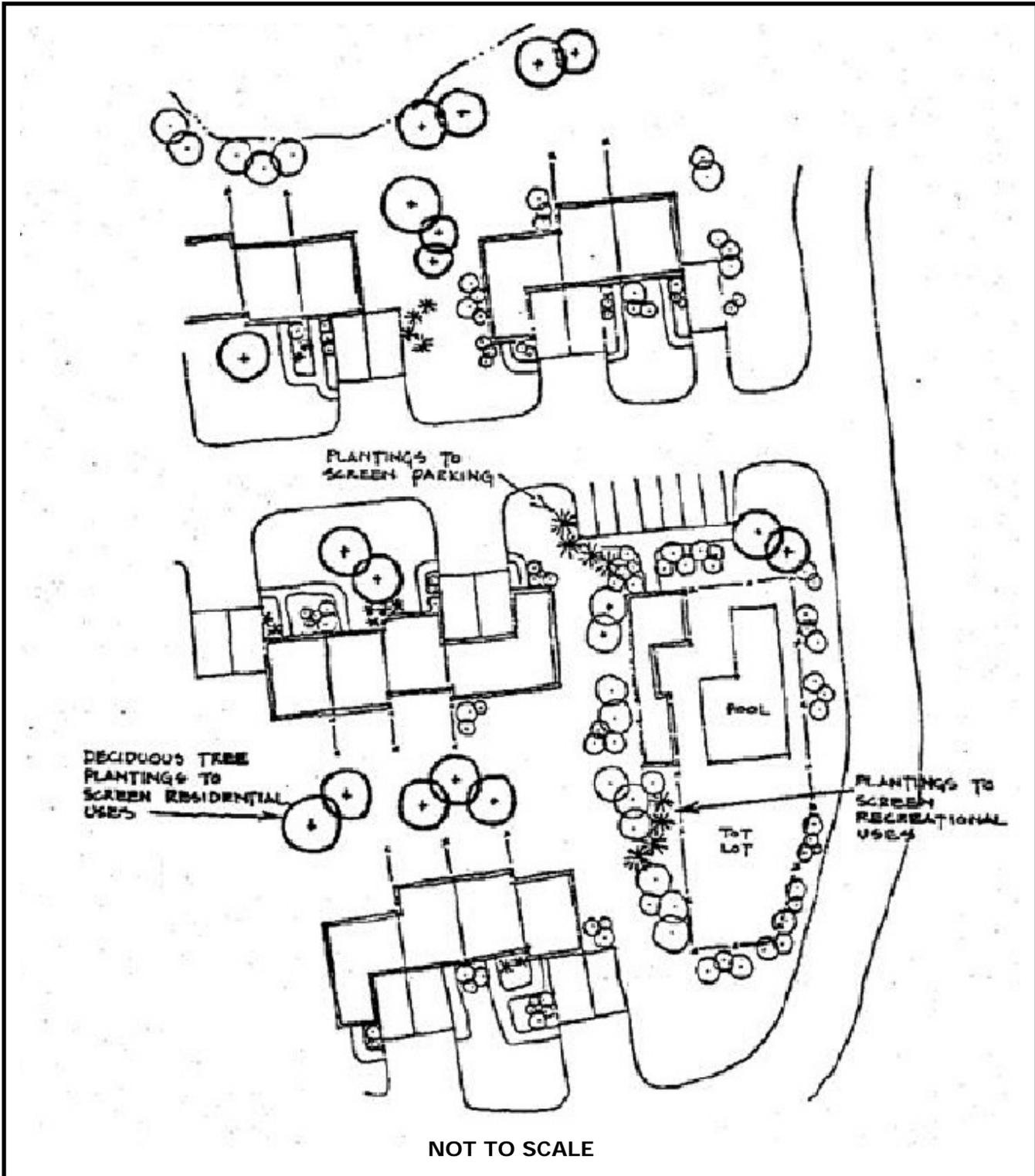
CITY OF PORTLAND, MAINE
 TECHNICAL STANDARDS MANUAL

**STDS FOR LANDSCAPING
 AND PRESERVATION OF
 EXISTING VEGETATION**
 SECTION IV

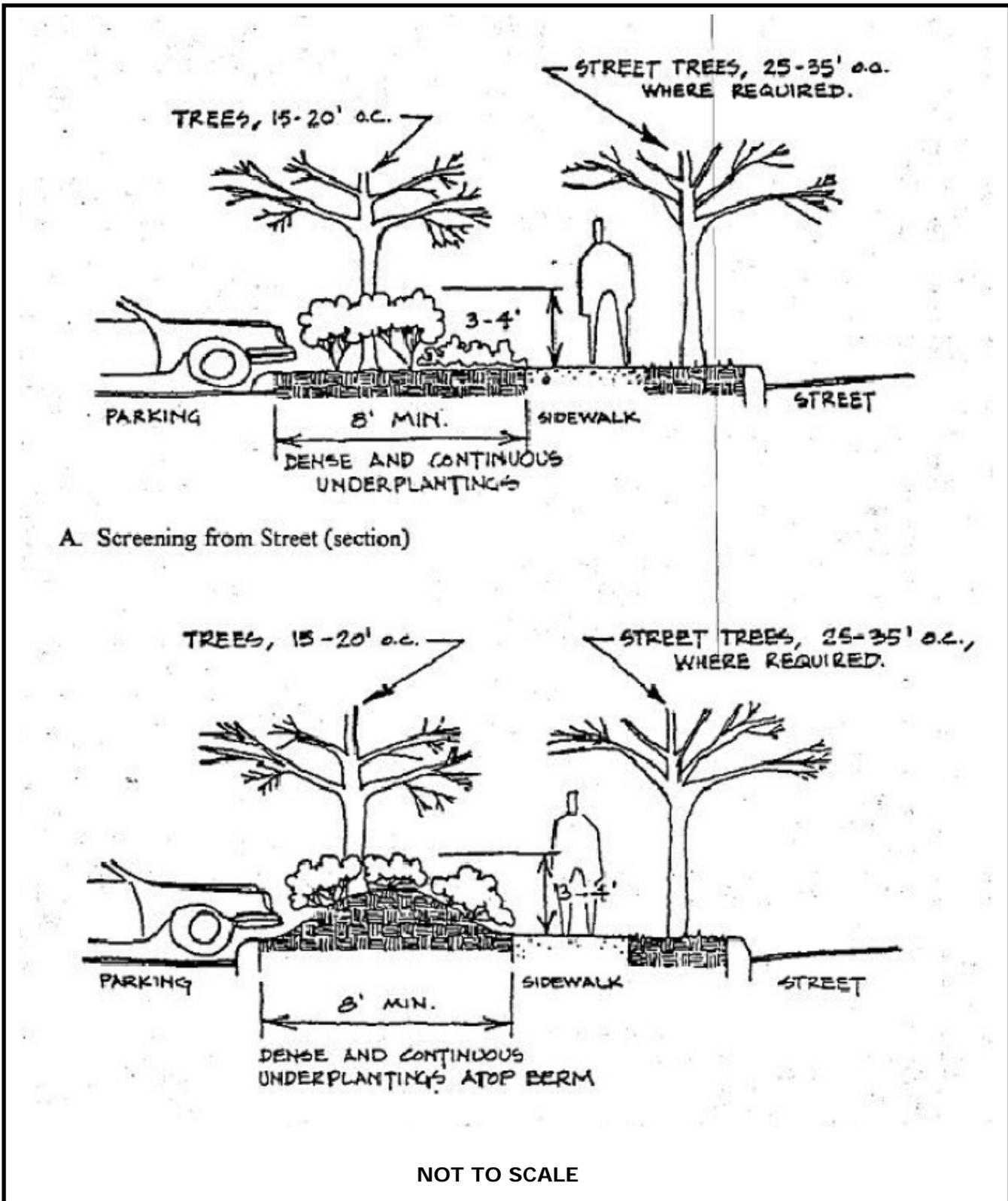
FIGURE:

**EXPANDABLE TREE GRATE FOR
 NARROW RESIDENTIAL URBAN STREETS**

IV-4A



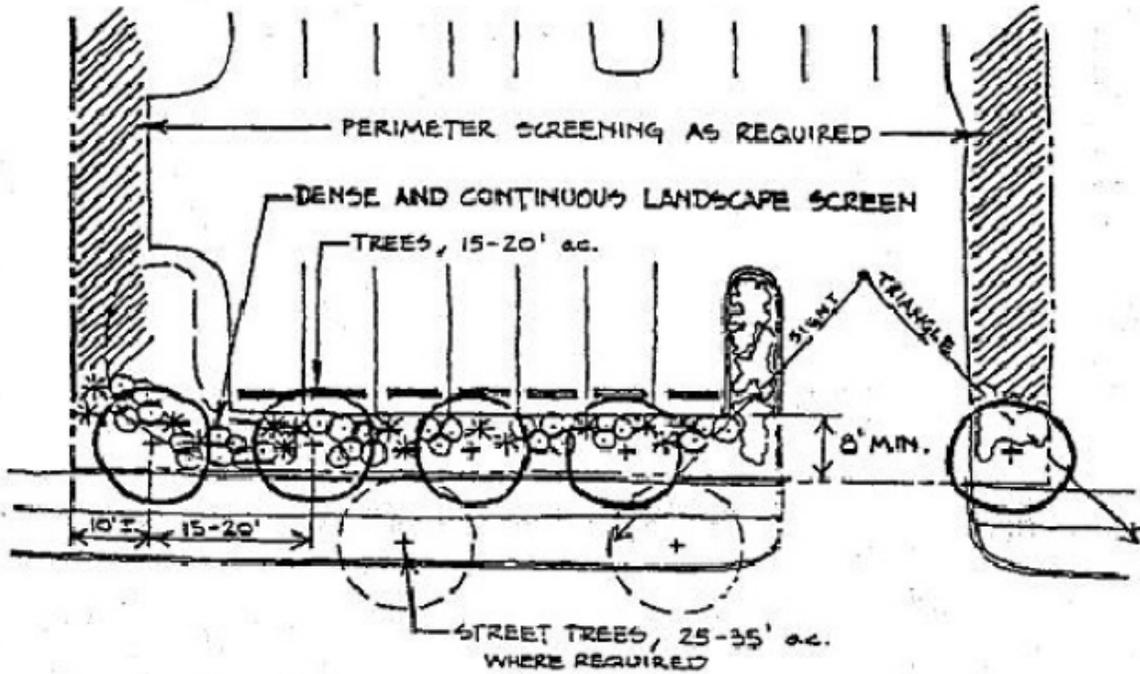
DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	STDS FOR LANDSCAPING AND PRESERVATION OF EXISTING VEGETATION SECTION IV	FIGURE:
REVISED:	INTERIOR SITE LANDSCAPING		IV-5



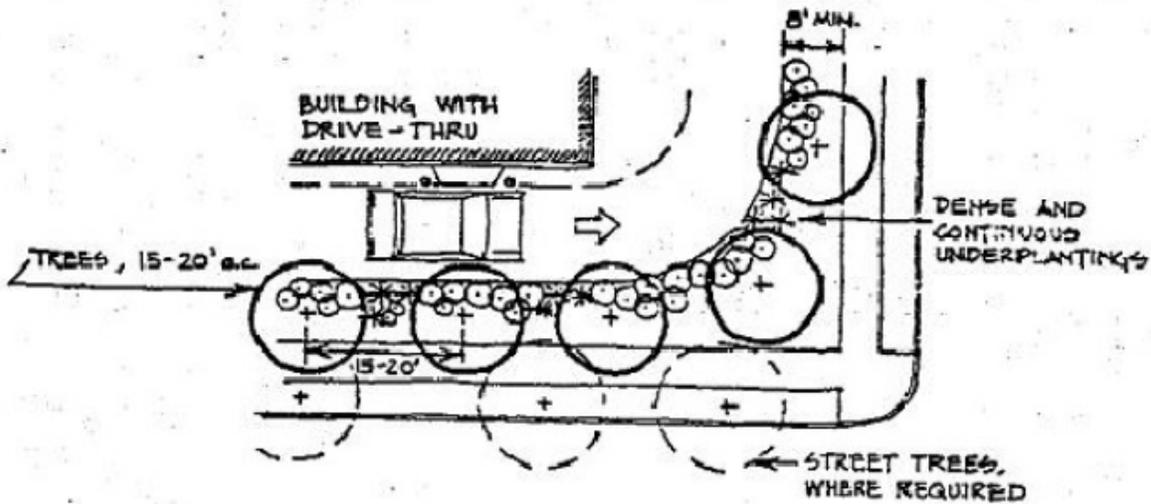
A. Screening from Street (section)

NOT TO SCALE

<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>STDS FOR LANDSCAPING AND PRESERVATION OF EXISTING VEGETATION SECTION IV</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>PARKING LOT SCREENING FROM PUBLIC VIEW</p>		<p>IV-6A</p>



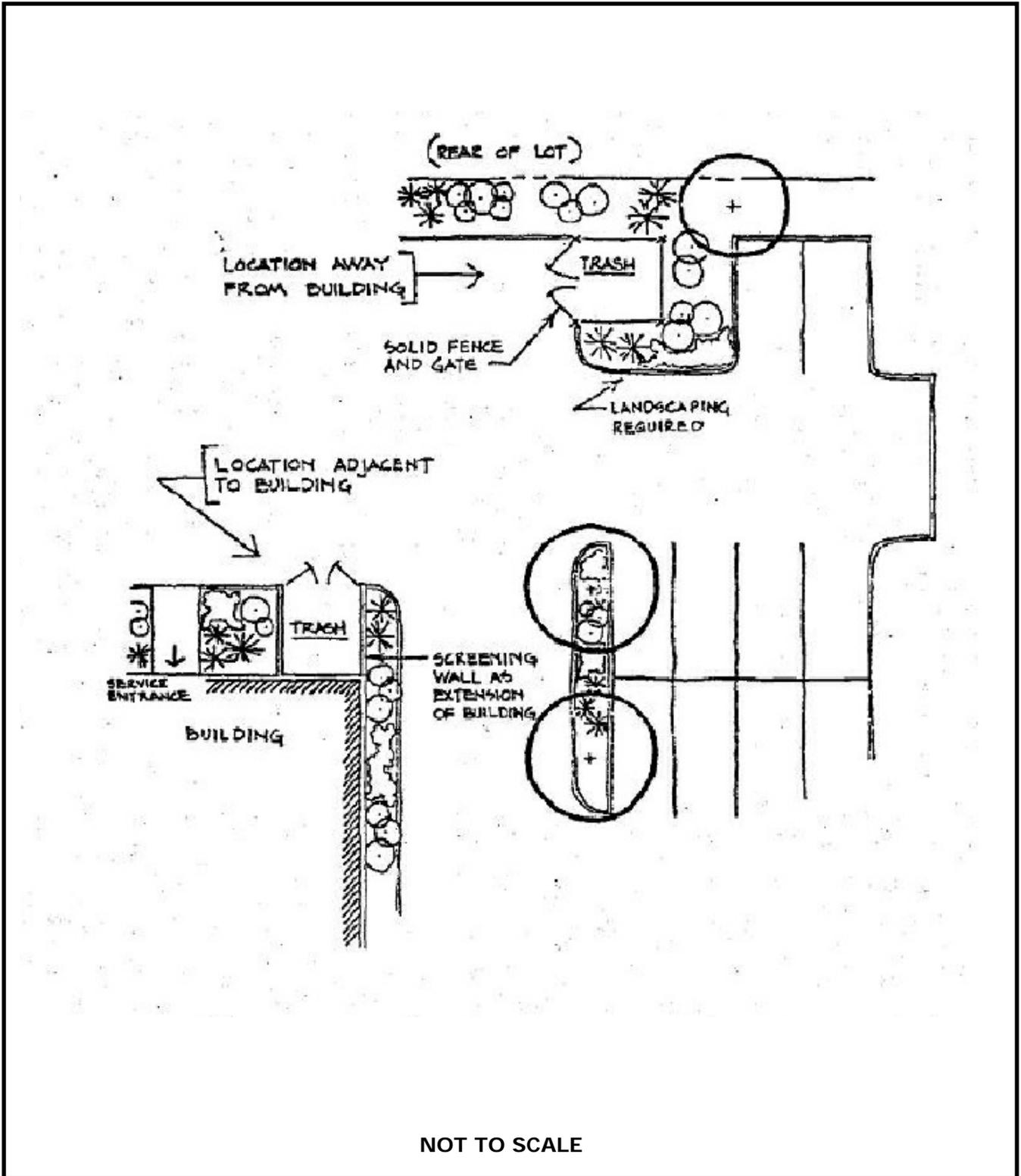
C. Screening from Street (plan)



D. Screening of Drive-Thru (plan)

NOT TO SCALE

<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>STDS FOR LANDSCAPING AND PRESERVATION OF EXISTING VEGETATION SECTION IV</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>PARKING LOT SCREENING FROM PUBLIC VIEW</p>		<p>IV-6B</p>



<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>STDS FOR LANDSCAPING AND PRESERVATION OF EXISTING VEGETATION SECTION IV</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>SCREENING OF ACCESSORY SITE ELEMENTS</p>		<p>IV-7</p>

5. PORTLAND STORMWATER MANAGEMENT STANDARDS AND MAINE DEP CHAPTER 500 STORMWATER MANAGEMENT

I. INTENTION

The goal of the City of Portland's Stormwater Management Program is to address the effects of development on both the quantity and quality of stormwater runoff. Please see Chapter 32 of the City Code of Ordinances for regulations governing stormwater systems in Portland.

II. APPLICABILITY IN PORTLAND

- A. All development, except single and two-family homes, subject to City of Portland review shall be required to comply with the Urban Impaired Stream Standard pursuant to Maine DEP Chapter 500 Stormwater Management Rules if they are located within these watersheds:
 - a. Capisic Brook
 - b. Fallbrook
 - c. Nason's Brook

- B. Single and two-family development proposals shall be required to meet Basic Standards, excluding Appendix B1c.

- C. The following development proposals shall be required to submit a stormwater management plan pursuant to the regulations of Maine DEP Chapter 500 Stormwater Management Rules, including Basic, General and Flooding standards:
 - a. Level II site plans, except for single and two-family homes, as defined in the Land Use Code - Section 14-522.

 - b. Level III site plans as defined in the Land Use Code - Section 14-522.

 - c. Subdivisions as defined in the Land Use Code Section 14-493 except for those projects which do not involve significant new construction.

 - d. Other projects that the Planning Authority determines that special conditions warrant a stormwater management plan; and

 - e. Projects that require a Stormwater Permit pursuant to 38 M.R.S.A. Sec. 420-D (Stormwater Management Law), a development that may substantially affect the environment and requires a site location of development (Site Law) permit pursuant to 38 MR.S.A Sec 481-490; and certain projects that may be eligible for license by rule for the infiltration of stormwater pursuant to 38 M.R.S.A. Sec 413.

III. MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION, CHAPTER 500 STORMWATER MANAGEMENT

SUMMARY: This chapter describes stormwater standards for activities licensed under the Stormwater Management Law and the Site Location of Development Law. It also describes license by rule standards for stormwater infiltration (Appendix D) adopted pursuant to the Waste Discharge Law.

- 1. Introduction.** Land use activities can cause changes in stormwater flows. Many pollutants, such as nutrients and metals, attach to fine particles of soil from throughout the watershed. Soil and attached pollutants are carried in the stormwater down to a waterbody or wetland. A project is required to meet appropriate standards to prevent and control the release of pollutants to waterbodies, wetlands, and groundwater, and reduce impacts associated with increases and changes in flow.

- 2. Applicability.** This chapter applies to a project that requires a stormwater permit pursuant to 38 M.R.S.A. §420-D; a development that may substantially affect the environment and requires a site location of development (Site Law) permit pursuant to 38 M.R.S.A. §§ 481 – 490; and certain projects that may be eligible for license by rule for the infiltration of stormwater pursuant to 38 M.R.S.A. §413.

- 3. Definitions.** The following terms have the following meanings as used in this chapter and chapter 502, unless the context otherwise indicates. “Lakes most at risk from new development” (lakes most at risk) and “urban impaired streams” are listed in chapter 502.
 - A. Certified erosion and sedimentation control professional.** A professional certified by the International Erosion Control Association (IECA).

 - B. Compensation fee utilization plan.** A plan that specifies how funds received as a compensation fee payment will be allocated to reduce the impact of stormwater pollution to an impaired water resource.

 - C. Detention basin.** A basin designed and constructed to provide temporary storage of runoff to control stormwater outflow from the site and peak flow in receiving waters, and to provide gravity settling of pollutants.

 - D. Developed area.** "Disturbed area" excluding area that within one calendar year of being disturbed is returned to a condition with the same drainage pattern that existed prior to the disturbance and is revegetated, provided the area is not mowed more than once per year.

 - E. Direct watershed of a waterbody or wetland.** The land area that drains, via overland flow, natural or man-made drainage systems, or waterbodies or wetlands, to a given waterbody or wetland without first passing through an upstream waterbody classified as GPA.

- F. Disturbed area.** All land areas that are stripped, graded, grubbed, filled, or excavated at any time during the site preparation or removing vegetation for, or construction of, a project.

"Disturbed area" does not include routine maintenance, but does include re-development and new impervious areas. "Routine maintenance" is maintenance performed to maintain the original line and grade, hydraulic capacity, and original purpose of the facility. Paving impervious gravel surfaces while maintaining the original line and grade, hydraulic capacity and original purpose of the facility is considered routine maintenance. Cutting of trees, without grubbing, stump removal, disturbance or exposure of soil is not considered "disturbed area".

A disturbed area continues to be considered as disturbed area if it meets the definition of "developed area" or "impervious area" following final stabilization.

- G. Drainageway.** A natural, man-made channel or course within which surface discharge of water may occur. Drainageways include, but are not limited to rivers, streams and brooks (whether intermittent or perennial), swales, ditches, pipes, culverts, and wetlands with localized discharge of water.

- H. Erosion and sedimentation control best management practices (erosion control BMPs).** Methods, techniques, designs, practices, and other means to control erosion and sedimentation, as approved or required by the department.

NOTE: For guidance, see "Maine Erosion and Sediment Control BMPs Maine Department of Environmental Protection."

- I. Erosion control mix.** A type of mulch that consists primarily of organic material such as shredded bark, stump grindings, composted bark, or fragmented wood generated as a by-product from log handling at wood mills. It includes a well-graded mixture of particle sizes with a mineral content that is less than 20% by weight, and is free from construction debris, refuse, and contaminants.

- J. High use parking lot.** A commercial or other parking lot with size and usage characteristics similar to a commercial lot, such as a fast food restaurant, factory, convenience store, high-turnover restaurant, shopping center, office complex, school, or supermarket.

- K. Impervious area.** The total area of a parcel that consists of buildings and associated constructed facilities or areas that will be covered with a low-permeability material, such as asphalt or concrete, and areas such as gravel roads and unpaved parking areas that will be compacted through design or use to reduce their permeability. Common impervious areas include, but are not limited to, rooftops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and macadam or other surfaces which similarly impede the natural infiltration of stormwater. A natural or man-made waterbody is not

considered an impervious area, but is treated as an immediate runoff surface in curve number calculations.

L. Infiltration. Any process specifically used to meet all or part of the stormwater standards of this chapter by actively directing all or part of the stormwater into the soil. Infiltration is the process by which runoff percolates through the unsaturated overburden and fractured bedrock to the water table. For the purposes of this chapter, infiltration does not include:

- (1) Incidental wetting of soil in ditches, detention basins or the equivalent;
- (2) Wetting of underdrained basins, dry swales, or similar filtration systems; or
- (3) Wetting of buffers meeting department requirements for use as stormwater control.

Discharge of runoff to areas of the site where the water will collect and percolate into the ground is considered infiltration if the volume, rate, or quality of the discharge exceeds the runoff capacity of the area. Underdrained swales, underdrained ponds, and similar practices that discharge to surface waters or to buffer strips meeting department requirements for stormwater buffers are not considered infiltration systems, although these may be used to treat runoff prior to discharge to an infiltration area.

M. Lake or pond. (1) A great pond, or (2) a lake or pond of any size used as a public water supply.

N. Landscaped area. An area of land that has been disturbed and re-planted or covered with one or more of the following: lawn or other herbaceous plants, shrubs, trees, or mulch; but not including area that has reverted to a natural, vegetated condition. A field or meadow is considered landscaped if it is mowed more than twice per twelve month period.

O. Linear portion of a project. The portion of a project consisting of a utility corridor, road, driveway, railroad track outside a yard or station, or similar transportation corridor as determined by the department. Linear projects do not include golf courses.

P. Major river segment. The rivers or portions of rivers identified as follows: Saco River; Androscoggin River; Kennebec River; West Branch Penobscot River below Elbow Lake; East Branch Penobscot River below Wassataquiok Stream; Piscataquis River below Dover-Foxcroft; St. Croix River below Grand Lake; Aroostook River below Ashland; and St. John River below the Allagash River.

Q. Parcel. "Parcel" is defined the same as "parcel of land" in 06-096 CMR 371(1) (L).

- R. Peak flow.** The greatest rate of flow in a drainageway, measured as volume per unit of time, resulting **from** a storm of specified frequency and duration.
- S. Person.** An individual, firm, corporation, municipality, quasi-municipal corporation, state agency, federal agency or other legal entity. For purposes of an activity requiring review pursuant to the Site Law or Stormwater Management Law, "person" is further defined at 06-096 CMR 371(1)(M).
- T. Practicable.** Available and feasible considering cost, existing technology and logistics based on the overall purpose of the project.
- U. Pre-development area.** An impervious or developed area created prior to the effective date of the Stormwater Management Law for a stormwater project, or the effective date of the jurisdictional threshold under which a development is licensed for a Site Law development.
- V. Protected natural resource.** As defined in the Natural Resources Protection Act at 38 M.R.S.A. §480-B. These resources are referred to as "wetlands and waterbodies".
- W. Stormwater.** The part of precipitation, including runoff from rain or melting ice and snow, that flows across the surface as sheet flow, shallow concentrated flow, or in drainageways.
- X. Stream.** A river, stream, or brook as defined in the Natural Resources Protection Act at 38 M.R.S.A. §480-B.
- Y. Subcatchment.** An area of a project site with a unique flow path to a specific point.
- Z. Two (ten, twenty-five)-year, 24-hour storm.** A precipitation event with a 50% (for two-year), 10% (for **ten**-year), or 4% (for 25-year) probability of being equaled or exceeded during any twenty-four hour period during any given year.
- AA. Watershed.** The land area that drains, via overland flow, drainageways, waterbodies, or wetlands to a given waterbody or wetland.
- BB. Wetlands.** Coastal and freshwater wetlands as defined in the Natural Resources Protection Act, 38 M.R.S.A. §480-B.
- 4. Stormwater standards.** This section describes the stormwater standards that apply to a project disturbing one acre or more, or to a modification of any size as described in Section 16 of this chapter. There are six categories of stormwater standards: basic, general, phosphorus, flooding, urban impaired stream, and other. More than one standard may apply to a project. In this situation, the stricter standard is applied as

determined by the department. For example, a project may be located in a stream watershed, and the stream may drain to a lake. The standards for the particular stream and lake are compared, and the stricter standard is applied as determined by the department.

A. Basic standards

- (1) When the basic standards must be met. A project disturbing one acre or more must meet the basic standards. Basic standards are specified in Appendices A, B, and C of this chapter and address erosion and sedimentation control, inspection and maintenance, and housekeeping, respectively.

A project qualifies for a stormwater permit by rule (PBR) described in Section 7, and therefore need only meet basic standards, if it results in one or more acres of disturbed area and the following.

- (a) Lakes most at risk and urban impaired streams. Less than 20,000 square feet of impervious area and 5 acres of developed area in the direct watershed of a lake most at risk or urban impaired stream; and
 - (b) All other watersheds. Less than one acre of impervious area and five acres of developed area in any other watershed.
- (2) Grading or other construction activity. Grading or other construction activity on any site disturbing one acre or more may not impede or otherwise alter drainageways to have an unreasonable adverse impact on a protected natural resource.

B. General standards. General standards apply as described below in addition to the basic standards described in Section 4(A).

- (1) When general standards must be met. A project disturbing one acre or more and resulting in any of the following must meet the general standards described below in Section 4(B) (2).
 - (a) Urban impaired streams. 20,000 square feet or more of impervious area, or 5 acres or more of developed area, in the direct watershed of an urban impaired stream; or
 - (b) Other stream, coastal and freshwater wetland watersheds. One acre or more of impervious area, or 5 acres or more of developed area, in any other stream, coastal, or wetland watershed.

Some projects in lake watersheds have the option to meet general standards in lieu of the phosphorus standards as described in Section 4(C) below.

- (2) Description of general standards. To meet the general standards, a project's stormwater management system must include treatment measures that will mitigate for the increased frequency and duration of channel erosive flows due to runoff from smaller storms, provide for effective treatment of pollutants in stormwater, and mitigate potential temperature impacts. This must be achieved by using one or more of the following methods to control runoff from no less than 95% of the impervious area and no less than 80% of the developed area that is impervious or landscaped. Where treatment of 95% of the impervious area is not practicable, the department may allow treatment on as low as 90% of the impervious area if the applicant is able to demonstrate that treatment of a greater depth of runoff than specified in the standards will result in at least an equivalent amount of overall treatment for the impervious area.

The department may, on a case-by-case basis, consider alternate treatment measures to those described in this section. An alternate treatment measure must provide at least as much pollutant removal as the treatment measures listed below and, unless otherwise approved by the department, as much channel protection and temperature control.

If a project is not in an urban impaired stream watershed, the department may allow the portion of a project's impervious or developed acreage that must be treated to be reduced through mitigation by eliminating or reducing an off-site or on-site impervious stormwater source (see Section 6(B)).

NOTE: The department strongly encourages applicants to incorporate low-impact development (LID) measures where practicable. LID addresses avoidance of stormwater impacts by minimizing developed and impervious areas on the project site. LID project design considers the location of any protected natural resources, and maintaining natural drainage patterns and pre-construction time of concentration. If practicable, LID incorporates runoff storage measures dispersed uniformly throughout a site rather than single point collection of stormwater through conventional end-of-pipe structures.

- (a) Wetpond with detention above the permanent pool. A stormwater management system using detention to control runoff must detain, above a wetpond's permanent pool, a runoff volume equal to 1.0 inch times the subcatchment's impervious area plus 0.4 inch times the subcatchment's landscaped area. If located within a stream watershed, a pond needs to discharge through an underdrained gravel outlet. A wetpond must have a storage volume below the permanent pool elevation at least equal to 1.5 inches times the subcatchment's impervious area plus 0.6 inch times the subcatchment's non-impervious developed area, a mean depth of at least three feet, and a length to width ratio of 2:1 or greater.
- (b) Filter. A detention structure using filters to control runoff must detain a runoff volume equal to 1.0 inch times the subcatchment's impervious area plus 0.4 inch times the subcatchment's developed area that is landscaped and discharge it solely through an underdrained vegetated soil filter having a single outlet with a diameter no greater than eight inches, or through a proprietary filter system approved by the department.

(c) Infiltration. A stormwater management system using infiltration to control runoff must retain a runoff volume equal to 1.0 inch times the subcatchment's impervious area plus 0.4 inch times the subcatchment's developed area that is landscaped and infiltrates this volume into the ground. Pre-treatment of stormwater must occur prior to discharge to the infiltration area. The infiltration area must minimize discharge of soluble pollutants to groundwater, and must be maintained to assure that its capacity for infiltration and pollutant removal is unimpaired. An infiltration system serving a development regulated under the Site Location of Development Act may be required to meet additional standards.

Infiltration from a stormwater infiltration system is considered *de minimis* and does not require an individual waste discharge license if the standards in Appendix D are met. For definitions and provisions associated with the Waste Discharge program, see 38 M.R.S.A. §§ 413 *et seq.*, and chapter 520 *et seq.* for waste discharge licensing concerns.

All drywells and subsurface fluid distribution systems must be registered with and meet all other requirements of the Department's Underground Injection Control Program.

- (d) Buffers. A stormwater management system using buffers to control runoff must meet the design and sizing requirements described in Appendix F.
- (3) Exceptions from the general standards. A project is eligible for an exception from the general standards as follows.
- (a) Pretreatment measures. A project that includes measures to pretreat runoff to a filter or infiltration system in a department-approved, flow-through sedimentation device may reduce the runoff volume to each treatment measure described in Section 4(B)(2)(b) and (c) by 25%.
- (b) Discharge to the ocean, great pond or a major river segment. A project discharging to the ocean, great pond or a major river segment and using a wetpond to meet the general standards is not required to incorporate treatment storage above the wetpond's permanent pool or to install an underdrain. The underdrain may also be omitted from a wetpond when discharging to a wetland if the department determines that filtering and temperature reduction, normally provided by an underdrain, are not necessary for maintaining the functions of the wetland.
- (c) A linear portion of a project. For a linear portion of a project, runoff volume control may be reduced to no less than 75% of the volume from the impervious area and no less than 50% of the developed area that is impervious or landscaped, or the runoff volume to each treatment measure

described in Section 4(B)(2) above may be reduced by 25%.

- (d) A utility corridor or portion of a utility corridor. A utility corridor or portion of a utility corridor that meets the following criteria is not required to meet General standards.
 - (i) The project or portion of the project does not include impervious area;
 - (ii) Disturbed areas are restored to pre-construction contours and revegetated following construction;
 - (iii) Mowing of the revegetated right-of-way occurs no more than once during any twelve month period; and
 - (iv) A vegetation management plan for the project has been reviewed and approved by the department.
- (e) Stormwater Management Law project including redevelopment. For a project requiring a Stormwater Management Law permit that includes redevelopment of impervious area that was in existence as of November 16, 2005 (the effective date of Chapter 500 revisions), the redevelopment of that impervious area is not required to meet General standards provided the department determines that the new use of the existing impervious area is not likely to increase stormwater impacts resulting from the proposed project's stormwater runoff beyond the level of impact already caused by the runoff from the existing impervious area. The requirements of Appendix D must still be met, if applicable.
- (f) Site Location of Development Law project including redevelopment. For a project requiring a Site Location of Development Law permit that includes redevelopment of existing impervious area that was in existence as of November 16, 2005 (the effective date of Chapter 500 revisions), redevelopment of that impervious area is required to meet the general standards to the extent practicable as determined by the department. If the department determines that it is not practicable to make significant progress towards meeting the general standards for the redeveloped impervious area, the department may require off-site mitigation within the same watershed as an alternative for stormwater treatment. The requirements of Appendix D must still be met, if applicable.

C. Phosphorus standards.

- (1) When the phosphorus standards must be met. The phosphorus standards apply only in lake watersheds. A project disturbing one acre or more and resulting in any of the following is required to meet the phosphorus standards described in Section 4(C)(2) below.

- (a) Lake most at risk watersheds. 20,000 square feet or more of impervious area, or 5 acres or more of developed area, in the direct watershed of a lake most at risk, except that an applicant with a project that includes less than three acres of impervious area and less than 5 acres of developed area may choose to meet the general standards rather than the phosphorus standards if the lake is not severely blooming. Severely blooming lakes are a subset of lakes most at risk as listed in Chapter 502.
 - (b) Any other lake watershed. One acre or more of impervious area, or 5 acres or more of developed area, in any other lake watershed, except that an applicant with a project that includes less than three acres of impervious area and less than 5 acres of developed area may choose to meet the general standards rather than the phosphorus standards.
- (2) Description of phosphorus standards. An allowable per-acre phosphorus allocation for each lake most at risk will be determined by the department. The department's determination is based upon current water quality, potential for internal recycling of phosphorus, potential as a cold-water fishery, volume and flushing rate, and projected growth in the watershed. This allocation will be used to determine phosphorus allocations for a project unless the applicant proposes an alternative per-acre phosphorus allocation that is approved by the department. If the project is a road in a subdivision, only 50% of the parcel's allocation may be applied to the road unless phosphorus export from both the road and the lots is subject to this chapter, in which case the entire allocation for the parcel may be applied.

NOTE: For guidance in calculating per-acre phosphorus allocations and in determining if stormwater phosphorus export from a project meets or exceeds the parcel's allocation; see Volume II of the Maine Stormwater Management BMP Manual.

D. Urban impaired stream standard. If required, the urban impaired stream standard applies in addition to the basic standards, general standards and phosphorus standards described in Sections 4(A), (B) and (C).

- (1) When the urban impaired stream standard must be met. If a project located within the direct watershed of urban impaired stream or stream segment listed in chapter 502 results in three acres or more of impervious area or 20 acres or more of developed area, requires review pursuant to the Site Law, or is a Site Law modification of any size as described in Section 16 of this chapter, the urban impaired stream standard must be met.
- (2) Description of the urban impaired stream standard. A project in the direct watershed of an urban impaired stream must pay a compensation fee or mitigate project impacts by treating, reducing or eliminating an off-site or on-site pre-development impervious stormwater source as described in Section 6(A). Compensation fees must be paid to the department's compensation fund or to an organization authorized by the department pursuant to the Stormwater Management Law, 38 M.R.S.A. §420-D(11).

- (3) Exception for a project including redevelopment. Redevelopment of an existing impervious area is not required to meet the urban impaired stream standard provided the department determines that the new use of the existing impervious area is not likely to increase stormwater impacts in the proposed project's stormwater runoff beyond the levels already present in the runoff from the existing impervious area.

E. Flooding standard. If required, the flooding standard applies in addition to the basic standards, general standards, phosphorus standards and urban impaired stream standards described in Sections 4(A), (B), and (C).

- (1) When the flooding standard must be met. If a project results in three acres or more of impervious area or 20 acres or more of developed area, requires review pursuant to the Site Law, or is a modification of any size as described in Section 16 of this chapter, the flooding standard must be met. Stormwater management systems for these projects must detain, retain, or result in the infiltration of stormwater from 24-hour storms of the 2-year, 10-year, and 25-year frequencies such that the peak flows of stormwater from the project site do not exceed the peak flows of stormwater prior to undertaking the project.
- (2) Waiver of the flooding standard. A project is eligible for a waiver from the flooding standard as follows.

- (a) Discharge to the ocean, a great pond, or a major river segment. A waiver is available for a project in the watershed of the ocean, a great pond, or a major river segment provided the applicant demonstrates that the project conveys stormwater exclusively in sheet flow, in a manmade open channel, or in a piped system directly into one of these resources. In addition, the department may allow a variance for other rivers, if the department determines that the increase in peak flow from the site will not significantly affect the peak flow of the receiving waters or result in unreasonable adverse impact on a wetland or waterbody.

Prior to requesting a waiver as part of an application, the applicant shall secure drainage easements from any downstream property owners across whose property the runoff must flow to reach the ocean, great pond, or river. The applicant shall also demonstrate that any piped or open-channel system in which the runoff will flow has adequate capacity and stability to receive the project's runoff plus any off-site runoff also passing through the system.

- (b) Insignificant increases in peak flow rates from a project site. When requesting a waiver for a project resulting in an insignificant increase in peak flow rates from a project site, the applicant shall demonstrate that insignificant increases in peak flow rates cannot be avoided by reasonable changes in project layout, density, and stormwater management design. The applicant shall also demonstrate that the proposed increases will not unreasonably increase the extent, frequency, or duration of flooding at downstream flow controls and conveyance structures or have an unreasonable adverse effect on protected natural resources. In making its determination to allow insignificant increases in peak flow rates, the department shall consider cumulative impacts. If additional information is

required to make a determination concerning increased flow, the department may only consider an increase after the applicant agrees, pursuant to 38 M.R.S.A. §344-B(3)(B), that the review period may be extended as necessary by the department.

- (3) Channel limits and runoff areas. The design of piped or open channel systems must be based on a 10-year, 24-hour storm without overloading or flooding beyond channel limits. In addition, the areas expected to be flooded by runoff from a 10-year or 25-year, 24-hour storm must be designated in the application, and no buildings or other similar facilities may be planned within such areas. This does not preclude the use of parking areas, recreation areas, or similar areas from use for detention of storms greater than the 10-year, 24-hour storm. Runoff from the project may not flood the primary access road to the project and public roads as a result of a 25-year, 24-hour storm.

NOTE: The municipality, the Maine Department of Transportation, or the Maine Turnpike Authority may require a project to meet additional design standards based on the 50-year or 100-year storm. The department recommends that any applicant proposing a project that may cause flooding of a primary access road or public road contact the appropriate entity.

F. Easements and covenants. If a project will require specific off-site areas for the control, disposal, or treatment of stormwater runoff, then these areas must be protected from alteration through easements or covenants according to the following standards.

- (1) When an easement is required. The applicant must secure easements from affected property owners when any of the following occur on property not owned by the applicant: A project changes the flow type (for example, converting from sheet flow to channelized flow); the flow channel changes; the flow qualifies for a waiver based on an insignificant increase in peak flow rates pursuant to Section 4(E) (2) (b); or the flow causes or increases flooding.

The department may determine that the expected change in flow, channel or impact is so insignificant as to not require an easement under this chapter. The department may require the applicant to provide evidence that such impacts will not occur or, if they will occur, provide evidence of the extent of the impact and evidence that suitable easements have been obtained.

NOTE: The department's decision to issue a stormwater permit, to require or not require an easement, or to specify the location or width of an easement is not intended to affect other federal, state or local requirements for easements or the availability of legal or equitable remedies for impacts due to stormwater runoff.

- (2) Easement specifications and restrictions. The following specifications and restrictions apply to all easements established under this standard.

- (a) Land use restrictions. Suitable land-use restrictions must be included in the easements to prevent any activity that might affect drainage to, across, or from the area affected by the easement.
 - (b) Drainage easements. Drainage easements must include all off-site channels constructed to receive flows from the project and any off-site channels receiving increased peak flow rates from the project. Drainage easements must extend up to, but not include, the channel of any river, stream, or brook accepting flow from the project. Drainage easements must conform with the center line of the drainageway or pipe and must have a minimum width of 30 feet, or 10 feet on each side of the channel or pipe required to accommodate the flow from a 25-year, 24-hour storm, whichever is greater. A reduction in the minimum width may be approved by the department if the full width is not available because of unavoidable physical limitations of the site. However, the minimum width allowed must still be sufficient to avoid an adverse impact on existing uses and to allow access for maintenance and repair.
 - (c) Flooding easements. Flooding easements must include all off-site areas flooded due to the project's development. These areas include, but are not limited to, those flooded due to the project overloading storm sewers, culverts, stormwater basins, and equivalent utilities with increased runoff; filling existing areas of runoff storage; diverting flows onto off-site properties; and impeding runoff from the project parcel or off-site areas. Flooding easements must conform to the greatest extent of inundation due to the increased runoff from a 25-year, 24-hour storm.
 - (d) Erosive flows. The flow through the easement or flooding within the easement may not cause erosion of soil or sediment.
- (3) Areas conveyed. When the permittee transfers land that contains areas of flow or areas to be flooded as described in (2) (a), (b) and (c), restrictive covenants protecting these areas must be included in any deeds or leases, and recorded at the appropriate county registry of deeds. Also, in all conveyances of such areas and areas containing parts of the stormwater management system, the permittee shall include deed restrictions making the conveyance subject to all applicable terms and conditions of the permit. These terms and conditions must be incorporated by specific and prominent reference to the permit in the deed. All conveyances must include in the restrictions the requirement that any subsequent conveyance must specifically include the same restrictions unless their removal or modification is approved by the department. These restrictions must be written to be enforceable by the department, and must reference the permit number.
 - (4) Buffers. Buffers must be protected from alteration through deed restrictions or conservation easement to which the department is a party.

NOTE: Suggested templates for deed restrictions and conservation easements for use under the Stormwater Management Law can be found in Appendix G of this chapter.

5. Other applicable standards. The following standards apply to a project as described in this section in addition to the basic, general, urban impaired stream, and flooding standards.

A. Management of stormwater discharges. A project discharging concentrated stormwater runoff through an open-channel or pipe to any point that is not an open channel, an inlet to a storm drain system, or a natural or man-made impoundment must convert the concentrated flow to sheet flow to prevent erosion of the downstream receiving area. The conversion of concentrated flow to sheet flow must be done using properly designed level spreaders meeting the criteria below.

- (1) Discharge to a level spreader. The peak stormwater flow rate to a level spreader due to runoff from a 10-year, 24-hour storm must be less than 0.25 cubic feet per second (0.25 cfs) per foot length of level spreader lip.
- (2) Drainage area. The maximum drainage area to the spreader may not exceed 0.10 acre per foot length of level spreader lip.
- (3) Length of level spreader. The level spreader length may not be more than 25 feet unless approved by the department.
- (4) Siting of level spreader. The level spreader must be sited so that flow from the level spreader will remain in sheet flow until entering a natural or man-made receiving channel.

This standard is not applicable for level spreaders discharging runoff to vegetated buffers used to meet the general standards. Requirements for these level spreaders can be found in Appendix F.

B. Discharge to freshwater or coastal wetlands. Stormwater standards for the waterbody must be met before the stormwater enters a wetland, unless otherwise approved by the department or unless the affected area of wetland qualifies for an exemption pursuant to the Natural Resources Protection Act, 38 M.R.S.A. §480-Q(17). Wetlands must receive stormwater in the same manner as before the project unless otherwise approved or required by the department. In general, new or increased stormwater discharges into wetlands must be put into sheet flow using level spreaders designed to meet the requirements in Section 5(A). The department may allow alternate stormwater treatment measures if those measures will not unreasonably adversely affect the wetland.

The discharge of runoff to a wetland due to a 2-year storm may not increase the mean storage depth within a wetland more than two inches above pre-development levels for more than 24 hours from the end of the storm event, unless otherwise approved by the department. The department may consider cumulative impacts due to runoff from other projects when applying this standard to any wetland.

- C. Threatened or endangered species.** Additional stormwater standards may apply on a case-by-case basis if the department determines that such standards are necessary to avoid significantly altering the habitat of a threatened or endangered plant or animal species or violating protection guidelines.

NOTE: Title 12 M.R.S.A. §7755-A prohibits state agencies from issuing a permit that will significantly alter the habitat of any species designated as threatened or endangered species or violate protection guidelines.

- D. Additional controls.** If the department determines that additional controls are necessary to avoid an unreasonable impact on any wetland or waterbody due to pollutants that are not adequately addressed by the standards described in Sections 4 and 5, a stormwater project that results in three acres or more of impervious area or 20 acres or more of developed area, requires review pursuant to the Site Law, or is a modification of any size as described in Section 16 of this chapter may be required to use additional controls. This is a case-by-case determination based upon factors such as the size, nature and intensity of the development, characteristics of the affected natural resource, topography and soils.

For example, stormwater from a metallic mineral mining or advanced exploration activity regulated under the department's regulations, Metallic Mineral Exploration, Advanced Exploration and Mining regulations (06-096 CMR 200), may contain contaminants, such as high concentrations of dissolved metals, or be very acidic or alkaline, for which stormwater best management practices (BMPs) for other commercial or industrial developments do not provide adequate treatment.

- E. Authorization for discharges to public storm sewer systems.** If runoff from a project site will flow to a publicly-owned storm sewer system, then the applicant must obtain authorization from the system's owner to discharge into the system. At its discretion, the department may require the applicant to demonstrate that the system has adequate capacity for any increases in peak flow rates and volumes to the system.

- 6. Compensation fees and mitigation credit.** The following applies to projects required to provide mitigation, pursuant to Section 4(D), or where the Department has allowed the applicant to reduce the acreage treated or lower the phosphorus export reduction required to meet the phosphorus standards in Section 4(C) through mitigation. Mitigation eliminates or reduces other off-site sources or pre-development on-site sources, in accordance with the requirements of Sections 6(A) through (F) below. The project must still meet the basic standards, general standards, phosphorus standards and the flooding standard described in Sections 4(A), (B), (C) and (D), respectively, if applicable.

- A. A project required to meet the urban impaired stream standard.**

- (1) Determining compensation fees or mitigation credits. If a project is required to meet the urban impaired stream standard described in Section 4(D), compensation fees or mitigation credits are determined as follows.

Type of surface with or without required treatment	Required compensation fee (per acre*)	Required mitigation credit (per acre*)
Non-roof impervious area	\$5,000.00	0.5 credits
Roof	\$2,000.00	0.2 credits
Landscaped area	\$1,000.00	0.1 credits

*per acre fees are based on whole acreages of impervious or disturbed area. Fees for partial acreages are prorated.

Compensation fees may only be used in watersheds where a compensation fee utilization plan has been approved by the department. If a compensation fee utilization plan is proposed by an applicant who is not a municipality, the applicant must demonstrate that the plan has been submitted to the municipality in which the project is located for review prior to submittal of an application to the department.

NOTE: If a project is located in the watershed of a public drinking water supply, the municipality is required by 30-A M.R.S.A. §4358-A(5) to notify the water district of the application as an abutter.

- (2) Amount of credit. The following table indicates the amount of credit earned for a variety of allowed off-site mitigation activities.

Mitigation activity	Source type	Credit earned (per acre* treated)
Retrofit with general standards at 1/3 required sizing or with approved flow through sedimentation device	Road or high use parking lot	0.5 credit
	Low use parking lot	0.3 credit
	Roof or other impervious area	0.2 credit
	Lawn	0.1 credit
Retrofit with general standards at 2/3 required sizing	Road or high use parking lot	1.0 credit
	Low use parking lot	0.6 credit
	Roof or other impervious area	0.4 credit
	Lawn	0.2 credit
Retrofit with general standards at required sizing	Road or high use parking lot	1.5 credits
	Low use parking lot	0.9 credit
	Roof or other impervious area	0.6 credit
	Lawn	0.3 credit
Eliminate impervious source area, replace with lawn	Road or high use parking lot	1.0 credit
	Low use parking lot	0.5 credit

Mitigation activity (cont.)	Source type	Credit earned (per acre* treated)
Eliminate impervious source area, replace with forest	Road or high use parking lot	2.0 credits
	Low use parking lot	1.0 credit
Retrofit detention with vegetated gravel under-drains	Impervious areas only	0.5 credit

*credits earned are based on whole acreages of impervious or disturbed area. Fees for partial acreages are prorated.

In addition to the use of off-site mitigation or compensation fees, the department may approve other mitigation measures on a case-by-case basis. Other measures proposed by an applicant must provide at least equivalent protection as measures described in the table above, as determined by the department.

- (3) Reduction of compensation fee or mitigation requirements for projects in watersheds with an approved watershed management plan. The department may waive or reduce requirements for compensation fees or mitigation credit if a municipality, or quasi-municipal entity having jurisdiction over the area in which the project is located has developed and is implementing a watershed management plan for the watershed in which the project is located. The

watershed management plan must be approved by the department as meeting the purpose of restoring water quality. Within a designated growth area of a municipality with an adopted comprehensive plan that the Maine State Planning Office has found to be consistent with the Planning and Land Use Regulation Act, or within a watershed located in a Service Center Community identified pursuant to 30-A MRSA §4301(14-A), implementation of the watershed management plan may be deferred for up to five years from the date of department approval, or until state or federal financial assistance is available, whichever comes first.

B. A project required to meet general standards that is not in an urban impaired stream watershed.

- (1) Reducing acreage that must be treated by eliminating or reducing an off-site or on-site pre-development impervious stormwater source. If a project is required to meet the general standards described in Section 4(B) and it is not in an urban impaired stream watershed, the department may allow the portion of a project’s impervious or developed acreage that must be treated to be reduced through mitigation by eliminating or reducing an off-site or on-site pre-development impervious stormwater source.
 - (a) Source reduction or elimination. A source is considered to be eliminated if impervious area is removed, the underlying soil is aerated, and the area revegetated and returned to a wooded condition. A source is considered to be reduced if the impervious area is removed, the underlying soil is

aerated and the area revegetated and maintained as a lawn or other non-forested area. The amount of reduction in treated acreage allowed will be determined on a case-by-case basis by the department, based on the existing and future uses of the project site, the existing and future use of the eliminated or reduced off-site or pre-development on-site impervious area, and the equivalency of these uses. In determining whether to approve a mitigation proposal, the department will determine whether the expected reduction in stormwater pollutant export and stormwater flows can reasonably be expected to exceed the stormwater pollutant export and stormwater flow resulting from the untreated acreage at the project site.

- (b) When the amount of roof or non-impervious developed acreage that must be treated may be reduced. The department may reduce the portion of a project's roof or non-impervious developed acreage that must be treated by an equivalent area of on-site roof, pre-development parking or road surfaces for which the applicant agrees to incorporate and maintain stormwater treatment structures.

C. A project in a lake watershed that is required to meet the phosphorus standards. If a project is required to meet the phosphorus standards described in Section 4(C), an off-site mitigation credit may be allowed, but only to eliminate or reduce off-site sources of phosphorus. A source is considered to be eliminated if impervious area is removed, and the area is revegetated and returned to a wooded condition. A source is considered to be reduced if the impervious area is removed, and the area is revegetated and maintained as lawn or other non-forested area. For every two pounds of estimated off-site phosphorus export that is eliminated or reduced, estimated on-site phosphorus export may be reduced by one pound. If the applicant can demonstrate, based on type of impervious area and intensity of use, that the level of phosphorus export from the eliminated or reduced off-site area is equivalent to or greater than that expected from the proposed impervious area, then a credit may be allowed at a ratio of 1 to 1. As an alternative, a compensation fee may be paid to off-set no more than 50% of the required reduction in export at a rate of \$10,000 per pound of phosphorus export, as described in 38 M.R.S.A. §420(D)(11)(A).

NOTE: For guidance in determining phosphorus export see "Phosphorus Control in Lake Watersheds", Maine Department of Environmental Protection.

- D. Location.** The mitigation activity must be located in the same watershed as the project to off-set the impact of the pollutant export from the project. More than one mitigation activity may be applied to a project.
- E. Protection from alteration.** Areas in which an off-site or on-site pre-development stormwater source has been reduced or eliminated as described in Section 6(A), (B), and (C) must be protected from alteration through deed restrictions, a conservation easement to which the department is a party, or similar measures. These covenants must specify that they may only be modified with department approval. See Appendix G.

- F. Maintenance and transfer.** Areas revegetated to off-set project impacts must be maintained as required by the permit, and any transfer of these areas must be made subject to deed restrictions that require such maintenance and are enforceable by the department. These covenants must specify that they may only be modified with department approval.

7. Stormwater permit by rule (PBR)

- A. When a project qualifies for a stormwater PBR.** A project needing a Stormwater Law permit qualifies for a stormwater PBR if it results the following:

- (1) Less than 20,000 square feet of impervious area and 5 acres of developed area in the direct watershed of a lake most at risk or urban impaired stream; and
- (2) Less than one acre of impervious area and five acres of developed area in any other watershed.

- B. Notification.** An applicant must file notice of the project with the department prior to beginning work on the project. The applicant shall use the notification form provided by the department and must include the required submissions. The applicant must keep a copy to serve as the permit. The notification information must be sent to the department by certified mail (return receipt requested), or hand delivered to the department and date stamped by the department.

- C. Effective period.** The stormwater PBR becomes effective 14 calendar days after the department receives the notification form, unless the department approves or finds the notification deficient prior to that date. Within this 14 day period, the department may notify the applicant in writing or through verbal communication that the project is ineligible for stormwater PBR, or that additional information or further review is needed. If the department does not inform the applicant that the notification is unacceptable within the 14-day period, the notification is deemed accepted by the department and is valid for two years from the date of approval.

By signing the notification form, the applicant is representing that the activity will meet the applicability requirements and standards of the rule. In addition, by signing the notification form the applicant represents that the applicant has sufficient title, right, or interest in the property where the proposed activity is to take place.

- D. Standards.** Projects eligible for permit by rule must meet the erosion and sedimentation control standards found in Appendix A and inspection and maintenance requirements found in Section 1 of Appendix B of this chapter.

NOTE: A project qualifying for a stormwater PBR is not required to meet the general standards in Section 4(b) or the Phosphorus Standards in Section 4(C). However, if a PBR project proposes

to use infiltration to control runoff, it must either meet the license by rule standards in Appendix D, or obtain a waste discharge license under the Waste Discharge Law.

E. Submissions. An applicant for a stormwater PBR must submit the notification form, fee and other information for the Department's review and approval. This information includes a location map, site plan, erosion and sedimentation control plan, and photographs of the area to be developed. Also, if the project is located in Essential Habitat, approval from the Maine Department of Inland Fisheries and Wildlife will need to be submitted. Specific submission requirements are described below.

- (1) Plan preparation. An erosion and sedimentation control plan accompanying a stormwater PBR must be designed by a professional who is registered, licensed, or certified in a related land-use field, or by education, training, or experience is knowledgeable in erosion and sedimentation control, or has received specific training in erosion and sedimentation control at a department-sponsored erosion and sedimentation control workshop.

NOTE: An applicant may use erosion and sedimentation control BMPs described in the "Citizen's Guide to Best Management Practices for Use with Maine Construction General Permit" or in "Maine Erosion and Sediment Control BMPs," Maine Department of Environmental Protection.

- (2) Location map. The notification form must be accompanied by a photocopy of a portion of a 7.5 minute USGS topographic map or other atlas showing the site's location and approximate property boundaries, if the size of the parcel and scale of the map allows it. A USGS topographic map can be useful for showing the general contour and topography of the project site
- (3) Site plan. Submit a scaled plan showing, at a minimum, the locations of structures and roads, the extent of disturbed land, pre-construction site topography, post-construction site topography, on-site and adjacent surface waterbodies, and all erosion and sedimentation control measures to be used on the site. Such measures include, but are not limited to, sedimentation barriers, ditch lining, rip rap, and culvert inlet and outlet designs.

An applicant may substitute the following information for surveyed pre-development and post-development site topography on the location plans:

- (a) the locations of high points on the site;
- (b) the locations of any ponds or other runoff storage depressions on the site;
- (c) the locations and flow direction of any drainage ditches, brooks, or streams;

- (d) the locations of any catch basin inlets or culvert inlets; and
 - (e) arrows showing the general direction(s) of overland drainage for the site.
- (4) Erosion and sedimentation control plan. In addition to a site plan, an erosion and sedimentation control plan must be included that contains, at a minimum, permanent stabilization measures to be taken (e.g., paving or planting vegetation), installation details of the erosion control measures proposed, seeding and mulching rates, and a construction schedule with the proposed construction dates and timeframe for major earth moving and construction events. This plan and its details may be included on the site plan instead of being a separate submission.

NOTE: A person who conducts, or causes to be conducted, an activity that involves filling, displacing or exposing soil or other earthen materials shall take measures to prevent unreasonable erosion of soil or sediment beyond the project site or into a protected natural resource as defined in 38 M.R.S.A. §480-B. Sediment control measures must be in place before the activity begins. Measures must remain in place and functional until the site is permanently stabilized. Adequate and timely temporary and permanent stabilization measures must be taken. The site must be maintained to prevent unreasonable erosion and sedimentation. See 38 M.R.S.A §420-C (in part). Other or additional standards may apply, under the Natural Resources Protection Act, to a project located in or adjacent to a protected natural resource.

- (5) Photos. Provide photographs of the project site that show the existing character and topography of the area proposed for development.

F. Approval of variations from plans. The granting of this approval is dependent upon and limited to the proposals and plans contained in the application and supporting documents submitted and affirmed to by the applicant. Any variation from these plans, proposals, and supporting documents must be reviewed and approved by the department prior to implementation. Any variation undertaken without approval of the department is in violation of 38 M.R.S.A. §420-D (8) and is subject to penalties under 38 M.R.S.A. §349.

G. Permit extensions. An individual permit issued under the Stormwater Management Law may be extended one time using a Stormwater PBR, provided that the approved project has not begun and the permit has not expired. If a Stormwater PBR needs to be extended, the applicant may file a new Stormwater PBR notification form for a one-time extension.

H. Discretionary authority. Notwithstanding compliance with the PBR requirements and standards set forth in this chapter, the department may require an individual stormwater permit application to be obtained in any case where the department determines that the activity:

- (1) May violate the standards of the Stormwater Management Law;
- (2) Could lead to significant environmental impacts, including cumulative impacts;
- (3) Could have an unreasonable adverse impact on a protected natural resource;
or
- (4) Could degrade the habitat of a threatened or endangered species (see Section 5(C)).

8. Submissions and pre-application meetings. The applicant shall use the application form provided by the department and include evidence that affirmatively demonstrates that the standards will be met, including information such as described in this section. A pre-application meeting between the applicant and the department is an opportunity for the applicant to determine the statutory and regulatory requirements that apply to a specific project, and to identify the department staff person who will serve as project manager for the application.

A. Pre-application meetings for Stormwater Management Law projects. A pre-application meeting is required for a project that does not qualify for a stormwater PBR, unless the requirement for such a meeting is waived by the department based on an initial review of project plans and scope. A written request for a stormwater pre-application meeting must include two copies of a preliminary site plan, brief project description, and a regional map with the site marked. Note: A Site Law application for a new development project requires a pre-application meeting pursuant to Chapter 2, Section 10(B).

B. Design requirements. A design for a stormwater management system that includes any form of conveyance structure must be prepared under the supervision of, and dated, signed and sealed by, a professional engineer registered in the State of Maine, who by education, training, or experience is knowledgeable in stormwater management.

C. Basic standards submissions. These submissions are required for all sites except those that qualify for stormwater PBR described in Section 7 above. An erosion and sedimentation control plan or an inspection and maintenance plan for a project that does not qualify for a stormwater PBR must be prepared by a professional engineer registered in the State of Maine, or a certified erosion and sedimentation control professional.

- (1) Erosion and sedimentation control plan. Submit a plan showing designs for temporary and permanent stabilization measures for all disturbed areas within the project site and for all proposed stormwater management structures. Erosion and sedimentation control plan requirements are described in Appendix A of this chapter. At a minimum, the erosion and sedimentation control plan must include the following.

- (a) Location plan. Submit a plan sheet or set of plans showing, at a minimum, the location of structures, disturbed land, pre-construction site topography, post-construction site topography, on-site or adjacent water resources, and all erosion and sediment control measures.

- (b) Site details. Submit a plan sheet showing the following.
 - (i) Erosion and sedimentation control notes. Erosion and sedimentation control notes, must include, but not limited to, permanent stabilization measures, seeding and mulching rates, and a construction schedule with the proposed construction dates and timeframe for major earth moving and construction events.

 - (ii) Construction and installation details. Construction and installation details for erosion and sedimentation control measure must include, but are not limited to, sedimentation barriers, ditch lining, rip rap, and culvert inlet and outlet designs.

NOTE: For guidance, see the Maine Erosion and Sediment Control BMP Manual.

- (2) Inspection and maintenance plan. Submit a plan for the inspection and maintenance of the temporary and permanent erosion and sedimentation controls for the project site as described in Appendices A and B of this chapter. At a minimum, the inspection and maintenance plan must include the following:
 - (a) List of measures. Submit a list of the erosion control measure and stormwater management measures to be inspected and maintained (e.g., “parking lot catch basins”).

 - (b) Inspection and maintenance tasks. Submit a list of inspection and maintenance tasks specific to each erosion control measure or stormwater management measure (e.g., “remove accumulated sediment s in basin sumps”). Submit the specific qualifications of the person performing each task (e.g., “a professional engineer registered in the State of Maine will inspect the retention pond embankment”).

 - (c) Task frequency. Indicate the required frequency of each inspection and maintenance task (e.g., “accumulated sediments will be removed from all catch basins annually in early spring”).

 - (d) Responsible parties. Submit the name, job title, employer, employer address, phone number, and current email contact information for the person responsible for ensuring that inspection and maintenance tasks are completed. Submit the names, job titles, employer addresses, phone number, and any current email contact information of the engineers or other design professionals who designed the erosion control measures

and stormwater management measures for the site. Include suppliers of proprietary erosion control measures or proprietary stormwater management measures used on the site.

- (e) Maintenance plan for detention basins or retention ponds. For each stormwater management pond or basin submit, at a minimum, an inspection and maintenance plan for the pond's embankments, outlet structure, and emergency spillway. Include as part of this plan provisions for the removal and disposal of accumulated sediments in the pond and the control of woody vegetation on the pond's embankments.
- (f) Maintenance plan for infiltration structures. For each infiltration structure, submit, at a minimum, an inspection and maintenance plan for the structure's pretreatment measures, embankments, surface lining, and overflow spillway. Include as part of this plan provisions for the removal and disposal of accumulated sediments in the structure and for the rehabilitation of clogged surface linings.
- (g) Maintenance plan for underdrained filters. For each underdrained filter, submit, at a minimum, an inspection and maintenance plan for the filter embankments, vegetation, underdrain piping, and overflow spillway. Include as part of this plan provisions for the removal and disposal of accumulated sediments in the structure, the rehabilitation of clogged surface linings, and the flushing of underdrain piping.
- (h) Maintenance plan for stormwater buffers. At a minimum, submit a plan for inspecting and maintaining the integrity and function of the project's stormwater buffers. As part of this plan, include provisions for the inspection, maintenance, and, if necessary, reconstruction of any level spreaders or ditch turnouts used to spread runoff into the buffers. Include as part of this plan provisions for the frequent removal and disposal of accumulated sediments and debris in the level spreader and turnout bays, provisions for the inspection and repair of any eroded areas within the buffer, and provisions for the reestablishment of buffer vegetation destroyed by post-construction activities.
- (i) Maintenance plan for manufactured stormwater treatment systems. For each manufactured system installed on the site, submit an inspection and maintenance plan for the system's inlet, treatment chamber(s), and outlet. The plan shall conform to the inspection and maintenance guidelines recommended by the manufacturer based on the estimated runoff and pollutant load expected to the system from the project. As part of this plan, include provisions for the frequent removal of accumulated sediments, debris, and contaminated waters from the system and, if applicable, provisions for the removal, disposal, and replacement of any clogged or spent filter media.
- (j) Maintenance plan for ditches, culverts, and storm drains. Provide an inspection and maintenance plan for all stormwater conveyances to be built or installed on the site – including, but not limited to, ditches,

swales, culverts, catch basins, and storm drain piping. As part of this plan, include provisions for the repair of eroded areas at the inlet, within, and at the outlet of each conveyance and include provisions for the frequent removal and disposal of accumulated sediments and debris at the inlet, within, and at the outlet of each conveyance.

- (3) Housekeeping. Submit a plan to address spill prevention, groundwater protection, fugitive sediment and dust, debris and other materials, trench or foundation de-watering, or non-stormwater charges, as applicable to the specific site. Housekeeping requirements are described in Appendix C of this chapter.

D. General standards submissions. A project required to meet general standards must provide the following information and design specifications.

- (1) Narrative. A narrative describing site layout, and on-site and off-site watershed hydrology, including all new and existing buildings and facilities, which may be affected by the site runoff. Provide the total amount of impervious area, disturbed area, and developed area created by the project.
- (2) Drainage Plans. All topographic features, such as buildings and other facilities, drainageways, cover type, roads, drainage easements and subcatchment boundaries for pre-construction and post-construction conditions must be shown on a plan. Show all hydrologic flow lines and hydrologic soil groups boundaries on a plan and identify each subcatchment, reach, and pond. For post-construction conditions, show all new stormwater management structures and changes to the hydrologic drainage patterns.
- (3) Calculations. The stormwater runoff calculations for measures designed to meet general standards must be in accordance with acceptable engineering practice, including the following.
 - (a) Water volume. Calculations used to determine the water volume needed to be filtered, infiltrated, or detained based on the proposed site development must be provided.
 - (b) Buffer sizing. Buffers used for runoff control must be sized according to requirements described in Appendix F.
- (4) Details, designs, and specifications. Submit designs, construction details, and technical specifications for each stormwater management measure that will be constructed, installed, or managed on the site.

Ponds. Submit a plan sheet having the following details and specifications for each stormwater management pond: a topographic plan view of the pond, a cross section of the pond embankment, a cross section and profile of the overflow spillway, test pit information, and specifications for constructing

and stabilizing the pond's embankment. The peak storage depth required to meet the general standards must be shown on a cross section for each pond embankment. Submit a cross section of the gravel underdrain used to meet the standards. This cross section must specify the width and elevation of the pond bench, the thickness and gradation for the gravel drainage fill, and the diameter and material for the perforated underdrain pipe.

Underdrained soil filters. Submit a plan sheet having the following details and specifications for each underdrained vegetated filter bed: a plan view of the filter area, a cross section of the embankment for the filter area at the overflow spillway, a cross section and profile of the overflow spillway, a cross section of the underdrain filter, the thickness and composition of the soil filter media, the thickness and gradation of the gravel drainage fill, the layout for the perforated underdrain pipe and the stabilization of the filter bed.

Infiltration. Submit a plan sheet showing the following details and specifications for each infiltration measure: a plan view of the infiltration structure, a cross section of the infiltration measure's runoff storage area, a cross section and profile of the structure's overflow spillway, and details and specifications for permanently stabilizing the infiltration area. The following information must be included, if required, as determined by the department and described below.

- (i) Locations of any monitoring wells necessary for assessing the infiltration measure's performance or stormwater infiltration impacts on groundwater, surface irrigation sites, or subsurface wastewater disposal systems must be shown on the site plan.
- (ii) Location of an existing or proposed surface irrigation site, waste disposal site, subsurface wastewater disposal system, or other facility that could be impacted by operation of the infiltration system must be shown on the site plan.
- (iii) Location of any soil borings, test pits, or other explorations used to determine depth to groundwater, separation from bedrock, or other design information must be shown on the site plan.
- (iv) Location of any water supply wells on-site or within 300 feet of the infiltration areas, zones of contribution for public water supply wells must be shown on the plan sheet.
- (v) Location of storage for any petroleum products, pesticides, fertilizers, road salt, hazardous materials, or other materials with the potential to contaminate groundwater must be shown on the site plan.
- (vi) Plans for management of any potential contaminants and soil sample analyses, such as a spill prevention, control, and countermeasure plan,

must be submitted with appropriate supporting information.

- (vii) Depth to the seasonal high groundwater table, depth to bedrock, and the thickness and composition of any liner used for restricting infiltration rates must be shown on the cross section view of the infiltration structure.
 - (d) Buffers. Submit a topographic site plan showing the location of each buffer on the site, showing the layout of any berm level spreaders used to spread flows into each buffer, identifying the soil type and cover type within each buffer, and showing the land use and impervious and developed area draining to each buffer area. Provide a typical cross section for the berm level spreaders showing the geometry of the berm, the geometry of the upstream storage area, and the specifications for the berm material. Submit information demonstrating that the inslope fill material will have slopes no steeper than 3:1. Submit documentation, in the form of draft covenants and restrictions, demonstrating that buffer area(s) will be maintained as buffer.
- (5) Phosphorus export calculations. An application for a project using the phosphorus standards must include phosphorus export calculations.

NOTE: For guidance in determining phosphorus export see "Phosphorus Control in Lake Watersheds", Maine Department of Environmental Protection.

- (6) Maintenance contract. Submit an executable contract with a third-party for the removal of accumulated sediments, oils, and debris within any proprietary devices and the replacement of any absorptive filters if these measures are part of a project's proposed stormwater management system. An applicant that has the personnel and equipment necessary to perform maintenance on any proprietary devices may submit a demonstration of capability in lieu of an executable contract with a third party. The frequency of sediment clean-out and filter replacements must be consistent with the unit's storage capacity and the estimated pollutant load from the contributing drainage area. This clean-out frequency is usually established by the manufacturer of the proprietary system when sizing the device for the project. The contract must state that a qualified professional will perform maintenance on stormwater management systems to maintain pollutant removal levels.

E. Flooding standard submissions

- (1) Control of peak flows. If a project must meet the flooding standard, the project must be designed to control the peak flows from the 2-, 10- and 25-year, 24-hour storms. This is in addition to the submittal requirements listed in Section 8(C) and (D) above.

- (2) Details, designs, and specifications. Provide runoff curve number computations and time of concentration calculations for each subcatchment. Areas may qualify as subcatchments based on the characteristics of the site or the model used. The department will review all methods of determining subcatchments on a case-by-case basis. Provide a reach description and reach routing analysis for each drainage structure and provide pond descriptions and storage routing calculation for any stormwater management structure, detention pond and culvert backwater areas.

Acceptable stormwater methodologies and models include, but are not limited to, “TR-20 - Computer Program for Project Formulation - Hydrology,” Second Edition, U.S. Department of Agriculture, Soil Conservation Service (March 1986); and “TR-55 - Urban Hydrology for Small Watersheds,” Second Edition, U.S. Department of Agriculture, Soil Conservation Service (June 1986); “WIN TR-55 2003.00.24 Microcomputer Program,” (January 12, 2003); and “HEC-HMS Flood Hydrology Package,” U.S. Army Corps of Engineers (January 2001). Any methodology or model other than those listed must have prior approval from the department.

F. Transfer. An applicant may apply for a transfer of an individual Stormwater Management Law project pursuant to Section 10(A) (4). If the project was approved under stormwater PBR, the transferee of the property shall file a new stormwater PBR notification.

G. Modification. An applicant may apply for a modification of an individual Stormwater Management Law permit. If a stormwater PBR needs to be modified, the applicant shall file a new stormwater PBR notification.

- 9. Municipal stormwater management programs.** The department may allow a municipality or a quasi-municipal organization, such as a watershed management district, to substitute a management system for stormwater for the stormwater permit requirement pursuant to 38 M.R.S.A. §420-D(2). The management system may apply to an entire watershed, or a subcatchment, of receiving water, and may include multiple watersheds within the jurisdiction of the municipality or quasi-municipal organization. A project located within the area served by a management system approved by the department is exempt from the stormwater permit requirements contained in this chapter.

The municipality or quasi-municipality may elect to have the substitution take effect at the time the system is approved by the department, or at the time the system is completed as provided in the implementation schedule provided by the department.

A management system may not substitute for an aspect of a project that is required to meet the infiltration standards described in Appendix D or required to obtain a waste discharge permit.

A. Program approval criteria. The department may review and approve a stormwater management program submitted by a municipality or a quasi-municipal organization, such as a watershed management district to meet this

exemption, provided that the municipality or quasi-municipal organization demonstrates that the following criteria are met.

- (1) Relationship to water quality. The municipality or quasi-municipal organization shall have a stormwater treatment system that, upon implementation, will result in the collective treatment of stormwater from new and existing sources within the watershed and will result in water quality in the receiving water that is as good, or better, than would be achieved with stormwater permits issued by the department for individual projects. The stormwater system may apply to an entire watershed, or a subcatchment, of a receiving water, and may include multiple watersheds within the jurisdiction of the municipality or quasi-municipal organization.
- (2) Funding and implementation. The program must include funding provisions and an implementation schedule that provides that the treatment system for new and existing sources will be in place and functioning within five years unless a longer time period, not to exceed 10 years, is approved by the department.
- (3) Annual reporting. The program must also include a provision for annual reporting by the municipality to the department on progress toward implementation and a listing of the new development within the jurisdiction of the management system.

B. Reinstatement of permit requirement. The department may reinstate the stormwater permit requirement if it finds that the implementation schedule is not being met, or that the management program and associated stormwater treatment system is not achieving the plan's objectives.

10. Conditions of approval. The following conditions of approval apply to an individual permit required pursuant to the Stormwater Management Law, 38 M.R.S.A. §420-D. For standard conditions of approval for a Site Law project, see 38 M.R.S.A. §372 (12) and Section 10-A below.

A. Standard conditions of approval. Unless otherwise specifically stated in the approval, a department approval is subject to the following standard conditions.

- (1) Approval of variations from plans. The granting of this approval is dependent upon and limited to the proposals and plans contained in the application and supporting documents submitted and affirmed to by the applicant. Any variation from these plans, proposals, and supporting documents must be reviewed and approved by the department prior to implementation. Any variation undertaken without approval of the department is in violation of 38 M.R.S.A. §420-D (8) and is subject to penalties under 38 M.R.S.A. §349.
- (2) Compliance with all terms and conditions of approval. The applicant shall submit all reports and information requested by the department demonstrating that the applicant has complied or will comply with all terms

and conditions of this approval. All preconstruction terms and conditions must be met before construction begins.

- (3) Advertising. Advertising relating to matters included in this application may not refer to this approval unless it notes that the approval has been granted WITH CONDITIONS, and indicates where copies of those conditions may be obtained.
- (4) Transfer of project. Unless otherwise provided in this approval, the applicant may not sell, lease, assign, or otherwise transfer the project or any portion thereof without written approval by the department where the purpose or consequence of the transfer is to transfer any of the obligations of the developer as incorporated in this approval. Such approval may only be granted if the applicant or transferee demonstrates to the department that the transferee agrees to comply with conditions of this approval and the proposals and plans contained in the application and supporting documents submitted by the applicant. Approval of a transfer of the permit must be applied for no later than two weeks after any transfer of property subject to the license.
- (5) Initiation of project within two years. If the construction or operation of the activity is not begun within two years, this approval shall lapse and the applicant shall reapply to the department for a new approval. The applicant may not begin construction or operation of the project until a new approval is granted. A reapplication for approval may include information submitted in the initial application by reference.
- (6) Reexamination after five years. If the project is not completed within five years from the date of the granting of approval, the department may reexamine its approval and impose additional terms or conditions or prescribe other necessary corrective action to respond to significant changes in circumstances or requirements which may have occurred during the five-year period.
- (7) Certification. Contracts must specify that "all work is to comply with the conditions of the Stormwater Permit." Work done by a contractor or subcontractor pursuant to this approval may not begin before the contractor and any subcontractors have been shown a copy of this approval with the conditions by the developer, and the owner and each contractor and subcontractor has certified, on a form provided by the department, that the approval and conditions have been received and read, and that the work will be carried out in accordance with the approval and conditions. Completed certification forms must be forwarded to the department.
- (8) Maintenance. The components of the stormwater management system must be adequately maintained to ensure that the system operates as designed, and as approved by the department.
- (9) Recertification requirement. Within three months of the expiration of each

five-year interval from the date of issuance of the permit, the permittee shall certify the following to the department.

- (a) All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.
- (b) All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the facilities.
- (c) The erosion and stormwater maintenance plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the department, and the maintenance log is being maintained.

(8) Severability. The invalidity or unenforceability of any provision, or part thereof, of this permit shall not affect the remainder of the provision or any other provisions. This permit shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

B. Special conditions. The department may, as a term or condition of approval, establish any reasonable requirement to ensure that the proposed project will proceed in accordance with the Stormwater Management Law and rules. However, terms and conditions relating to compliance with the Stormwater Management Law may not substitute for or reduce the burden of proof of the developer to affirmatively demonstrate to the department that each of the standards of the Stormwater Management Law has been met.

10-A. Conditions of approval. The following standard condition of approval applies to a Site Law permit required pursuant to the Site Location of Development Law, 38 M.R.S.A. §§ 481 *et seq.*, in addition to those specified in 06-096 CMR 372.

Recertification requirement. Within three months of the expiration of each five-year interval from the date of issuance of the permit, the permittee shall certify the following to the department.

- A.** All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.
- B.** All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the facilities.
- C.** The erosion and stormwater maintenance plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by

the department, and the maintenance log is being maintained.

- 11. Recording of order.** The department shall record each order approving or modifying a permit pursuant to chapters 500 and 502 in the appropriate registry of deeds.
- 12. Severability.** Should any provision of this chapter be declared invalid or ineffective by court decision, the decision shall not invalidate any other provision of this chapter.
- 13. Transition.** For purposes of the Stormwater Management Law only, Laws 1995, c. 704, §B-4 provides that impervious areas and disturbed areas created prior to July 1, 1997 are not counted when determining the amount of such areas on a parcel, although such areas may be reviewed to the extent necessary to ensure that controls intended to address new areas function adequately. New construction on an impervious area created prior to July 1, 1997 is not counted when determining the amount of impervious area on a parcel. An area is considered "created" for purposes of this provision when local approval has been received, and construction has begun.

If the definition for "impervious area" is met, examples of "new construction on an impervious area created prior to July 1, 1997," which is not counted toward total impervious area for purposes of determining jurisdiction under the Stormwater Management Law, include the following:

- A. A building demolished and a parking lot created within the footprint of the building;
- B. A building constructed on a parking lot; and
- C. A gravel parking lot paved over.

NOTE: The examples in Section 13 (A) and (B) above would be counted toward the higher threshold for "structure area" under the Site Law. The Site Law addresses larger developments under several types of standards, and does not include an exemption for new construction on impervious area created prior to a specific date.

- 14. Permit shield.** If a stormwater best management practice is approved by the department and, although adequately and appropriately constructed and maintained by the permittee, as determined by the department, it fails to meet an applicable standard provided in Section 4 or 5, the permittee is not in violation for failing to comply with that standard.

This section does not apply if an experimental measure is approved. See Section 15. This section does not apply to the requirements of Appendix D. This section does not create an exemption or exception from Site Location standards for projects that obtain a Stormwater Management Law permit.

NOTE: This section does not apply to license by rule approvals granted, or the need for a license pursuant to 38 M.R.S.A. §413, the Waste Discharge Law. A wastewater discharge license is required for any stormwater discharge that the department determines will contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the State. See 06-096 CMR 521(9) (a) (1) (v). For the permit shield provision applicable to the Waste Discharge Law, see 38 M.R.S.A. 414(8) "Effect of license".

Nothing in this section alters or affects the liability of the permittee if a violation has occurred prior to permit issuance.

15. Experimental measure. The department may, on a case-by-case basis, approve a best management practice that is experimental, as determined by the department, when requested by an applicant. However, in this case, the "permit shield" provision in Section 14 will not apply, and the department may require the applicant to collect and submit sufficient information on the performance on the best management practice to allow evaluation. If the best management practice does not perform at least as well as would have been expected from otherwise available best management practices, the department may require the permittee to replace or otherwise redesign the system.

The department may only approve an experimental practice on a site where it would be possible to replace or redesign the experimental system if necessary.

16. Modification. If a project has required a permit pursuant to the Stormwater Management Law or Site Law, all subsequent modifications of any size are also required to meet standards, except as allowed for redevelopment in Section 4(D). When the applicable standard depends upon an area threshold, the area of the entire licensed project, including the modification, is included. The area may be limited if the project covers more than one direct watershed, and the standards so provide.

APPENDIX A. Erosion and sedimentation control

This appendix applies to all projects.

A person who conducts, or causes to be conducted, an activity that involves filling, displacing or exposing soil or other earthen materials shall take measures to prevent unreasonable erosion of soil or sediment beyond the project site or into a protected natural resource as defined in 38 M.R.S.A. §480-B. Sediment control measures must be in place before the activity begins. Measures must remain in place and functional until the site is permanently stabilized. Adequate and timely temporary and permanent stabilization measures must be taken.

NOTE: The site must be maintained to prevent unreasonable erosion and sedimentation. See 38 M.R.S.A §420-C (in part). Other or additional standards than those provided in Appendix A may apply, under the Natural Resources Protection Act, to a project located in or adjacent to a protected natural resource.

NOTE: For guidance on erosion and sedimentation controls, consult "Maine Erosion and Sediment Control BMPs", Maine Department of Environmental Protection.

1. **Pollution prevention.** Minimize disturbed areas and protect natural downgradient buffer areas to the extent practicable.

The discharge may not result in erosion of any open drainage channels, swales, upland, or coastal or freshwater wetlands.

NOTE: Buffers improve water quality by helping to filter pollutants in run-off both during and after construction. Minimizing disturbed areas through phasing limits the amount of exposed soil on the site through retention of natural cover and by retiring areas as permanently stabilized. Less exposed soil results in fewer erosion controls to install and maintain. If work within an area is not anticipated to begin within two weeks time, consider leaving the area in its naturally existing cover.

2. **Sediment barriers.** Prior to construction, properly install sediment barriers at the edge of any downgradient disturbed area and adjacent to any drainage channels within the disturbed area. Maintain the sediment barriers until the disturbed area is permanently stabilized.
3. **Temporary stabilization.** Stabilize with mulch or other non-erodible cover any exposed soils that will not be worked for more than 7 days. Stabilize areas within 75 feet of a wetland or waterbody within 48 hours of the initial disturbance of the soil or prior to any storm event, whichever comes first.
4. **Removal of temporary sediment control measures.** Remove any temporary sediment control measures, such as silt fence, within 30 days after permanent stabilization is attained. Remove any accumulated sediments and stabilize.

NOTE: It is recommended that silt fence be removed by cutting the fence materials at ground level to avoid additional soil disturbance.

- 5. Permanent stabilization.** If the area will not be worked for more than one year or has been brought to final grade, then permanently stabilize the area within 7 days by planting vegetation, seeding, sod, or through the use of permanent mulch, or riprap, or road sub-base. If using vegetation for stabilization, select the proper vegetation for the light, soil and moisture conditions; amend areas of disturbed subsoils with topsoil, compost, or fertilizers; protect seeded areas with mulch or, if necessary, erosion control blankets; and schedule sodding, planting, and seeding to avoid die-off from summer drought and fall frosts. Newly seeded or sodded areas must be protected from vehicle traffic, excessive pedestrian traffic, and concentrated runoff until the vegetation is well-established. If necessary, areas must be seeded and mulched again if germination is sparse, plant coverage is spotty, or topsoil erosion is evident. One or more of the following may apply to a particular site.
- (a) Seeded areas. For seeded areas, permanent stabilization means a 90% cover of healthy plants with no evidence of washing or rilling of the topsoil.
 - (b) Sodded areas. For sodded areas, permanent stabilization means the complete binding of the sod roots into the underlying soil with no slumping of the sod or die-off.
 - (c) Permanent Mulch. For mulched areas, permanent mulching means total coverage of the exposed area with an approved mulch material. Erosion control mix may be used as mulch for permanent stabilization according to the approved application rates and limitations.
 - (d) Riprap. For areas stabilized with riprap, permanent stabilization means that slopes stabilized with riprap have an appropriate backing of well-graded gravel or approved geotextile to prevent soil movement from behind the riprap. Stone must be sized appropriately. It is recommended that angular stone be used.
 - (e) Agricultural use. For construction projects on land used for agricultural purposes (e.g., pipelines across crop land), permanent stabilization may be accomplished by returning the disturbed land to agricultural use.
 - (f) Paved areas. For paved areas, permanent stabilization means the placement of the compacted gravel subbase is completed.
 - (g) Ditches, channels, and swales. For open channels, permanent stabilization means the channel is stabilized with a 90% cover of healthy vegetation, with a well-graded riprap lining, or with another non-erosive lining such as concrete or asphalt pavement. There must be no evidence of slumping of the channel lining, undercutting of the channel banks, or down-cutting of the channel.
- 6. Winter construction.** "Winter construction" is construction activity performed during the period from November 1 through April 15. If disturbed areas are not stabilized with permanent measures by November 1 or new soil disturbance occurs after November 1, but before April 15, then these areas

must be protected and runoff from them must be controlled by additional measures and restrictions.

NOTE: For guidance on winter construction standards, see the "Maine Erosion and Sediment Control BMPs", Maine Department of Environmental Protection.

- 7. Stormwater channels.** Ditches, swales, and other open stormwater channels must be designed, constructed, and stabilized using measures that achieve long-term erosion control. Ditches, swales, and other open stormwater channels must be designed to handle, at a minimum, the expected volume of run-off. Each channel should be constructed in sections so that the section's grading, shaping, and installation of the permanent lining can be completed the same day. If a channel's final grading or lining installation must be delayed, then diversion berms must be used to divert stormwater away from the channel, properly-spaced check dams must be installed in the channel to slow the water velocity, and a temporary lining installed along the channel to prevent scouring. Permanent stabilization of channels is addressed under Appendix A (5) (g) above.
- 8. Roads.** Gravel and paved roads must be designed and constructed with crowns or other measures, such as water bars, to ensure that stormwater is delivered immediately to adjacent stable ditches, vegetated buffer areas, catch basin inlets, or street gutters.
- 9. Culverts.** Culverts must be sized to avoid unintended flooding of upstream areas or frequent overtopping of roadways. Culvert inlets must be protected with appropriate materials for the expected entrance velocity, and protection must extend at least as high as the expected maximum elevation of storage behind the culvert. Culvert outlet design must incorporate measures, such as aprons or plunge pools, to prevent scour of the stream channel. The design must take account of tailwater depth.
- 10. Parking areas.** Parking areas must be constructed to ensure runoff is delivered to adjacent swales, catch basins, curb gutters, or buffer areas without eroding areas downslope. The parking area's subbase compaction and grading must be done to ensure runoff is evenly distributed to adjacent buffers or side slopes. Catch basins must be located and set to provide enough storage depth at the inlet to allow inflow of peak runoff rates without by-pass of runoff to other areas.
- 11. Additional requirements.** Additional requirements may be applied on a site-specific basis.

APPENDIX B. Inspection and maintenance

This appendix applies to all projects. A project that is only required to meet basic standards (stormwater PBR) must meet the standards in Section 1. All other projects must meet standards in Sections 1 through 5.

See Appendix D (5) for additional maintenance requirements related to infiltration of stormwater.

1. **During construction.** The following standards must be met during construction.

- (a) **Inspection and corrective action.** Inspect disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. Inspect these areas at least once a week as well as before and after a storm event, and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct the inspections.
- (b) **Maintenance.** Maintain all measures in effective operating condition until areas are permanently stabilized. If best management practices (BMPs) need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within 7 calendar days and prior to any storm event (rainfall).
- (c) **Documentation.** Keep a log (report) summarizing the inspections and any corrective action taken. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, materials storage areas, and vehicles access points to the parcel. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and location(s) where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken.

The log must be made accessible to department staff and a copy must be provided upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

4. **Post-construction.** The following standards must be met after construction.

- (a) **Plan.** Carry out an approved inspection and maintenance plan that is consistent with the minimum requirements of this section. The plan must address inspection and maintenance of the project's permanent erosion control measures and stormwater management system. This plan may be combined with the plan listed in Section 2(a) of this appendix. See Section 8(C) (2) for submission requirements.

- (b) Inspection and corrective action. All measures must be maintained in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct the inspections. The following areas, facilities, and measures must be inspected and identified deficiencies must be corrected. Areas, facilities, and measures other than those listed below may also require inspection on a specific site. Inspection or maintenance tasks other than those discussed below must be included in the maintenance plan developed for a specific site.

NOTE: Expanded and more-detailed descriptions for specific maintenance tasks may be found in the Maine DEP's "Stormwater Management for Maine: Best Management Practices."

- (i) Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows. See permanent stabilization standards in Appendix A (5).
- (ii) Inspect ditches, swales and other open stormwater channels in the spring, in late fall, and after heavy rains to remove any obstructions to flow, remove accumulated sediments and debris, to control vegetated growth that could obstruct flow, and to repair any erosion of the ditch lining. Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity. Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable. If the ditch has a riprap lining, replace riprap on areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged. The channel must receive adequate routine maintenance to maintain capacity and prevent or correct any erosion of the channel's bottom or sideslopes.
- (iii) Inspect culverts in the spring, in late fall, and after heavy rains to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the culvert's inlet and outlet.
- (iv) Inspect and, if required, clean-out catch basins at least once a year, preferably in early spring. Clean-out must include the removal and legal disposal of any accumulated sediments and debris at the bottom of the basin, at inlet any grates, at any inflow channels to the basin, and at any pipes between basins. If the basin outlet is designed to trap floatable materials, then remove the floating debris and any floating oils (using oil-absorptive pads).
- (v) Inspect resource and treatment buffers at least once a year for evidence of erosion, concentrating flow, and encroachment by development. If flows are concentrating within a buffer, site grading, level spreaders, or ditch turn-outs must be used to ensure a more even distribution of flow into a buffer. Check down slope of all spreaders and turn-outs for erosion. If erosion is present, adjust or modify the spreader's or turnout's lip to ensure a better distribution of flow into a buffer. Clean-out any accumulation of sediment within the spreader bays or turn-out pools.
- (c) Regular maintenance
- (i) Clear accumulations of winter sand in parking lots and along roadways at least once a year,

preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader. Grading of gravel roads, or grading of the gravel shoulders of gravel or paved roads, must be routinely performed to ensure that stormwater drains immediately off the road surface to adjacent buffer areas or stable ditches, and is not impeded by accumulations of graded material on the road shoulder or by excavation of false ditches in the shoulder. If water bars or open-top culverts are used to divert runoff from road surfaces, clean-out any sediments within or at the outlet of these structures to restore their function.

- (ii) Manage each buffer's vegetation consistently with the requirements in any deed restrictions for the buffer. Wooded buffers must remain fully wooded and have no disturbance to the duff layer. Vegetation in non-wooded buffers may not be cut more than three times per year, and may not be cut shorter than six inches.

NOTE: Contact the department's Division of Watershed Management (Maine DEP) for assistance developing inspection and maintenance requirements for other drainage control and runoff treatment measures installed on the site. The maintenance needs for most measures may be found in the Maine DEP's "Stormwater Management for Maine: Best Management Practices."

- (d) Documentation. Keep a log (report) summarizing inspections, maintenance, and any corrective actions taken. The log must include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed after removal.

The log must be made accessible to department staff and a copy provided to the department upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

3. **Maintenance contract.** Contract with a third-party or other qualified professional, as approved by the department, for the removal of accumulated sediments, oils, and debris within any proprietary devices and the replacement of any absorptive filters. The frequency of sediment clean-out and filter replacements must be consistent with the unit's storage capacity and the estimated pollutant load from the contributing drainage area. This clean-out frequency is usually established by the manufacturer of the proprietary system when sizing the device for the project.
4. **Re-certification.** Submit a certification of the following to the department within three months of the expiration of each five-year interval from the date of issuance of the permit.
 - (a) Identification and repair of erosion problems. All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.
 - (b) Inspection and repair of stormwater control system. All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the system, or portions of the system.

- (c) **Maintenance.** The erosion and stormwater maintenance plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the department, and the maintenance log is being maintained.

Municipalities with separate storm sewer systems regulated under the Maine Pollutant Discharge Elimination System (MPDES) Program may report on all regulated systems under their control as part of their required annual reporting in lieu of separate certification of each system. Municipalities not regulated by MPDES, but that are responsible for maintenance of permitted stormwater systems, may report on multiple stormwater systems in one report.

- 5. Duration of maintenance.** Perform maintenance as described and required in the permit unless and until the system is formally accepted by the municipality or quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. If a municipality or quasi-municipal district chooses to accept a stormwater management system, or a component of a stormwater system, it must provide a letter to the department stating that it assumes responsibility for the system. The letter must specify the components of the system for which the municipality or district will assume responsibility, and that the municipality or district agrees to maintain those components of the system in compliance with department standards. Upon such assumption of responsibility, and approval by the department, the municipality, quasi-municipal district, or association becomes a co-permittee for this purpose only and must comply with all terms and conditions of the permit.

- 6. Additional requirements.** Additional requirements may be applied on a site-specific basis.

APPENDIX C. Housekeeping

These performance standards apply to all projects.

- 1. Spill prevention.** Controls must be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.
- 2. Groundwater protection.** During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

See Appendix D for license by rule standards for infiltration.

NOTE: Lack of appropriate pollutant removal best management practices (BMPs) may result in violations of the groundwater quality standard established by 38 M.R.S.A. §465-C (1).

- 3. Fugitive sediment and dust.** Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

NOTE: An example of the use of BMPs to control fugitive sediment and dust is as follows. Operations during wet months that experience tracking of mud off the site onto public roads should provide for sweeping of road areas at least once a week and prior to significant storm events. Where chronic mud tracking occurs, a stabilized construction entrance should be provided. Operations during dry months, that experience fugitive dust problems, should wet down the access roads once a week or more frequently as needed.

NOTE: Dewatering a stream without a permit from the department violates state water quality standards and the Natural Resources Protection Act.

- 4. Debris and other materials.** Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

NOTE: To prevent these materials from becoming a source of pollutants, construction and post-construction activities related to a project may be required to comply with applicable provision of rules related to solid, universal, and hazardous waste, including, but not limited to, the Maine solid waste and hazardous waste management rules; Maine hazardous waste management rules; Maine oil conveyance and storage rules; and Maine pesticide requirements.

- 5. Trench or foundation de-watering.** Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the department.

NOTE: For guidance on de-watering controls, consult the Maine Erosion and Sediment Control BMPs", Maine Department of Environmental Protection."

- 6. Non-stormwater discharges.** Identify and prevent contamination by non-stormwater discharges.
- 7. Additional requirements.** Additional requirements may be applied on a site-specific basis.

Appendix D. Infiltration Basins, Dry Wells, And Subsurface Fluid Distribution Systems (Section 413 License By Rule Standards)

Any project proposing infiltration of stormwater must provide adequate pre-treatment of stormwater prior to discharge of stormwater to the infiltration area, or provide for treatment within the infiltration area. Lack of appropriate pollutant removal best management practices (BMPs) may result in violations of the groundwater quality standard established by 38 M.R.S.A. §465-C (1). Many pollutants found in stormwater accumulate in the soils in infiltration areas and are released due to chemical changes that occur in the infiltration area over time. Consequently, runoff quality often underestimates the long-term adverse effects on groundwater quality due to these contaminants, and cannot be used as a direct indicator of anticipated adverse effects. Maintenance of the infiltration area may be required to prevent clogging, development of anaerobic conditions, or other conditions that could impair the functioning of the area or increase the risk of pollutant discharge from the infiltration area.

Provided that the standards in this appendix are met, a discharge to groundwater from a stormwater infiltration system is considered a *de minimis* discharge for the purposes of the Waste Discharge Licensing Program, and does not require a waste discharge license. However, nothing in this chapter may be construed to limit the department's licensing or enforcement authority under 38 M.R.S.A. Articles 4-A or 6.

NOTE: Stormwater infiltration systems not meeting the standards described in Appendix D may require a waste discharge permit. An infiltration system serving a development regulated under the Site Location of Development Act may be required to meet additional standards. For definitions and provisions associated with the Waste Discharge program, see 38 M.R.S.A. §§ 413 *et seq.*, and department Rules chapters 520 *et seq.* All drywells and subsurface fluid distribution systems must be registered with and meet all other requirements of the department's Underground Injection Control Program.

1. **Definitions.** As used in this appendix, the following terms have the following meanings.
 - (a) Dry-weather discharges. Any discharge to a stormwater management system that is not composed entirely of stormwater, other than discharges directly resulting from fire-fighting at the facility. Dry-weather discharges can originate from direct connections to industrial, commercial, or residential facilities, or indirectly as surface or subsurface discharges to the stormwater collection system.
 - (b) Drywell. A well or other facility deeper than it is wide, completed above the water table so that its bottom and sides are typically dry except when receiving fluids.
 - (c) Infiltration. Any process specifically used to meet the stormwater standards of this chapter by actively directing all or part of the stormwater into the soil. For the purposes of this chapter, infiltration is the process by which runoff percolates through the unsaturated overburden and fractured bedrock to the water table. For the purposes of this chapter, infiltration does not include:

- (1) Incidental wetting of soil in ditches, detention basins or the equivalent;
 - (2) Wetting of underdrained basins, dry swales, or similar filtration systems, provided that they discharge to surface waters or to a buffer strip; or
 - (3) Wetting of buffers meeting department requirements for use as stormwater control. Discharge of runoff to areas of the site where the water will collect and percolate into the ground is considered infiltration if the volume, rate, or quality of the discharge exceeds the runoff treatment capacity of the area, such as a stormwater buffer, as determined by the department. Underdrained swales, underdrained ponds, and similar practices that discharge to surface waters or to buffer strips meeting department requirements for stormwater buffers are not considered infiltration systems, although these may be used to treat runoff prior to discharge to an infiltration area.
- (d) Infiltration basin. A structure wider than it is deep and designed to hold runoff without any means of discharge other than evapotranspiration, infiltration, or emergency bypass.
 - (e) Public water supply. Any publicly or privately-owned water-supply system that serves at least 25 people or 15 service connections for at least 60 days per year.
 - (f) Subsurface fluid distribution system. Any system designed to dispose of stormwater beneath the surface of the earth, including, but not limited to, wells, settling tanks, disposal fields, pretreatment filters, pipes, or any other fixture, mechanism, or apparatus used for this purpose.
 - (g) Zone of contribution or delineated contributing area. The area that contributes water to a water supply well, generally represented as the projection of the three-dimensional volume of water flowing to a discharging well onto a two-dimensional map view.

2. Limitations on the use of infiltration for stormwater treatment

- (a) Storage or handling of petroleum products, pesticides, fertilizers, and hazardous substances. Infiltration of runoff from subwatersheds of a project in which petroleum products, pesticides, fertilizers, hazardous substances, or other materials with the potential to contaminate groundwater are stored or handled, is not allowed unless containment structures are used. This does not apply to storage of heating oil in a tank or tanks with a total volume of 550 gallons or less and serving a single consumptive residential or commercial user.
- (b) Storage or handling of road salt or similar materials. Infiltration of runoff from subwatersheds of an activity in which road salt or similar materials are stored or handled in bulk is not allowed.
- (c) Containment structures. Storage and handling areas for petroleum products, road salt, and other potential groundwater contaminants may be isolated within containment structures, buildings, or other enclosures to effectively remove those areas from subwatersheds, so that infiltration structures may be constructed to serve the remaining areas of the subwatershed, provided that the facility is operated in accordance with a spill prevention, control, and countermeasures plan; operation and maintenance plan; or equivalent document as required by Section (8)(D)(4)(c)(vi)

approved by the department.

- (d) Infiltration of runoff from asphalt or concrete paving or equivalent material. Infiltration of runoff from a total of one acre or more of asphalt or concrete paving or equivalent material at a given project is not allowed except by means of infiltration basins located, designed, operated, and maintained in accordance with this appendix. This limitation does not apply to roads entirely within subdivisions consisting of lots for single-family detached residential housing or to use of pavement alternatives approved by the department. Use of pavement alternatives is limited by subsections 2(a) and 2(b), and other requirements of this chapter.
- (e) Infiltration of runoff from lawn areas, vegetated areas, and roofs. Infiltration of runoff from lawn areas and other vegetated areas, playing fields, and roofs of residential and commercial structures where no manufacturing or processing occurs, other than for home-based industries, is allowed, provided that any application of fertilizers, pesticides, and similar turf-management chemicals, is in accordance with a department approved management plan and no part of the areas used for infiltration is in the delineated contributing area of a well that is part of a public water supply system. Lawn areas on individual lots that are sold or developed as part of a residential subdivision consisting of lots for single-family detached residential housing are exempt from this requirement.
- (f) Dry-weather discharges, and stormwater from outside drainage systems. Dry-weather discharges and stormwater from drainage systems outside the area of the activity may not be discharged to an infiltration system, unless approved by the department.

3. Location

- (a) Water supply wells. Unless specifically approved by the department and the Department of Human Services' Drinking Water Program, if applicable, infiltration systems must be located no less than 300 feet from any private water supply well, must not be located within the delineated contributing area of a public water supply well, and must be located as far down gradient of any water supply well as practical. Department approval of a reduced setback will be subsequent to review and approval of a study by a Maine Certified Geologist demonstrating that discharges from the infiltration system will not be within the zone of contribution of the well or wells. This limitation does not apply to on-site wells that are not used to provide drinking water.
- (b) Subsurface wastewater disposal systems. An infiltration system is considered a major watercourse for the purposes of Table 700.2 of the Maine Subsurface Wastewater Disposal Rules, 144A CMR 241, for determining applicable setbacks from the relevant components of an offsite subsurface wastewater disposal system. Additional setback distances may be required by the local plumbing inspector or the Department of Human Services' Division of Health Engineering. Allowance for lesser setbacks for onsite disposal systems or other disposal systems owned or controlled by the developer may be requested from the department, the Department of Human Services, and the local plumbing inspector. Infiltration systems must be located as far down gradient of any component of a subsurface wastewater disposal system as practical.
- (c) Protected natural resources. Infiltration systems must be located no less than 25 feet from any protected natural resources as defined at 38 M.R.S.A §480-B, other than fragile mountain areas, and must be located as far up gradient of any such resources as practical.

- (d) Surface grade. The pre-construction surface grade must be 20% or less at the location of the proposed infiltration system.
- (e) Separation from bedrock. Infiltration systems serving one acre or more of impervious area must be located in areas with more than five feet of saturated overburden above the bedrock surface, as measured during the seasonal low water table. This restriction does not apply to runoff from areas of non-asphalt roofing on structures in which no manufacturing or processing occurs, other than for home-based industries. Separation from bedrock and depth to the water table may be demonstrated by means of test pits, borings, or similar invasive explorations, or by non-invasive geophysical methods such as seismic surveys. Thickness of blast rock or similar material is not counted toward the required thickness of overburden; blast rock or similar material is not considered as bedrock. Demonstration of a continuous in-situ layer, at least five feet in thickness, of unfractured basal till or marine, estuarine, or lacustrine clay between bedrock and the infiltration structure may substitute for this requirement, at the discretion of the department.

4. Design and operation

- (a) Soil permeability. The permeability of the soil at the depth of the base of the proposed infiltration system must be no greater than 2.41 inches per hour. Permeability must be shown to be reasonably consistent across the proposed infiltration area and may be determined by in-place well or permeameter testing, by analyses of soil gradation, or other means acceptable to the department. Imported or manufactured soils or other materials (such as compost), as specifically approved by the department, may be installed at the base and sides of the proposed infiltration system to obtain this range of permeability and provide additional treatment. This layer must be at least six inches in thickness, of which the bottom three inches is to be tilled into the native soil.
- (b) Vegetation of infiltration basins. All areas of the basin not covered by stone or other non-vegetative covers must be maintained as grass.
- (c) Separation from seasonal high water table. The bottom of the infiltration system, including any stone layer or other material below the depth of any manufactured components of the system, must be at least three feet above the elevation of the seasonal high water table.
- (d) Time for drainage. The infiltration system must be designed to drain completely within 72 hours following the runoff event.
- (e) Impact on depth to groundwater. Infiltration of stormwater may not increase the elevation to the seasonal high water table beneath a surface-irrigation site, land-disposal area for septage or other waste, or other waste management or wastewater management facility, without specific approval by the department and, if applicable, the Department of Human Services.
- (f) Impact on groundwater flow. Stormwater infiltration may not affect the direction of groundwater flows so as to impair any groundwater monitoring programs or cause the migration of existing contaminated groundwater that would result in unreasonable adverse impact on the quality of surface water, groundwater, or drinking water supplies.

- (g) Mounding and seepage. Groundwater mounding due to stormwater infiltration, especially on clay, bedrock, or other low-permeability surfaces, or stormwater discharges to highly permeable materials such as gravel or blast rock, may not cause seepage, high pore-pressures, or other effects that will adversely affect the stability of slopes in the vicinity of the activity. A qualified professional shall assess the potential for seepage and reduction in slope stability, and submit a report of findings, including logs of test borings or other subsurface explorations, modeling, or other means of analysis as determined to be necessary and applicable.
- (h) Conveyance of overflow. Infiltration systems must include measures to convey overflow to a stable discharge location.
- (i) Control of access. Access to any infiltration area must be controlled during and after construction to prevent compaction of the soil.
- (j) Geotextile. A geotextile fabric with suitable characteristics must be placed between any stone layer and adjacent soil.
- (k) Sediment discharge to infiltration structures. Grassed swales, underdrained swales, sediment traps, or similar practices must be incorporated in the design to minimize discharge of sediment to the infiltration system.
- (l) Devices to trap petroleum products. Dry wells or subsurface fluid distribution systems receiving runoff from areas of asphalt or concrete paving not prohibited from using infiltration under Section 2 must include sump skimmers, sorbent booms, or similar devices to remove petroleum products from runoff. These devices must provide enough sorptive capacity to trap petroleum products for at least six months after construction and after any repaving or reconstruction.

5. Maintenance

- (a) Snow storage prohibited. Snow removed from any on-site or off-site areas may not be stored over an infiltration area, with the exception of storage on pavement alternatives approved by the department.
- (b) Groundwater monitoring. Groundwater quality monitoring may be required by the department if necessary to demonstrate that the infiltration system will operate in compliance with the Water Classification Program. Groundwater quality monitoring will generally be required for activities infiltrating water from areas of heavy turf-chemical use, such as golf courses and certain athletic fields, and large connected impervious areas, such as parking lots and runways. Groundwater quality monitoring will generally not be required for activities infiltrating water from lawn areas and other vegetated areas, residential developments except for those with large parking areas, playing fields, low-use roads such as residential subdivision roads, and roofs of residential and commercial structures.
- (c) Pollution-control devices. Pollution-control devices such as oil – water separators, skimmers, and booms must be inspected regularly to determine if they need to be cleaned or replaced.

- (d) Observation wells, measure of sediment accumulation, and points of access for sediment removal. Observation wells to determine the system's performance and access points to allow for the removal of accumulated sediment must be included in the design of subsurface fluid distribution systems. Dry wells and infiltration basins must have staff gauges, marked rods, or similar instrumentation to measure the accumulation of sediment and determine how quickly the system drains after a storm. The maintenance plan for the infiltration system prepared in accordance with Section 8(C) (2) (f) must indicate the expected rate of drainage of the infiltration system and provide for removal of sediment from the infiltration system.

- (e) Sediment removal and maintenance of system performance. Sediment must be removed from the system to prevent deterioration of system performance. The system must be rehabilitated or replaced if its performance is degraded to the point that applicable stormwater standards are not met.

6. Additional requirements. Additional requirements may be applied on a site-specific basis.

Appendix E. Stormwater Basins, Ponds and Underdrained Filter Beds

This appendix applies to all projects using stormwater basins, ponds or underdrained filters, and outlines the criteria for siting, designing, and constructing detention basins and ponds used for meeting the department's stormwater management rules. The department may require additional measures regarding geotechnical, hydrologic, structural, hydraulic, and construction concerns. For example, the department may require that the designer assess the impoundment's hazard potential for determining the appropriate design storm for the impoundment because the design storm may have a greater rainfall depth and larger recurrence interval than the 25-year, 24-hour storm used for the department's stormwater management program.

- 1. Basin and pond types.** A variety of stormwater management basins and ponds are used to control runoff quantity and improve runoff quality from developments. All need professional siting and design to avoid unreasonable impacts to wetlands, surface waters, and groundwater and to ensure long-term stability, pollutant removal performance, and control of peak flow rates. General restrictions and requirements for all basins and ponds are provided below.

NOTE: Specific siting and design criteria for each type of structure can be found in the department's manual "Stormwater Management for Maine: Best Management Practices".

- 2. Siting restrictions.** The department has placed the following general restrictions on the siting of stormwater basins and ponds. Additional restrictions may be required based on drainage, geotechnical, wildlife, and safety concerns.
 - (a) Rivers, streams and brooks.** A basin or pond may not be located in or adjacent to a river, stream, or brook (intermittent or perennial) unless approved by the department pursuant to, or exempted from, the Natural Resources Protection Act (NRPA). For the purposes of this appendix, "adjacent to" is defined as in Chapter 305.
 - (b) Wetlands.** A basin or pond may not be constructed in or adjacent to a wetland and no dam, wall, berm, or embankment may be placed within or adjacent to a wetland as part of a stormwater management system, unless approved by the department pursuant to the NRPA. The use of natural wetlands for runoff detention or retention storage to meet the general, phosphorus, flooding, or other standards in this chapter is prohibited unless the flooding standards in Section 4(D) are met and a Natural Resources Protection Act permit is obtained if required.
 - (c) Discharge of flows.** Concentrated flows from stormwater basins and ponds may not be discharged to an off-site area that has not received concentrated flows before. When detention is used on a site, the pre-construction flow condition to off-site areas, whether sheet or concentrated, must be maintained in the post-construction condition unless drainage easements are obtained from affected property owners.

- (c) Underground detention. Where underground detention is required because of limited space or other restrictions, runoff must at a minimum receive treatment to remove sediment and debris prior to discharge to the underground storage facility. The department may require treatment to remove other pollutants if it determines that underground storage poses a threat to groundwater quality in which case all requirements in Appendix D must be met. The outlet control structure and the storage chambers for the underground detention structure must be accessible from the surface for maintenance, debris removal, and, if necessary, future modification.

3. Pond and basin design requirements

- (a) Principal spillways. Basins and ponds designed to control flows so as to meet the flooding standard must have principal spillways capable of controlling runoff from 24-hour storms of the 2-year, 10-year, and 25-year frequencies. Basins and ponds designed to provide channel protection detention must have principal spillways capable of providing extended detention of twelve hours for runoff from a 24-hour storm of a one-year frequency. In both cases, the principal spillway must control the maximum flows from the design storm(s) without activating the emergency spillway.
 - (i) Trash racks. Any pipe, orifice, or culvert serving as a basin or pond outlet must have a trash rack to control clogging by debris and to provide safety to the public. The surface area of each rack must be at least four times the outlet opening it is protecting. A significantly larger trash rack ratio may be required for openings less than twenty-four inches in diameter. The spacing between rack bars must be no more than six inches or one-half the dimension of the smallest outlet opening behind it, whichever is less. If possible, trash racks should be inclined so to be self-cleaning.
 - (ii) Seepage controls. All smooth outlet pipes greater than eight inches and all corrugated outlet pipes greater than 12 inches must have seepage controls to prevent the piping of soil along the outside of the pipe. This standard applies to both dry detention basins and ponds with permanent pools.
 - (iii) Anti-floatation design. All outlets employing a riser structure must be designed to prevent the riser floating.
- (b) Emergency spillways. Each stormwater basin and pond must have an emergency spillway designed to independently convey the routed runoff from at least the 25-year, 24-hour storm (as described under 3(c)(i) Crest elevation). All spillways must meet the following criteria.
 - (i) Location. Emergency spillways must be located on undisturbed, non-fill soil wherever possible. If the spillway must be located on fill soils, then the spillway must be horizontally offset at least 20 feet from the principal outlet and be designed with a riprap lining, reinforced-turf lining, or a non-flexible lining.

- (ii) Exit channel grade. The maximum grade of the spillway's exit channel may not exceed 20% unless a non-flexible lining is used to control erosion within the channel. Vegetation, reinforced turf, riprap, and modular blocks are considered flexible linings. All linings must be evaluated for stability at the channel grade chosen.
- (iii) Flow depth. The design flow depth in the exit channel may not exceed one-half the d50 stone size for channels lined with riprap. The design flow depth in the exit channel may not exceed three inches for channels lined with un-reinforced vegetation.
- (c) Embankments. Basin and pond embankments must be designed by a professional engineer registered in the State of Maine. The design must include an investigation of the subsurface conditions at the proposed embankment location to evaluate settlement potential, groundwater impacts, and the need for seepage controls. The department will require the submittal of a geotechnical report from a geotechnical engineer for any embankment over 10 feet in effective height or posing a significant hazard to downstream property or life.
- (i) Crest elevation. The minimum elevation of the top of the settled embankment must be at least one foot above the peak water surface in the basin with the emergency spillway flowing at design depth for the design storm routed through just the emergency spillway.
- (ii) Crest width. The minimum crest width for any embankment must be as shown in the following table:

Effective height of embankment (feet)	Crest Width (feet)
less than 10	6
10 - 15	8
15 - 20	10
20 - 25	12
25 - 35	14
more than 35	15

- (iii) Construction. The selection of fill materials must be subject to approval of the design engineer or inspecting engineer. Fill must be free of frozen soil, rocks over six inches, and sod, brush, stumps, tree roots, wood, or other perishable materials. Embankment fills less than 10 feet in fill height must be compacted using compaction methods that would reasonably guarantee that the fill density is at least 90% of the maximum density as determined by standard proctor (ASTM-698). All embankment fills more than 10 feet in fill height must be compacted to at least 90% of the maximum density as determined by standard proctor (ASTM-698) and must have their density verified by field density testing.

- (iv) Slopes. The embankment's slopes may not be steeper than 3 horizontal to one vertical.
- (d) Gravel outlet with an under drain. The outlet of wet ponds discharging directly to a stream must be designed to meet the general standards for channel protection and must be fitted with a gravel outlet with an under drain.
- (i) Pond bench. The bed of the gravel outlet must be built on a pond bench having a width of at least eight feet and a length that equivalent to 3 feet per 1000 cubic feet of volume for channel protection. The bench elevation must be set at the permanent pool elevation such that the channel protection volume will be stored between the bench surface elevation and the elevation of the principal spillway's lowest control outlet. The bench must be located at or near the end of the pond furthest from the principal inflow.
 - (ii) Under drain pipe. The under drain pipe must be installed down the centerline of the gravel trench. The pipe may be either perforated PVC pipe or corrugated, polyethylene drainage tubing. The slope of the installed under drain pipe must be 1% or greater.
 - (iii) Gravel trench. A gravel filled trench with a minimum width of 4 feet and a minimum depth of 3 feet must be installed in the pond bench at least 2 feet from the pond side edge of the bench. The under drain pipe must be bedded in clean, well-graded gravel (MDOT specification 703.22 Type B) extending 24 inches over the top of the drainage pipe, with at least six inches to the sides of the pipe, and six inches below the pipe.
 - (iv) Under drain outlet. The under drain outlet must discharge to an area capable of withstanding concentrated flows and saturated conditions without eroding.

4. Underdrained Soil Filter Beds Design Requirements.

Underdrained soil filter are designed to provide pollutant removal and channel protection as they provide the slow release of runoff. The filter also provides cooling of the discharge reducing thermal impact to the receiving body of water.

NOTE: Specific design criteria for each type of filter bed structure and design can be found in the department's BMP manual "Stormwater Management for Maine."

Bed construction. Under drained soil filter basins designed to meet the general standards for soil filters must be designed to meet the following criteria.

- (a) Volume stored and treated. The soil filter basin must store and filter at least 1.0 inch of stormwater runoff from the impervious area draining to it and 0.4 inches of stormwater runoff from the landscaped area draining to it. A stable overflow outlet must be provided for stormwater in excess of the volume to be stored for treatment.

- (b) Soil filter. The soil filter basin must consist of depressional surface storage over a densely vegetated soil filter that is underlain with under drain bedding and drained by perforated under drain pipe. The soil filter material must be fine enough to filter fine sediments and provide effective adsorption of pollutants, but coarse enough to slowly drain the stored stormwater within a 24 to 48 hour period. The soil filter material must be well blended and graded and must contain sufficient organic matter to facilitate the removal and treatment of hydrocarbons.
- (c) Under drain pipe bedding. The interface between the under drain bedding material and the soil filter material must be designed to minimize the risk of clogging at the interface while preventing significant loss of fine soil material from the soil filter layer. The under drain bedding material must be sufficiently coarse to allow flow of treated water to the under drain pipe.
- (d) Filter bed design. The area and volume of the soil filter must be adequate to provide effective long term treatment of the volume of stormwater to be treated.
- (e) Under drain outlet. The under drain system and the overflow must discharge to areas capable of withstanding concentrated flows and saturated conditions without eroding.

5. Additional requirements. Additional requirements may be applied on a site-specific basis.

Appendix F. Vegetated Buffers

This appendix applies to all projects using vegetated buffers for stormwater control. A buffer is a vegetated, non-lawn area or areas located down gradient from a project that serves to store and remove pollutants from stormwater runoff flowing from a project. Buffers must not be interrupted by intermittent or perennial stream channels or other drainageways and must have a relatively uniform slope so that stormwater does not concentrate in channels. This appendix describes the design and sizing requirements for vegetated buffers designed to meet the general standards. Requirements are described for four different types of buffers, each of which is appropriate for specific situations.

1. Types of vegetated buffers. The applicability of each of the four types of vegetated buffers is as follows.

- (a) Vegetated buffer with stone bermed level lip spreaders. A vegetated buffer with stone bermed level lip spreaders must be used when treating stormwater runoff from any of the following:
 - (i) An impervious area greater than one acre;
 - (ii) Impervious areas where the flow path across the impervious area exceeds 150 feet; or
 - (iii) Developed areas, including lawns and impervious surfaces, where runoff is concentrated, intentionally or unintentionally, so that it does not run off in well-distributed sheet flow when it enters the upper end of a buffer, except that road ditch runoff may be treated using a ditch turn-out buffer.
- (b) Buffer adjacent to the downhill side of a road. A buffer located along the downhill side of a road may only be used when the runoff from the road surface and shoulder sheets immediately into a buffer. In no instance may runoff from areas other than the adjacent road surface and shoulder be directed to these buffers.
- (c) Ditch turn-out buffer. A ditch turn-out buffer may only be used when runoff from a road ditch is diverted to a 20-foot stone bermed level lip spreader that distributes runoff into a buffer. No areas other than the road surface, road shoulder and road ditch may be directed into a buffer. No more than 400 ft of road and ditch may be treated in any ditch turn-out buffer, and no more than 250 feet may be treated if more than one travel lane is draining to the ditch.
- (d) Buffer adjacent to residential, largely pervious or small impervious areas. A buffer adjacent to a residential, largely pervious or small impervious area that does not require that runoff be distributed by means of a level spreader may only be used when:
 - (i) A buffer is located immediately downhill of the developed area; and
 - (ii) Runoff from the developed area is not concentrated and enters a buffer in well distributed

sheet flow.

Only runoff from the following areas may be treated using this type buffer:

- (iii) A single family residential lot;
- (iv) A developed area with less than 10% imperviousness where the flow path over the portion of the developed area for which treatment is being credited does not exceed 150 feet; or
- (v) An impervious area of less than one acre, where the flow path across the impervious area does not exceed 100 feet.

2. Design requirements for all buffer types. The following design requirements apply to all types of buffers.

- (a) **Topography.** The topography of a buffer area must be such that stormwater runoff will not concentrate as it flows across a buffer, but will remain well-distributed. Flow paths of runoff through a buffer must not converge, but must be essentially parallel or diverging.
- (b) **Vegetative cover.** The vegetative cover type of a buffer must be either forest or meadow. In most instances the sizing of a buffer varies depending on vegetative cover type.
 - (i) **Forest buffer.** A forest buffer must have a well distributed stand of trees with essentially complete canopy cover, and must be maintained as such. A forested buffer must also have an undisturbed layer of duff covering the mineral soil. Activities that may result in disturbance of the duff layer are prohibited in a buffer.
 - (ii) **Meadow buffer.** A meadow buffer must have a dense cover of grasses, or a combination of grasses and shrubs or trees. A buffer must be maintained as a meadow with a generally tall stand of grass, not as a lawn. It must not be mown more than twice per calendar year. If a buffer is not located on natural soils, but is constructed on fill or reshaped slopes, a buffer surface must either be isolated from stormwater discharge until a dense sod is established, or must be protected by a three inch layer of erosion control mix or other wood waste material approved by the department before stormwater is directed to it, with vegetation must be established using an appropriate seed mix.
 - (iii) **Mixed meadow and forest buffer.** If a buffer is part meadow and part forest, the required sizing of a buffer must be determined as a weighted average, based on the percent of a buffer in meadow and the percent in forest, of the required sizing for meadow and forest buffers.
- (c) **Deed restrictions and covenants.** Areas designated as vegetated buffers must be clearly identified on site plans and protected from disturbance by deed restrictions and covenants.

3. Design specifications and sizing tables for a vegetated buffer with stone bermed level lip

spreaders. Stormwater runoff must be delivered to a vegetated buffer with stone bermed level lip spreaders in either sheet or concentrated flow. These design specifications direct runoff behind a stone berm constructed along the contour at the upper margin of a buffer area. As a result of restriction of flow through the berm, the runoff then spreads out behind the berm so that it seeps through the entire length of the berm and is evenly distributed across the top of a buffer. The stone must be coarse enough that it will not clog with sediment. The berm must be well-graded and contain some small stone and gravel so that flow through the berm will be restricted enough to cause it to spread out behind the berm.

- (a) Stone berm specifications. The stone berm must be at least 1.5 feet high and 2.0 feet across the top with 2:1 side slopes constructed along the contour and closed at the ends. Unless otherwise approved by the department, the design must include a shallow, 6-inch deep trapezoidal trough with a minimum bottom width of three feet, and with a level downhill edge excavated along the contour on the uphill edge of the stone berm. Stone for stone bermed level lip spreaders must consist of sound durable rock that will not disintegrate by exposure to water or weather. Fieldstone, rough quarried stone, blasted ledge rock or tailings may be used. The rock must be well-graded within the following limits, or as otherwise approved by the department.

Sieve Designation (Metric)	Sieve Designation	Percent by Weight passing Square Mesh Sieves
300 mm	12 in	100
150 mm	6 in	84-100
75 mm	3 in	68-83
25.4 mm	1 in	42-55
4.75 mm	No. 4	8-12

- (b) Buffer sizing. The required size of a buffer area below the stone bermed level lip spreader varies with the size and imperviousness of the developed area draining to a buffer, the type of soil in a buffer area, the slope of a buffer, and the vegetative cover type. The following table indicates the required berm length per acre of impervious area and lawn draining to a buffer for a given length of flow path through a buffer. Required berm length varies by the Hydrologic Soil Group of the soils in a buffer and by the length of flow path through a buffer. If more than one soil type is found in a buffer, the required sizing of a buffer must be determined as weighted average, based on the percent of a buffer in each soil type, of the required sizing for each soil type buffer. Alternative sizing may be allowed if it is determined by a site specific hydrologic buffer design model approved by the department. A buffer meeting this standard is not allowed on Hydrologic Soil Group D soils that are identified as wetland soils. A buffer meeting this standard is not allowed on natural slopes in excess of 15% unless a buffer has been evaluated using a site specific hydrologic buffer design model approved by the department, and measures have been included to ensure that runoff remains well-distributed as it passes through a buffer.

The table below applies to a buffer with slopes ranging from 0 to 8%. For a buffer with slopes between 9% and 15%, the indicated berm length must be increased by 20%.

NOTE: The following tables were developed using a 1.25 inch, 24 hour storm of type III distribution, giving a maximum unit flow rate of less than 0.009 cfs per foot.

Required berm and flow length of buffer with 0–8% slope and a stone bermed level lip spreader.

Hydrologic Soil Group	Length of flow path through buffer (feet)	Berm length for a forested buffer (feet)		Berm length for a meadow buffer (feet)	
		Per acre of impervious area	Per acre of lawn	Per acre of impervious area	Per acre of lawn
Soil Group A	75	75	25	125	35
	100	65	20	75	25
	150	50	15	60	20
Soil Group B	75	100	30	150	45
	100	80	25	100	30
	150	65	20	75	25
Soil Group C, sandy loam or loamy sand	75	125	35	150	45
	100	100	30	125	35
	150	75	25	100	30
Soil Group C, silt loam, clay loam or silty clay loam	100	150	45	200	60
	150	100	30	150	45
Soil Group D, non-wetland	150	150	45	200	60

- 4. Design specifications and sizing tables for a buffer adjacent to the downhill side of a road.** A buffer adjacent to the downhill side of a road may only be used when a buffer is located such that the runoff from the road surface and shoulder sheets immediately into a buffer. Required buffer design and sizing for this type of buffer does not vary with soil type or slope, except that a buffer meeting this standard is not allowed on soils identified as wetland soils or on natural slopes in excess of 20%. Sizing depends on the vegetative cover type of a buffer and the number of travel lanes draining to a buffer as indicated in the following table.

	Length of flow path for a forested buffer (feet)	Length of flow path for a meadow buffer (feet)
One travel lane draining to buffer	35	50
Two travel lanes draining to buffer	55	80

The in slope of the road bed may be included as part of a meadow buffer only if it is designed and constructed to allow infiltration. Design and construction to allow infiltration includes, but is not limited to, the in slope fill material having slopes no steeper than 3:1; loaming and seeding to meadow grasses; and maintaining a buffer area as a meadow buffer.

5. Design specifications and sizing tables for a ditch turn-out buffer. A ditch turn-out buffer may only be used when runoff from a road ditch is diverted to a 20-foot stone bermed level lip spreader that distributes runoff into a buffer. No areas other than the road surface, road shoulder, road ditch, and ditch back slopes may be directed to the stone bermed level lip spreader.

- (a) Stone berm specifications. The stone berm to which the ditch turn-out delivers the runoff must be at least 20 feet in length and must be constructed along the contour. It must be at least one-foot high and two feet across the top with 2:1 side slopes. Stone for the berm must consist of sound durable rock that will not disintegrate by exposure to water or weather. Fieldstone, rough quarried stone, blasted ledge rock or tailings may be used. The rock must be well-graded with a median size of approximately 3 inches and a maximum size of 6 inches.
- (b) Buffer sizing. The required size of a buffer area below the stone bermed level lip spreader varies with the type of soil in a buffer area, the slope of a buffer, the length of road ditch draining to a buffer and the vegetative cover type within a buffer. A buffer meeting this standard is not allowed on Hydrologic Soil Group D soils or on slopes in excess of 15%. The following table indicates the required length of the flow path through a buffer for various vegetative covers and ditch lengths. The tables below apply to a buffer with slopes ranging from 0 to 8%. For a buffer with slopes between 9% and 15%, the indicated length of flow path should be increased by 20%. If two travel lanes drain to the ditch, as in the case of a super elevated road, the length of flow path indicated for 400 feet of road must be used, but no more than 250 feet of ditch may drain to each turn-out.

Required length of flow path per length of road or ditch draining to a buffer.

Hydrologic soil group of soil in buffer	Length of road or ditch draining to a buffer (feet)	Length of flow path for a forested buffer (feet)	Length of flow path for a meadow buffer (feet)
A	200	50	70
	300	50	85
	400	60	100
B	200	50	70
	300	50	85
	400	60	100
C Loamy Sand or Sandy Loam	200	60	100
	300	75	120
	400	100	Not applicable
C Silt Loam, Clay Loam, or Silty Clay Loam	200	75	120
	300	100	Not applicable
D Non-wetland	200	100	150

9. **Design specifications and sizing tables for a buffer adjacent to a residential lot; developed area with less than 10% imperviousness, where the flow path over the portion of the developed area for which treatment is being credited does not exceed 150 feet; or an impervious area where the flow path across the impervious area does not exceed 100 feet.** The design specifications and sizing tables below may only be used when a buffer is located immediately adjacent to the downhill side of a developed area, and where the topography and structures within the developed area do not cause any significant concentration of runoff.

This design is appropriate for residential lots and other mostly pervious areas with relatively uniform topography and for small impervious areas. This design is not appropriate for treating large impervious areas because, even if pavement is graded evenly, it is likely that some concentration of runoff will occur as the stormwater travels across large areas of pavement. For large areas of pavement where the average path of flow across the pavement exceeds 100 feet, or where runoff will not be evenly distributed across the downhill edge of the pavement, a stone bermed level lip spreader must be used and the berm and buffer must be sized according to the specifications in Section 3 above.

The table below indicates the required minimum length of the flow path through a buffer for various soil types and vegetative cover types. Length of flow paths defined in this table applies to buffers with slopes between 0 and 8%. For buffers with slopes between 9% and 15%, the indicated length of flow path must be increased by 20%. A buffer meeting this standard is not allowed on slopes in excess of 15% or

Hydrologic Soil Group D soils except that a forested buffer is allowed if the D soils in a buffer are not wetland soils. Buffers described by this section must be located downhill of the entire developed area for which it is providing stormwater treatment, such that all runoff from the entire developed area has a flow path through a buffer at least as long as the required length of flow path.

Required minimum length of the flow path through a buffer for various soil types and vegetative

cover types.

Hydrologic soil group of soil in buffer	Length of flow path for a forested buffer (feet)	Length of flow path for a meadow buffer (feet)
A	45	75
B	60	85
C Loamy Sand or Sandy Loam	75	100
C Silt Loam, Clay Loam, or Silty Clay Loam	100	150
D Non-wetland	150	Not applicable

Appendix G. Suggested Templates For Deed Restrictions And Conservation Easements For Use Under The Stormwater Management Law

1. Forested buffer, limited disturbance

DECLARATION OF RESTRICTIONS (Forested Buffer, Limited Disturbance)

THIS DECLARATION OF RESTRICTIONS is made this _____ day of _____, 20____, by _____,

(name)

(street address)

_____, _____ County, Maine, _____, (herein referred to as the (city or town) (county) (zip code)

"Declarant"), pursuant to a permit received from the Maine Department of Environmental Protection under the Stormwater Management Law, to preserve a buffer area on a parcel of land near _____.

(road name)

(known feature and/or town)

WHEREAS, the Declarant holds title to certain real property situated in _____, Maine

(town)

described in a deed from _____ to _____ dated

(name)

(name of Declarant)

_____, 20____, and recorded in Book ____ Page ____ at the _____ County Registry of Deeds, herein referred to as the "property"; and

WHEREAS, Declarant desires to place certain restrictions, under the terms and conditions herein, over a portion of said real property (hereinafter referred to as the "Restricted Buffer") described as follows: (Note: Insert description of restricted buffer area location here)

WHEREAS, pursuant to the Stormwater Management Law, 38 M.R.S.A. Section 420-D and Chapter 500 of rules promulgated by the Maine Board of Environmental Protection ("Stormwater Management Rules"), Declarant has agreed to impose certain restrictions on the Restricted Buffer Area as more particularly set forth herein and has agreed that these restrictions may be enforced by the Maine Department of Environmental Protection or any successor (hereinafter the "MDEP"),

NOW, THEREFORE, the Declarant hereby declares that the Restricted Buffer Area is and shall forever be held, transferred, sold, conveyed, occupied and maintained subject to the conditions and restrictions set forth herein. The Restrictions shall run with the Restricted Buffer Area and shall be binding on all parties having any right, title or interest in and to the Restricted Buffer Area, or any portion thereof, and their heirs, personal representatives, successors, and assigns. Any present or future owner or occupant of the Restricted Buffer Area or any portion thereof, by the acceptance of a deed of conveyance of all or part of the Covenant Area or an instrument conveying any interest therein, whether or not the deed or instrument shall so express, shall be deemed to have accepted the Restricted Buffer Area subject to the Restrictions and shall agree to be bound by, to comply with and to be subject to each and every one of the Restrictions hereinafter set forth.

1. Restrictions on Restricted Buffer Area. Unless the owner of the Restricted Buffer Area, or any successors or assigns, obtains the prior written approval of the MDEP, the Restricted Buffer Area must remain undeveloped in perpetuity. To maintain the ability of the Restricted Buffer Area to filter and absorb stormwater, and to maintain compliance with the Stormwater Management Law and the permit issued thereunder to the Declarant, the use of the Restricted Buffer Area is hereinafter limited as follows.
 - a. No soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material may be placed, stored or dumped on the Restricted Buffer Area, nor may the topography of the area be altered or manipulated in any way;
 - b. Any removal of trees or other vegetation within the Restricted Buffer Area must be limited to the following:
 - (i) No purposefully cleared openings may be created and an evenly distributed stand of trees and other vegetation must be maintained. An "evenly distributed stand of trees" is defined as maintaining a minimum rating score of 24 points in any 25 foot by 50 foot square (2500 square feet) area, as determined by the following rating scheme:

Diameter of tree at 4½ feet above ground level	Points
2 - 4 inches	1
4 - 8 inches	2
8 - 12 inches	4
>12 inches	8

Where existing trees and other vegetation result in a rating score less than 24 points, no trees may be cut or sprayed with biocides except for the normal maintenance of dead, windblown or damaged trees and for pruning of tree branches below a height of 12 feet provided two thirds of the tree's canopy is maintained;

- (ii) No undergrowth, ground cover vegetation, leaf litter, organic duff layer or mineral soil may be disturbed except that one winding path, that is no wider than six feet and that does not provide a downhill channel for runoff, is allowed through the area;
- c. No building or other temporary or permanent structure may be constructed, placed or permitted to remain on the Restricted Buffer Area, except for a sign, utility pole or fence;
- d. No trucks, cars, dirt bikes, ATVs, bulldozers, backhoes, or other motorized vehicles or mechanical equipment may be permitted on the Restricted Buffer Area;

- e. Any level lip spreader directing flow to the Restricted Buffer Area must be regularly inspected and adequately maintained to preserve the function of the level spreader.

Any activity on or use of the Restricted Buffer Area inconsistent with the purpose of these Restrictions is prohibited. Any future alterations or changes in use of the Restricted Buffer Area must receive prior approval in writing from the MDEP. The MDEP may approve such alterations and changes in use if such alterations and uses do not impede the stormwater control and treatment capability of the Restricted Buffer Area or if adequate and appropriate alternative means of stormwater control and treatment are provided.

- 2. Enforcement. The MDEP may enforce any of the Restrictions set forth in Section 1 above.
- 3. Binding Effect. The restrictions set forth herein shall be binding on any present or future owner of the Restricted Buffer Area. If the Restricted Buffer Area is at any time owned by more than one owner, each owner shall be bound by the foregoing restrictions to the extent that any of the Restricted Buffer Area is included within such owner's property.
- 4. Amendment. Any provision contained in this Declaration may be amended or revoked only by the recording of a written instrument or instruments specifying the amendment or the revocation signed by the owner or owners of the Restricted Buffer Area and by the MDEP.
- 5. Effective Provisions of Declaration. Each provision of this Declaration, and any agreement, promise, covenant and undertaking to comply with each provision of this Declaration, shall be deemed a land use restriction running with the land as a burden and upon the title to the Restricted Buffer Area.
- 6. Severability. Invalidity or unenforceability of any provision of this Declaration in whole or in part shall not affect the validity or enforceability of any other provision or any valid and enforceable part of a provision of this Declaration.
- 7. Governing Law. This Declaration shall be governed by and interpreted in accordance with the laws of the State of Maine.

(NAME)

STATE OF MAINE _____ County, _____, 20__.
(County) (date)

Personally appeared before me the above named _____, who swore to the truth of the foregoing to the best of (his/her) knowledge, information and belief and acknowledged the foregoing instrument to be (his/her) free act and deed.

Notary Public

2. Forested buffer, no disturbance

DECLARATION OF RESTRICTIONS

(Forested Buffer, No Disturbance)

THIS DECLARATION OF RESTRICTIONS is made this _____ day of _____, 20____,
by _____,

(name)

(street address)

_____, _____ County, Maine, _____, (herein referred to as the

(city or town)

(county)

(zip code)

"Declarant", pursuant to a permit received from the Maine Department of Environmental Protection under
the Stormwater Management Law, to preserve a buffer area on a parcel of land near

_____, _____.

(road name)

(known feature and/or town)

WHEREAS, the Declarant holds title to certain real property situated in _____, Maine

(town)

described in a deed from _____ to _____, dated

(name)

(name of Declarant)

_____, 20____, and recorded in Book ____ Page ____ at the _____ County
Registry of Deeds, herein referred to as the "property"; and

WHEREAS, Declarant desires to place certain restrictions, under the terms and conditions herein, over a
portion of said real property (hereinafter referred to as the "Restricted Buffer") described as follows:
(Note: Insert description of restricted buffer location here)

WHEREAS, pursuant to the Stormwater Management Law, 38 M.R.S.A. Section 420-D and Chapter 500
of rules promulgated by the Maine Board of Environmental Protection ("Stormwater Management
Rules"), Declarant has agreed to impose certain restrictions on the Restricted Buffer Area as more
particularly set forth herein and has agreed that these restrictions may be enforced by the Maine
Department of Environmental Protection or any successor (hereinafter the "MDEP"),

NOW, THEREFORE, the Declarant hereby declares that the Restricted Buffer Area is and shall forever
be held, transferred, sold, conveyed, occupied and maintained subject to the conditions and restrictions set
forth herein. The Restrictions shall run with the Restricted Buffer Area and shall be binding on all parties
having any right, title or interest in and to the Restricted Buffer Area, or any portion thereof, and their

heirs, personal representatives, successors, and assigns. Any present or future owner or occupant of the Restricted Buffer Area or any portion thereof, by the acceptance of a deed of conveyance of all or part of the Covenant Area or an instrument conveying any interest therein, whether or not the deed or instrument shall so express, shall be deemed to have accepted the Restricted Buffer Area subject to the Restrictions and shall agree to be bound by, to comply with and to be subject to each and every one of the Restrictions hereinafter set forth.

1. Restrictions on Restricted Buffer Area. Unless the owner of the Restricted Buffer Area, or any successors or assigns, obtains the prior written approval of the MDEP, the Restricted Buffer Area must remain undeveloped in perpetuity. To maintain the ability of the Restricted Buffer Area to filter and absorb stormwater, and to maintain compliance with the Stormwater Management Law and the permit issued thereunder to the Declarant, the use of the Restricted Buffer Area is hereinafter limited as follows.
 - a. No soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material will be placed, stored or dumped on the Restricted Buffer Area, nor shall the topography of the area be altered or manipulated in any way;
 - b. No trees may be cut or sprayed with biocides except for the normal maintenance of dead, windblown or damaged trees and for pruning of tree branches below a height of 12 feet provided two thirds of the tree's canopy is maintained;
 - c. No undergrowth, ground cover vegetation, leaf litter, organic duff layer or mineral soil may be disturbed except that one winding path, that is no wider than six feet and that does not provide a downhill channel for runoff, is allowed through the area;
 - d. No building or other temporary or permanent structure may be constructed, placed or permitted to remain on the Restricted Buffer Area, except for a sign, utility pole or fence;
 - e. No trucks, cars, dirt bikes, ATVs, bulldozers, backhoes, or other motorized vehicles or mechanical equipment may be permitted on the Restricted Buffer Area;
 - f. Any level lip spreader directing flow to the Restricted Buffer Area must be regularly inspected and adequately maintained to preserve the function of the level spreader.

Any activity on or use of the Restricted Buffer Area inconsistent with the purpose of these Restrictions is prohibited. Any future alterations or changes in use of the Restricted Buffer Area must receive prior approval in writing from the MDEP. The MDEP may approve such alterations and changes in use if such alterations and uses do not impede the stormwater control and treatment capability of the Restricted Buffer Area or if adequate and appropriate alternative means of stormwater control and treatment are provided.

2. Enforcement. The MDEP may enforce any of the Restrictions set forth in Section 1 above.
3. Binding Effect. The restrictions set forth herein shall be binding on any present or future owner of the

Restricted Buffer Area. If the Restricted Buffer Area is at any time owned by more than one owner, each owner shall be bound by the foregoing restrictions to the extent that any of the Restricted Buffer Area is included within such owner's property.

- 4. Amendment. Any provision contained in this Declaration may be amended or revoked only by the recording of a written instrument or instruments specifying the amendment or the revocation signed by the owner or owners of the Restricted Buffer Area and by the MDEP.
- 5. Effective Provisions of Declaration. Each provision of this Declaration, and any agreement, promise, covenant and undertaking to comply with each provision of this Declaration, shall be deemed a land use restriction running with the land as a burden and upon the title to the Restricted Buffer Area.
- 6. Severability. Invalidity or unenforceability of any provision of this Declaration in whole or in part shall not affect the validity or enforceability of any other provision or any valid and enforceable part of a provision of this Declaration.
- 7. Governing Law. This Declaration shall be governed by and interpreted in accordance with the laws of the State of Maine.

(NAME)

STATE OF MAINE, _____ County, dated _____, 20__.
(County)

Personally appeared before me the above named _____, who swore to the truth of the foregoing to the best of (his/her) knowledge, information and belief and acknowledged the foregoing instrument to be (his/her) free act and deed.

Notary Public

3. Meadow buffer

DECLARATION OF RESTRICTIONS

(Non-Wooded Meadow Buffer)

THIS DECLARATION OF RESTRICTIONS is made this _____ day of _____, 20____, by

_____ , _____

(name)

(street address)

_____, _____ County, Maine, _____, (herein referred to as the

(city or town)

(county)

(zip code)

"Declarant"), pursuant to a permit received from the Maine Department of Environmental Protection under the Stormwater Management Law, to preserve a buffer area on a parcel of land near

_____, _____ .

(road name)

(known feature and/or town)

WHEREAS, the Declarant holds title to certain real property situated in _____, Maine

(town)

described in a deed from _____ to _____, dated

(name)

(name of Declarant)

_____, 20____, and recorded in Book ____ Page ____ at the _____ County Registry of Deeds, herein referred to as the "property"; and

WHEREAS, Declarant desires to place certain restrictions, under the terms and conditions herein, over a portion of said real property (hereinafter referred to as the "Restricted Buffer") described as follows: (Note: Insert description of restricted buffer location here)

WHEREAS, pursuant to the Stormwater Management Law, 38 M.R.S.A. Section 420-D and Chapter 500 of rules promulgated by the Maine Board of Environmental Protection ("Stormwater Management Rules"), Declarant has agreed to impose certain restrictions on the Restricted Buffer Area as more particularly set forth herein and has agreed that these restrictions may be enforced by the Maine Department of Environmental Protection or any successor (hereinafter the "MDEP"),

NOW, THEREFORE, the Declarant hereby declares that the Restricted Buffer Area is and shall forever be held, transferred, sold, conveyed, occupied and maintained subject to the conditions and restrictions set forth herein. The Restrictions shall run with the Restricted Buffer Area and shall be binding on all parties having any right, title or interest in and to the Restricted Buffer Area, or any portion thereof, and their heirs, personal representatives, successors, and assigns. Any present or future owner or occupant of the

Restricted Buffer Area or any portion thereof, by the acceptance of a deed of conveyance of all or part of the Covenant Area or an instrument conveying any interest therein, whether or not the deed or instrument shall so express, shall be deemed to have accepted the Restricted Buffer Area subject to the Restrictions and shall agree to be bound by, to comply with and to be subject to each and every one of the Restrictions hereinafter set forth.

1. Restrictions on Restricted Buffer Area. Unless the owner of the Restricted Buffer Area, or any successors or assigns, obtains the prior written approval of the MDEP, the Restricted Buffer Area must remain undeveloped in perpetuity. To maintain the ability of the Restricted Buffer Area to filter and absorb stormwater, and to maintain compliance with the Stormwater Management Law and the permit issued thereunder to the Declarant, the use of the Restricted Buffer Area is hereinafter limited as follows.
 - a. No soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material will be placed, stored or dumped on the Restricted Buffer Area, nor may the topography or the natural mineral soil of the area be altered or manipulated in any way;
 - b. A dense cover of grassy vegetation must be maintained over the Restricted Buffer Area, except that shrubs, trees and other woody vegetation may also be planted or allowed to grow in the area. The Restricted Buffer Area may not be maintained as a lawn or used as a pasture. If vegetation in the Restricted Buffer Area is mowed, it may be mown no more than two times per year.
 - c. No building or other temporary or permanent structure may be constructed, placed or permitted to remain on the Restricted Buffer Area, except for a sign, utility pole or fence;
 - d. No trucks, cars, dirt bikes, ATVs, bulldozers, backhoes, or other motorized vehicles or mechanical equipment may be permitted on the Restricted Buffer Area, except for vehicles used in mowing;
 - e. Any level lip spreader directing flow to the Restricted Buffer Area must be regularly inspected and adequately maintained to preserve the function of the level spreader.

Any activity on or use of the Restricted Buffer Area inconsistent with the purpose of these Restrictions is prohibited. Any future alterations or changes in use of the Restricted Buffer Area must receive prior approval in writing from the MDEP. The MDEP may approve such alterations and changes in use if such alterations and uses do not impede the stormwater control and treatment capability of the Restricted Buffer Area or if adequate and appropriate alternative means of stormwater control and treatment are provided.

2. Enforcement. The MDEP may enforce any of the Restrictions set forth in Section 1 above.
3. Binding Effect. The restrictions set forth herein shall be binding on any present or future owner of the Restricted Buffer Area. If the Restricted Buffer Area is at any time owned by more than one owner, each owner shall be bound by the foregoing restrictions to the extent that any of the Restricted Buffer Area is included within such owner's property.

- 4. Amendment. Any provision contained in this Declaration may be amended or revoked only by the recording of a written instrument or instruments specifying the amendment or the revocation signed by the owner or owners of the Restricted Buffer Area and by the MDEP.
- 5. Effective Provisions of Declaration. Each provision of this Declaration, and any agreement, promise, covenant and undertaking to comply with each provision of this Declaration, shall be deemed a land use restriction running with the land as a burden and upon the title to the Restricted Buffer Area.
- 6. Severability. Invalidity or unenforceability of any provision of this Declaration in whole or in part shall not affect the validity or enforceability of any other provision or any valid and enforceable part of a provision of this Declaration.
- 7. Governing Law. This Declaration shall be governed by and interpreted in accordance with the laws of the State of Maine.

(NAME)

STATE OF MAINE, _____, County, dated _____, 20__ .
(County)

Personally appeared before me the above named _____, who swore to the truth of the foregoing to the best of (his/her) knowledge, information and belief and acknowledged the foregoing instrument to be (his/her) free act and deed.

Notary Public

AUTHORITY: 38 M.R.S.A. §§ 341-D, 413, 420-D, and 484
 EFFECTIVE DATE: December 31, 1997
 REPEALED AND REPLACED: November 16, 2005, filing 2005-417
 AMENDED: December 27, 2006 – filing 2006-530

6. EROSION AND SEDIMENTATION CONTROL STANDARDS FOR SINGLE AND TWO-FAMILY HOMES

6.1. STANDARDS

- 6.1.1. Single and two family homes shall meet the requirements of Chapter 500, Appendix A, Appendix B 1a. and 1b, and Appendix C only, found under Section IV of the Technical Manual.
- 6.1.2. Erosion and sediment control measures shall follow the guidelines established by the Maine Department of Environmental Protection and contained in the publication "Maine Erosion and Sediment Control BMP's", which may be obtained on the MDEP website:

[\(http://mainegov-images.informe.org/dep/blwg/docstand/escbmeps/\)](http://mainegov-images.informe.org/dep/blwg/docstand/escbmeps/) or may be viewed at the City of Portland Planning Division.
- 6.1.3. Sediment should be removed from runoff water before it leaves the site.
- 6.1.4. Temporary erosion control devices will be in place before commencing construction activities.
- 6.1.5. If any winter construction is planned, a specific winter construction erosion and sedimentation control plan will be implemented.

7. SOIL SURVEY STANDARDS

7.1. APPLICABILITY

Development proposals required to submit soil surveys include:

- Level III site plans as defined in the Site Plan Standards of the Land Use Code
- Subdivisions as defined in the Subdivision Standards of the Land Use Code except for those projects which do not involve construction of significant new infrastructure.
- Other projects where the Reviewing Authority determines that unusual conditions specific to the site warrant a high intensity soil survey.

7.2. STANDARDS

Soil Surveys are divided into four levels or classes, depending on the intensity desired. These are the minimum standards for each class of soil survey.

Class A (high intensity)

- Mapping units of 1/8 acre or less
- Scale is 1 inch equals 100 feet or larger
- Ground control – base line and test pits accurately located under the direction of a registered land surveyor or qualified professional engineer.
- Base map with 2 foot contour lines with ground survey, or aerial survey with ground control.

Class B (high intensity)

- Mapping units of 1 acre or less
- Scale of 1 inch equals 200 feet or larger.
- Ground control – test pits located by means of compass by chaining, pacing or taping from known survey points.
- Base map with 5 foot contour lines.

Class C (medium high intensity)

- Mapping units of 3 acres or less
- Scale of 1 inch equals 500 feet or larger.
- Ground control – as determined by the mapper.
- Base map – as determined by the mapper.

7.2.1. Use of the USDA National Cooperative Soil Survey and Classification:

The soil survey shall be designed using the National Cooperative Soil Survey as a guide and the soils classified at the series level. Soil map units will be phases of

soil series.

7.2.2. Map Legend and Map Unit Narratives:

The soil map legend shall include a symbol for each map unit and special symbol for areas too small to be mapped, and the name of each map unit.

The soil scientist shall provide a description for each map unit.

7.2.3. Map Unit Purity:

The soil(s) within an area enclosed by a soil boundary (map unit) will have a minimum of 75 percent of the soil(s) that provide the name of that map unit or similar soil(s). The total amount of dissimilar soils shall not exceed 25 percent of the map unit.

7.2.4. Accurate Soil Boundary Placement:

Soil boundaries must be observed throughout their length and their placement must correspond to changes in soils and/or land forms.

7.2.5. Map Preparation by a Maine Certified Soil Scientist:

All soil surveys submitted for the public record, with the exception of Soil Conservation Service soil surveys, shall be stamped and signed by a Maine Certified Soil Scientist licensed by the Maine Board of Certification for Geologists and Soil Scientists.

7.3. Reserved.

7.4. SUBMISSIONS

The following submissions will support the contention that the development will be built on suitable soils:

High Intensity Soil Survey:

A soil survey prepared by a Maine Certified Soil Scientist (CSS), completed at the appropriate mapping intensity. The soil survey must be mapped at a scale as required by the Maine Association of Professional Soil Scientists (MAPSS) Soil Survey Guidelines (available through the Department of Public Services or through the MAPSS website at <http://www.mapss.org/publications.htm>). The map must identify the soil mapping intensity under which the mapping was conducted.

The guidelines for each intensity level of soil mapping and the level at which various types of projects must be mapped are as follows:

- **Class A (High-Intensity) Soil Survey:**

Specific land area, within any project, which is proposed to be used for

phosphorus control measures. Phosphorus control measures include wet ponds, infiltration facilities, and buffer strips.

For residential and commercial subdivisions where any lot is less than 2 acres and on site subsurface wastewater disposal is proposed.

- **Class B (High-Intensity) Soil Survey:**

For residential and commercial subdivisions where any lot is less than 2 acres with more than 15 lots and 20 acres of area, no on site wastewater disposal is proposed, and new city streets are to be constructed.

The land area of condominium developments which is to be disturbed during construction. Condominium developments include single or multi-family attached dwellings where greater than 3 acres of new non-vegetated surface is constructed and/or it results in the development of an area exceeding 20 acres.

Shopping centers, or similar commercial and industrial developments, where large areas are to be utilized or disturbed such that greater than 3 acres of new non-vegetated surface is proposed for construction and/or results in the development of an area exceeding 20 acres.

- **Class C (Medium High-Intensity) Soil Survey:**

Residential and commercial subdivisions where all lots are greater than 2 acres and on site subsurface wastewater disposal is proposed.

Golf courses, ski areas and trails, and other multi-use recreational developments.

Any project which the City has determined will require a hydrogeological investigation.

- **Class D (Medium Intensity) Soil Survey (published by Soil Conservation Service for Cumberland County)**

All other developments.

In the event that greater than 50 percent of a proposed development site is currently developed, an applicant may petition the Planning Authority to accept a lower class soil survey. The Planning Authority shall review the request, and their decision on the appropriate level of mapping shall be final.

A Maine Certified Soil Scientist shall accurately map and mark in the field the boundaries of any hydric soils identified by the Soil Survey.

These standards are a minimum. The Planning Authority reserves the right to request the preparation of a high intensity soil map or require more intense hydric

soil boundary delineation, when special conditions warrant it. All soil maps, with the exception of U.S. Soil Conservation Service Soil surveys, shall be signed and stamped by a Maine Certified Soil Scientist. The soil survey shall meet the standards for the degree of mapping intensity as adopted by the Maine Association of Professional Soil Scientists, dated 4-4-89.

7.4.1. Geotechnical Investigation:

If proposed buildings, facilities or infrastructure require a geotechnical investigation for their design and construction, or a geotechnical investigation is determined to be necessary by the Planning Authority, the applicant shall submit a report of this investigation prepared and endorsed by a registered professional engineer and/or other licensed professionals, as appropriate, for review and approval. This report shall identify all major limitations to the development posed by existing soils and other surface and subsurface features of the site and describe the techniques to be used to overcome these limitations. Depending on the nature of the proposed development, the requirement for a soil survey map and report may be waived if the Planning Authority determines that the geotechnical report will provide sufficient information.

7.4.2. Soils Report:

A report, completed by a Certified Soil Scientist, identifying all major limitations to the proposed development by the soil characteristics, as well as the SCS Hydrologic Soil Group classification for each soil series. A soil report shall not be required for those projects where a Class D Soil Survey is determined to be sufficient.

7.4.3. Site Engineering Report:

A Site Engineering report prepared by a qualified professional such as a soils or geotechnical engineer that describes the techniques to be used to overcome the soil limitations identified in the soil survey. The application will not be considered complete until a Site Engineering Report is submitted if the Planning Authority determines one is required.

8. STANDARDS FOR DEVELOPMENT IN AND ADJACENT TO WETLANDS

8.1. APPLICABILITY

All projects which may impact wetlands as defined by the Shoreland Zoning Ordinance or are classified as a river, stream, or brook as defined by the Natural Resources Protection Act are subject to these standards. Some wetlands which may not be regulated by the City of Portland may be regulated under State and Federal law.

8.2. STANDARDS

All wetlands shall be delineated and mapped according to the U.S. Army Corps of Engineers Wetlands Delineation Manual (1987).

Maine State Jurisdictional Wetlands and wetlands as defined by the Shoreland Zoning Ordinance (hereafter referred to as wetlands) should be identified according to the Natural Resources Protection Act (Title 38 M.R.S.A. Section 480-B) and identified on a map.

Design the development to minimize wetland impacts by either avoiding direct wetland impacts or minimizing them when they are unavoidable. Activities in or adjacent wetlands should be carried out in accordance with the standards set forth in the Maine Wetlands Protection Rules (Chapter 310 Wetlands and Waterbodies Protection) or following the specific design criteria:

- 8.2.1. The development should be designed to avoid disturbance in wetlands and the developer must establish undisturbed buffer strips from the wetland boundary. For developments located adjacent to perennial streams, a minimum one hundred (100) foot buffer strip on either side of the stream should be maintained. For intermittent streams, the buffer strip may be reduced to twenty five (25) feet. The undisturbed buffer must be placed in deed restrictions. In cases where State and Local rules are in conflict, the most stringent rules will apply.

8.3. Reserved.

8.4. SUBMISSIONS

- 8.4.1. The following submissions will support the contention that the wetland impacts have been avoided:

- A topographic map with wetlands delineated according to the U.S. Army

Corps of Engineers Wetlands Delineation Manual (1987). State of Maine Jurisdictional Wetlands will be identified according to the Natural Resources Protection Act on the same map. The scale should be 1 inch equals 100 feet.

- A site plan that shows all development activity including lots, common areas, roads, driveways, and building windows in conjunction with wetlands.

If any wetlands filling or alteration is proposed:

- Areas of wetland fill or alteration must be clearly marked and individually identified on the site plan.
- A report that contains surface area amounts of wetland fill or alteration for the individually identified fill or alteration locations.
- A letter from the Department of Inland Fisheries and Wildlife indicating the wetlands on the site contain no significant or valuable wildlife habitat.
- A letter of non-jurisdiction, a copy of permits received from other regulatory agencies (i.e. Maine Department of Environmental Protection or the U.S. Army Corps. Of Engineers) or report from a qualified professional stating that the proposed work will not require a permit from state or local agencies must be submitted for all projects proposing work either in or adjacent to wetlands prior to issuance of a building permit. This includes wetlands not regulated by the City of Portland.

9. WATER SUPPLY STANDARDS

9.1. APPLICABILITY

All applications for approval of proposed developments shall include evidence that demonstrates that the developer has made adequate provisions for securing and maintaining a sufficient and healthful water supply.

9.2. STANDARDS

9.2.1. Documentation.

If water is to be supplied from an off-site source, provide a letter from the appropriate utility or water district stating that a sufficient and healthful water supply exists and may be utilized by the development.

For on-site water supply wells, provide evidence in the form of well inventory and water quality data on existing water supplies located within one thousand feet of any property boundary of the proposed development. The well inventory data must show a probability that proposed wells will produce a safe and adequate water supply. Positive findings by a Maine Certified Geologist must be supported by a report which summarizes and interprets hydrogeologic and groundwater data for the region, with emphasis on the project site. It should include information such as: number of wells established in the vicinity of the proposed project; identification and locations of these wells on a site map, such as a USGS topographic map; the type and depths of the wells; the types and depths of soil and bedrock encountered at the well sites; and water quality data from these wells (if applicable).

9.2.2. A common water supply will be required if there is a reasonable doubt that sufficient water quality or quantity will be available from individual wells. A common water supply must have adequate safe yield and storage to supply a minimum of seventy-five (75) gallons per day per person. For a single family home, the well must be able to supply a minimum of three hundred (300) gallons per day, per household.

9.2.3. The Maine Center for Disease Control (MeCDC), Division of Environmental Health's Drinking Water Program must review and approve of any public drinking water system (if such a system serves an average of at least twenty-five (25) individuals daily at least sixty (60) days out of the year, or has fifteen (15) service connections.)

9.2.4. If the water supply wells and subsurface wastewater disposal systems are on-site and any proposed lots are less than 2 acres in area, locations of the wells and subsurface disposal systems must be identified on the site plan.

9.2.5. A water supply report must be submitted, if any well services five (5) or more homes, or any development uses greater than 1500 gallons per day.

9.2.6. If there is a reasonable doubt that sufficient and healthful water supply can be provided by on site wells, the following are required:

- potability test of water from the development site.
- establishment of one or more test wells on the development site
- pump tests of the well(s)
- A report by a Maine Certified Geologist discussing the yield and potability of water obtained.
- A complete hydrogeological assessment of groundwater quality and quantity may also be required.

For developments with shallow to bedrock soils, wells must be cased 20 feet into the solid bedrock surface and the annular space cement/bentonite grouted.

9.3. Reserved

9.4. SUBMISSIONS

For developments to be serviced by individual wells, provide evidence, from the Certified Geologist knowledgeable about the project, which indicates a sufficient and healthful water supply is likely to be available as follows:

- Well inventory data indicating number of wells, depth, yield and approximate locations shown on a USGS topographic map. This data may be available upon request from the inventory data base at the Maine Geological Survey.
- Water quality data from an area well or wells showing potability.
- If a common well or wells are to service any portion of a development, submit a detailed water supply report prepared by a Maine Certified Geologist. The report must indicate that the water supply conforms to Maine State Drinking Water Regulations, Title 22 M.R.S.A. Section 601 and it must contain the following information:
 - Determination of the long term safe yield of each well including a prediction of operating levels.
 - Determination of the cone of influence (cone of depression) for the well or wells.
 - Water quality analysis results in accordance with requirements of the Maine State Drinking Water Regulations, Title 22 M.R.S.A. Section 601.

- Delineation of well head protection zones A, B, and C.
- Well head protection plan for each zone.
- Determination of any off-site wells which may be at risk due to groundwater withdrawal.
- Storage, treatment and distribution system designed, signed, stamped and dated by a Maine Registered Professional Engineer
- Evidence that adequate provisions will be made for the establishment of an entity to provide long-term maintenance and operation of the water supply system.

10. MUNICIPAL STREET LIGHTING STANDARDS

10.1. APPLICABILITY:

The City of Portland has established special street lighting districts in the following areas:

- West Bayside
- Downtown (includes portions of Cumberland Avenue)
- Old Port
- Eastern Waterfront
- Commercial Street
- Historic Landscape Districts (including Baxter Boulevard, the Eastern and Western Promenades and Deering Oaks Park)
- Trails and pathways, including Eastern Promenade Trail, Fore River Trail and Bayside Trail.

Each lighting district is subject to individual street lighting specifications including but not limited to fixture type, pole and base type, pole height to top of fixture, pole spacing and color. Please refer to Figures X-1 for the boundaries of Portland's street lighting districts.

For areas of the City outside the special street lighting districts, the general standards under 10.2 of this section shall apply.

10.2. GENERAL STANDARDS:

For areas not located within a special street lighting district, street lighting may be placed on only one side of the street. However, when deemed necessary for traffic safety, the Reviewing Authority may require some street lights to be placed the opposite side of a curving street section so as to place light poles along the inside of the curve.

The City of Portland has adopted the following basic street light pole and fixture standards:

- Residential Street – On residential streets, the standard light pole is a 14' – 4" black aluminum Town and Country pole. Poles shall be mounted on reinforced concrete pole bases with 4 bolts per pole. Street light pole base design, mounting bolt pattern, bolt spacing, and bolt size shall be

approved by the Department of Public Services, Streetlights shall be full cutoff, using cost-effective and innovative technologies and shall seek to match uniformity, lumen output, and color of existing streetlights along the roadway, where applicable.

- **Commercial/Industrial Road** – On all new commercial/industrial roads, the standard pole shall be a 30 foot black aluminum. Streetlights shall be full cutoff, using cost-effective and innovative technologies and shall seek to match uniformity, lumen output, and color of existing streetlights along the roadway, where applicable.

10.2.1. **Minimum Lighting Design** – Street lighting design proposed outside of the City of Portland Special Lighting Districts (see Section 10.3 below) shall conform to the following table:

STREET CLASSIFICATION	COMMERCIAL		RESIDENTIAL	
	Min. Avg. Foot Candles	Maximum Pole Spacing	Min. Avg. Foot Candles	Maximum Pole Spacing
Arterial	2.0	160' (30' pole)	1.0	130' (30' pole)
Collector	1.2	130' (30' pole)	0.6	60' (14' pole)
Local/Minor	0.9	130' (30' pole)	0.4	120' (14' pole)

Developments subject to Level III site plan review that are on an existing or proposed street that is not currently illuminated with street lighting meeting city standards shall install the requisite number of street lights along all frontages. Developers are responsible for purchasing and installing all street lighting, including light poles, brackets, slip fitters, bases and all electrical wiring and conduit. The new street lighting shall be connected to either a new *Central Maine Power Company (CMP)* metered secondary service, or an existing metered service, unless otherwise directed by the City. Where a leased service is necessary, luminaires will be leased from CMP under the existing municipal street lighting rate and lease agreement held between the City and the *Central Maine Power Company (CMP)*. Once installed and operational, and upon acceptance by the City, street lighting located in the City right of way shall become the property of the City of Portland.

10.3. Reserved.

10.4. STANDARDS FOR SPECIAL LIGHTING DISTRICTS:

Locations, Specifications and Colors:

Figure X-1 identifies the established special Street Light Districts city-wide. The following tables and Figures X-2 through X-7K illustrate the requirements for **fixture type, height, layout and color for each district**, according to street name.

WEST BAYSIDE LIGHTING DISTRICT				
<i>The boundary of the West Bayside Lighting District is depicted in Attachment X-2A.</i>				
*For street lighting requirements on either side of Cumberland Avenue between Forest Avenue and Franklin Arterial, please refer to the standards and specifications for the Downtown Lighting District.				
Location	Fixture Type	Fixture Height (top of fixture)	Layout	Color
Marginal Way	Bayside District Large Scale Light (see Figure X-2B)	24 ft 3 inch	90 – 110 ft on center (one side only)	Silver Metallic Natural Aluminum – Tiger Drylac Old Navy Silver Y003J
Franklin Arterial: Cumberland Ave. to Marginal Way			175 – 225 ft on center (staggered pattern on both sides of street)	
Forest Avenue: Cumberland Avenue to Marginal Way				
Chestnut Street: Lancaster Street to Marginal Way	Bayside District Medium Scale Light (see Figure X-2C)	19 ft 3 inch	80 – 100 ft on center (one side only)	Silver Metallic Natural Aluminum – Tiger Drylac Old Navy Silver Y003J
Somerset Street				
Preble Street and Elm Street: Cumberland Avenue to Marginal Way			150 – 200 feet on center (staggered pattern on both sides of street)	
Pearl Street: Lancaster St. to Marginal Way				
Kennebec Street				
Hanover Street: Somerset Street to Marginal Way				
Portland Street	Bayside District Medium Scale Residential Light (see Figure X-2D)	19 ft 3 inch	80 – 100 ft on center (one side only)	Dark Gray – Tiger Drylac RAL 7016
Chestnut Street: Cumberland Avenue to Lancaster Street			150 – 200 ft on center (staggered pattern on both sides of street)	
Pearl Street: Cumberland Avenue to Lancaster Street				
Oxford Street				
Lancaster Street				
Wilmot Street, Chapel Street, Stone Street and Cedar Street	Bayside Small Scale Residential Light (see Figure X-2E)	12 ft 9 inch	60 – 80 ft on center (one side only)	Dark Gray – Tiger Drylac RAL 7016
Alder Street			100-175 ft on center (staggered pattern on both sides of street)	
Hanover Street: above Somerset Street				
Parris Street, Brattle Street, Mechanic Street				

DOWNTOWN LIGHTING DISTRICT				
<p><i>The boundary of the Downtown Lighting District is depicted in Figure X-3A. For projects in the Downtown Lighting District, except on Franklin Arterial, please refer to the City of Portland Downtown Sidewalk and Street Lighting Plan.</i></p> <p>*Any fixtures identified in <u>The City of Portland Downtown Sidewalk and Street Lighting Plan</u> for Exchange Street are superseded by the <u>City of Portland Old Port Lighting Plan</u>. For street lighting requirements along Exchange Street, please refer to the standards for the Old Port Lighting District of this section.</p>				
Location	Fixture Type	Fixture Height (top of fixture)	Layout	Color
Franklin Arterial: Between Cumberland and Commercial Street	Eastern Waterfront District Large Scale Lighting Pole (see Figure X-5B)	24 ft 3 inch	90-100 ft on center (one side only) 175-225 on center (staggered pattern on both sides of street)	Black (Manufacturer's Specification)
Congress Street: Between St. John Street and State Street	<p>Four styles of street light are specified for the Downtown Lighting District. These lights vary in terms of height and amount and placement of luminaires (see Figures X-3B through X-3H).</p> <p>Please refer to the <u>City of Portland Downtown Sidewalk and Street Lighting Plan</u>, available for review at the Planning Division, for detailed information concerning lighting pole placement and type.</p>			<p>Dark Green – Tiger Drylac RAL 6012</p>
Congress Street: Between State Street and High Street				
Congress Street: Between High Street and Myrtle Street				
Congress Street: Between Myrtle Street and Franklin Arterial				
Congress Street: Between Franklin Arterial and Eastern Promenade				
Myrtle, Chestnut, Elm and Preble Streets: Between Congress Street and Cumberland Avenue				
Union Street: Between Spring Street and Pleasant Street				
Federal Street: Between Monument Square and Exchange Street				
Brown, Casco, Oak, Shepley and High Streets: Between Cumberland Avenue and Congress Street				
Forest Avenue, Pearl Street and State Street: Between Congress Street and Cumberland Avenue				
Center Street, High Street, Temple Street, Oak Street and Cross Street: Between Congress Street and Spring St. Arterial				
Free Street: Between High Street and Temple Street				
Spring Street Arterial: Between Exchange Street and Oak Street				
Brown Street: Between Congress Street and Free Street				

OLD PORT LIGHTING DISTRICT				
<i>The boundary of the Old Port Lighting District is depicted in Figure X-4A. For projects on Exchange Street and portions of Fore Street described below, please Refer to the <u>City of Portland Old Port Lighting Plan</u>, available for review at the Planning Division.</i>				
Location	Fixture Type	Fixture Height (top of fixture)	Layout	Color
Exchange Street: Between Congress and Middle Streets	Old Port District Street Lighting Pole (see Figure X-4B)	14 ft 3 inch	Please refer to the <u>City of Portland Old Port Lighting Plan</u> , available through the Planning Division, for detailed specifications concerning light pole placement.	Black (Manufacturer's Specification)
Exchange Street: Between Middle Street and Fore Street				
Fore Street: Between Exchange Street and Franklin Arterial				
Silver Street	Old Port District Street Lighting Pole (see Figure X-4B)	14 ft 3 inch	60-80 ft on center (staggered pattern on both sides)	Black (Manufacturer's Specification)
Middle Street: Between Exchange Street and Franklin Arterial				
Federal Street W: Between Exchange Street and Franklin Arterial				
Market Street: Between Congress Street and Fore Street				
Newbury Street W: Between Market Street and Franklin Arterial				
Pearl Street: Between Congress Street and Commercial Street				
Church Street				
Milk Street: Between Exchange Street and Pearl Street				

COMMERCIAL STREET LIGHTING DISTRICT				
<i>The boundary of the Commercial Street Lighting District is depicted in Figure X-6A.</i>				
Location	Fixture Type	Fixture Height (top of fixture)	Layout	Color
Commercial Street: From Thames Street to Casco Bay Bridge	Eastern Waterfront District Large Scale Lighting Pole Large (see Figure X-5B)	24 ft 3 inch	90-100 ft on center (one side only) 175-225 on center (staggered pattern on both sides of street)	Black (Manufacturer's Specification)
West Commercial Street: From Casco Bay Bridge to Fore River Parkway	Commercial Street District Lighting Pole- W Commercial Street (see Figure X-6B)	18 ft 4 inch	90 - 125 ft on center (one side only) 174 - 225 ft on center (staggered pattern on both sides of street)	Dark Green – Tiger Drylac RAL 6028

EASTERN WATERFRONT LIGHTING DISTRICT				
<i>The boundaries of the Eastern Waterfront Lighting District are depicted in Figure X-5A.</i>				
Location	Fixture Type	Fixture Height (top of fixture)	Layout	Color
Fore Street: Between Franklin Arterial and Eastern Promenade	Eastern Waterfront District Medium Scale Lighting Pole (see Figure X-5C.)	19 ft 3 inch	80 – 100 ft on center (one side only) 150 – 225 ft on center (staggered pattern on both sides of street)	Black (Manufacturer’s spec)
Middle Street: Between Franklin Arterial and Hancock Street				
India Street				
Hancock Street: Between Newbury Street and Thames Street				
Newbury Street: Between India Street and Mountfort Street				
Bradbury Court				
Newbury Street: Between Franklin Arterial and India Street	Eastern Waterfront District Small Scale Lighting Pole (see Figure X-5D)	12 ft 9 inch	60 - 80 ft on center (one side only) 100 - 175 ft on center (staggered pattern on both sides of street)	Black (Manufacturer’s spec)
Hampshire St				
Mountfort Street				
Hancock Street: Between Newbury Street and Federal Street				
Federal Street: Between Franklin Arterial and Mountfort Street				
Thames Street	Commercial Street District Lighting Pole- W Commercial Street (see Figure X-6B)	18 ft 4 inch	90 - 125 ft on center (one side only) 174 - 225 ft on center (staggered pattern on both sides of street)	Dark Green – Tiger Drylac RAL 6028

HISTORIC LANDSCAPE DISTRICTS AND TRAILS				
<i>The boundaries of the Historic and Trail Lighting Districts are depicted in Figure X-7A.</i>				
Location	Fixture Type	Fixture Height (top of fixture)	Layout	Color
Eastern Promenade: Between North Street and Fore Street	Eastern Waterfront District Medium Scale Lighting (<i>see Figure X-5C</i>)	19 ft 3 inch	80 – 100 feet on center (one side only)	Black (Manufacturer's Specification)
Western Promenade: Between Danforth Street and Bramhall Street			150 – 200 feet on center (staggered pattern on both sides of street)	
Baxter Boulevard: Between Forest Avenue and Bates Street	Baxter Boulevard Lighting Pole (<i>see Figure X-7D</i>)	21 ft	90 – 100 feet on center (one side only) 175 – 225 feet on center (staggered pattern both sides)	Black (Manufacturer's Specification)
Eastern Promenade Trail	Commercial Street District Lighting Pole - W Commercial Street (<i>see Figure X-6B</i>)	18 ft 4 inch	90 - 125 ft on center (one side only)	Dark Green – Tiger Drylac RAL 6028
Fore River Parkway: Between Valley Street and Frederic Street			174 - 225 ft on center (staggered pattern on both sides of street)	
Deering Oaks Park (Interior)	Deering Oaks Park Pedestrian Light (<i>see Figure X-7B</i>)	11 ft 10 inch	Please refer to the Deering Oaks Master Plan (2003), available through the Planning Division and on the City of Portland website, for specifications concerning exact placement of street lighting poles.	Black (Manufacturer's Specification)
	Deering Oaks Park Bridge Light (<i>see Figure X-7C</i>)	4 ft 8 inch		
Park Avenue: abutting Deering Oaks Park	Deering Oaks Park. Park Avenue Street Light (<i>see Figure X-7E</i>)	21 ft	n/a	Black (Manufacturer's Specification)
Bayside Trail	Bayside Trail Pedestrian Trail Light	16 ft	n/a	Blue - Tiger Drylac RAL 5003

10.5. Central Maine Power versus Construction Contractor Responsibilities:

For projects where the construction contractor is required by the City to provide new street lighting, the new street lighting shall be connected to either a new *Central Maine Power Company (CMP)* metered secondary service, or an existing metered service, unless otherwise directed by the City. The responsibilities of the construction contractor and of *CMP* are as follows:

Construction Contractor Responsibilities:

1. Where a new *CMP* metered secondary service is provided, the construction contractor shall contact the project representative with *CMP* to review the proposed new service meter configuration, location and connection to existing *CMP* service lines.
2. The construction contractor shall furnish and install as part of the construction scope street lighting luminaires, street lighting poles, bracket arms, pole accessories, and decorative base enclosures all as stipulated by the City according to the City Street Lighting Standards for the given project location.
3. The construction contractor shall furnish and install as part of the construction scope concrete foundation bases for new street lighting poles. The installation of the foundation bases shall be coordinated with sidewalk details and requirements as stipulated by the City of Portland Department of Public Services.
4. The construction contractor shall furnish and install as part of the construction scope underground conduit and wire between street lighting pole foundation bases. In addition, underground conduit and wire shall be provided to an electrical service panelboard and *CMP* meter, as well as to an existing point of *CMP* service connection.
5. The construction contractor shall furnish and install as part of the construction scope wiring to be installed within each street lighting pole and shall be extended at the pole top (or bracket arm), with connection to the street lighting luminaire(s).
6. Upon completion of the erection of the project street lighting, including the installation of all lighting poles and conduit/wire, the construction contractor shall notify the City that the system is ready for operation. Where a new metered service has been provided, the City will execute a contract agreement with *CMP* to energize the system. THE LUMINAIRES SHALL BE ENERGIZED PRIOR TO THE CONSTRUCTION CONTRACTOR'S REQUEST FOR A CITY CERTIFICATE OF OCCUPANCY.

7. It shall be the construction contractor's responsibility to pay all costs associated with the provision of required street lighting including costs associated with street lighting luminaires, street lighting poles, brackets, bases, conduit, and wire, panelboards and metering equipment. This includes all requirements stipulated by *CMP* for connection to existing *CMP* electrical power source(s).

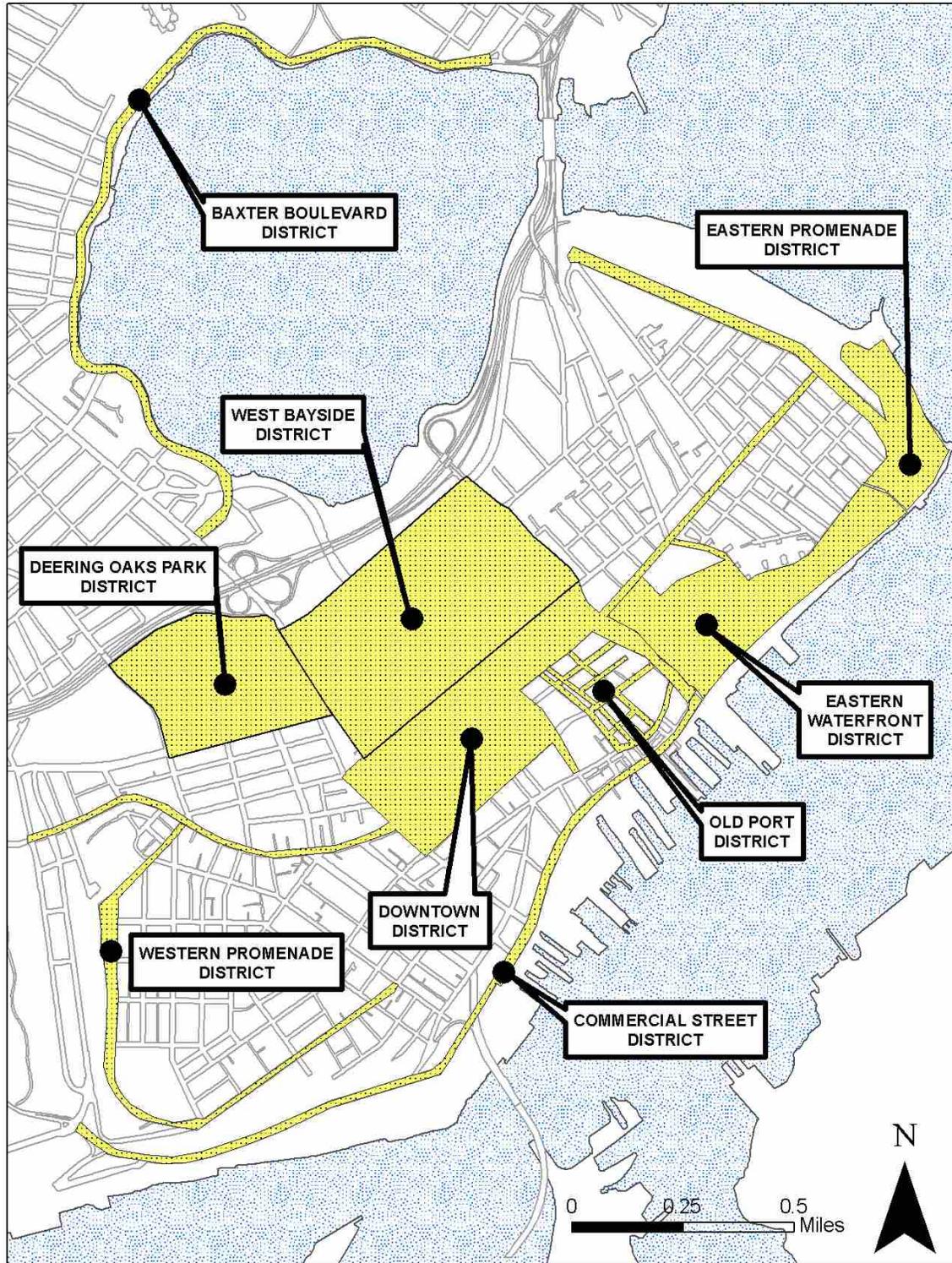
Central Maine Power Company (CMP) Responsibilities:

1. To approve the proposed point of connection for electrical service for new municipal street lighting where a new metered service is provided.
2. To prepare a secondary metered service agreement where a new service is provided, for execution between *CMP* and the City, for street lighting service.
3. Connection of the construction contractor's secondary service conductors at an existing *CMP* service point, where a new service is provided.

10.6. Reserved.

10.7. Submission Requirements:

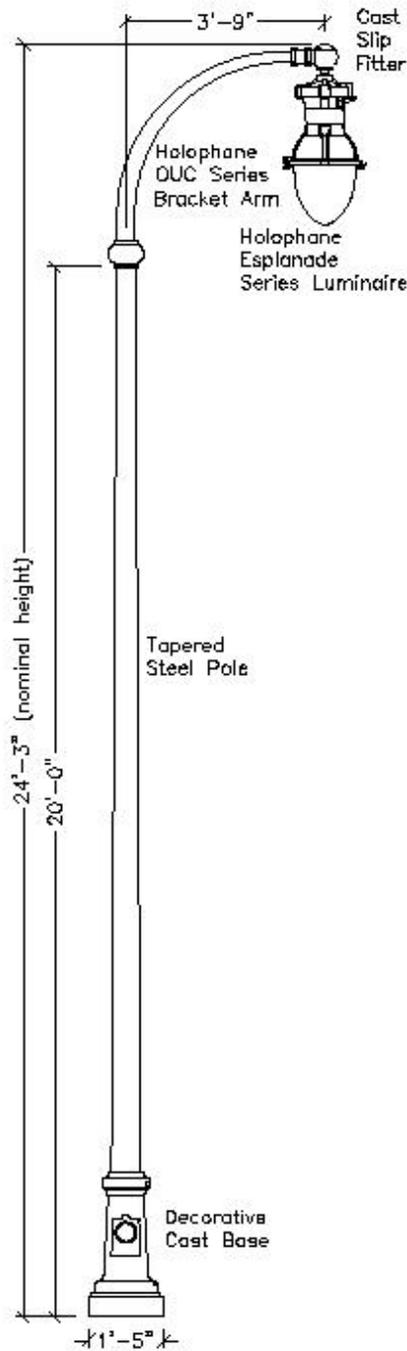
- A lighting plan shall be provided which shall show the quantity and location of all existing and proposed street lights. This shall be incorporated into the site plan or presented on an individual lighting plan. Descriptive information including engineering detail drawings depicting the entire proposed fixture, including luminaire, bracket arm, slip fitter and lighting, along with the proposed color shall be included on the individual lighting plan.



DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	MUNICIPAL STREET LIGHTING DISTRICTS		X-1



DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	WEST BAYSIDE LIGHTING DISTRICT		X-2A



LUMINAIRE

Holophane Lighting model ESU175MH12A4-R-RAL8012
 Cast Aluminum housing with stainless steel hardware. Dropped refractor shall be thermal resistant borosilicate glass. Internal reflector and prismatic diffuser shall provide an IES Type III distribution pattern according to the manufacturer's photometric test # 47384. Luminaire shall include an integral ballast with modular wiring connectors and multi-voltage taps (factory wired for 120VAC). Provide an internal receptacle type photocell control. Luminaire finish shall be Tiger Drylac Old Navy Sivler Y003J polyester powder coat.

LAMP

Holophane Lighting model S-M175/U 64471
 Vertical mounted, 175 watt mogul base clear metal halide lamp.

BRACKET ARM

Holophane Lighting model OUC 6083-T8 aluminum crossarm with a post-top fitting for a 3-1/2" by 8" tenon. Bracket arm finish shall be Tiger Drylac Old Navy Sivler Y003J polyester powder coat paint.

SLIP FITTER

Holophane Lighting model BHLF200-SCA/AS (Boston Harbor Series)
 2-3/8" O.D. with swivel cast fitter. Finish shall be polyester powder coat paint Tiger Drylac Old Navy Sivler Y003J.

LIGHTING POLE

Tapered steel pole shaft rated for a 90 mph wind load with a 1.3 gust factor. Pole shall be pre-galvanized with a finish coat of polyester powder coat paint RAL # 6012 (dark green). Provide four hot-dipped galvanized steel L-type anchor bolts.

DECORATIVE POLE BASE

Holophane model Cambridge Series clamshell cast aluminum base. Hardware shall be stainless steel.

APPLICATION

Street/sidewalk lighting for two-way streets with parking on both sides.
 Suggested layout guidelines:
 90-110 feet on center (one side only)
 or
 175-225 feet on center (staggered pattern both sides).

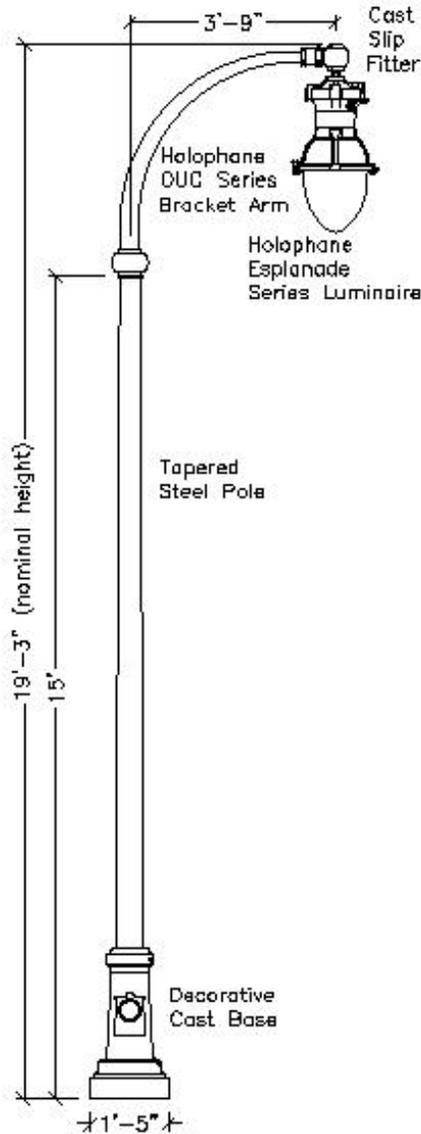
City of Portland, Maine

**Street & Sidewalk Lighting
 BAYSIDE DISTRICT
 Large Scale Lighting Pole**



07/28/06

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	BAYSIDE DISTRICT LARGE SCALE LIGHT		X-2B



LUMINAIRE

Holophane Lighting model ESU175MH12A4-PR

Cast Aluminum housing with stainless steel hardware. Dropped refractor shall be thermal resistant borosilicate glass. Internal reflector and prismatic diffuser shall provide an IES Type III distribution pattern according to the manufacturer's photometric test # 47384. Luminaire shall include an integral ballast with modular wiring connectors and multi-voltage taps (factory wired for 120VAC). Provide an internal receptacle type photocell control.

LAMP

Holophane Lighting model S-M175/U 84471
 Vertical mounted, 175 watt mogul base clear metal halide lamp.

BRACKET ARM

Holophane Lighting model OUC 1/2" by 5"
 6063-T6 aluminum crossarm with a post-top fitting for a 3-tenon.

SLIP FITTER

Holophane Lighting model BHLF200-SCA/AS
 (Boston Harbor Series)
 2-3/4" O.D. with swivel cast fitter.

LIGHTING POLE

Tapered steel pole shaft rated for a 90 mph wind load with a 1.3 gust factor. Pole shall be pre-galvanized. Provide four hot-dipped galvanized steel L-type anchor bolts.

DECORATIVE POLE BASE

Holophane model Cambridge Series clamshell cast aluminum base. Hardware shall be stainless steel.

APPLICATION

Street/sidewalk lighting for two-way streets with parking on one side, or one-way streets. Suggested layout guidelines:
 80-100 feet on center (one side only)
 or
 150-200 feet on center (staggered pattern both sides).

FINISHES

Luminaire, bracket arm, slip fitter and lighting
 Residential Areas:
 Tiger Drylac 49/72830 RAL 7016 5M GL Tribo
 Mixed Use Commercial Areas
 Tiger Drylac Old Navy Silver Y003J

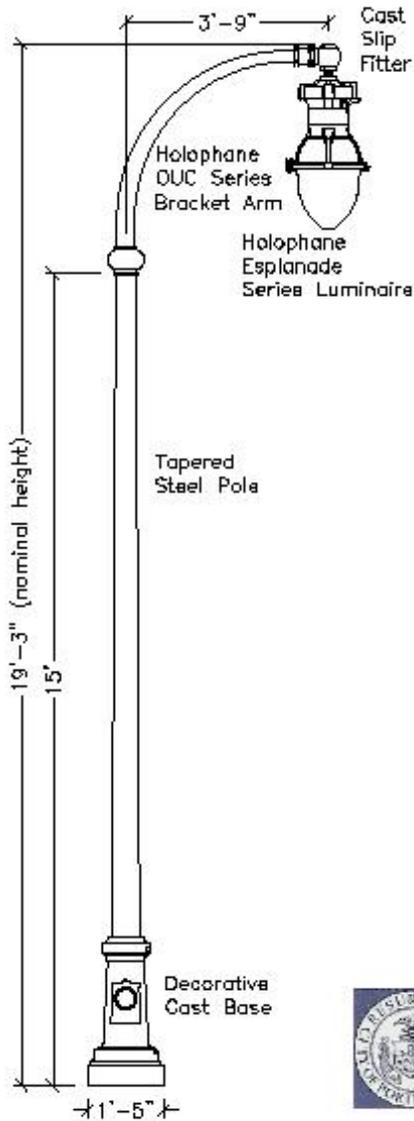
City of Portland, Maine

**Street & Sidewalk Lighting
 BAYSIDE DISTRICT
 Medium Scale Lighting Pole**



07/08/08

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	BAYSIDE DISTRICT MEDIUM SCALE LIGHT		X-2C



LUMINAIRE

Holophane Lighting model ESU175MH12A4-R
 Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting.
 Luminaire shall be custom color RAL-7016 (Dark Grey).

LAMP

Holophane Lighting model S-M175/U 64471
 Vertical mounted, 175 watt mogul base clear metal halide lamp.

BRACKET ARM

Holophane Lighting model OUC 6063-T6
 Aluminum crossarm with a post-top fitting for a 3-1/2" by 8" tenon.
 Bracket arm shall be custom color RAL-7016 (Dark Grey).

SLIP FITTER

Holophane Lighting model BHLF200-SCA/AS (Boston Harbor Series)
 2-3/8" O.D. with swivel cast fitter.
 Slip fitter shall be custom color RAL-7016 (Dark Grey).

LIGHTING POLE

Tapered steel pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts.
 Lighting pole shall be custom color RAL-7016 (Dark Grey).

DECORATIVE POLE BASE

Holophane Lighting model Cambridge Series
 Decorative clamshell cast aluminum base. Hardware shall be stainless steel.
 Decorative pole base shall be custom color RAL-7016 (Dark Grey).

APPLICATION

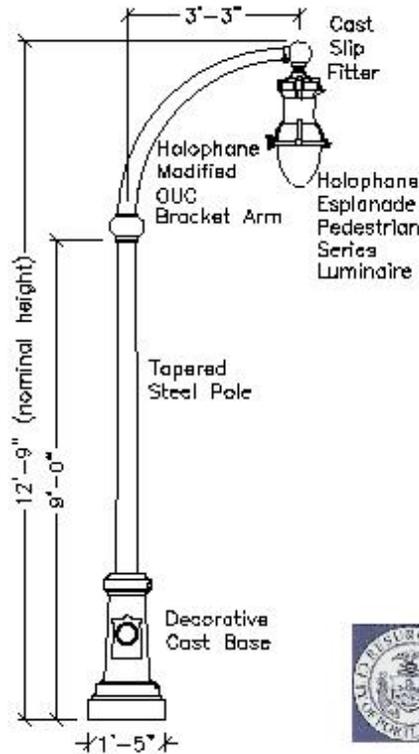
Street/Sidewalk lighting for two-way streets with parking on one side, or one-way streets.
 Suggested layout:
 80-100 ft on center (one side only)
 150-200 ft on center (staggered pattern both sides)



City of Portland, Maine
Street & Sidewalk Lighting
BAYSIDE RESIDENTIAL DISTRICT
Medium Scale Lighting Pole

08/05/09

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:			X-2D
BAYSIDE DISTRICT MEDIUM SCALE RESIDENTIAL LIGHT			



LUMINAIRE

Holophane Lighting model ESP70MH12A5-R
Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting.
Luminaire shall be custom color RAL-7016 (Dark Grey).

LAMP

Holophane Lighting model S-MP70/MED
vertical mounted, 70 watt mogul base clear metal halida lamp.

BRACKET ARM

Holophane Lighting model OUC(modified) 6063-T6
Aluminum crossarm with a post-top fitting for a 3-1/2" by 8" tenon.
Bracket arm shall be custom color RAL-7016 (Dark Grey).

SLIP FITTER

Holophane Lighting model BHLF200-SCA/AS (Boston Harbor Series)
2-3/8" O.D. with swivel cast fitter.
Slip fitter shall be custom color RAL-7016 (Dark Grey).

LIGHTING POLE

Tapered steel pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts.
Lighting pole shall be custom color RAL-7016 (Dark Grey).

DECORATIVE POLE BASE

Holophane Lighting model Cambridge Series
Decorative clamshell cast aluminum base. Hardware shall be stainless steel.
Decorative pole base shall be custom color RAL-7016 (Dark Grey).

APPLICATION

Sidewalk lighting or small area lighting.
Suggested layout:
60-80 ft on center (one side only)
100-175 ft on center (staggered pattern both sides)

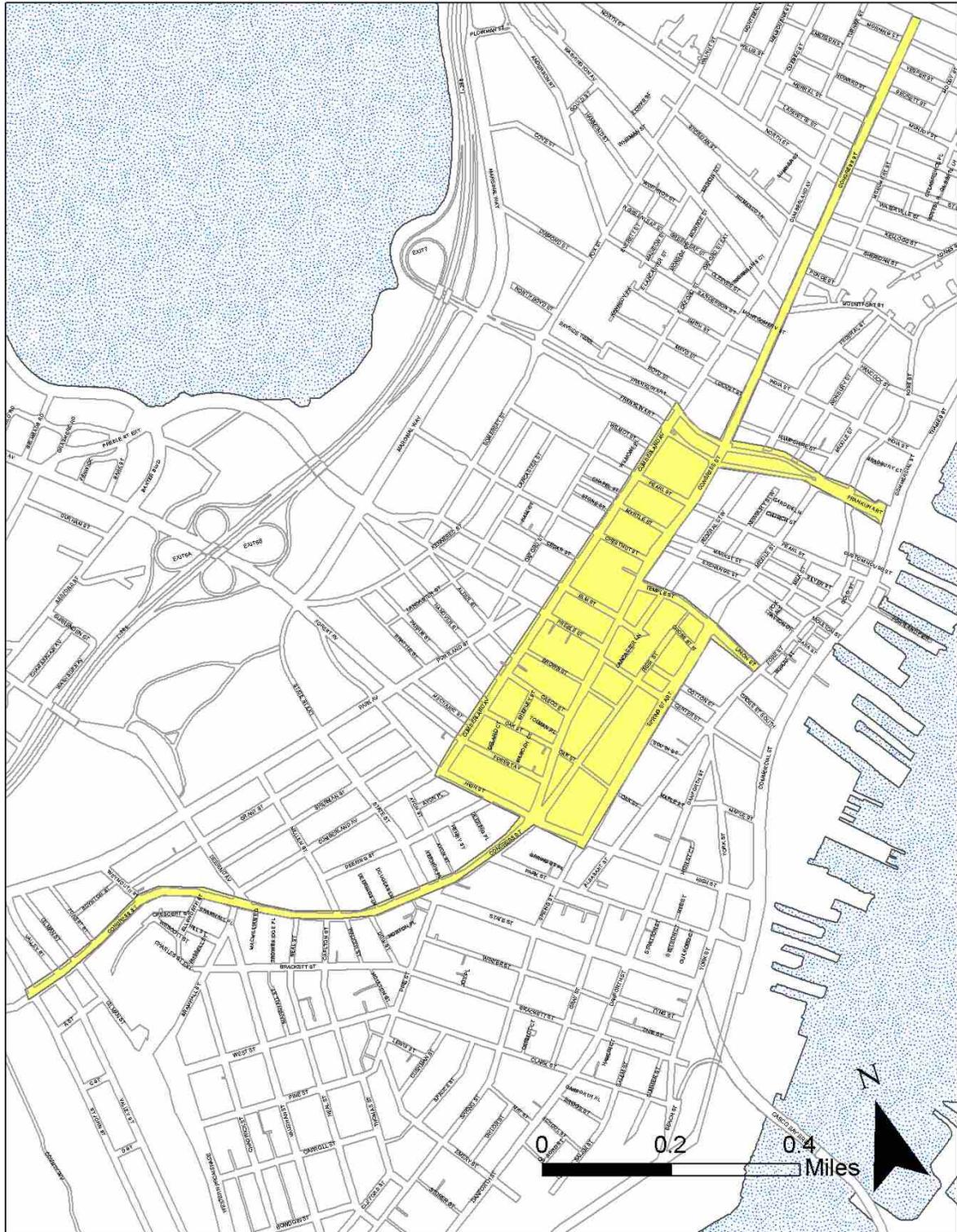
City of Portland, Maine

**Street & Sidewalk Lighting
BAYSIDE RESIDENTIAL DISTRICT
Small Scale Lighting Pole**

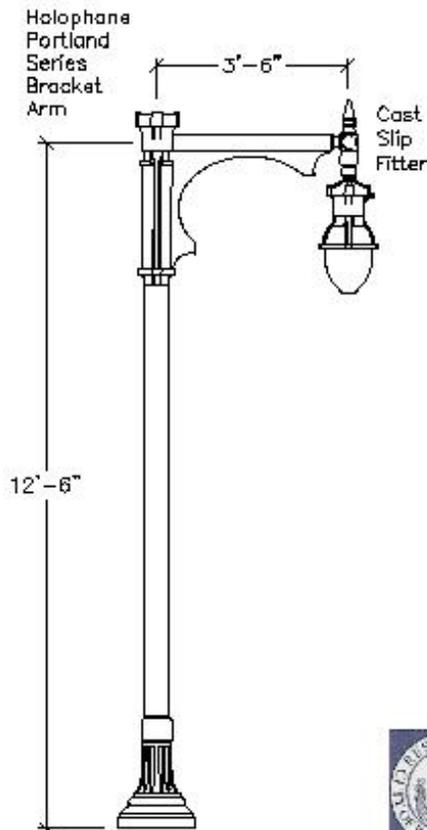


08/05/07

<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>BAYSIDE DISTRICT SMALL SCALE RESIDENTIAL LIGHT</p>		<p>X-2E</p>



DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	DOWNTOWN STREET LIGHTING DISTRICT		X-3A



LUMINAIRE

Holophane Lighting model ESP70DMH12A5-PR
Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting.
Luminaire shall be custom color RAL-6012 (dark green).

LAMP

Holophane Lighting model S-MP70/MED 64546
Vertical mounted, 70 watt mogul base clear metal halide lamp.

BRACKET ARM

Holophane Lighting model PD42CARAL6012
Steel crossarm with a post-top fitting for a 3-1/2" by 8" tenon.
Bracket arm shall be custom color RAL-6012 (dark green).

SLIP FITTER

Holophane Lighting model WLLF200SCARAL6012
2-3/8" O.D. with swivel cast fitter.
Slip fitter shall be custom color RAL-6012 (dark green).

LIGHTING POLE

Tapered aluminum pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts.
Lighting pole shall be custom color RAL-6012 (dark green).

DECORATIVE POLE BASE

Holophane Lighting NY10SS17CARAL6012
Decorative clamshell cast aluminum base. Hardware shall be stainless steel.
Decorative pole base shall be custom color RAL-6012 (dark green).

APPLICATION

Sidewalk lighting or small area lighting.
Suggested layout:
60-80 ft on center (one side only)
100-175 ft on center (staggered pattern both sides)

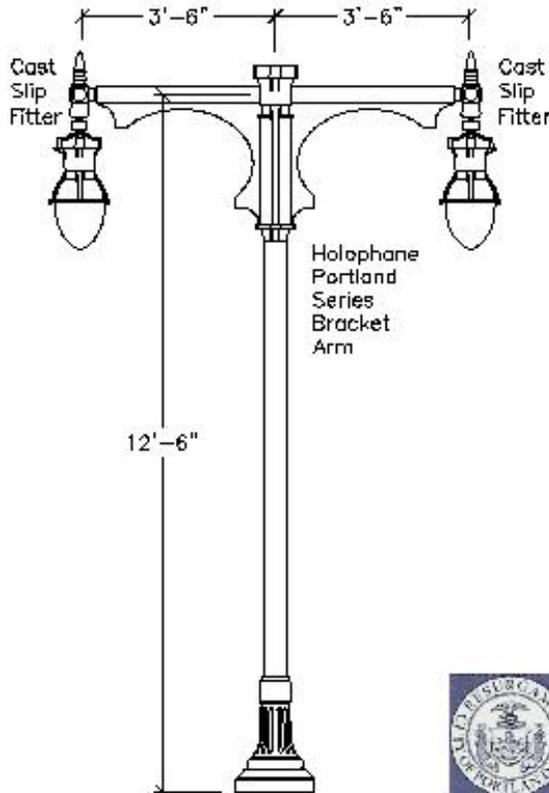


City of Portland, Maine

**Street & Sidewalk Lighting
CONGRESS STREET DISTRICT
Pedestrian Lighting Pole-Style 1**

08/25/07

<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>DOWNTOWN DISTRICT PEDESTRIAN SCALE LIGHT- STYLE 1</p>		<p>X-3B</p>



LUMINAIRE

Holophane Lighting model ESP70DMH12A5-PR Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting. Luminaire shall be custom color RAL-6012 (dark green).

LAMP

Holophane Lighting model S-MP70/MED 64546 Vertical mounted, 70 watt mogul base clear metal halide lamp.

BRACKET ARM

Holophane Lighting model PD42CARAL6012 Steel dual crossarm with a post-top fitting for a 3-1/2" by 8" tenon. Bracket arm shall be custom color RAL-6012 (dark green).

SLIP FITTER

Holophane Lighting model WLLF200SCARAL6012 2-3/8" O.D. with swivel cast fitter. Slip fitter shall be custom color RAL-6012 (dark green).

LIGHTING POLE

Tapered aluminum pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts. Lighting pole shall be custom color RAL-6012 (dark green).

DECORATIVE POLE BASE

Holophane Lighting NY10S517CARAL6012 Decorative clamshell cast aluminum base. Hardware shall be stainless steel. Decorative pole base shall be custom color RAL-6012 (dark green).

APPLICATION

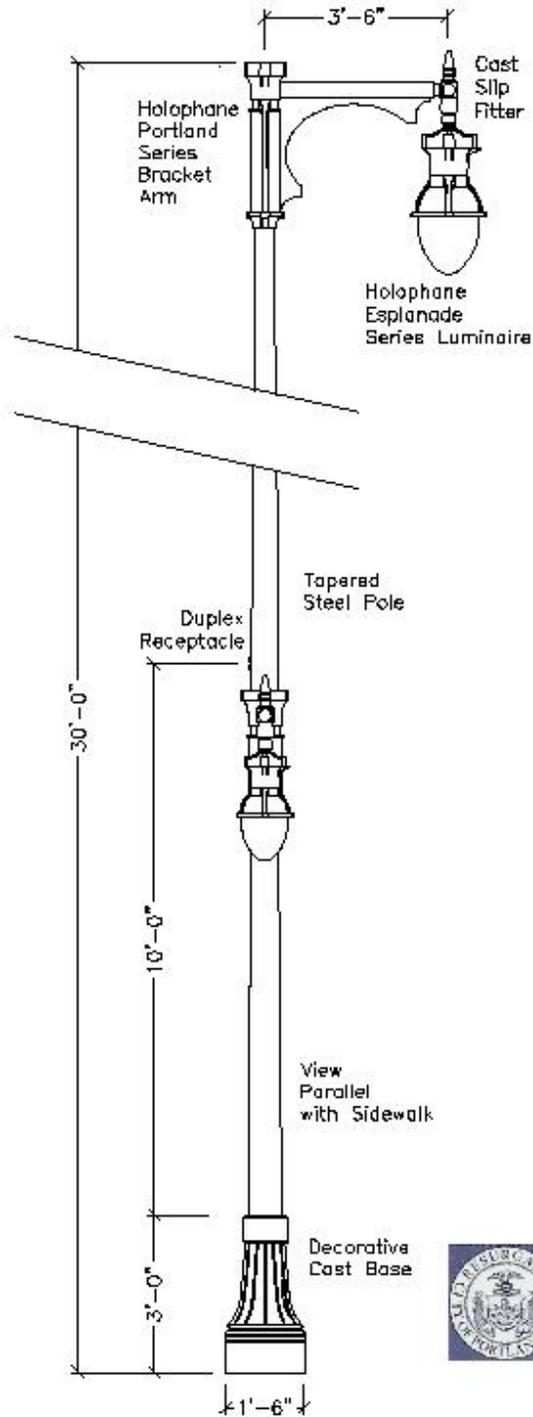
Sidewalk lighting or small area lighting. Suggested layout:
 60-80 ft on center (one side only)
 100-175 ft on center (staggered pattern both sides)



City of Portland, Maine
Street & Sidewalk Lighting
CONGRESS STREET DISTRICT
Pedestrian Lighting Pole-Style 2

08/25/07

<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>DOWNTOWN DISTRICT PEDESTRIAN SCALE LIGHT- STYLE 2</p>		<p>X-3C</p>



LUMINAIRE

Holophane Lighting model ESU250MH12A4-R Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting. Luminaire shall be custom color RAL-6012 (dark green).

LAMP

Holophane Lighting model S-M250/U 64457 Vertical mounted, 250 watt mogul base clear metal halide lamp.

TOP BRACKET ARM

Holophane Lighting model PD42CARAL6012 Steel Crossarm with a post-top fitting for a 3-1/2" by 8" tenon. Bracket arm shall be custom color RAL-6012 (dark green).

LOWER BRACKET ARM

Holophane Lighting model PD69CARAL6012 Steel dual crossarm. Bracket arm shall be custom color RAL-6012 (dark green).

SLIP FITTER

Holophane Lighting model WLLF200SCARAL6012 2-3/8" O.D. with swivel cast fitter. Slip fitter shall be custom color RAL-6012 (dark green).

LIGHTING POLE

Tapered steel pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts. Lighting pole shall be hot dip galvanized prior to powder coat paint custom color RAL-6012 (dark green).

DECORATIVE POLE BASE

Holophane Lighting PM18CSBCARAL6012 Decorative clamshell cast aluminum base. Hardware shall be stainless steel. Decorative pole base shall be custom color RAL-6012 (dark green).

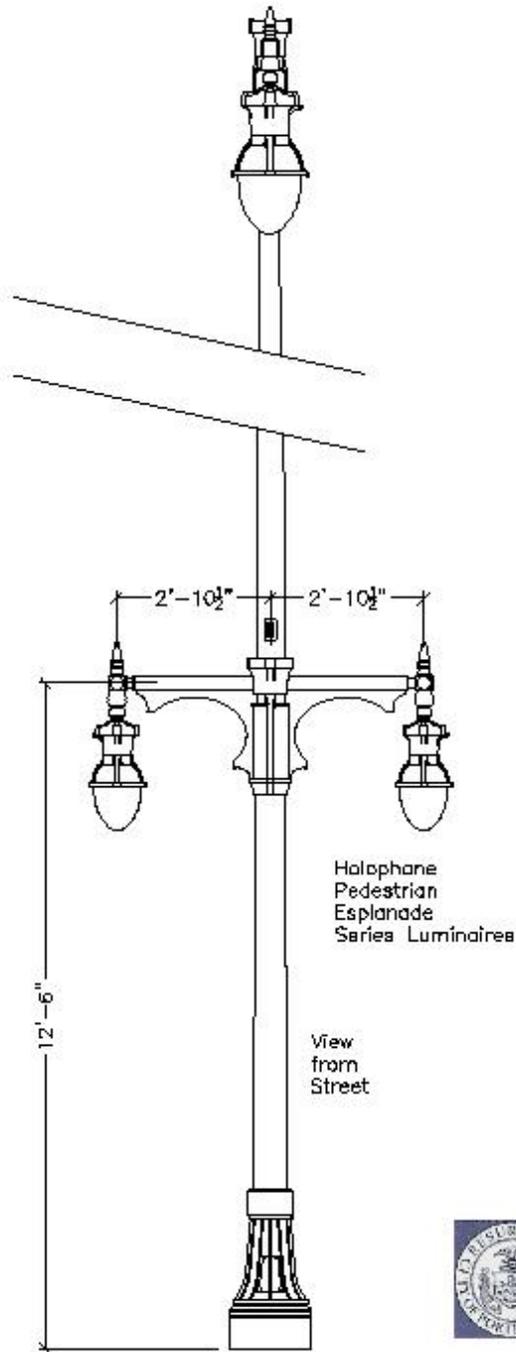


City of Portland, Maine
Street & Sidewalk Lighting
CONGRESS STREET DISTRICT
Street/Pedestrian Lighting Pole

Sheet 1 of 2

08/05/09

<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>DOWNTOWN DISTRICT STREET/PED LIGHTING POLE- SHEET 1 OF 2</p>		<p>X-3D</p>



APPLICATION

Street/Sidewalk lighting for two-way streets with parking on both sides.
 Suggested layout:
 90-100 ft on center (one side only)
 175-225 ft on center (staggered pattern both sides)

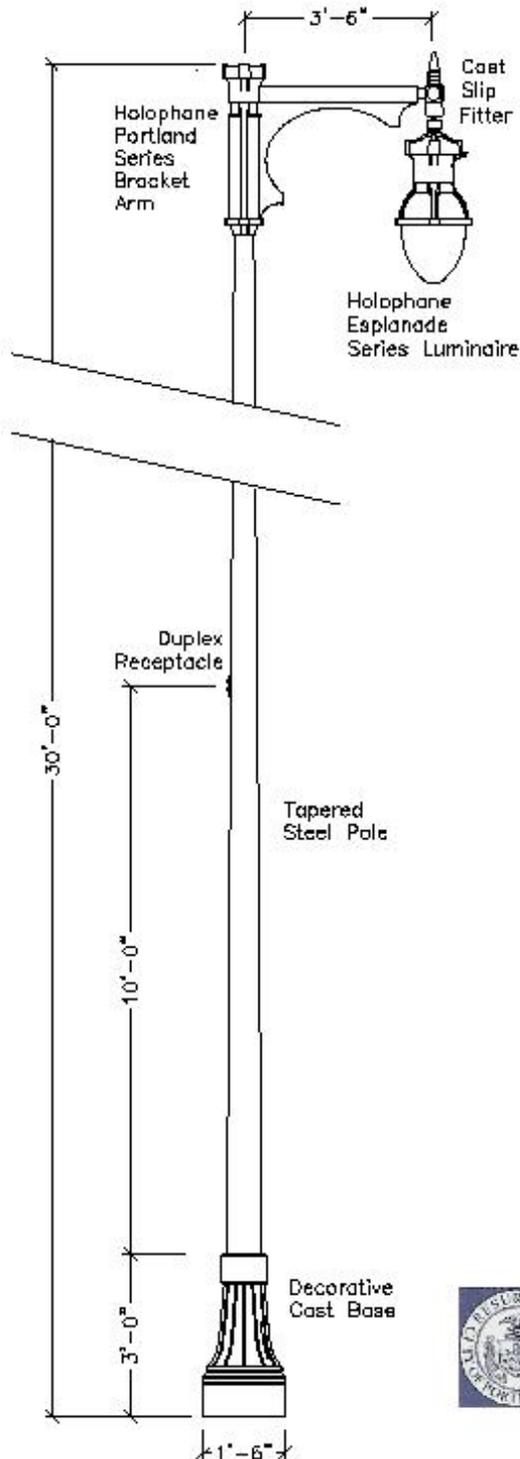


City of Portland, Maine
 Street & Sidewalk Lighting
 CONGRESS STREET DISTRICT
 Street/Pedestrian Lighting Pole

Sheet 2 of 2

08/05/09

<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>DOWNTOWN DISTRICT STREET/PED LIGHTING POLE- SHEET 2 OF 2</p>		<p>X-3E</p>



LUMINAIRE

Holophane Lighting model ESU250MH12A4-R
 Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting.
 Luminaire shall be custom color RAL-6012 (dark green).

LAMP

Holophane Lighting model S-M250/U 64457
 Vertical mounted, 250 watt mogul base clear metal halide lamp.

TOP BRACKET ARM

Holophane Lighting model PD42CARAL6012
 Steel Crossarm with a post-top fitting for a 3-1/2" by 8" tenon.
 Bracket arm shall be custom color RAL-6012 (dark green).

SLIP FITTER

Holophane Lighting model WLLF200SCARAL6012
 2-3/8" O.D. with swivel cast fitter.
 Slip fitter shall be custom color RAL-6012 (dark green).

LIGHTING POLE

Tapered steel pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts.
 Lighting pole shall be hot dipped galvanized prior powder coat paint, custom color RAL-6012 (dark green).

DECORATIVE POLE BASE

Holophane Lighting PM1BCSBCARAL6012
 Decorative clamshell cast aluminum base.
 Hardware shall be stainless steel.
 Decorative pole base shall be custom color RAL-6012 (dark green).

APPLICATION

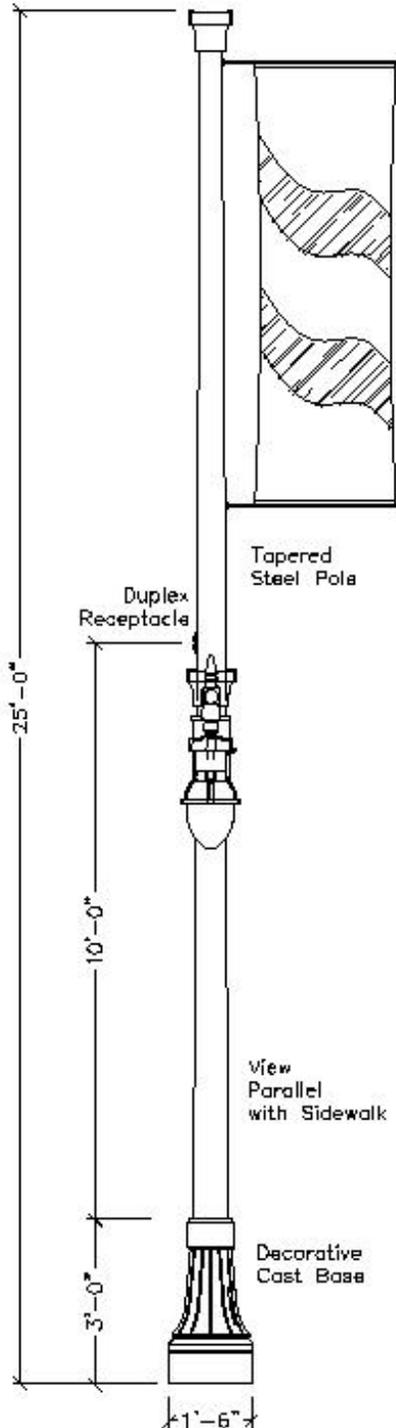
Street/Sidewalk lighting for two-way streets with parking on both sides.
 Suggested layout:
 90-100 ft on center (one side only)
 175-225 ft on center (staggered pattern both sides)



City of Portland, Maine
Street & Sidewalk Lighting
CONGRESS STREET DISTRICT
Street Lighting Pole-Style 1

08/05/07

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	DOWNTOWN DISTRICT STREET LIGHTING POLE- STYLE 1		X-3F



LUMINAIRE

Holophane Lighting model ESP7QDMH12A5-PR
 Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting.
 Luminaire shall be custom color RAL-6012 (dark green).

LAMP

Holophane Lighting model S-M250/U 64457
 Vertical mounted, 250 watt mogul base clear metal halide lamp.

LOWER BRACKET ARM

Holophane Lighting model PD69CARAL6012
 Steel dual crossarm.
 Bracket arm shall be custom color RAL-6012 (dark green).

SLIP FITTER

Holophane Lighting model WLLF200SCARAL6012
 2-3/8" O.D. with swivel cast fitter.
 Slip fitter shall be custom color RAL-6012 (dark green).

LIGHTING POLE

Tapered steel pole shaft rated for a 80mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts.
 Lighting pole shall be hot dip galvanized prior to powder coat paint custom color RAL-6012 (dark green).

DECORATIVE POLE BASE

Holophane Lighting PM1BCSBCARAL6012
 Decorative clamshell cast aluminum base. Hardware shall be stainless steel.
 Decorative pole base shall be custom color RAL-6012 (dark green).

BANNER ARM

Holophane Lighting KBW
 Aluminum banner arm and hardware for mounting an 8 ft tall banner to be provided by the city.



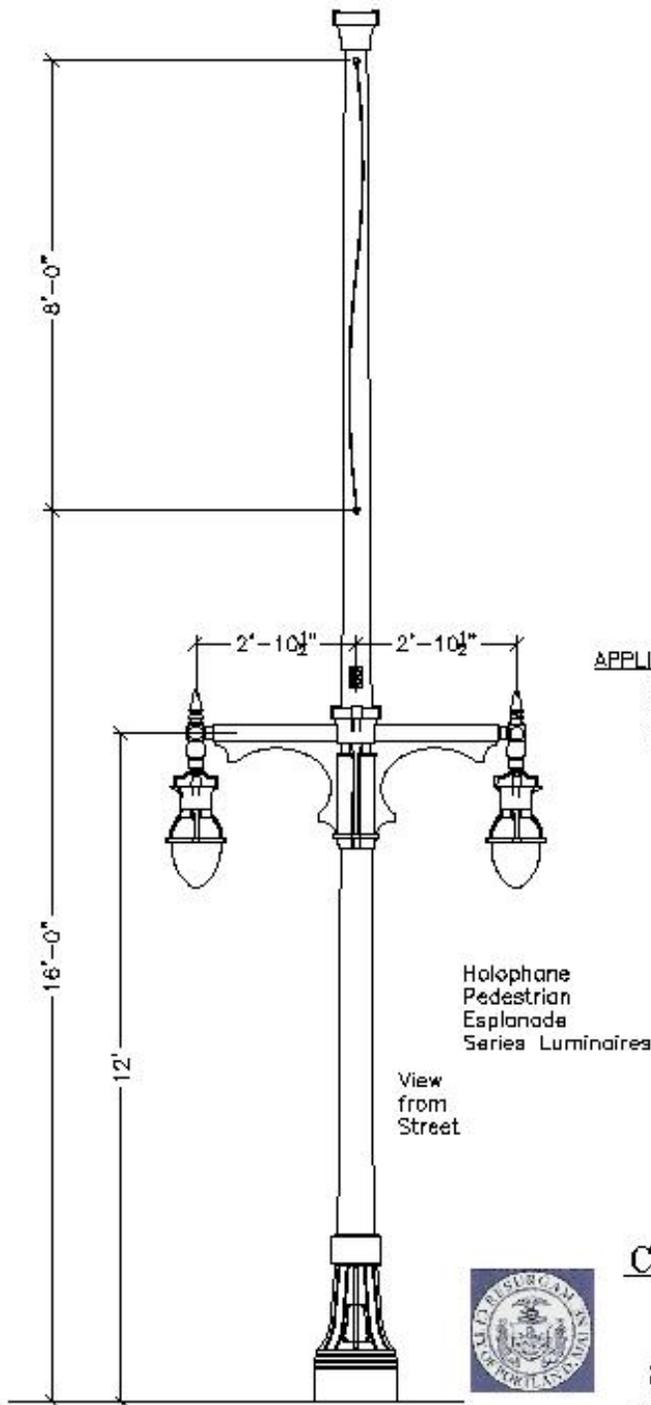
City of Portland, Maine

Street & Sidewalk Lighting
 CONGRESS STREET DISTRICT
 Street Lighting Pole-Style 2

Sheet 1 of 2

08/05/09

<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>DOWNTOWN DISTRICT STREET LIGHTING POLE- STYLE 2. SHEET 1 OF 2</p>		<p>X-3G</p>



APPLICATION

Street/Sidewalk lighting for two-way streets with parking on both sides.
 Suggested layout:
 90-100 ft on center (one side only)
 175-225 ft on center (staggered pattern both sides)

City of Portland, Maine

Street & Sidewalk Lighting
 CONGRESS STREET DISTRICT

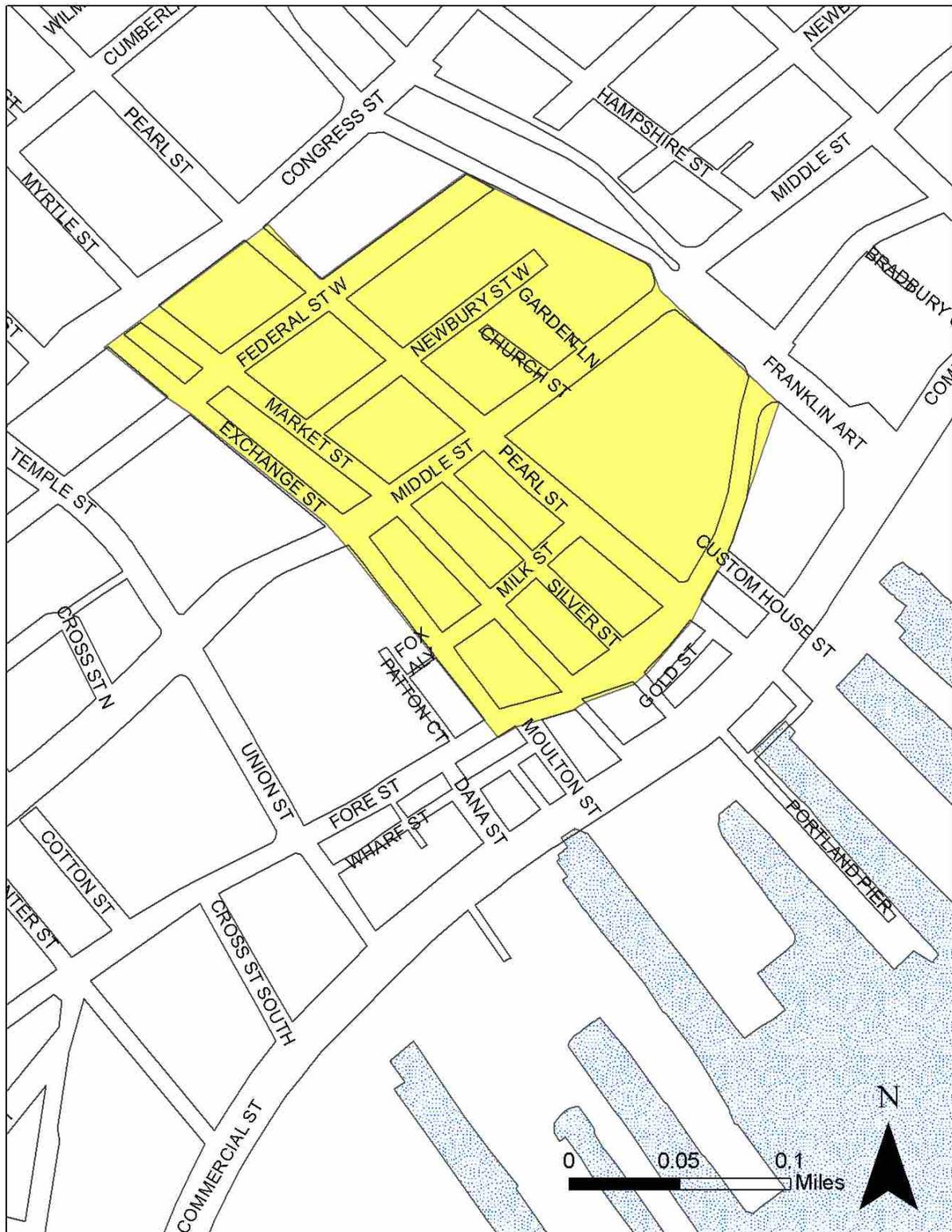
Street Lighting Pole-Style 2

Sheet 2 of 2

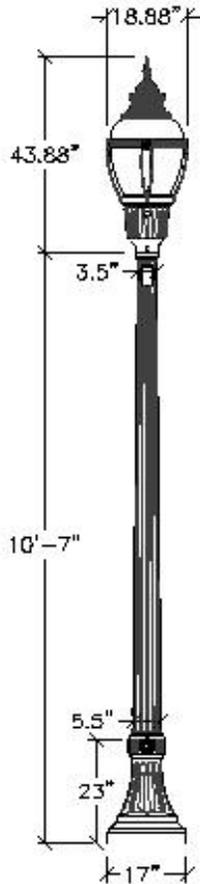
08/25/09



<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>DOWNTOWN DISTRICT STREET LIGHTING POLE- STYLE 2. SHEET 2 OF 2</p>		<p>X-3H</p>



DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	OLD PORT STREET LIGHTING DISTRICT		X-4A



LUMINAIRE

Holophane Lighting model WAU10DMH128667
 Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting.
 Luminaire shall black.

LAMP

Holophane Lighting model S-M100/U 64417
 Vertical mounted, 100 watt mogul base clear metal halide lamp.

LIGHTING POLE

Holophane model NY11C/17U6192, AB-26-4, FDIUS-SBKH
 Tapered, fluted cast aluminum pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts. Provide non-GFI rated duplex receptacle outlet. Lighting pole shall be hot dipped galvanized prior powder coat paint, black.

APPLICATION

Street/Sidewalk lighting for two-way streets with parking on both sides.
 Suggested layout:
 60-80 ft on center (staggered pattern both sides)

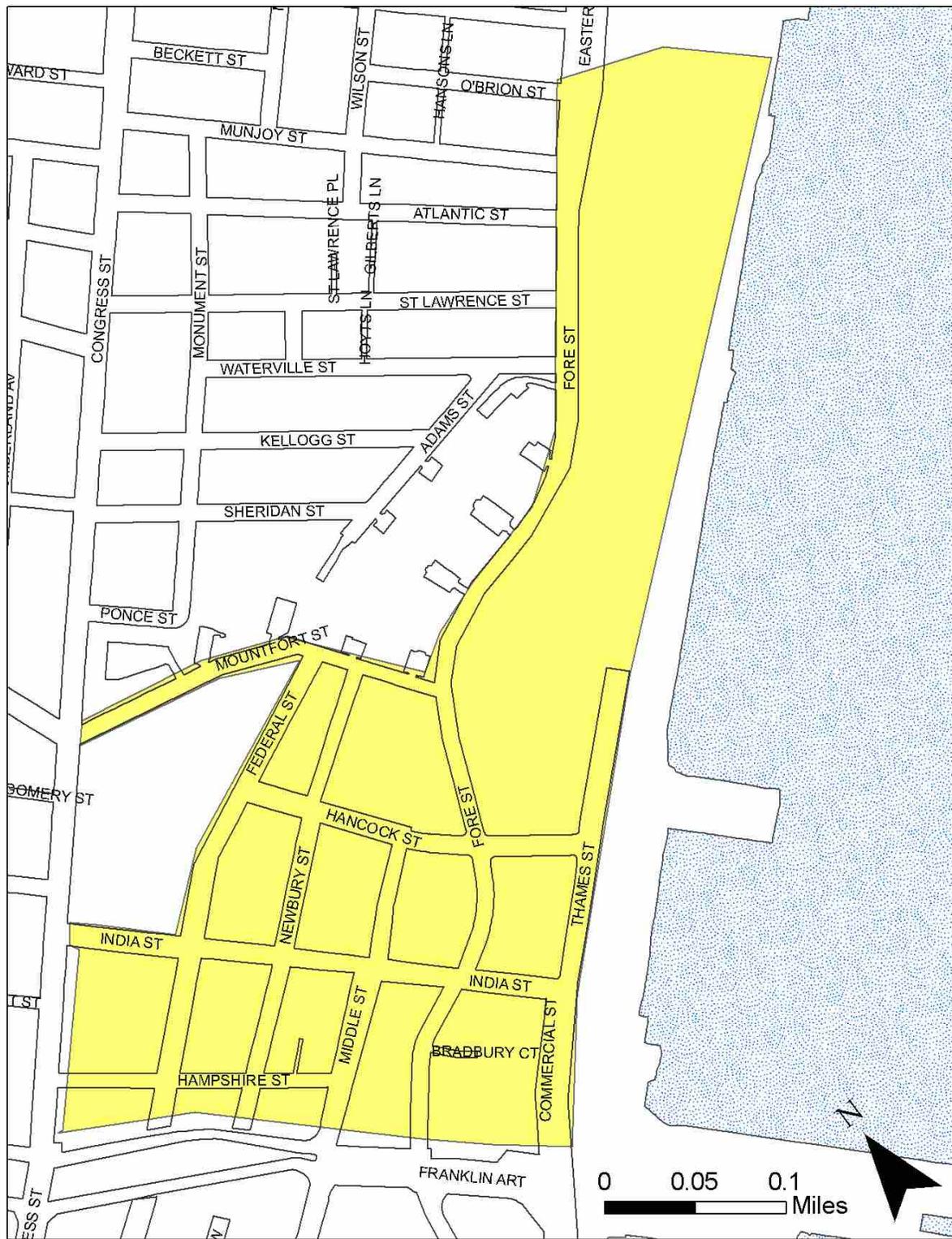


City of Portland, Maine
Street & Sidewalk Lighting
OLD PORT DISTRICT
Street Lighting Pole

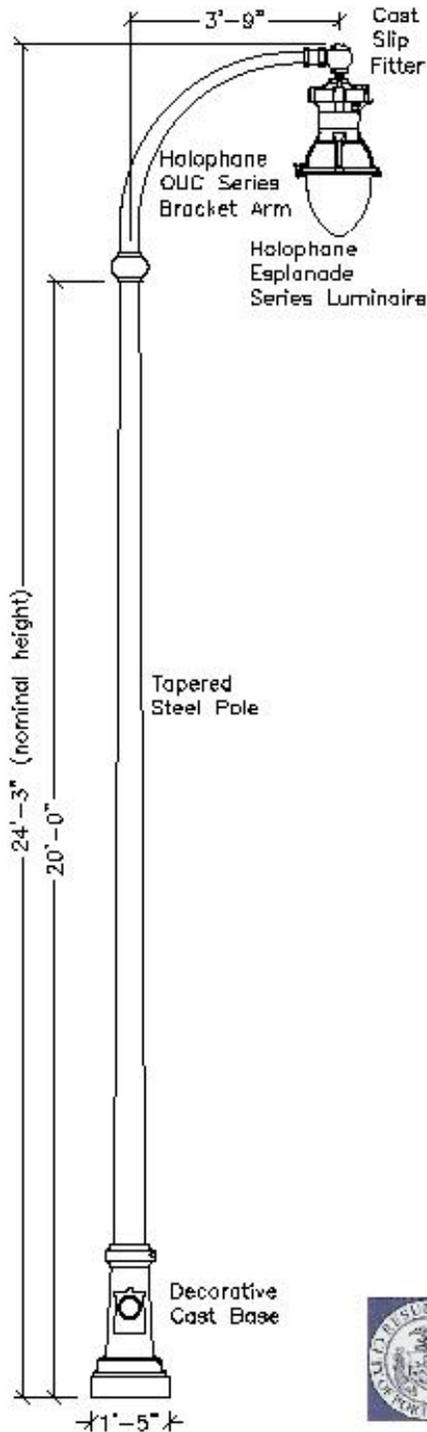
Sheet 1 of 1

10/09/08

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	OLD PORT DISTRICT STREET LIGHTING POLE		X-4B



<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>EASTERN WATERFRONT STREET LIGHTING DISTRICT</p>		<p>X-5A</p>



LUMINAIRE

Halophane Lighting model ESU175MH12A4-R
Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting.
Luminaire shall be manufacturer's standard black color.

LAMP

Halophane Lighting model S-M175/U 64471
vertical mounted, 175 watt mogul base clear metal halide lamp.

BRACKET ARM

Halophane Lighting model OUC 6063-T8
Aluminum crossarm with a post-top fitting for a 3-1/2" by 8" tenon.
Bracket arm shall be manufacturer's standard black color.

SUP FITTER

Halophane Lighting model BHLF200-SCA/AS (Boston Harbor Series)
2-3/8" O.D. with swivel cast fitter.
Slip fitter shall be manufacturer's standard black color.

LIGHTING POLE

Tapered steel pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts.
Lighting pole shall be manufacturer's standard black color.

DECORATIVE POLE BASE

Halophane Lighting model Cambridge Series
Decorative clamshell cast aluminum base.
Hardware shall be stainless steel.
Decorative pole base shall be manufacturer's standard black color.

APPLICATION

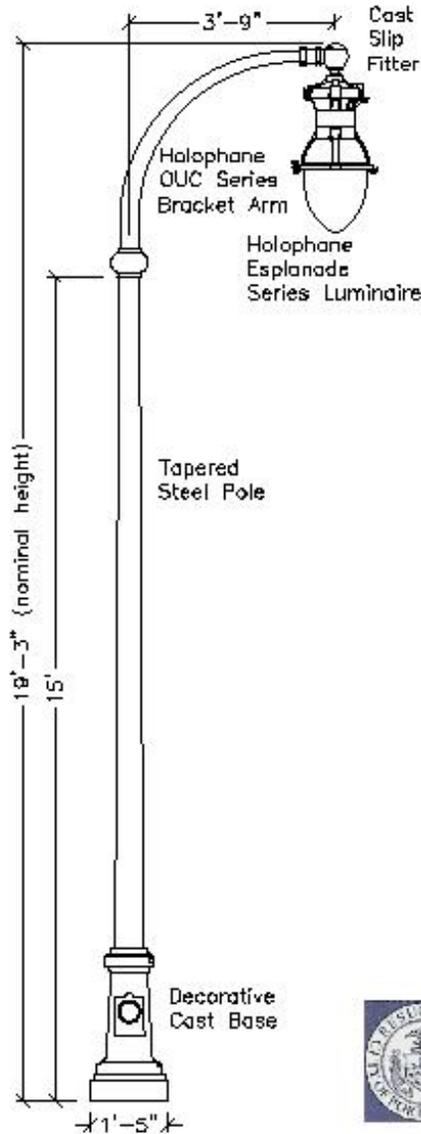
Street/Sidewalk lighting for two-way streets with parking on both sides.
Suggested layout:
90-100 ft on center (one side only)
175-225 ft on center (staggered pattern both sides)



City of Portland, Maine
Street & Sidewalk Lighting
WATERFRONT COMMERCIAL DISTRICT
Large Scale Lighting Pole

08/05/07

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	EASTERN WATERFRONT DISTRICT LARGE SCALE LIGHTING POLE		X-5B



LUMINAIRE

Holophane Lighting model ESU175MH12A4-R
Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting.
Luminaire shall be manufacturer's standard black color.

LAMP

Holophane Lighting model S-M175/U 64471
Vertical mounted, 175 watt mogul base clear metal halide lamp.

BRACKET ARM

Holophane Lighting model OUC 6063-T8
Aluminum crossarm with a post-top fitting for a 3-1/2" by 6" tenon.
Bracket arm shall be manufacturer's standard black color.

SLIP FITTER

Holophane Lighting model BHLF200-SCA/AS (Boston Harbor Series)
2-3/8" O.D. with swivel cast fitter.
Slip fitter shall be manufacturer's standard black color.

LIGHTING POLE

Tapered steel pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts.
Lighting pole shall be manufacturer's standard black color.

DECORATIVE POLE BASE

Holophane Lighting model Cambridge Series
Decorative clamshell cast aluminum base.
Hardware shall be stainless steel.
Decorative pole base shall be manufacturer's standard black color.

APPLICATION

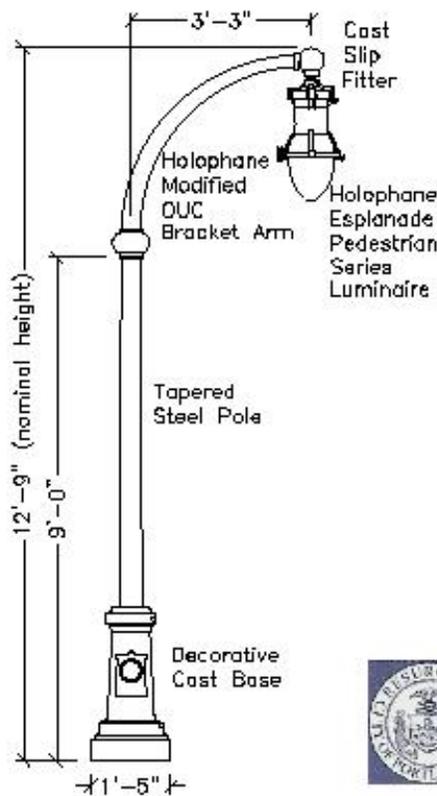
Street/Sidewalk lighting for two-way streets with parking on one sides, or one-way streets.
Suggested layout:
80-100 ft on center (one side only)
150-200 ft on center (staggered pattern both sides)



City of Portland, Maine
Street & Sidewalk Lighting
WATERFRONT COMMERCIAL DISTRICT
Medium Scale Lighting Pole

08/25/07

<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>EASTERN WATERFRONT DISTRICT MEDIUM SCALE LIGHTING POLE</p>		<p>X-5C</p>



LUMINAIRE

Holophane Lighting model ESP70MH12A5-R
Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting.
Luminaire shall be manufacturer's standard black color.

LAMP

Holophane Lighting model S-MP70/MED vertical mounted, 70 watt mogul base clear metal halide lamp.

BRACKET ARM

Holophane Lighting model OUC(modified) 6063-T6 Aluminum crossarm with a post-top fitting for a 3-1/2" by 8" tenon.
Bracket arm shall be manufacturer's standard black color.

SLIP FITTER

Holophane Lighting model BHLF200-5CA/AS (Boston Harbor Series)
2-3/8" O.D. with swivel cast fitter.
Slip fitter shall be manufacturer's standard black color.

LIGHTING POLE

Tapered steel pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts.
Lighting pole shall be manufacturer's standard black color.

DECORATIVE POLE BASE

Holophane Lighting model Cambridge Series
Decorative clamshell cast aluminum base.
Hardware shall be stainless steel.
Decorative pole base shall be manufacturer's standard black color.

APPLICATION

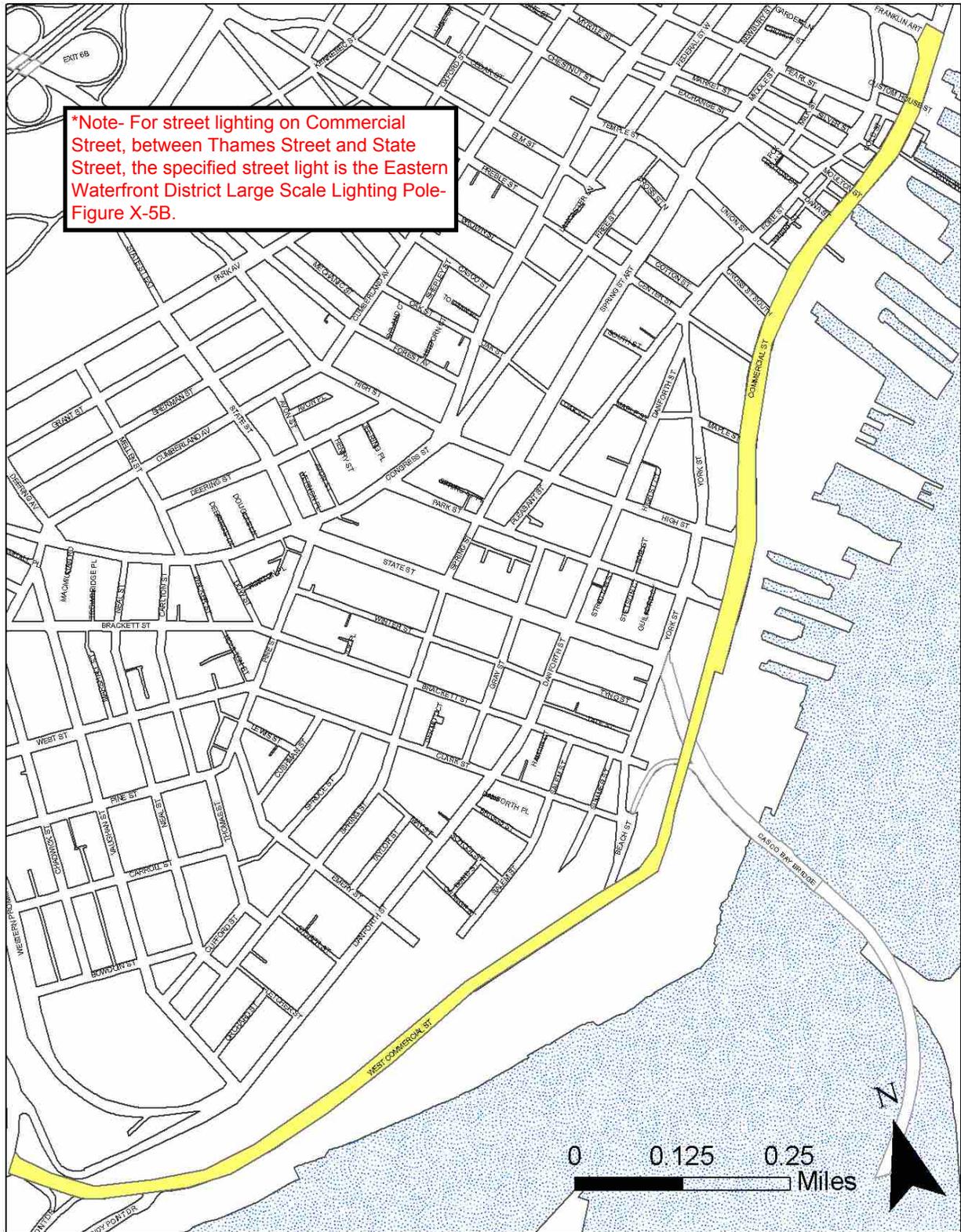
Sidewalk lighting or small area lighting.
Suggested layout:
60-80 ft on center (one side only)
100-175 ft on center (staggered pattern both sides)



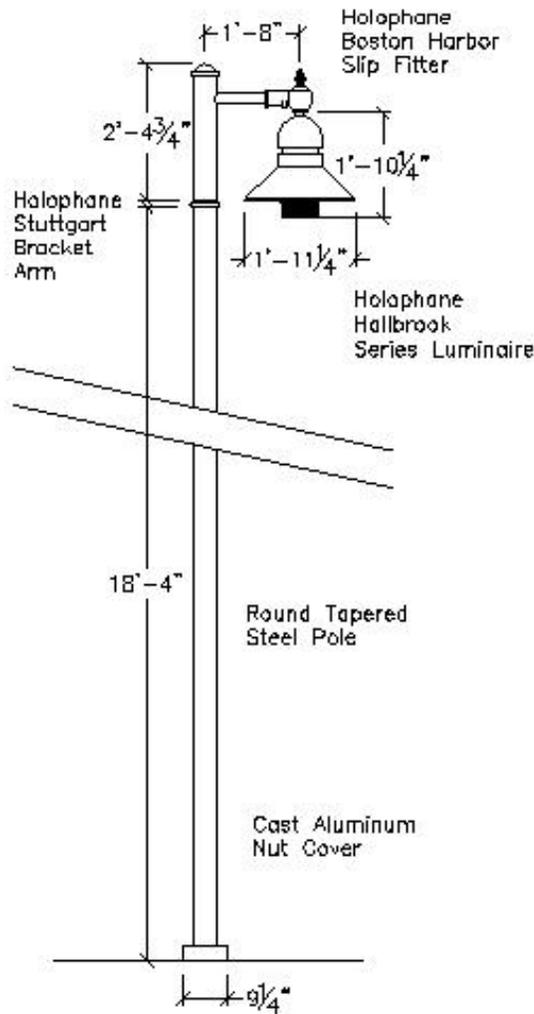
City of Portland, Maine
Street & Sidewalk Lighting
WATERFRONT COMMERCIAL DISTRICT
Small Scale Lighting Pole

08/05/07

<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>EASTERN WATERFRONT DISTRICT SMALL SCALE LIGHTING POLE</p>		<p>X-5D</p>



<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>COMMERCIAL STREET LIGHTING DISTRICT</p>		<p>X-6A</p>



LUMINAIRE

Halophane Lighting model 180430505ST4
Luminaire shall be furnished and installed by The Central Maine Power Company under the municipal lease agreement for street lighting.
Luminaire shall black.

LAMP

Halophane Lighting model S-M250/U 64457
Vertical mounted, 250 watt mogul base clear metal halide lamp.

TOP BRACKET ARM

Valmont model 1HT90H30X30" LONG 317RB405
Steel Crossarm with a post-top fitting for a 2-3/8" by 6" tenon.
Bracket arm shall be black.

SLIP FITTER

Halophane Lighting model BHLF/200-SCA/BK
2-3/8" O.D. with swivel cast fitter.
Slip fitter shall be black.

LIGHTING POLE

Valmont model 1804-30505T4-BK
Tapered steel pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts.
Lighting pole shall be hot dipped galvanized prior powder coat paint, black.

APPLICATION

Street/Sidewalk lighting for two-way streets with parking on both sides.
Suggested layout:
90-125 ft on center (one side only)
175-225 ft on center (staggered pattern both sides)



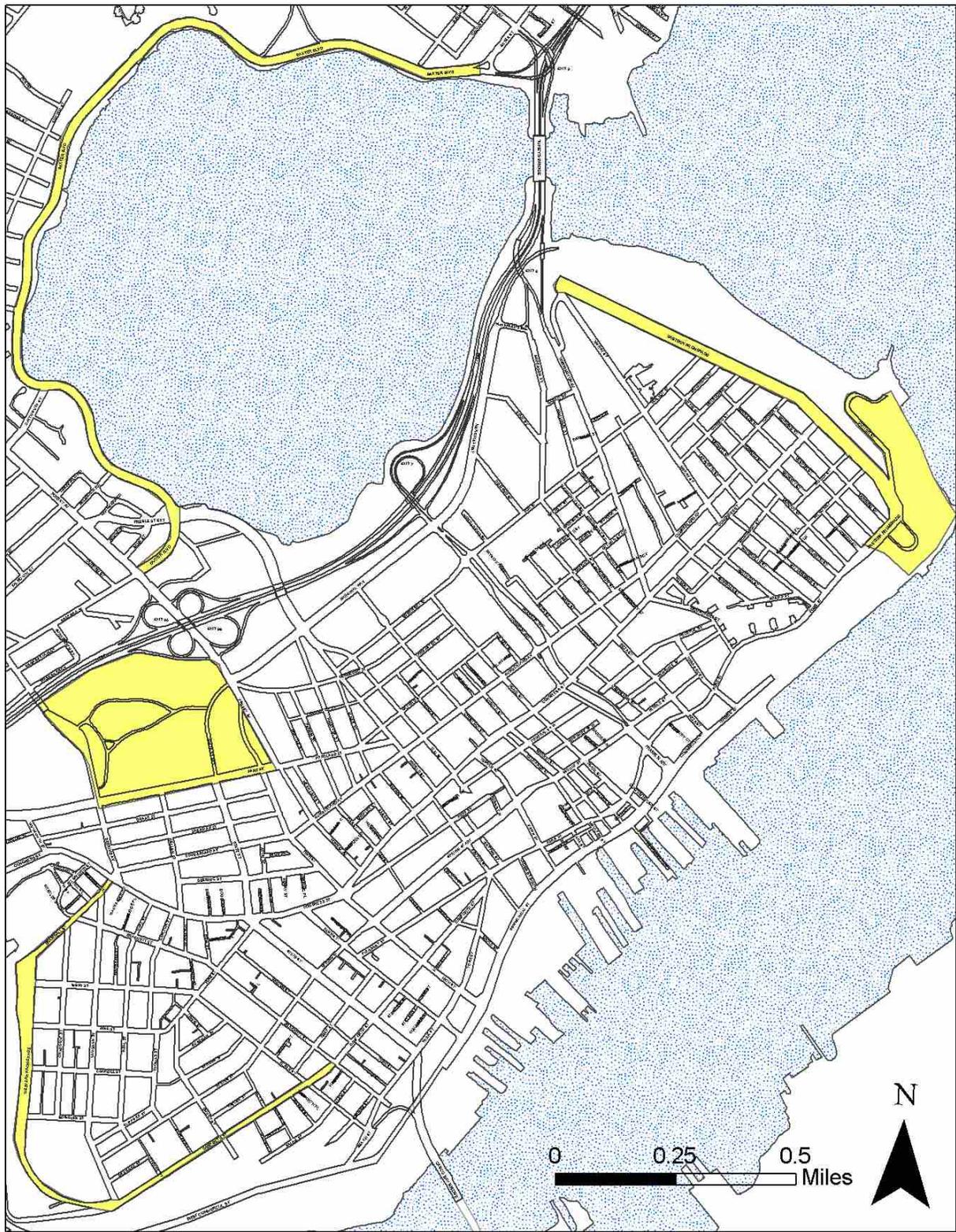
City of Portland, Maine

**Street & Sidewalk Lighting
COMMERCIAL STREET DISTRICT
Street Lighting Pole**

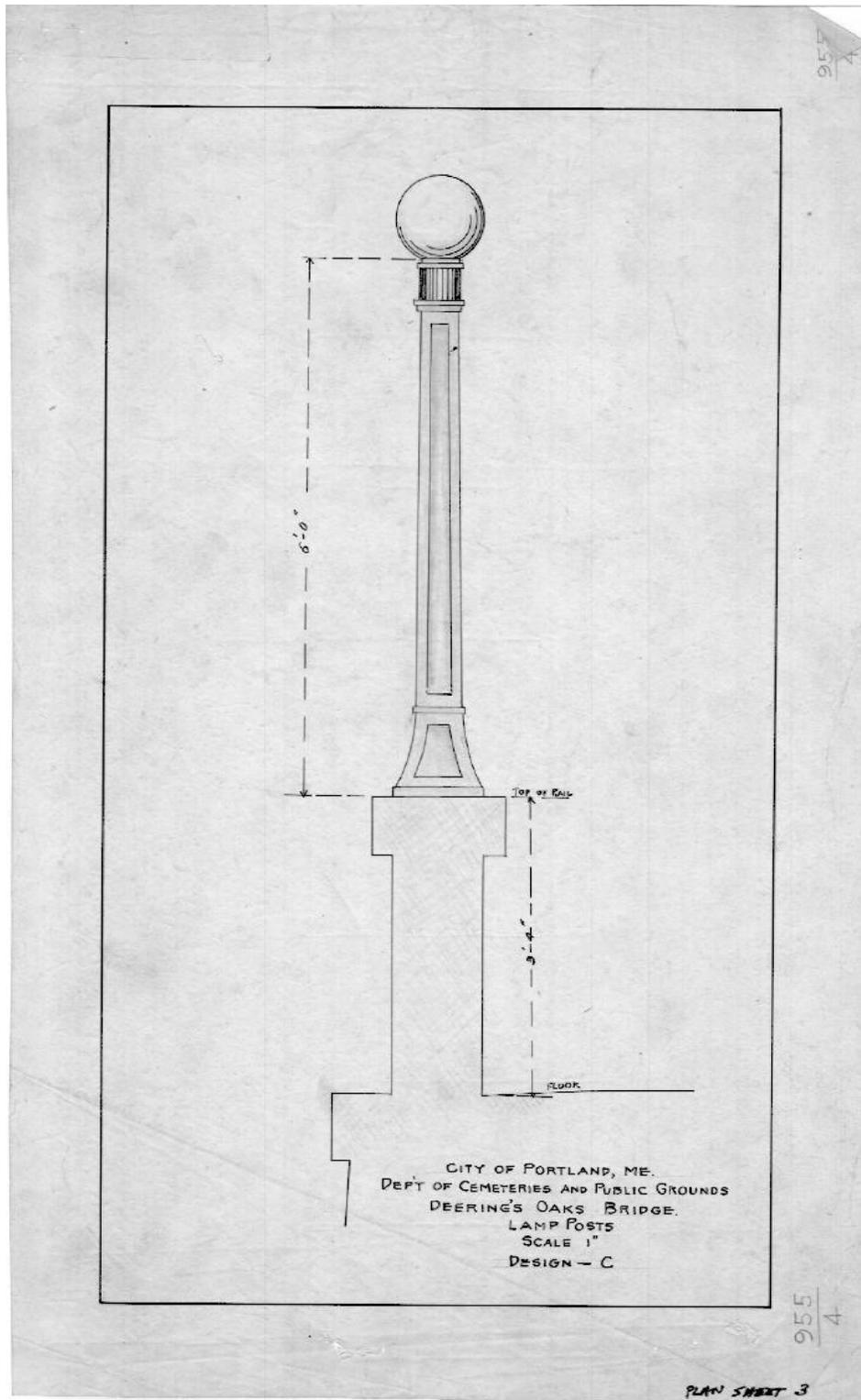
Sheet 1 of 1

10/26/08

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	COMMERCIAL STREET DISTRICT LIGHTING POLE- W. COMMERCIAL ST		X-6B



DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	HISTORIC LIGHTING DISTRICTS		X-7A



DATE:
 AUGUST 2009

CITY OF PORTLAND, MAINE
 TECHNICAL STANDARDS MANUAL

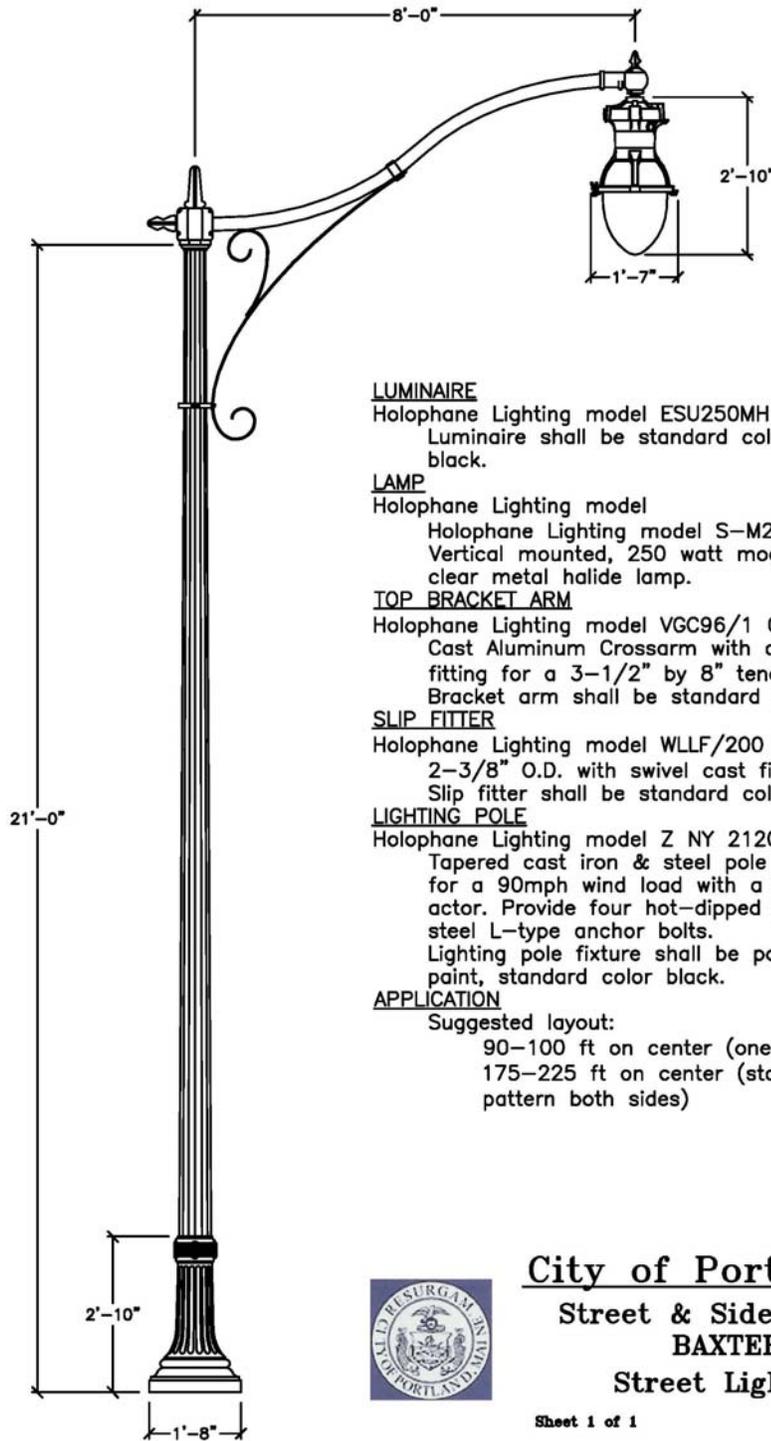
MUNICIPAL STREET
 LIGHTING STANDARDS
 SECTION X

FIGURE:

REVISED:

**HISTORIC DISTRICT LIGHTING POLE-
 DEERING OAKS PARK BRIDGE LIGHT**

X-7C



LUMINAIRE

Holophane Lighting model ESU250MH12A4-R
 Luminaire shall be standard color black.

LAMP

Holophane Lighting model
 Holophane Lighting model S-M250/U 64457
 Vertical mounted, 250 watt mogul base clear metal halide lamp.

TOP BRACKET ARM

Holophane Lighting model VGC96/1 CA BK
 Cast Aluminum Crossarm with a post-top fitting for a 3-1/2" by 8" tenon. Bracket arm shall be standard color black.

SLIP FITTER

Holophane Lighting model WLLF/200 SCA BK
 2-3/8" O.D. with swivel cast fitter. Slip fitter shall be standard color black.

LIGHTING POLE

Holophane Lighting model Z NY 2120 CIS BK
 Tapered cast iron & steel pole shaft rated for a 90mph wind load with a 1.3 gust factor. Provide four hot-dipped galvanized steel L-type anchor bolts. Lighting pole fixture shall be powder coat paint, standard color black.

APPLICATION

Suggested layout:
 90-100 ft on center (one side only)
 175-225 ft on center (staggered pattern both sides)



City of Portland, Maine

Street & Sidewalk Lighting

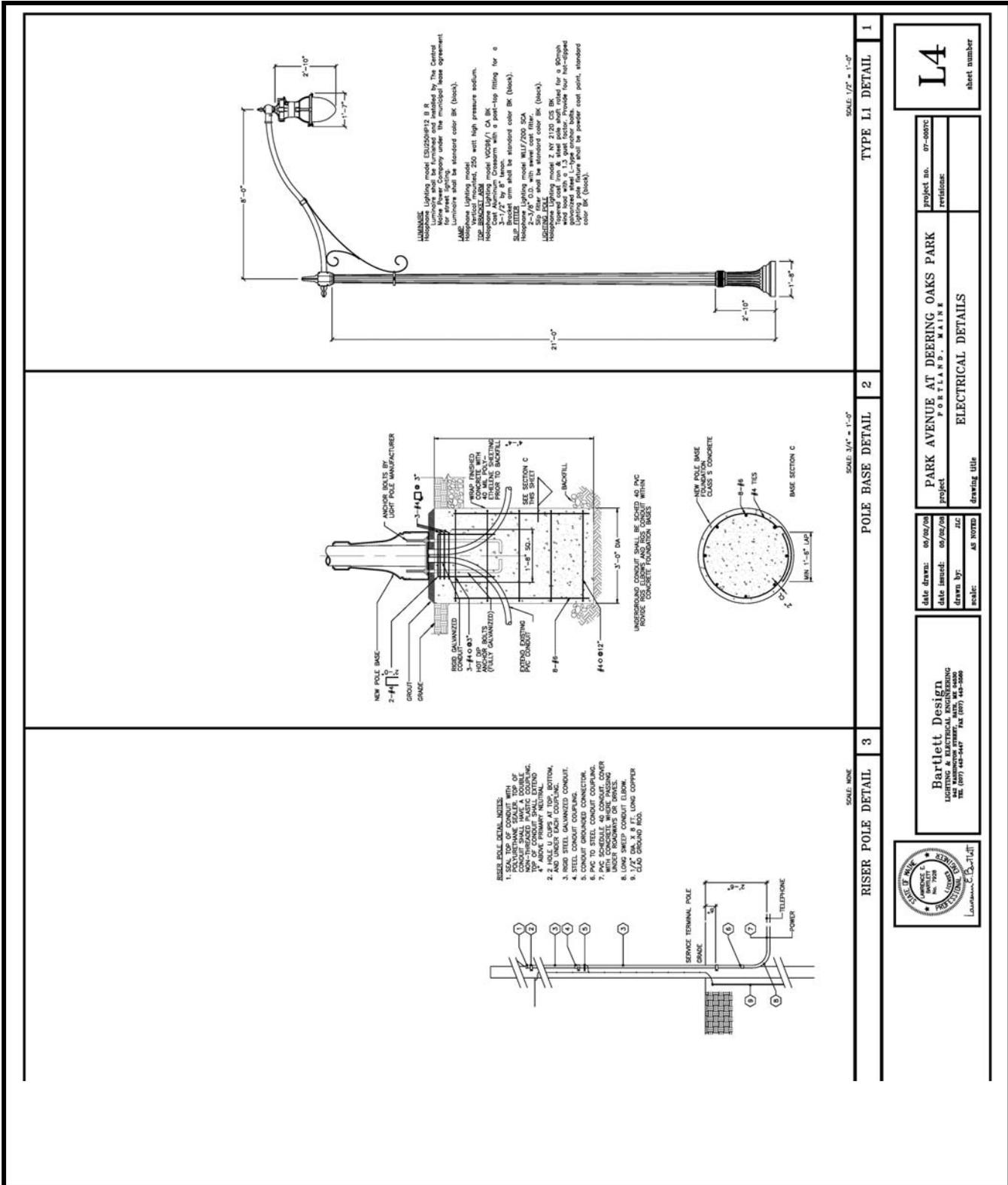
BAXTER BLVD

Street Lighting Pole

Sheet 1 of 1

12/14/09

<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION X</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>HISTORIC DISTRICT LIGHTING POLE- BAXTER BOULEVARD</p>		<p>X-7D</p>



DATE:
 AUGUST 2009

REVISED:

CITY OF PORTLAND, MAINE
 TECHNICAL STANDARDS MANUAL

HISTORIC DISTRICT LIGHTING POLE- DEERING OAKS PARK. PARK AVENUE STREET LIGHT

MUNICIPAL STREET LIGHTING STANDARDS SECTION X

FIGURE:
X-7E

L4 sheet number	
project no. 07-0000C	revision:
PARK AVENUE AT DEERING OAKS PARK PORTLAND, MAINE	
ELECTRICAL DETAILS	
date drawn: 05/02/08	date issued: 08/02/08
drawn by: zic	checked: as NOTED
Bartlett Design LIGHTING & ELECTRICAL ENGINEERING 1000 BROAD STREET, SUITE 200 PORTLAND, ME 04108 TEL: (603) 443-2447 FAX: (603) 443-2006	

Submitted by Swaney Lighting 	Job Name: BAYSIDE TRAILS Engineer: ME	Catalog Number: 1SA/WP9SE2/L5K480/CC(RAL #5003)/LSS/TL Notes:	Type: FIXTURE SLA09-12954
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WP9SE-LED
 WARP9™ - Small, Electronic LED
 revision 5-21-09 • wp9seled.pdf

Type:
Job:
Catalog number:

/	/	/	/
Mtg. Fixture	Electrical Module	Finish	Options See pages 3-4
See page 2			

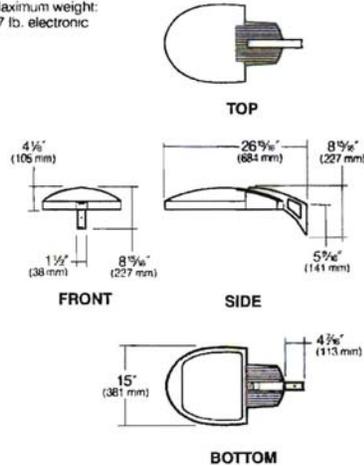
Approvals:

Date:
Page: 1 of 4

Select pole from Kim Pole Catalog. If pole is provided by others indicate O.D. for arm fitting.

Specifications

WP9SE-LED
 Small Electronic
 60 Light Emitting Diodes
 Total Max System Watts = 88W
 Maximum weight:
 17 lb. electronic



Housing: One-piece die-cast, low copper (<0.6% Cu) aluminum alloy with integral cooling ribs over the electrical compartment. Solid barrier wall separates optical and electrical compartments. A single die-cast aluminum cam-latch provides positive locking and sealing of the optical chamber. A one-piece extruded and vulcanized silicone gasket seals the housing against the lens surface.

Electronic Driver Module: One-piece die-cast, low copper (<0.6% Cu) aluminum alloy with integral cooling ribs over exposed bottom surface. Integral hinges and slide latch with stainless steel hardware provides no-tool mounting and removal from housing. All electronic components are UL and CSA recognized and mounted directly to the driver tray for maximum heat dissipation.

Lens: Clear 3/8" thick tempered glass lens retained by a stainless steel piano hinge and a single die-cast aluminum cam-latch. The edges are camouflaged to conceal the outer portion of the housing.

Optical Module: Precision injection molded, high specular reflectors are positioned to achieve directional control toward desired task. Secondary high specular reflector 95% Miro4 panels surround the module to redirect light downward. No fasteners are placed on the reflective surface. The entire assembly fastens to the housing as a one-piece module.

Support Arm: Heavy cast, low copper aluminum alloy with stainless steel mounting bolts. A pole reinforcing plate is provided with wire strain relief. Arm is circular cut for specified round pole.

Finish: Super TGIC thermoset polyester powder coat paint, 2.5 mil nominal thickness, applied over a titanated zirconium conversion coating; 2500 hour salt spray test endurance rating. Standard colors are Black, Dark Bronze, Stealth Gray™, Platinum Silver, or White. Custom colors are available

CAUTION: Fixtures must be grounded in accordance with national, state and/or local electrical codes, Failure to do so may result in serious personal injury.



U.S. Patent D568,521,
 Patent Pending Optics

Listings and Ratings			
UL cUL 1598 ¹	CE	IP66 Rated	25C Ambient

¹Suitable for wet locations.
 KIM LIGHTING RESERVES THE RIGHT TO CHANGE SPECIFICATIONS WITHOUT NOTICE.

© 2009 KIM LIGHTING • P.O. BOX 60080, CITY OF INDUSTRY, CA 91716-0080 • TEL: 626/968-5666 • FAX: 626/969-2695 5646809141

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	TRAIL LIGHTING – THE BAYSIDE TRAIL. PAGE 1 OF 6		X-7F

Submitted by Swaney Lighting	Job Name: BAYSIDE TRAILS Engineer: ME	Catalog Number: 1SA/WP9SE2/L5K480/CC(RAL #5003)/LSS/TL Notes:	Type: FIXTURE <small>SLA09-12954</small>
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WP9SE-LED
WARP9™ - Small, Electronic LED
revision 5-21-09 • wp9seled.pdf

Type:
Job:

Page: 2 of 4



Standard Features

Mounting
3Y configuration is available for round poles only.

Plan View:

EPA: 0.52	1.04	0.82	1.3	1.3	1.5	n/a
Cat. No.: <input checked="" type="checkbox"/> 1SA	<input type="checkbox"/> 2SB	<input type="checkbox"/> 2SL	<input type="checkbox"/> 3ST	<input type="checkbox"/> 3SY	<input type="checkbox"/> 4SC	<input type="checkbox"/> 1W

Fixture
Cat. No. designates fixture and light distribution.
See the Kim Warp9 Catalog for detailed information on reflector design and application.

Light Distribution:

Type II	Type III	Type IV Forward Throw	Type V Square	Type R Right	Type L Left
Full Cutoff	Full Cutoff	Full Cutoff	Full Cutoff	Full Cutoff	Full Cutoff
Cat. No.: <input checked="" type="checkbox"/> WP9SE2	<input type="checkbox"/> WP9SE3	<input type="checkbox"/> WP9SE4	<input type="checkbox"/> WP9SE5	<input type="checkbox"/> WP9SER	<input type="checkbox"/> WP9SEL

Electrical Module
L3K = Light Emitting Diodes - 3500K
L5K = Light Emitting Diodes - 5100K
L2K = Light Emitting Diodes - 1700K 590nm
Lamp Line Type Volts
L5K 240

Cat. Nos. for Electrical Modules available:

LED	LED	Turtle Friendly
<input type="checkbox"/> L3K120	<input type="checkbox"/> L5K120	<input type="checkbox"/> L2K120
<input type="checkbox"/> L3K208	<input type="checkbox"/> L5K208	<input type="checkbox"/> L2K208
<input type="checkbox"/> L3K240	<input type="checkbox"/> L5K240	<input type="checkbox"/> L2K240
<input type="checkbox"/> L3K277	<input type="checkbox"/> L5K277	<input type="checkbox"/> L2K277
<input type="checkbox"/> L3K347	<input type="checkbox"/> L5K347	<input type="checkbox"/> L2K347
<input type="checkbox"/> L3K480	<input checked="" type="checkbox"/> L5K480	<input type="checkbox"/> L2K480
Lamp LED	LED	LED

Finish
Super TGIC powder coat paint over a titanated zirconium conversion coating.

Color: Black Dark Bronze Stealth Gray™ Platinum Silver White Custom Color*

Cat. No.: BL DB SG PS WH CC

*Custom colors subject to additional charges, minimum quantities and extended lead times. Consult representative. Custom color description: Please verify standard RAL color # 5003

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE: X-7G
REVISED:	TRAIL LIGHTING – THE BAYSIDE TRAIL. PAGE 2 OF 6		

Submitted by Swaney Lighting	Job Name: BAYSIDE TRAILS Engineer: ME	Catalog Number: 1SA/WP9SE2/L5K480/CC(RAL #5003)/LSS/TL Notes:	Type: FIXTURE SLA09-12954
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WP9SE-LED
WARP9™ - Small, Electronic LED
revision 5-21-09 • wp9seled.pdf

Type:
Job:

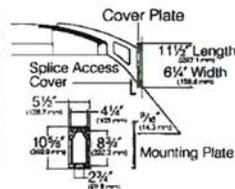
Page: 3 of 4



Optional Features

Wall Mounting
Cat. No. **1W**
Select from Mounting on page 2.

A cast aluminum mounting plate is mounted to the wall with four bolts (by others). Fixture and arm are mounted to the cast aluminum cover plate before attaching to the wall mounting plate. The fixture-arm-cover plate assembly is hooked to the wall mounting plate and secured with stainless steel screws provided. Field splices are made at the opening in the cover plate. Cover is finished to match arm and fixture color.



Fusing (internal only):
Cat. No. (see chart at right)
 No Option

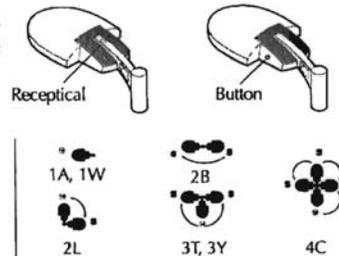
High temperature fuse holders factory installed inside the fixture housing. Fuse is included.
Line Volts: 120V 208V 240V 277V 347V 480V
Cat. No.: SF DF DF SF SF DF



Photocell Controls
Cat. Nos. *receptacle*
 A-25

Line	Volts
<input type="checkbox"/> A-30	120V
<input type="checkbox"/> A-31	208V
<input type="checkbox"/> A-32	240V
<input type="checkbox"/> A-33	277V
<input type="checkbox"/> A-35	347V
<input type="checkbox"/> A-34	480V
<input type="checkbox"/> No Option	

Two types of photocell controls are available. A receptacle for a NEMA base photocell or an internal photocell button sensor on the side of the fixture.

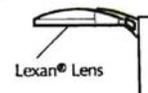


Mounting (see page 2)

* - Fixture with Photocell Receptacle
S - slave unit(s)

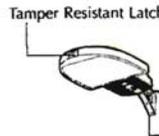
Lexan® Lens
Cat. No. LS
 No Option
LSS- Lexan Lens Small

One-piece flat advanced polymer (Lexan®) replaces standard tempered glass lens.
CAUTION: Use only when vandalism is anticipated to be high. For LED use only.



Tamper-Resistant Latch
Cat. No. TL
 No Option

Standard die-cast latch is provided with a captive 10-32 stainless steel flat socket-head screw to prevent unauthorized opening.
NOTE: Required only for vandal protection in locations where fixtures can be reached by unauthorized persons.



DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	TRAIL LIGHTING – THE BAYSIDE TRAIL. PAGE 3 OF 6		X-7H

Submitted by Swaney Lighting 	Job Name: BAYSIDE TRAILS Engineer: ME	Catalog Number: RSA-16-B4-4-CC(RAL #5003)	Type: POLE
		Notes:	SLA09-12954

4 Bolt Base

RSA16B4-4-

Pole Cap With Stainless Steel Screws

Luminaire / Arm Drilling Per Customer Specs.

Straight Alum. Tube
 "B" Wall Alloy 6063-T6
 Satin Ground or Powder Coat Finish per Customer Specification

Internal Damper (for 6"-10" butt diameter poles only)
 (Installed At Shaft Midpoint)

Grounding Provision Opposite Handhole
 For 4"- 6" OD Poles
 Handhole Frame Tapped 3/8"-16NC For Grounding For 7"- 10" OD Poles

- Reinforced Handhole with Cover and Stainless Steel Hex Hd Screws
 3" x 5" For 6" Poles
- 4" x 6" For 7" and larger Poles
- Handhole (2" x 5") with Cover and Stainless Steel Hex Hd Screws for Poles with butt diameters 5" or smaller

"C" Butt Diameter
 Base Flange Alloy 356-T6 With Bolt Covers And Stainless Stl. Hex. Hd. Screws

(4) Galv. Stl. Anchor Bolts, AASHTO M314-90 Grade 55, 10" Of Threaded End Galv. Per ASTM A153 With (4) Galv. Stl. Hex. Nuts, Lock-washers And Flatwashers

Optional Tenon Mounting (specify)

Reference pages 105-106 for bull horn arms and crossarms

WARNING: Do not install light pole without luminaire.

Mounting Height: 16 ft	Maximum EPA	
Wall Thickness: .125 in	70: 1.8	
Butt Diameter: 4 in	80: 0.8	
Top Diameter: 4 in	90:	
Base Diameter: 7.5 in	100:	
Bolt Circle: 6.5-8 in	110:	
Bolt Projection: 2 in		
Net Weight: 33		
Luminary Weight: 45		
Arm Length:		
Quantity:		

Accessories

Finish
 CC - Custom Color / Please verify
 Standard RAL color # 5003

Your Name:

Representative Name:

Architect Name:

Project Name:

Customer P.O. #:

Finish: -

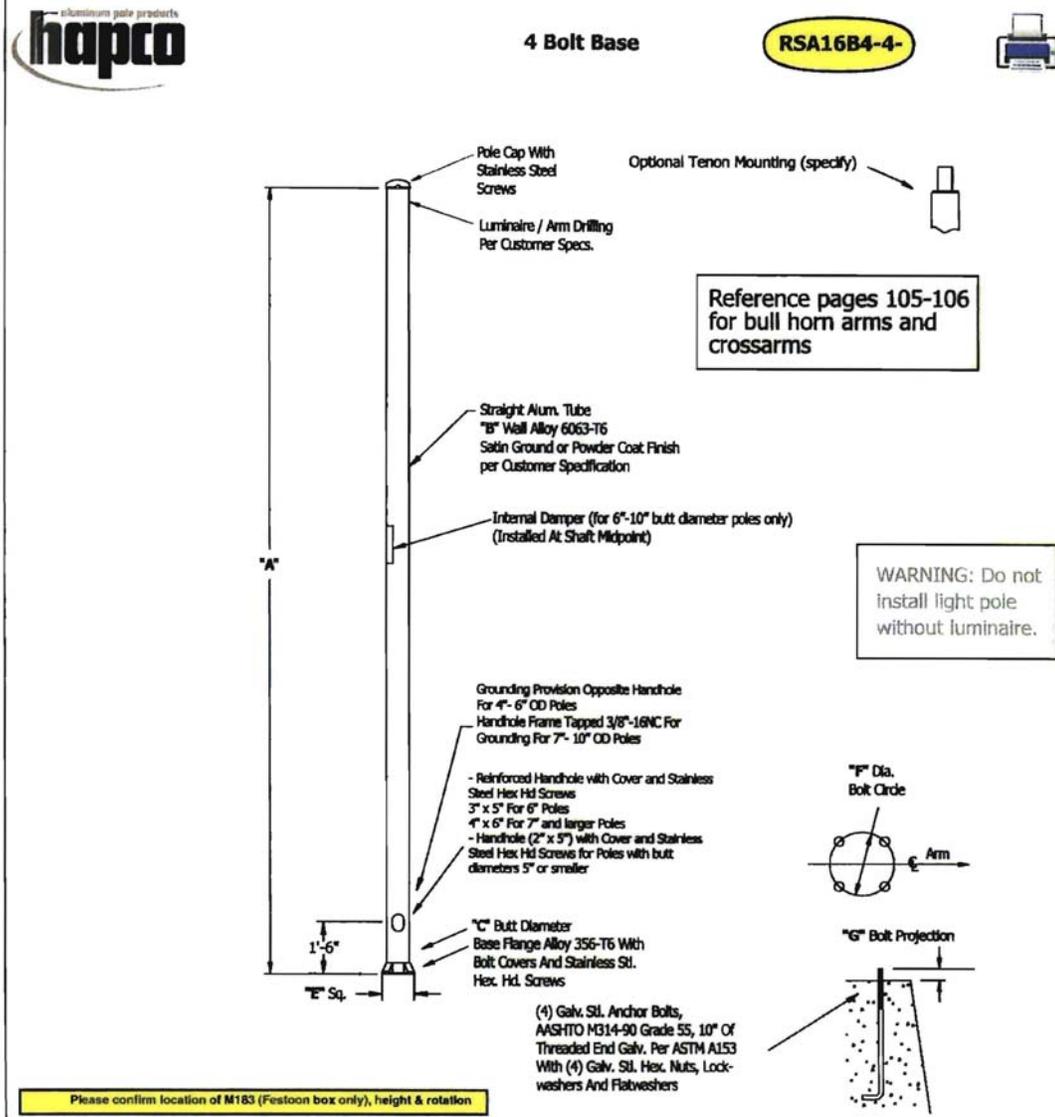
Date: 8/14/2009

Notes:

/visit Hapco.com or call 800-368-7171 or fax 276-628-7707 v.2.02

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	TRAIL LIGHTING – THE BAYSIDE TRAIL. PAGE 4 OF 6		X-71

Submitted by Swaney Lighting		Catalog Number: RSA-16-B4-4-CC(RAL #5003)-M183	Type: POLE
Job Name: BAYSIDE TRAILS Engineer: ME		Notes: PLEASE CONFIRM LOCATION OF M183, HEIGHT AND ROTATION	SLA09-12954

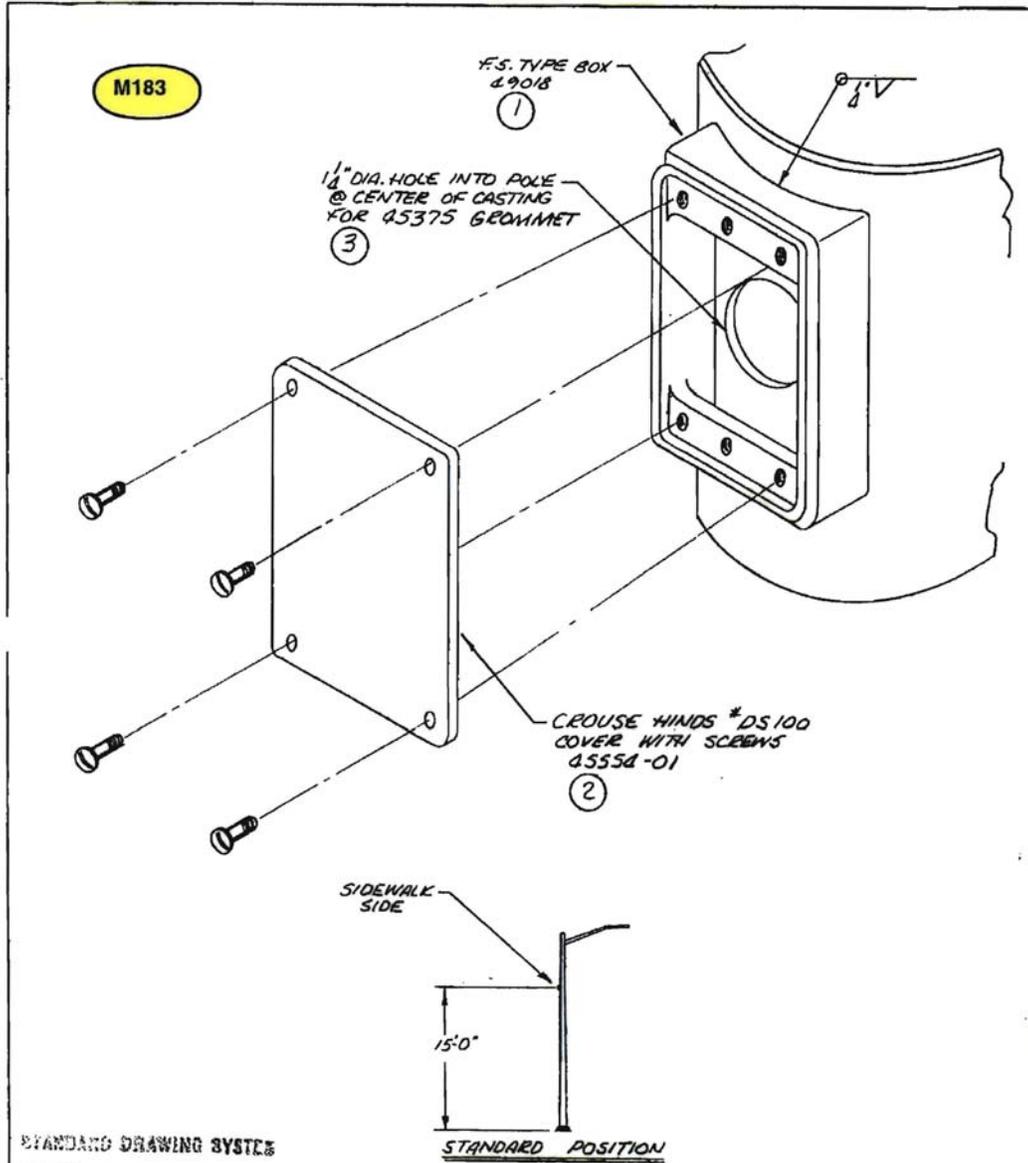


Mounting Height: 16 ft	<i>Maximum EPA</i>	Your Name:
Wall Thickness: .125 in	70: 1.8	Representative Name:
Butt Diameter: 4 in	80: 0.8	Architect Name:
Top Diameter: 4 in	90:	Project Name:
Base Diameter: 7.5 in	100:	Customer P.O. #:
Bolt Circle: 6.5-8 in	110:	Finish: -
Bolt Projection: 2 in		Date: 8/14/2009
Net Weight: 33	Accessories	Notes:
Luminary Weight: 45	Finish	
Arm Length:	CC - Custom Color / Please verify Standard RAL color # 5003	
Quantity:		

Visit Hapco.com or call 800-368-7171 or fax 276-628-7707 v. 2.02

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	TRAIL LIGHTING – THE BAYSIDE TRAIL. PAGE 5 OF 6		X-7J

Submitted by Swaney Lighting	Job Name: BAYSIDE TRAILS Engineer: ME	Catalog Number: RSA-16-B4-4-CC(RAL #5003)- M183 Notes: PLEASE CONFIRM LOCATION OF M183, HEIGHT AND ROTATION	Type: POLE SLA09-12954
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STANDARD DRAWING SYSTEM
 BOOKS

NO.	REVISIONS	DATE	TITLE MODIFICATION #183	DATE 3-18-66
			CUSTOMER FESTON OUTLET - BLANK COVER	SCALE N.T.S.
			HAPCO DIVISION OF HUBBARD AND COMPANY P. O. BOX 547-ABINGDON, VA.	BY T. B.
				CHK'D
				DWG. NO. A183

DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION X	FIGURE:
REVISED:	TRAIL LIGHTING – THE BAYSIDE TRAIL. PAGE 6 OF 6		X-7K

11. SHADOW STANDARDS

11.1. DEFINITIONS

For the purposes of this section, the following definitions shall apply:

- **Shadow:** A shadow is defined as the circumstance in which a built structure blocks the sun from the land.
- **Adverse Shadow Impact:** An adverse shadow impact occurs when the shadow cast by a proposed development falls on publicly accessible open space or other important natural features where such a shadow impact would adversely affects its use and/or the viability of existing landscaping and vegetation. For the purposes of this section, the above locations shall also be referred to as “significant public resources”.
- **Shadow Analysis:** A shadow analysis refers to a document and its supporting graphics, which illustrate how the shadow cast by a proposed development, will impact adjacent properties and land uses.

11.2. APPLICABILITY

All Level II or Level III proposals **outside the B3, B5 B6 and B7 zones** that would result in new shadows long enough to reach significant public resources (except within an hour and a half of sunrise or sunset) are required to submit a preliminary shadow analysis to the Planning Authority for review. If a preliminary analysis indicates the potential for adverse shadow impact, applicants are then required to submit a shadow analysis, as outlined below. In many cases, it may be appropriate to use the services of an architect or other professional skilled in use of computer analysis to perform a shadow analysis; however, this is not a requirement. Anyone undertaking a shadow analysis must use the longitude, latitude and time information for Portland, Maine.

11.3. REQUIRED SUBMITTALS:

Preliminary Shadow Analysis: A preliminary shadow analysis shall be required for all Level II or Level III developments that include new structures or additions to structures greater than 45 ft tall, in order to determine if additional shadow analysis is required.

- a) **Shadow Length:** The longest shadow that any structure will cast in Portland, Maine during the year (except within an hour of sunrise or sunset) is 4.26 times its height. To conduct a preliminary analysis, multiply this factor by the height of each proposed structure. If no significant public resources, as defined above, are located within that distance from the project site in any direction, no further analysis is required. If a resource is identified, the location of the site in relationship to the resource shall be evaluated to determine the potential for adverse shadow impact and the need for further analysis.

For example, if a development would result in a 48 ft tall building, its longest shadow would be approximately 192 feet. If there are no significant public resources within 192 feet of the project site, then no further shadow analysis is required.

- b) Evaluate Site Location: Because of the path that the sun travels across the sky, no shadow can be cast in a triangular area to the south of any given project site. Therefore, if the resource in question is located within that triangular area, no further shadow analysis is required. In Portland, Maine that area lies between -122 degrees from true north and 122 degrees from true north. Thus, any significant public resource would have to be at an angle from true north greater than -122 degrees or 122 degrees in order to be shaded at any time by the proposed development.
- c) Evaluate Significant Public Resource: Finally, the preliminary shadow analysis shall consider the sensitivity of the significant public resource(s) to shadow. Open spaces or natural features that require direct sunlight for a portion of the day to sustain existing vegetation or to maintain the viability of its current use (e.g. - sitting or sunning areas, public gathering spaces, turf sports fields or children's play areas) require further analysis.

Some significant open space resources may not be sensitive to sunlight, such as paved areas or landscaped areas with all shade-tolerant species. For these types of conditions, no further shadow analysis is needed.

If the above steps are not able to determine that shadows from a proposed development would not reach a shadow-sensitive significant public resource during any time of the year, a full shadow analysis is required.

11.3.1. SHADOW ANALYSIS:

A shadow analysis shall define the extent and duration of additional shadow that a proposed development would cast on significant public resources in the project vicinity during the year, along with the effect that new shadowing would have on any sun-sensitive aspects of the resource(s). Applicants are encouraged to use professional resources and/or computer analysis to calculate and graphically display shadows; especially if proposed structures are irregularly shaped or if the project site is located in a densely developed area. A shadow analysis shall include the following times of year:

- March 21st or September 21st
- June 21st
- May 6th or August 6th
- December 21st

A shadow analysis should identify the types of significant public resources, types of vegetation and common use(s) of the site, along with discussion of the corresponding sunlight requirements for each. The uses and vegetation of open space areas establish its susceptibility to adverse shadow impact. Uses that rely on sunlight include sitting areas, gardens, and play areas. Vegetation that relies on

sunlight includes tree canopy, shade-intolerant flowering plants and turf. Shadow-sensitive landscapes and uses generally require a minimum of four to six hours of sunlight a day. If necessary, applicants are encouraged to use the professional services of a landscape architect or recreation planner to inventory and assess the sensitivity of various landscape features to shadow.

In presenting the results of a shadow analysis, the following information shall be included for each date:

- Duration of incremental shadow on affected features
- Times of shadow penetration
- Description of affected features (e.g.- landscaping, seating, active uses, historic resource)
- Time of sunrise and sunset for the date being analyzed.

In addition to a narrative description, the analysis shall include clear graphic representations of the following, as applicable:

- Relationship between the project site and significant public resources,
- Calculation of the angles from north for project shadows entering and existing the affected areas of the resource(s)
- A map showing pre-development condition shadows and the incremental shadows from the proposed structure(s) on all significant public resource(s) on each representative date.
- In the case of public open space resources, a site plan of the open space should be used to illustrate the placement of incremental shadows to allow for clear presentation of any impact to sensitive features. The length of time of the project's shadows should be indicated on each map.
- Photographs of the resource(s), focusing on elements sensitive to sunlight loss that may be impacted by new shadows from the development.
- Plan of the significant public resource, showing composite shadows and the location and duration of sunlight.
-

11.4. DETERMINING SIGNIFICANCE OF SHADOW IMPACT

A significant shadow impact occurs if the new shadow added by the development proposal reduces sunlight to a level where it would have an adverse impact on existing sunlight-sensitive uses. This includes but is not limited to the following scenarios:

- Substantial reduction in sunlight where a sensitive use is already subject to substandard sunlight.
- Reduction in sunlight to vegetation resulting in less available sunlight than the minimum necessary for its survival.
- Substantial reduction in the usability of an open space area.

11.5. Reserved.

11.6. ALTERNATIVES AND MITIGATION

Where an adverse shadow impact is identified, mitigation must be assessed. Types of mitigation that may be appropriate include but are not limited to relocating facilities within an open space to avoid sunlight loss, relocating or replanting vegetation, undertaking additional maintenance to reduce the likelihood of species loss, replacement facilities on another nearby site. Where affected open space is a City park, it is appropriate for the applicant to coordinate mitigation options with the Parks Division of the City of Portland Department of Public Services.

Alternatives that may reduce shadow impacts include but are not limited to

- Reorientation of the structure(s) bulk to avoid adverse shadow impacts on sensitive significant public resources.
- Reorientation of the site plan to include replacement facilities.
- Where possible, reorientation of the sun sensitive features of the resource itself.
- Incorporation of architectural design techniques and/or reflective façade materials to increase available light.

12. SITE LIGHTING STANDARDS

12.1. APPLICABILITY

The following types of development proposals are required to submit a lighting management plan for review and approval:

- All developments subject to site lighting standards of Section 14-526 of the Land Use Code.
- Other projects where the Reviewing Authority determines that special conditions warrant a lighting management plan.

12.2. STANDARDS

12.2.1. Unless otherwise specified below, exterior lighting shall conform to the recommendations put forth in Lighting for Exterior Environments RP-33-99, or its successor, published by the Illuminating Engineering Society of North America (IESNA). Proposed uses that demonstrate a need to exceed the specific site lighting limits shown below for safe and reasonable exercise of the proposed use must provide a professionally produced lighting plan which adheres to the current Illuminating Engineering Society of North America (IESNA) recommendations for the proposed use.

12.2.2. Uniformity: As measured in foot candles at grade, maximum to minimum illumination levels shall not exceed a ratio of twenty (20) to one (1.)

12.2.3. Illumination Levels: Minimum, Maximum, and Average illumination levels for areas intended to be lighted, as measured at grade, shall be:

Minimum	0.2 foot candles (fc)
Maximum	5.0 foot candles (fc)
Average	1.25 foot candles (fc)

12.2.4. Wattage: No fixture shall exceed 250 watts, except in industrial areas.

12.2.5. Light Trespass: The maximum illumination level at a property line shall not exceed 0.1 foot candle, as measured at grade, except where abutting industrial, or other non-sensitive uses. All residential uses and natural resource protection areas are to be considered sensitive to light trespass. In certain instances where a proposed development is adjacent to a sensitive use, house-side shielding may be necessary to comply with this standard.

12.2.6. Luminaire Types: All fixtures, including pole mounted and wall mounted luminaires, shall be a "cut-off" type where lenses, refractors or lamp sources do not extend below the surface of the fixture housing and no direct light shall be directed at or above the horizontal plane. Sites which are part of an historic district or require specific decorative lighting fixtures as means to achieve

compatibility within an existing architectural context may propose non-cutoff fixtures providing that they have built in reflectors to mitigate uplighting and that photometrics fall within IESNA guidelines. Low pressure sodium bulbs are prohibited.

12.2.7. Fixture Height: Fixtures shall be mounted at the lowest height necessary with no fixture height to exceed twenty (20) feet above grade, except in sites proposed for large industrial and/or commercial uses, where the fixture height shall not exceed thirty (30) feet above grade. For the purposes of this standard only, a large industrial and/or commercial use is defined to have greater than fifty thousand (50,000) gross square feet of building space.

12.2.8. Lighting Curfew: For non-residential uses, lighting in vehicle parking areas containing twenty (20) or more parking spaces shall be reduced to 50% of permitted levels from one hour after the business closing to one hour before business opening. If lighting levels are already below 50% of permitted levels, no curfew adjustment is required. Motion sensor activated lighting shall be permitted during closed hours to activate additional lighting above the 50% permitted, for the purposes of public safety.

12.3. Reserved.

12.4. ARCHITECTURAL AND SPECIALTY LIGHTING AND UPLIGHTING:

12.4.1. Lighting shall be designed to minimize lighting of night sky and shall accentuate individual architectural or aesthetic elements, not the entire structure.

12.4.2. The light shall only be directed onto the building façade and not spillover beyond the plane of the building.

12.4.3. Lighting shall be directed downward unless the development is located in an area of the city where uplighting is permitted as described in section 14-526 (a) of the City Code. Lighting shall be mounted as close to the architectural feature being lit as possible and shall be fully shielded from view off site.

12.4.4. Uplighting: Where permitted, upward aimed lighting (uplighting) shall not exceed 4,000 mean lumens per accent feature, shall be placed as close as possible to the base of the building or feature that is being illuminated and shall be fully shielded from view off-site.

12.5. ILLUMINANCE STANDARDS FOR SPECIFIED EXTERIOR AREAS:

Average illuminance levels for exterior areas specified below shall not exceed the following levels:

Automated Teller Machine (ATM) Surrounding Area (10 ft perimeter)	10.0 fc average
	3:1 average to minimum uniformity ratio
	20.0 fc maximum
Drive- through Canopy	10.0 fc average
	3:1 average-to-minim uniformity ratio
	20.0 fc maximum

12.6. AUTO SERVICE STATION ILLUMINANCE STANDARDS:

Illuminance levels for major and minor auto service stations, as defined in City Code 14-47 shall not exceed the following levels:

Minor Gasoline Service Stations and Major Gasoline Service Stations abutting residential zones, illuminance levels shall not exceed the following:

Minor Gasoline Service Stations:

Approaches and Drives	1.5 fc average
	3:1 average to minimum uniformity ratio
	3.0 fc maximum
Service Areas	2.0 fc average
	3:1 average-to-minim uniformity ratio
	4.0 fc maximum
Pump Island Areas	10.0 fc average
	3:1 average-to-minim uniformity ratio
	20.0 fc maximum

Major Gasoline Service Stations, illuminance levels shall not exceed the following:

Major Gasoline Service Stations:

Approaches and Drives	2.0 fc average
	3:1 average to minimum uniformity ratio
	6.0 fc maximum

Service Areas	3.0 fc average
	3:1 average-to-minim uniformity ratio
	6.0 fc maximum

Pump Island Areas	10.0 fc average
	3:1 average-to-minim uniformity ratio
	20.0 fc maximum

12.7. Reserved.**12.8. SUBMISSION REQUIREMENTS, PHOTOMETRIC PLANS:**

A photometric plan shall be provided at 20 scale or larger which shall show the extent of the areas designed and intended for lighting, and within those specific areas show a photometric grid of maximum 10' point spacing, and within those areas provide foot candle calculations of maximum, average, minimum, maximum to minimum ratio, and average to minimum ratio. On the same or additional plan, a photometric plot shall extend to all lot lines and as necessary to reach illumination levels of 0 (zero) foot candles. Additionally, the applicant shall provide descriptive information, including manufacturers catalog excerpts, for all proposed light fixtures, lamps, and poles.

13. BOUNDARY SURVEY STANDARDS

13.1. LEVEL I MINOR RESIDENTIAL GENERAL STANDARDS:

In addition to a standard boundary survey, all applications must also include a Site Plan prepared in accordance with Section 14-527, Content of Site Plan Applications, of the Site Plan Ordinance.

The following items and information shall be shown on boundary surveys for minor residential development site plans to ensure compliance with City of Portland Planning Requirements, Engineering Technical and Design Standards, and accurate documents are on record for future planning, GIS mapping, and engineering needs:

1. Name and address of the property owner, the applicant and name of the proposed development, and with references to the Deed Book and Page at the Cumberland County Registry of Deeds.
2. North arrow
3. Scale of not less than one (1) inch to fifty (50) feet
4. A graphic scale (scale bar)
5. Plan Size: Where possible, it is preferred that plans not exceed a maximum size of 24" x 36".
6. Site Boundaries: The full parcel boundaries must be shown on the survey.
7. Total land area of the site.
8. Flood Zone statement, where applicable, based on FEMA, FIRM Flood Insurance Rate Maps.
9. Existing streets, right-of-way, restrictions or easements on the site.
10. A revision block with a number and date indicating the revision status. The revision block shall be located in the title block or adjacent to it.
11. Property Corners: Location and descriptions of all property corners set or found, proposed to be set, and all granite survey monuments set. Where no property markers exist, the City of Portland requires that the property markers be installed and that a licensed surveyor set and confirm proposed building locations on site prior to the issuance of a building permit.
12. Boundary Survey plans, based on State of Maine Professional Licensing Boards' legal requirements, shall bear the seal of a Professional Land Surveyor licensed to practice in the State of Maine.
13. City Vertical Datum: It shall be stated on all plans that the City of Portland established vertical datum of NGVD 1929 is used or manhole rim elevation data is used for all information shown on the plan.

14. All plans shall state the Official City of Portland Benchmark used as supplied by the Department of Public Services Engineering Division Archivist.
15. It may be required, especially in areas of old subdivision plans and areas not previously subdivided, that the survey show tie bearings and distances to the nearest street line corner, or to the nearest City of Portland survey monument. Survey tie line precision shall be an inverse line with the bearing to the nearest second and the distance to the nearest hundredth of a foot. This requirement is to aid in adding and verifying the property location on the City of Portland digital GIS basemap.
16. All current conveyances of lots, parcels, easements, and other forms of right, title, and/or interest shall be shown on both the survey plan (as submitted and as amended), with references to the Deed Book and Page at the Cumberland County Registry of Deeds.
17. Street Status: The Status of the street shall be shown; IE Accepted City Street, Continued Paper Street, Discontinued City Street, Vacated Paper Street, or new Proposed Street as per the project submission.

13.2. LEVEL I SITE ALTERATION, II AND III GENERAL STANDARDS:

The following items shall be shown on boundary surveys for Level I (site alteration), Level II and Level III site plans to ensure compliance with City of Portland Planning Requirements, Engineering Technical and Design Standards, and accurate documents are on record for future planning, GIS mapping, and engineering needs:

1. Name and address of the property owner, the applicant and name of the proposed development, and with references to the Deed Book and Page at the Cumberland County Registry of Deeds.
2. North arrow
3. Scale of not less than one (1) inch to fifty (50) feet.
4. Graphic scale (scale bar).
5. Plan Size: Where possible, it is preferred that plans not exceed a maximum size of 24" x 36".
6. Site Boundaries: The full parcel boundaries must be shown on the survey.
7. Total land area of the site
8. Zoning district boundaries, if applicable
9. Flood Zone statement, where applicable, based on FEMA, FIRM Flood Insurance Rate Maps

10. Required zoning setbacks for the site
11. Existing and proposed grading contours at intervals of not more than two (2) feet
12. Existing structures or other improvements on the site and the approximate location of structures or improvements on adjoining lots within fifty feet (50') of the site boundary
13. Existing streets, right-of-way, restrictions or easements on the site
14. The location and size of existing utilities servicing the site, including fire hydrants
15. Significant natural features on or directly adjacent to the site, including wetlands, ponds, watercourses, floodplains, significant wildlife habitats and fisheries or other important natural features as listed in Section 14-526 (b)1. of the Land Use Code
16. Location of existing street trees and the general location of on-site trees and vegetation
17. Vicinity Map showing the relationship of the project to the surrounding area at a scale no greater than one inch equals 2,000 feet
18. A revision block with a number and date indicating the revision status. The revision block shall be located in the title block or adjacent to it
19. Rim elevations of all catch basin and manhole structures
20. Invert elevations of all pipes entering and/or exiting catch basins and manhole structures
21. The length, material, diameter, and slope of all storm sewer and sanitary sewer piping
22. The location, with dimensions from existing structures, at the main line pipe and at the street property line, of all sanitary sewer and storm drain laterals. The Public Services Department Engineering Archives may have this information available for existing infrastructure
23. Location, size, type of material, and invert elevations of culverts
24. Location of water lines and valves, gas lines and valves, buried electrical lines, buried communication cables, buried TV cables, telephone and electric manholes, utility hand-hold access boxes, transformer pads, utility and light poles
25. All curbing and sidewalks, stating type of material.

26. Property Corners: Location and descriptions of all property corners set or found, proposed to be set, and all granite survey monuments set. Where no property markers exist, the City of Portland requires that the property markers be installed and that a licensed surveyor set and confirm proposed building locations on site prior to the issuance of a building permit.
27. Boundary Survey plans, based on State of Maine Professional Licensing Boards' legal requirements, shall bear the seal of a Professional Land Surveyor licensed to practice in the State of Maine.
28. City Vertical Datum: It shall be stated on all plans that the City of Portland established vertical datum of NGVD 1929 is used or manhole rim elevation data is used for all information shown on the plan.
29. All plans shall state the Official City of Portland Benchmark used as supplied by the Public Services Engineering Division Archivist.
30. Distances, bearings, and angles shall be shown on the survey or subdivision plans, shall tie the property into the nearest accepted street line and be tied into established City of Portland survey monuments or record survey data at the Public Services Engineering Archives. Ties shall be considered as an inverse line with a bearing and distance to the nearest second and hundredth of a foot.
31. All current conveyances of lots, parcels, easements, and other forms of right, title, and/or interest shall be shown on both the survey plan (as submitted and as amended), with references to the Deed Book and Page at the Cumberland County Registry of Deeds.
32. Street Status. The Status of the street shall be shown; IE Accepted City Street, Continued Paper Street, Discontinued City Street, Vacated Paper Street, or new Proposed Street as per the project submission.

13.3. ADDITIONAL BOUNDARY SURVEY STANDARDS FOR LEVEL II AND LEVEL III SITE PLANS:

On Level II and III site plans (not single or two family homes), the following items shall be addressed:

1. Prior to starting field surveys and design on a project it is strongly advised to contact the City Engineer's office, Public Services Department, Engineering Division at (207) 874-8846 for information on existing infrastructure, additional requirements, or future projects that may affect the proposed project.
2. Proposed Survey Monument Locations, if required. Granite survey monuments shall be set on one side of the street as directed by the Public Services Engineering Division on the 3 foot offset Lines, as offset towards the street. Notes describing monuments found by the Project Surveyor shall

include information describing the size, condition, and depth below grade to the top of any buried monuments found.

3. All proposed (if required by Planning) and existing survey monuments shall be shown in bold line type on all utility and site plans.
4. Projects shall be tied into the Maine State Plane Coordinate System (2-zone projection), West Zone using the NAD1983 Datum and the U.S. Survey Foot as the unit of measure. The survey methods, traverse or GPS observations/methods, geodetic control used, and coordinates of new monuments set shall be stated on the survey and subdivision plans.
5. When State Plane Coordinates are required, the State Plane Coordinates (to the nearest hundredth of a foot) of two survey property corners shall be displayed for any two property corners in the project which are the farthest distance apart. Please contact the Public Services Engineering Division for assistance in providing Survey Control Points or GPS Base Station Support.
6. Bearing Basis. When State Plane Coordinates are required, magnetic bearings may be shown on plans submitted, with a note stating that the project was submitted digitally to the City of Portland on State Plane Coordinates, but that the bearings on the plans are magnetic due to survey and boundary retracement considerations. The plan shall show the magnetic declination if magnetic bearings are shown.
7. All easements and conveyances proposed as part of the project shall be recorded, upon project approval, at the Cumberland County Registry of Deeds. Easement ownership and responsibility must be stated on the survey plans. Revised plans may be requested if deeds are executed during the progression of the project for easements or other conveyances.

13.4. WAIVER OF BOUNDARY SURVEY REQUIREMENTS

13.4.1. Level I Site Alternation, Level II and Level III Site plans – The Reviewing Authority may permit the submission of a partial survey depicting only the to-be-developed portion of the improved lot of record if the development:

1. Is proposed on an already improved lot of record; and
2. Comprises less than one (1) acre of said improved lot of record,

13.4.2. Level I Minor Residential – The proposed house is to be located on a lot within an existing subdivision, approved no earlier than 1968, the final subdivision recording plat may be used, provided that the applicant sufficiently documents all existing encumbrances, and can show that no new encumbrances have occurred since recording of the final plat.

14. STANDARDS FOR LOCAL SITE LOCATION OF DEVELOPMENT REVIEW

14.1. Intention

These standards are intended to provide a flexible and practical means by which the City of Portland may exercise its police powers to control the location of those developments substantially affecting the local environment in order to ensure that such developments will be located in a manner which will have minimal adverse impact on the natural environment within the development sites and of their surroundings and to otherwise protect the health, safety and general welfare of the people.

14.2. APPLICABILITY

The Planning Board shall review:

- (a) subdivisions;
- (b) structures;
- (c) developments generating passenger car equivalents of between 100-200 per peak hour for compliance with the following standards; and
- (d) metallic mineral mining or advanced exploration activity.

For purposes of this section the following definitions shall be applied by the City of Portland Planning Board:

14.2.1. **Subdivisions.** The subdivision of land into 5 or more lots, other than lots for single-family, detached, residential housing, common areas or open space, to be offered for sale or lease to the general public during any 5-year period, if the aggregate land area includes more than 20 acres; or the division of a parcel of land into 15 or more lots for single-family, detached, residential housing, common areas or open space, to be offered for sale or lease to the general public within any 5-year period, if the aggregate land area includes more than 30 acres. The aggregate land area includes lots to be offered together with the roads, common areas, easement areas and all portions of the parcel of land in which rights or interests, whether express or implied, are to be offered. This definition of "subdivision" is subject to the following exceptions:

- A. Lots of 40 or more acres but not more than 500 acres may not be counted as lots except where:
 - (1) The proposed subdivision is located wholly or partly within the shoreland zone;
- B. Lots of more than 500 acres in size may not be counted as lots;
- C. Five years after a subdivider establishes a single-family residence for

that subdivider's own use on a parcel and actually uses all or part of the parcel for that purpose during that period, a lot containing that residence may not be counted as a lot;

- D. Unless intended to circumvent this article, the following transactions may not be considered lots offered for sale or lease to the general public:
- (1) Sale or lease of lots to an abutting owner or to a spouse, child, parent, grandparent or sibling of the developer if those lots are not further divided or transferred to a person not so related to the developer within a 5-year period, except as provided in this subsection;
 - (2) Personal, nonprofit transactions, such as the transfer of lots by gift, if those lots are not further divided or transferred within a 5-year period or the transfer of lots by devise or inheritance; or
 - (3) Grant of a bona fide security interest in the whole lot or subsequent transfer of the whole lot by the original holder of the bona fide security interest or that person's successor in interest;
- E. In those subdivisions that would otherwise not require site location approval, unless intended to circumvent this article, the following transactions may not, except as provided, be considered lots offered for sale or lease to the general public:
- (1) Sale or lease of common lots created with a conservation easement as defined in Title 33, section 476, provided that the Department of Environmental Protection is made a party;
 - (2) The exception described in paragraph E does not apply, and the subdivision requires site location approval, whenever the use of a lot described in paragraph E changes or the lot is offered for sale or lease to the general public without the limitations set forth in paragraph E; and
- F. The transfer of contiguous land by a permit holder to the owner of a lot within a permitted subdivision is exempt from review hereunder, provided that the land was not owned by the permit holder at the time the Department of Environmental Protection, the MDOT or the City approved the subdivision. Further division of the transferred land must be reviewed under these standards.

For the purposes of this section, a parcel of land is defined as all contiguous land in the same ownership provided that lands located on opposite sides of a public or private road are considered each a separate parcel of land unless that

road was established by the owner of land on both sides of the road subsequent to January 1, 1970. A lot to be offered for sale or lease to the general public is counted, for purposes of determining jurisdiction, from the time a municipal subdivision plan showing that lot is recorded or the lot is sold or leased, whichever occurs first, until 5 years after that recording, sale or lease.

14.2.2. **Structure.** A "structure" means any building, parking lot, road, paved area, wharf or area to be stripped or graded and not to be revegetated that cause a total project to occupy a ground area in excess of 3 acres. Stripped or graded areas that are not revegetated within a calendar year are included in calculating the 3-acre threshold; and

14.2.3. **Passenger car equivalents at peak hour.** "Passenger car equivalents at peak hour" means the number of passenger cars, or, in the case of non-passenger vehicles, the number of passenger cars that would be displaced by non-passenger vehicles, that pass through an intersection or on a roadway under prevailing roadway and traffic conditions at that hour of the day during which the traffic volume generated by the development is higher than the volume during any other hour of the day. A one tractor-trailer combination is the equivalent of 2 passenger cars.

14.3. STANDARDS

The following standards shall be applied in evaluating subdivisions or site plans as defined above, except where Portland elsewhere has adopted more restrictive standards, the more restrictive standards shall control:

1. **Financial and technical capacity.** The developer has the financial capacity and technical ability to develop the project in a manner consistent with state environmental standards and with the provisions of Portland's Code of Ordinances . The Planning Board may issue a permit that conditions any site alterations upon a developer providing the Planning Board with evidence that the developer has been granted a line of credit or a loan by a financial institution authorized to do business in this State or with evidence of any other form of financial assurance the Planning Board determines to be adequate. The Planning Board shall also assess any such application in accordance with the standards set forth in Chapter 373 of the Maine Department of Environmental Protection Site Law Regulations, as may be amended from time to time.
2. **Traffic movement.** For any development that generates 100 or more passenger car equivalents at peak hour, the developer has made adequate provision for traffic movement of all types into and out of the development area. Before issuing a permit, the Planning Board shall determine that any traffic increase attributable to the proposed development will not result in unreasonable congestion or unsafe conditions on a road in the vicinity of the proposed development. The Department of Transportation or the City of Portland Traffic

Engineer shall provide the Planning Board with an analysis of traffic movement of all types into and out of the development area and with a statement of recommended findings on traffic issues. In making its determination under this subsection, the Planning Board shall consider the analysis and recommendations provided by the City's Traffic Engineer or the Department of Transportation. Traffic movement determinations are subject to the following:

- A. A proposed development that involves fewer than 100 passenger car equivalents at peak hour is not subject to traffic review.
- B. If any project qualifies for review hereunder solely because it generates 100 or more passenger car equivalents at peak hour then the review hereunder shall be limited only to issues relevant to the traffic movement standards in this section. Otherwise, all other standards of review shall be applied.

In all instances the appropriate representative of the municipality or municipalities where the project is located, shall discuss with the applicant the scope of impact evaluation required for the proposed development. The applicant shall provide notice to abutting municipalities.

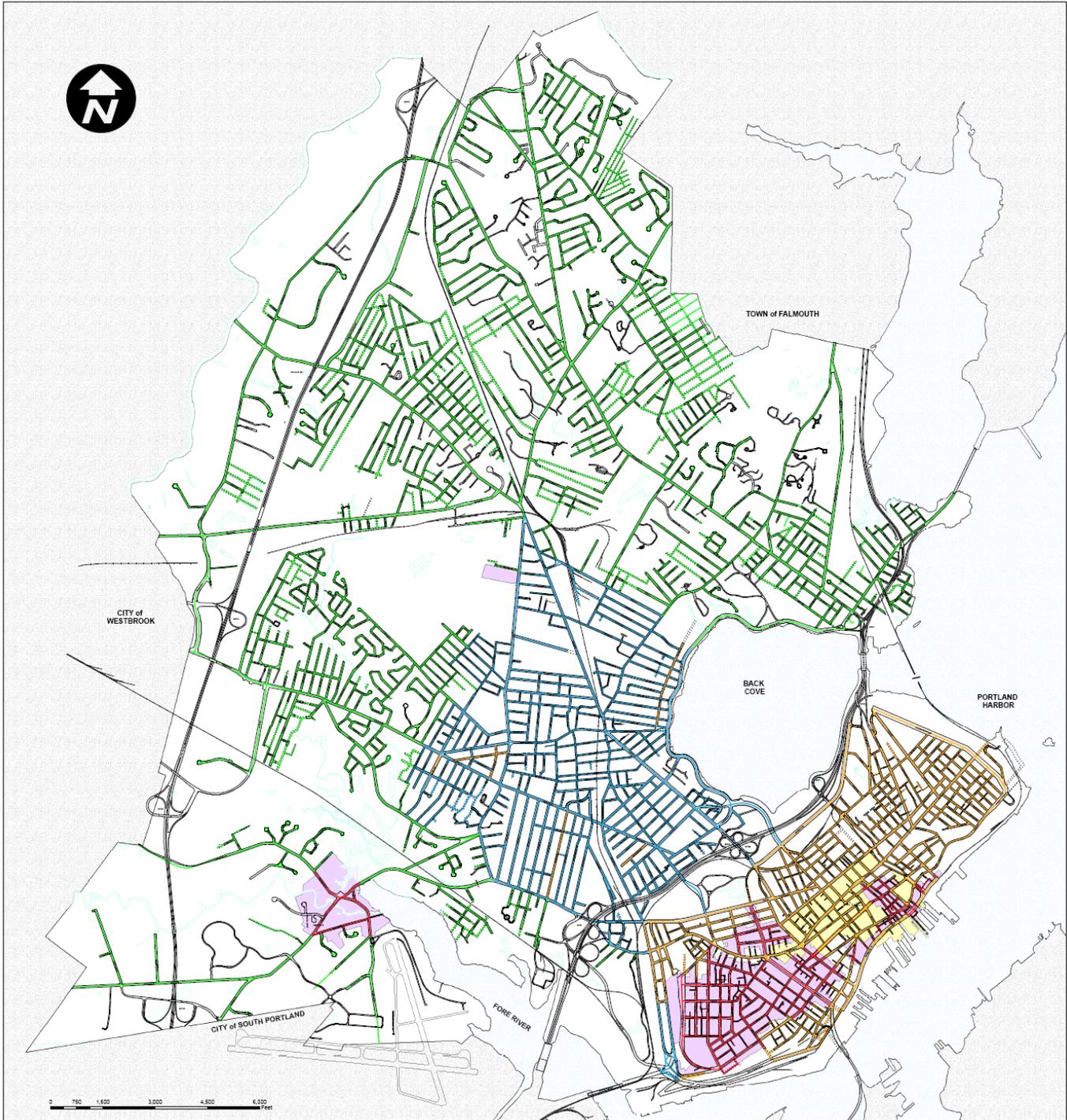
- C. If a development is located in an area designated as a growth area in a local growth management plan that has been found by the State to be consistent with the growth management program in Title 30-A, chapter 187, the Planning Board shall require improvements to the level of traffic service only if the level of service adjacent to or in the vicinity of the development is or would be level of service E or F, as determined by the City's Traffic Engineer in accordance with the "Highway Capacity Manual" (3rd ed. 1994). In these cases, improvements are limited only to those necessary to mitigate for the foreseeable impacts of the development.
 - D. The Planning Board shall also assess any such application in accordance with the standards set forth in Chapter 374 of the Maine Department of Environmental Protection Site Law Regulations, as may be amended from time to time.
- (3) No adverse effect on the natural environment. The developer has made adequate provision for fitting the development harmoniously into the existing natural environment and that the development will not adversely affect existing uses, scenic character, air quality, water quality or other natural resources in the municipality or in neighboring municipalities. In making a determination under this subsection, the Planning Board shall apply the standards set forth in Chapter 375 of the Maine Department of Environmental Protection Site Law Regulations, as may be amended from time to time.
- (4) Soil types. The proposed development will be built on soil types that are

suitable to the nature of the undertaking. In making a determination under this subsection, the Planning Board shall apply the standards set forth in Chapter 376 of the Maine Department of Environmental Protection Site Law Regulations, as may be amended from time to time.

- (5) Ground water. The proposed development will not pose an unreasonable risk that a discharge to a significant ground water aquifer will occur. In making a determination under this subsection, the Planning Board shall apply the standards set forth in Chapter 500 and 502 of the Maine Department of Environmental Stormwater Management and Direct Watersheds of Waterbodies Most at Risk from New Development Rules as may be amended from time to time.
- (6) Infrastructure. The developer has made adequate provision of utilities, including water supplies, sewerage facilities, solid waste disposal and roadways required for the development and the development will not have an unreasonable adverse effect on the existing or proposed utilities and roadways in the municipality or area served by those services.
- (7) Flooding. The activity will not unreasonably cause or increase the flooding of the alteration area or adjacent properties nor create an unreasonable flood hazard to any structure. In making a determination under this subsection, the Planning Board shall apply the standards set forth in Chapter 500 and 502 of the Maine Department of Environmental Stormwater Management and Direct Watersheds of Waterbodies Most at Risk from New Development Rules as may be amended from time to time.
- (8) Storm water management and erosion and sedimentation control. The proposed development meets the standards for storm water management in 38 MRSA §420-D as amended from time to time (See Exhibit 1) and the standard for erosion and sedimentation control in 38 MRSA §420-C as amended from time to time. In making a determination under this subsection, the Planning Board shall apply the standards set forth in Chapter 500 and 502 of the Maine Department of Environmental Stormwater Management and Direct Watersheds of Waterbodies Most at Risk from New Development Rules, as may be amended from time to time.

15. APPENDICES

15.1. CITY SIDEWALK REPLACEMENT MATERIALS MAP



SIDEWALK REPLACEMENT MATERIAL
PORTLAND, MAINE AUGUST 2006

- | | | |
|---|-------------------|----------------------------|
| CLAY BRICK SIDEWALK with CLAY BRICK APRON | CONCRETE SIDEWALK | HISTORIC DISTRICT |
| BRICK SIDEWALK with ASPHALT APRON | ASPHALT SIDEWALK | PORTLAND DOWNTOWN DISTRICT |

Map prepared by the City of Portland's Department of Public Works

15.2. CONSISTENCY WITH RELATED MASTER PLANS

In accordance with Section 14-526(a) of the City Code, all developments shall be designed so as to be consistent with related City master plans and facilities plans and with off-premises infrastructure existing or proposed, supported or endorsed by the City, including but not limited to the following:

- a. [Deering Oaks Master Plan](#). May, 1994
- b. [Brighton Avenue Plan](#). December, 1999
- c. [A New Vision for Bayside](#). April, 2000
- d. [The Eastern Waterfront Master Plan](#). December, 2004
- e. [Arts District Plan](#). November, 1995
- f. [Shoreway Access Plan](#). November, 1987
- g. Combined Sewer Overflow (CSO) Abatement Study
- h. [Peninsula Transit Plan](#). June, 2009
- i. Capisic Brook Stormwater Abatement Plan. September, 1999
- j. City of Portland Island Groundwater Management Study. August, 1986
- k. [Saint John and Valley Streets Streetscape Plan](#). September, 2010

Applicable plans are available through the City of Portland website and/or through the City of Portland Planning Division.