

City of Portland

Technical Manual



Preamble

The Technical Standards contained herein have been promulgated by the Department of Public Works 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, concrete, or brick, as illustrated in Figures I-10 through I-12. At a minimum, all driveway aprons shall be constructed of the designated sidewalk material within the pedestrian access route.

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. Within the city's historic districts, only brick shall be used. Sidewalk and driveway construction details are illustrated in Figures I-10 through I-15.

All new concrete sidewalks and driveway aprons 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, including the pedestrian access route through driveway aprons. 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%, including the pedestrian access route through driveway aprons.

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.

1.8.4. 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), 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

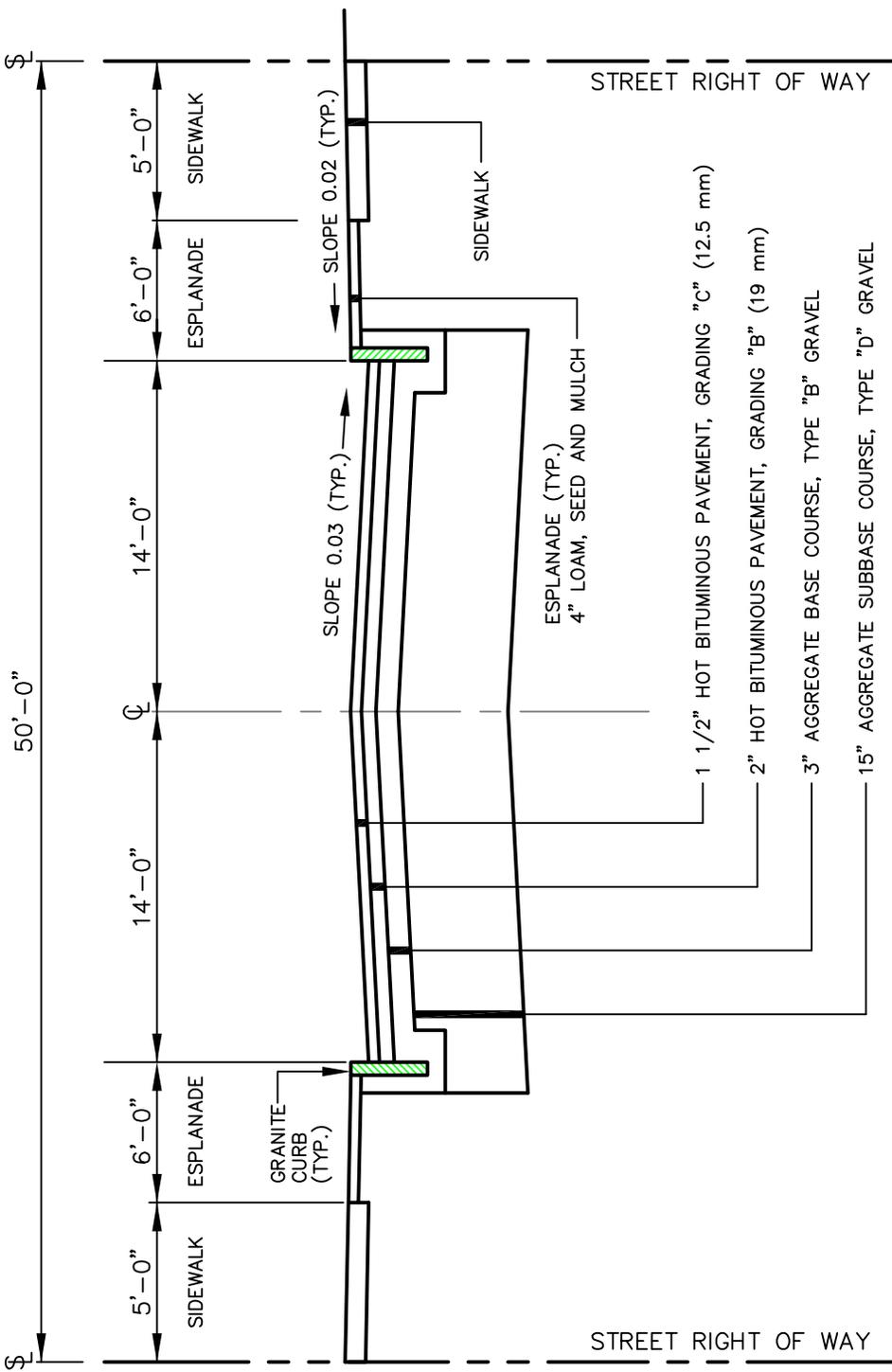
street and/or sidewalk shall not inhibit sight distances, particularly for visibility of pedestrians and bicyclists.

- 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

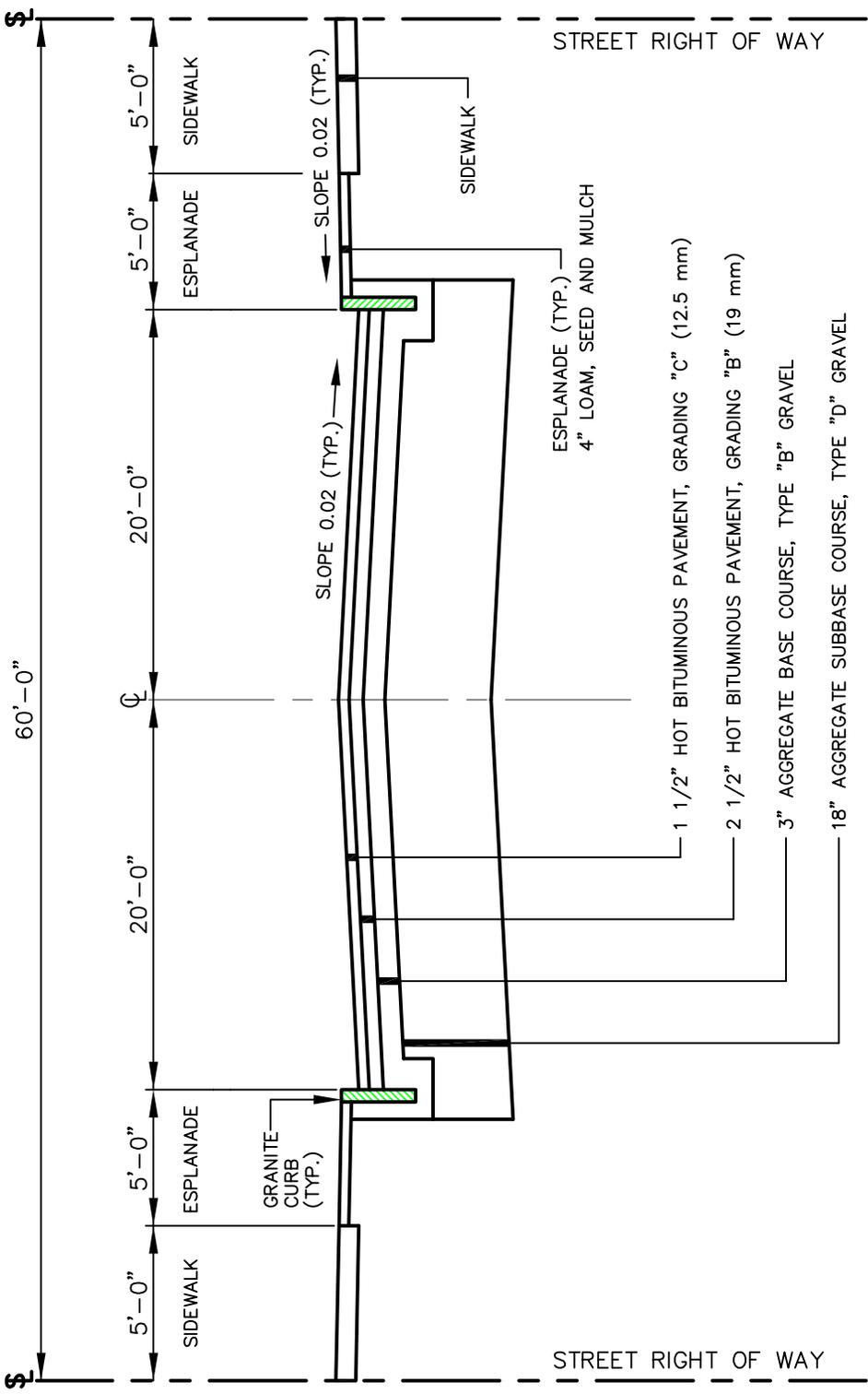
Projects that generate traffic, which impacts roadways and intersections already operating at substandard levels of service E or F or adds traffic to improvement districts within the City (**as identified on the attached map - Figure I-39**) shall contribute towards future improvements. A contribution 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.



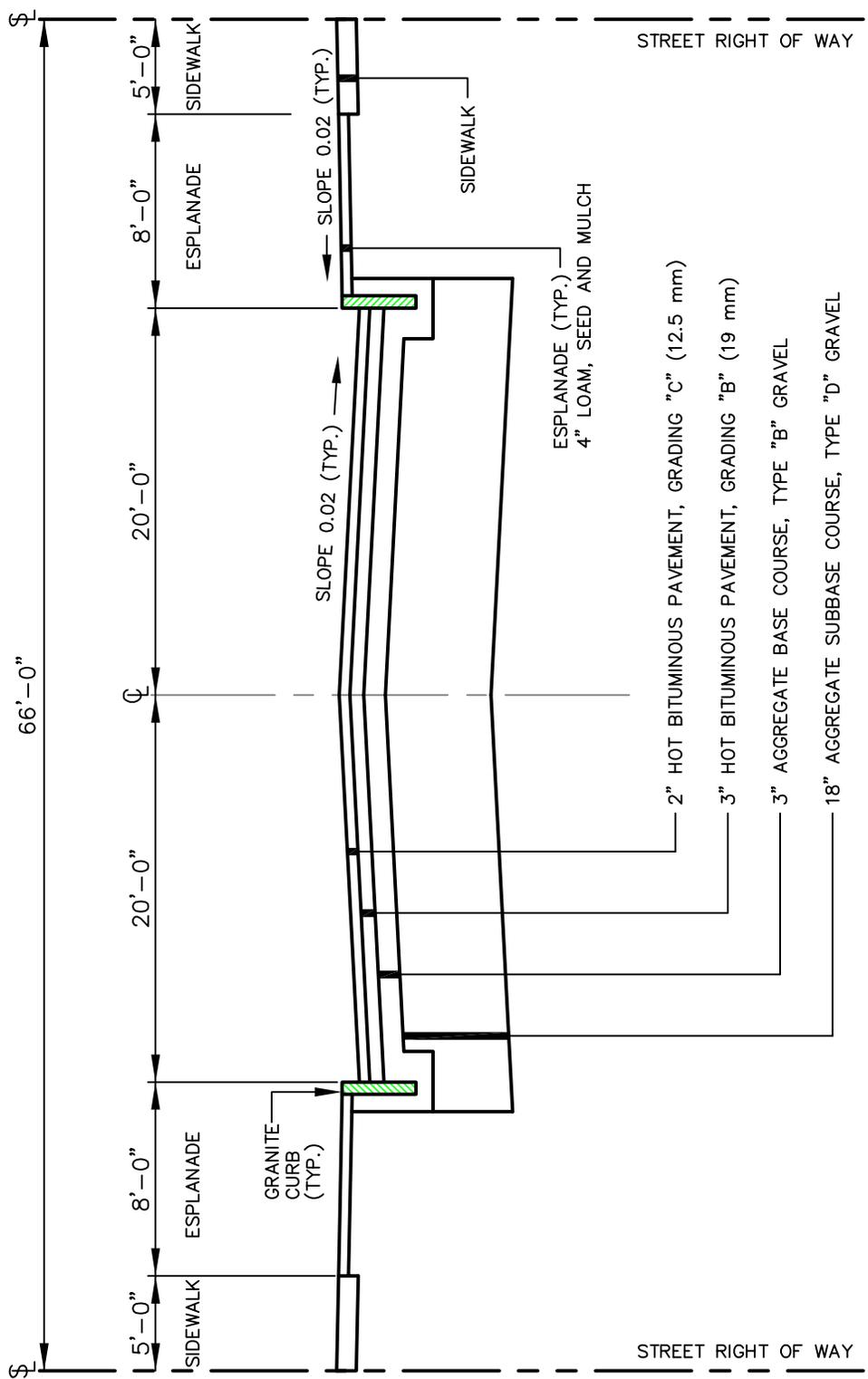
LOCAL STREET CROSS SECTION
 NOT TO SCALE

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



COLLECTOR STREET CROSS SECTION
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COLLECTOR STREET CROSS SECTION			I-2



ARTERIAL STREET CROSS SECTION

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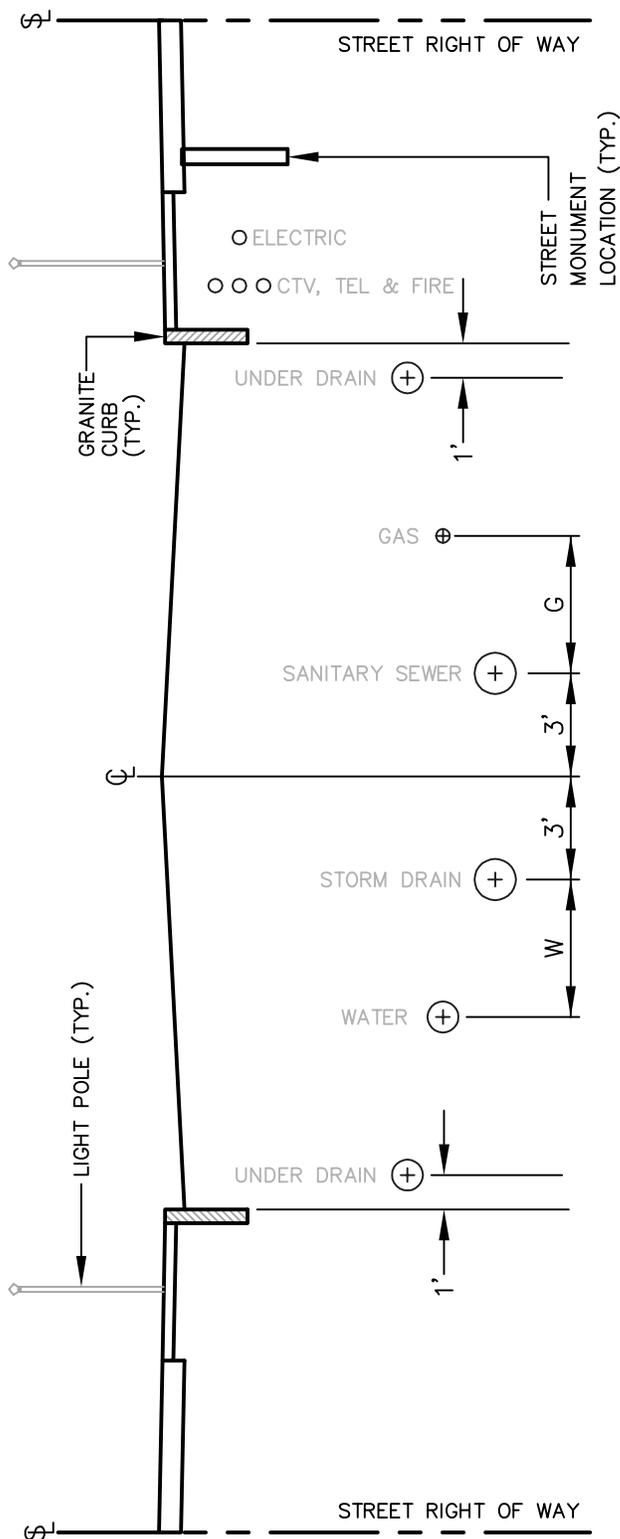
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 SECTION I

FIGURE:

I-3

ARTERIAL STREET CROSS SECTION



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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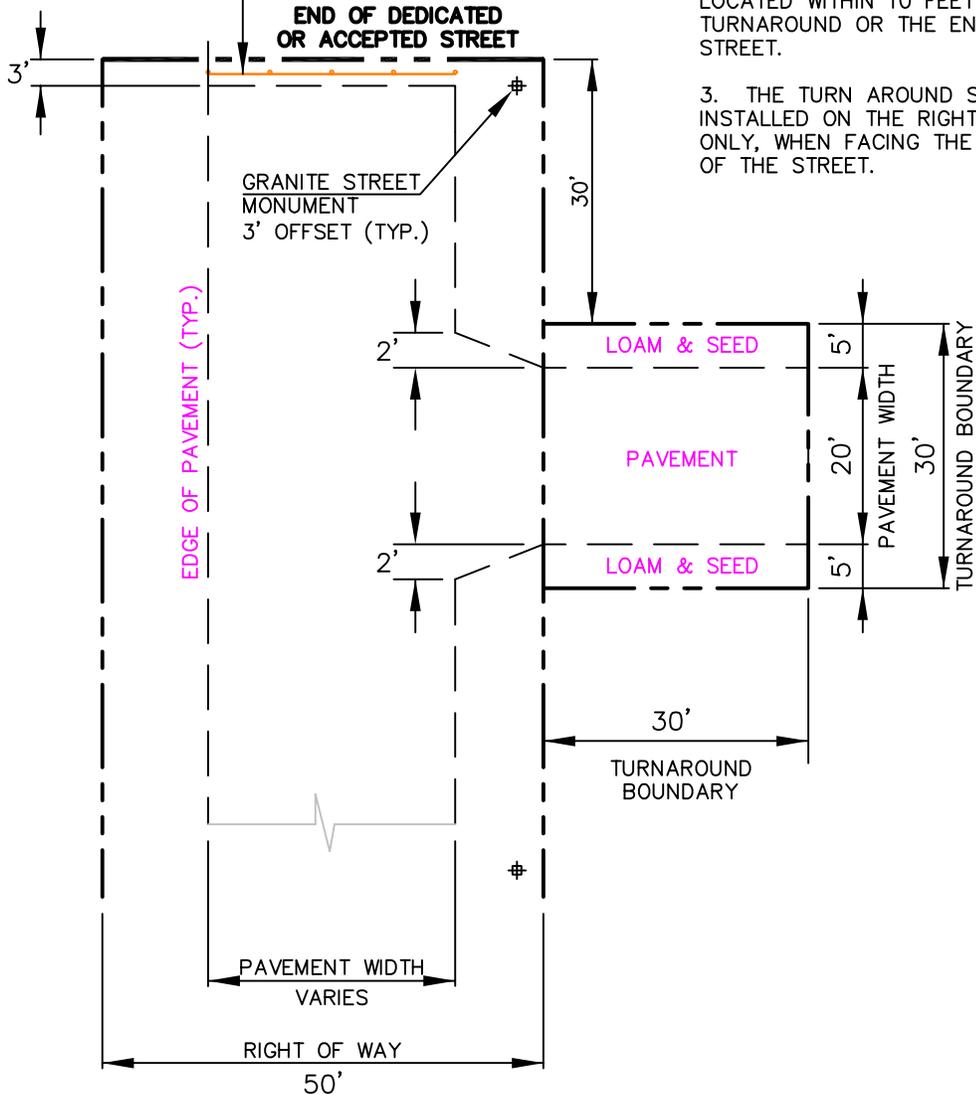
TRANSPORTATION SYSTEMS
 AND STREET DESIGN
 SECTION I

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

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**TRANSPORTATION SYSTEMS
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FIGURE:

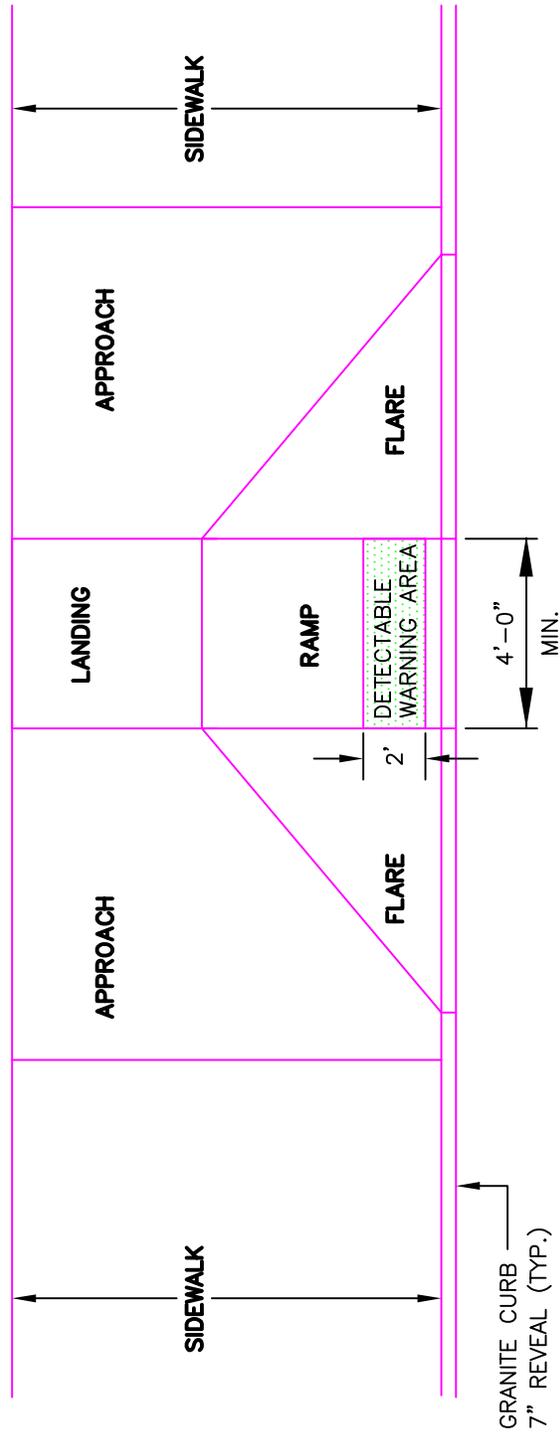
TURNAROUND ON DEAD END STREET

I-5

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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FIGURE:

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

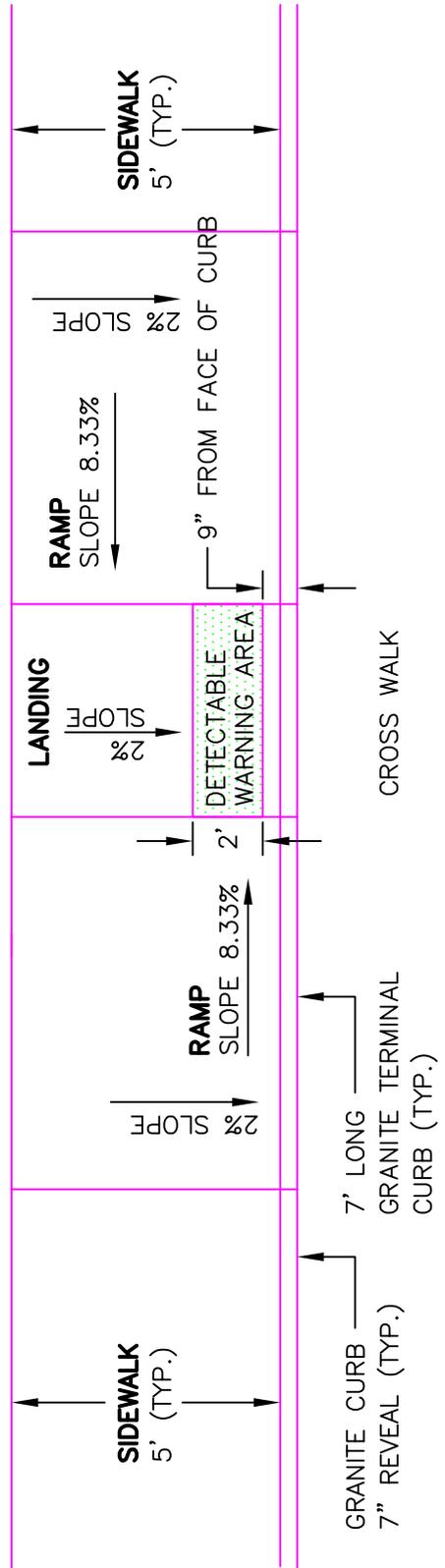
I-6A

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

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 SECTION I

FIGURE:

PARALLEL ADA RAMP LAYOUT FOR NARROW SIDEWALK WITH NO ESPLANADE

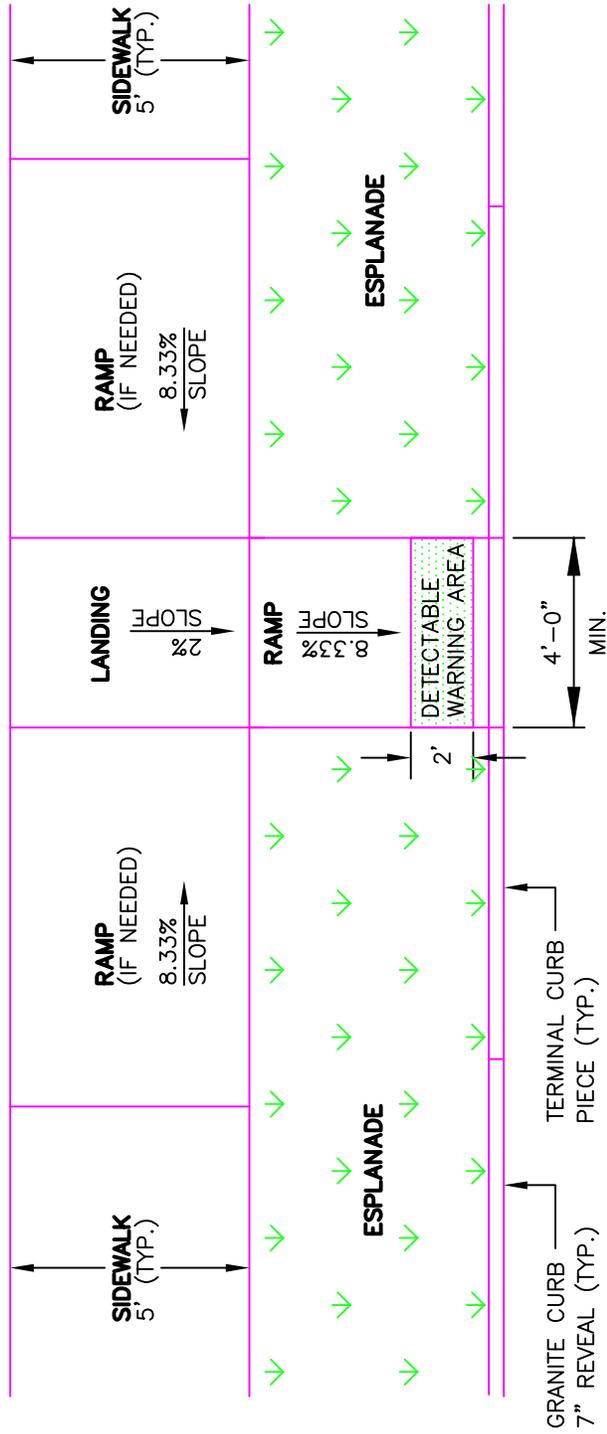
I-6B

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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 SECTION I

FIGURE:

**PERPENDICULAR RAMP FOR
 NARROW SIDEWALK WITH ESPLANADE**

I-6C

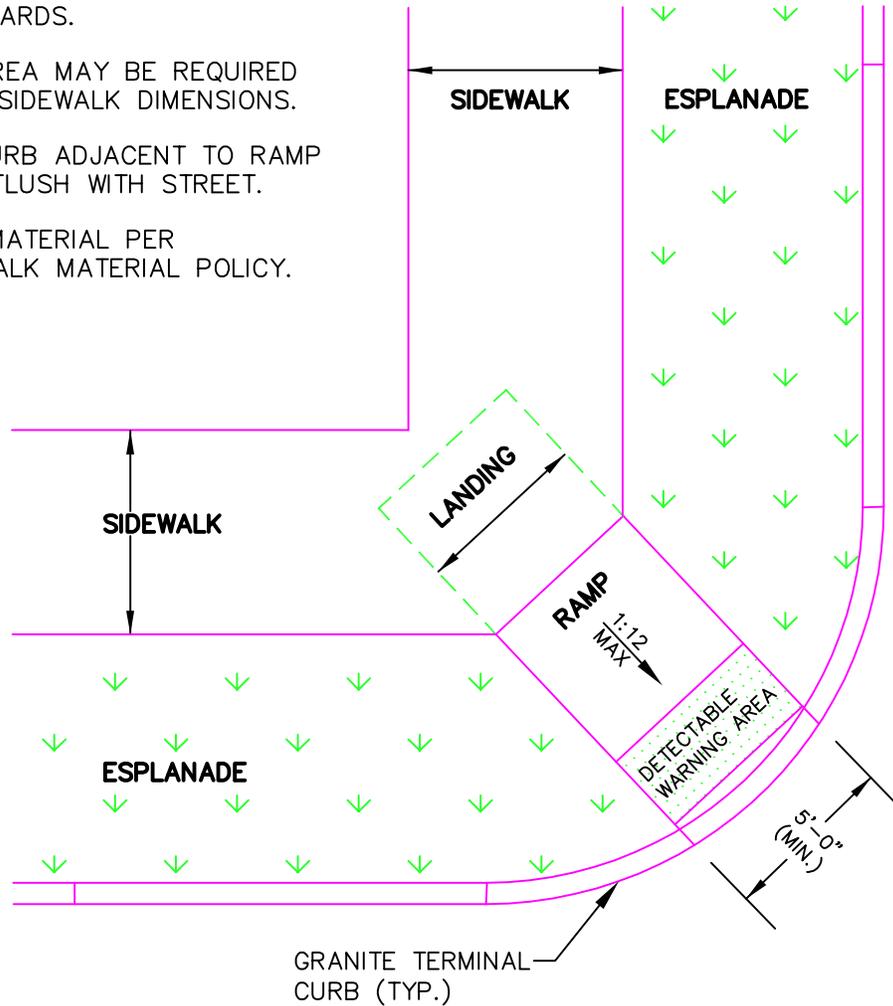
NOTES:

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)

DATE:
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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.

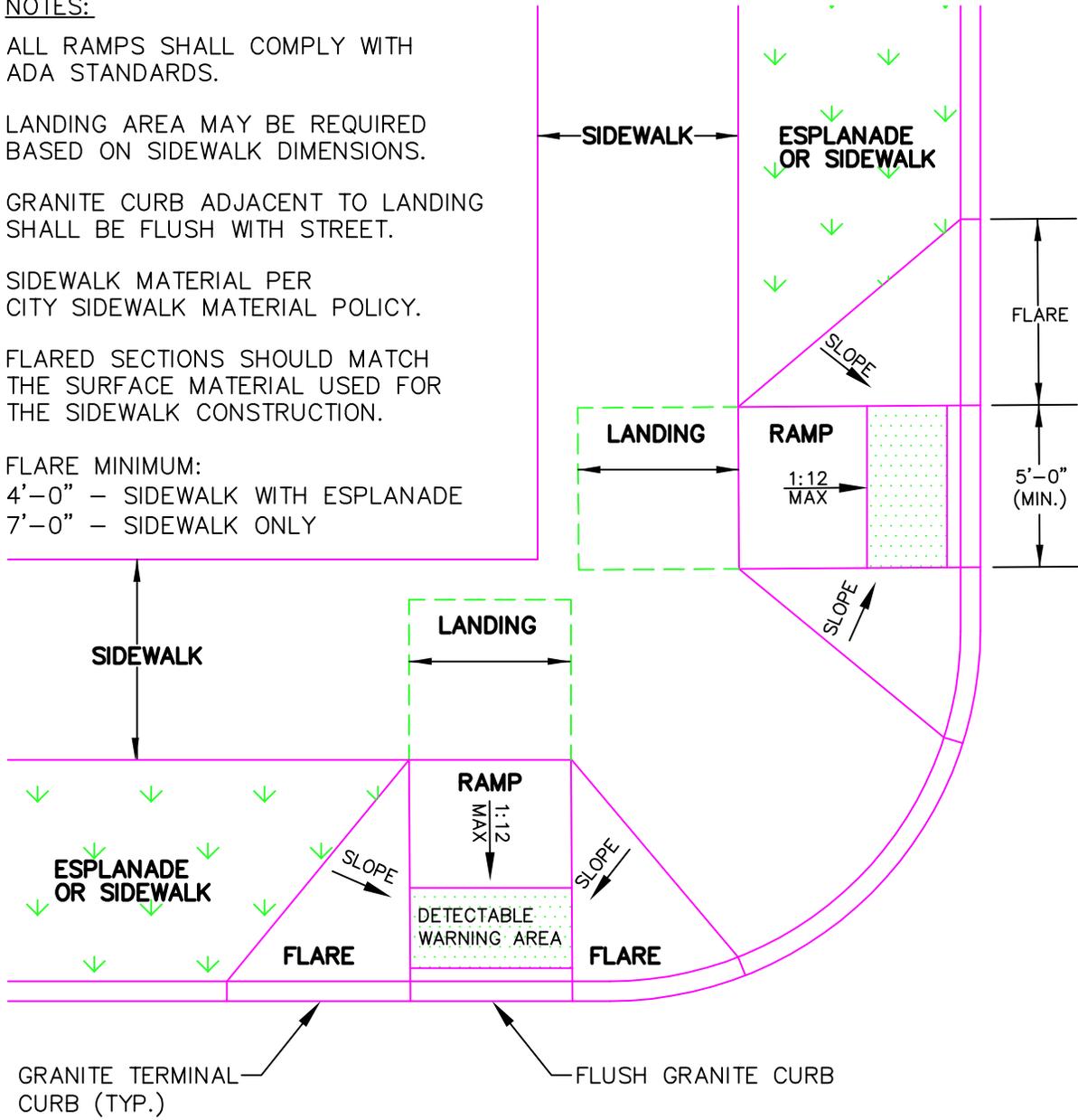
LANDING AREA MAY BE REQUIRED BASED ON SIDEWALK DIMENSIONS.

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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 TECHNICAL STANDARDS MANUAL

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 SECTION I

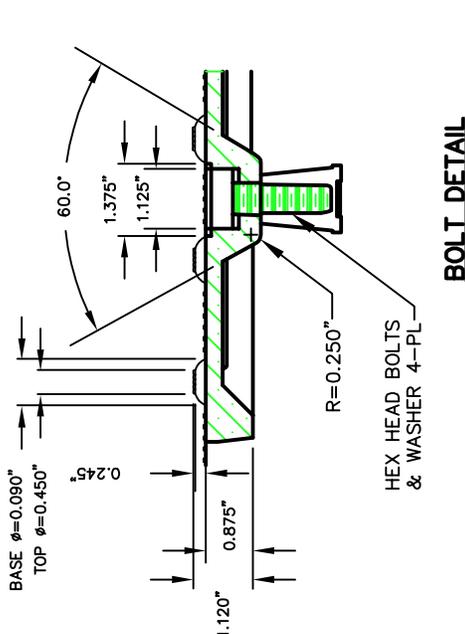
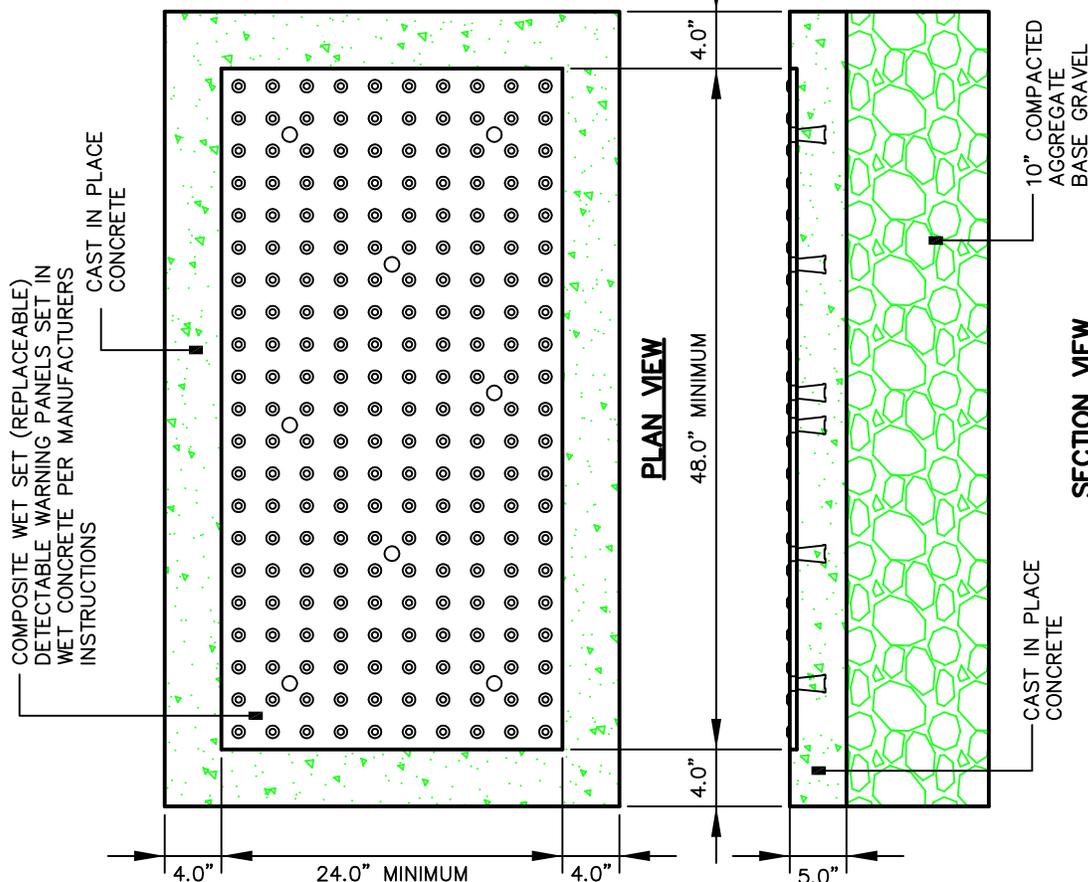
FIGURE:

**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 I-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.



BOLT DETAIL

SIDEWALK RAMP DETECTABLE WARNING PANEL

NOT TO SCALE

DATE:
 JUNE 3, 2010
 REVISED:
 MARCH 2, 2011
 JUNE 23, 2011
 AUGUST 8, 2011

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FIGURE:

SIDEWALK RAMP DETECTABLE WARNING PANEL

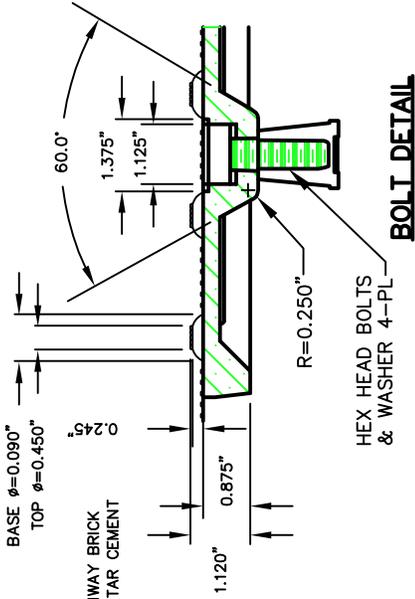
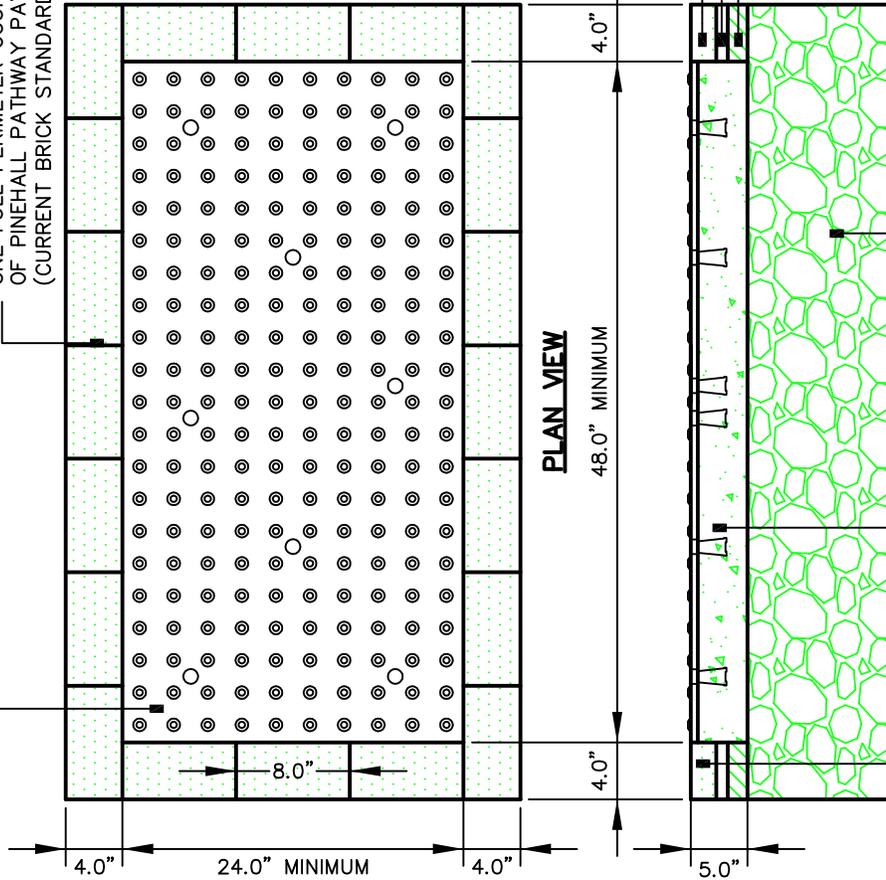
I-7

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.

COMPOSITE WET SET (REPLACEABLE) DETECTABLE WARNING PANELS SET IN WET CONCRETE PER MANUFACTURERS INSTRUCTIONS

ONE FULL PERIMETER COURSE OF PINEHALL PATHWAY PAVERS (CURRENT BRICK STANDARD)



SIDEWALK RAMP DETECTABLE WARNING PANEL (HISTORIC DISTRICTS AND LANDSCAPES)

NOT TO SCALE

DATE:
 JUNE 23, 2011

REVISED:
 AUGUST 8, 2011

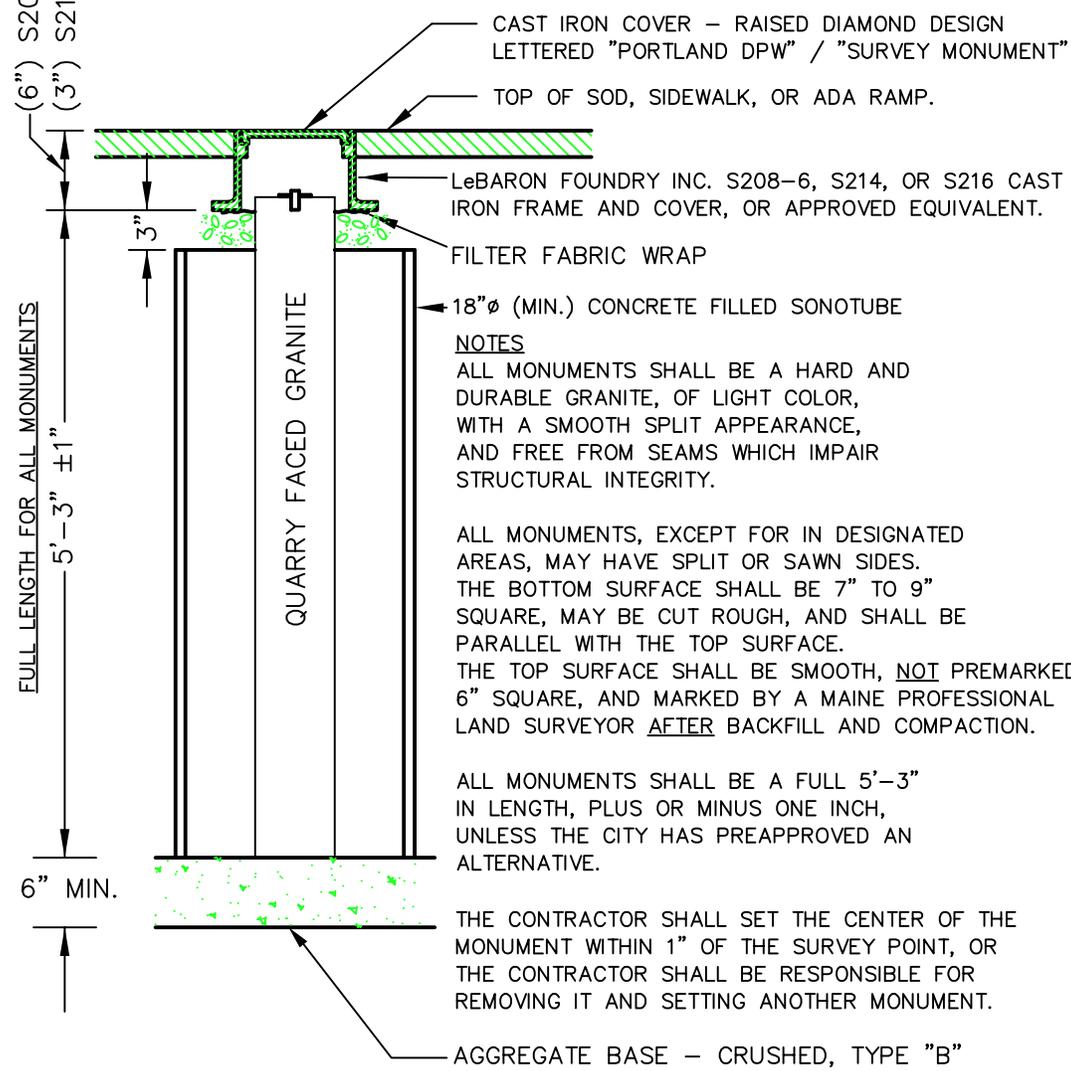
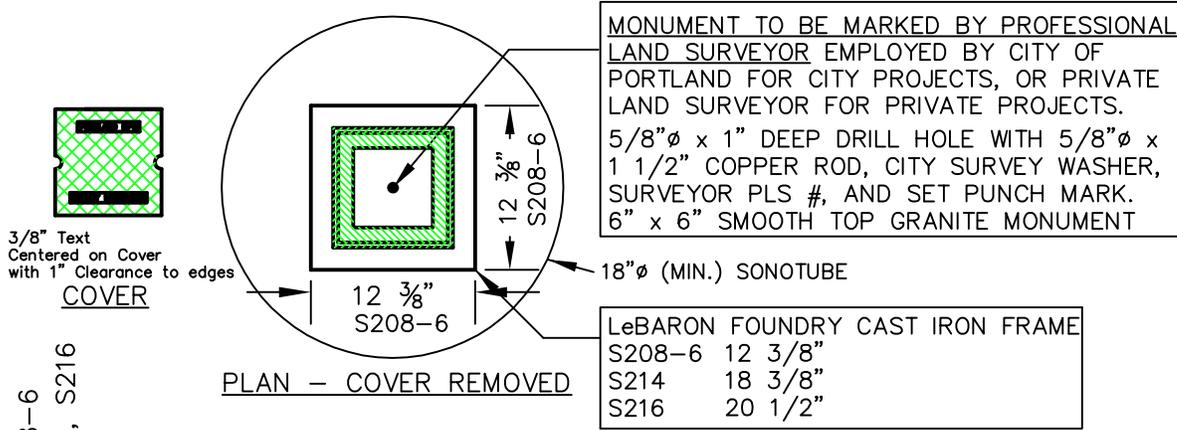
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FIGURE:

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

I-7A



GRANITE STREET MONUMENT
 NOT TO SCALE

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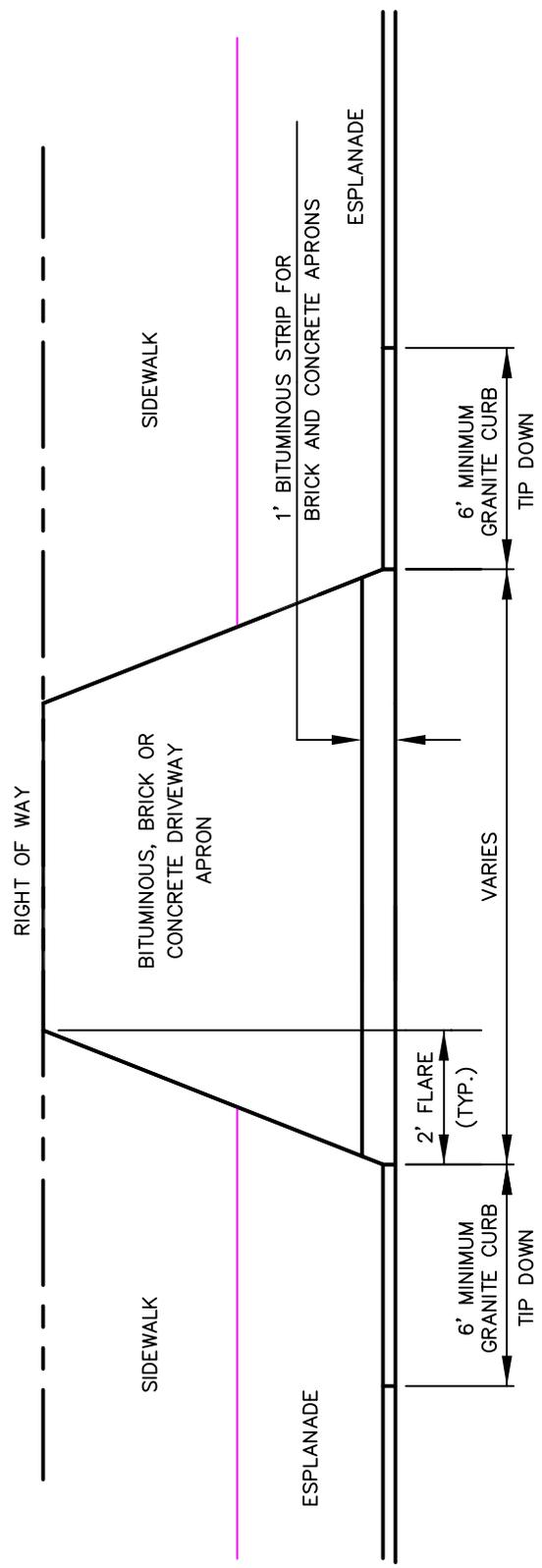
**TRANSPORTATION SYSTEMS
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FIGURE:

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

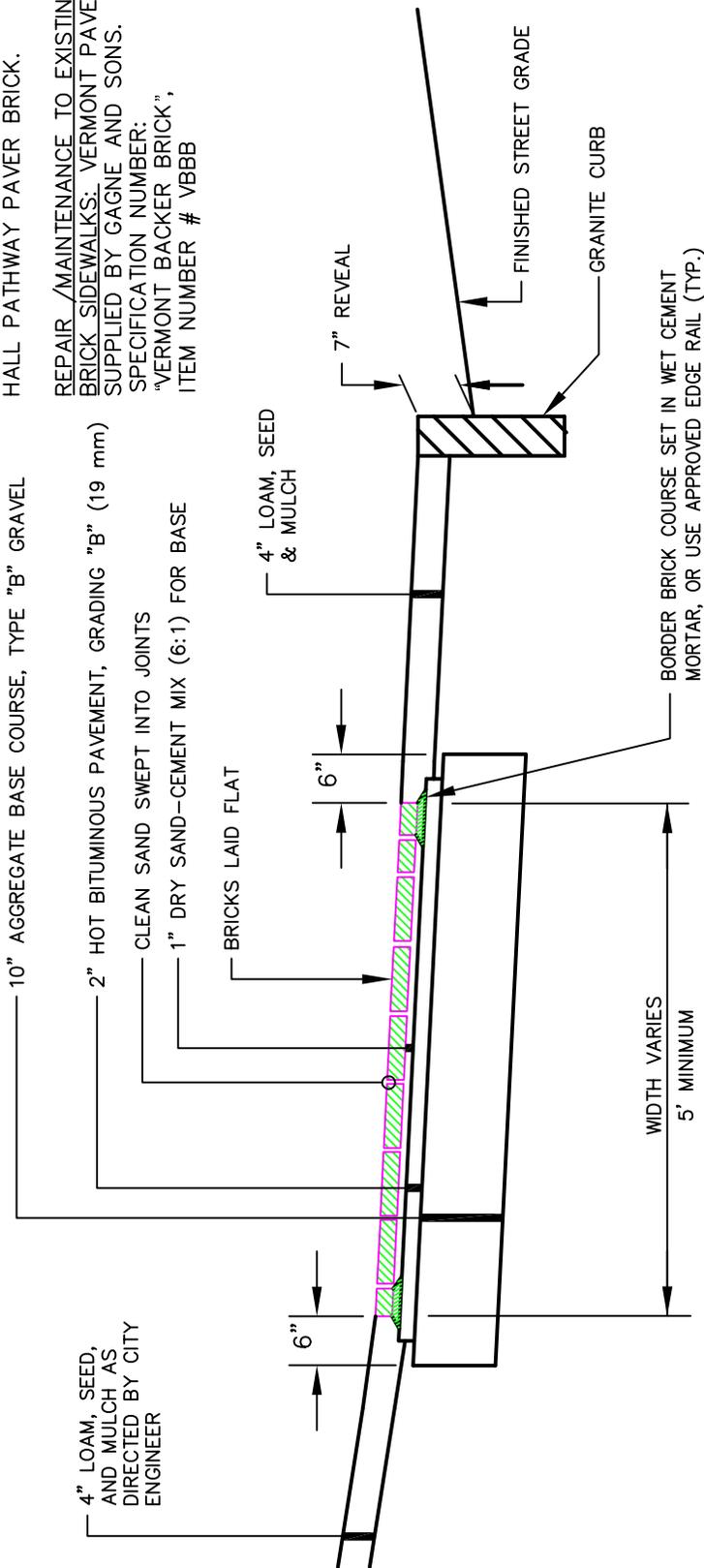
DATE: AUGUST 2009 REVISED:	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	TRANSPORTATION SYSTEMS AND STREET DESIGN SECTION I	FIGURE:
DRIVEWAY APRON LAYOUT			I-9

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

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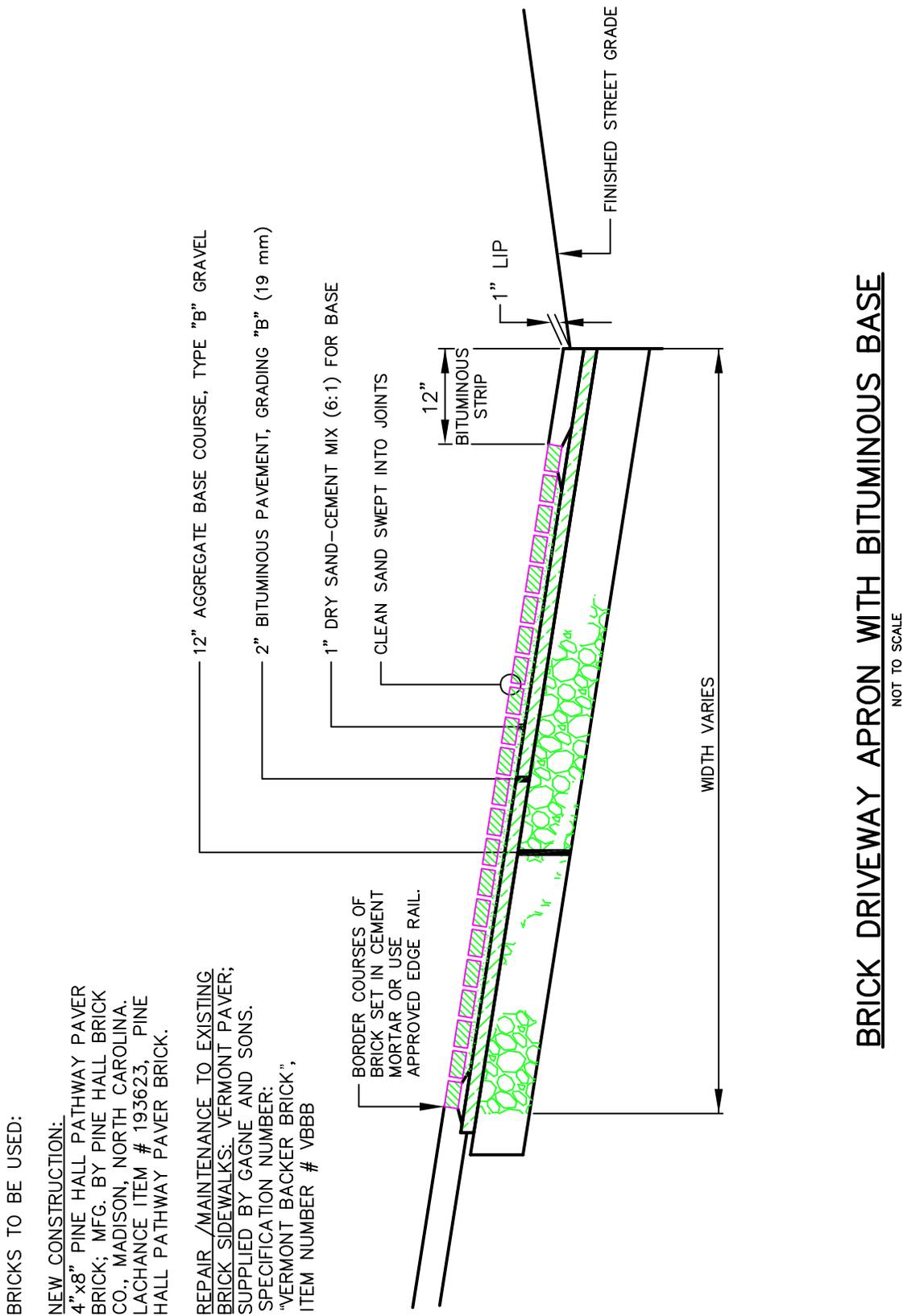
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 SECTION I

FIGURE:

BRICK SIDEWALK WITH BITUMINOUS BASE

I-10



DATE:
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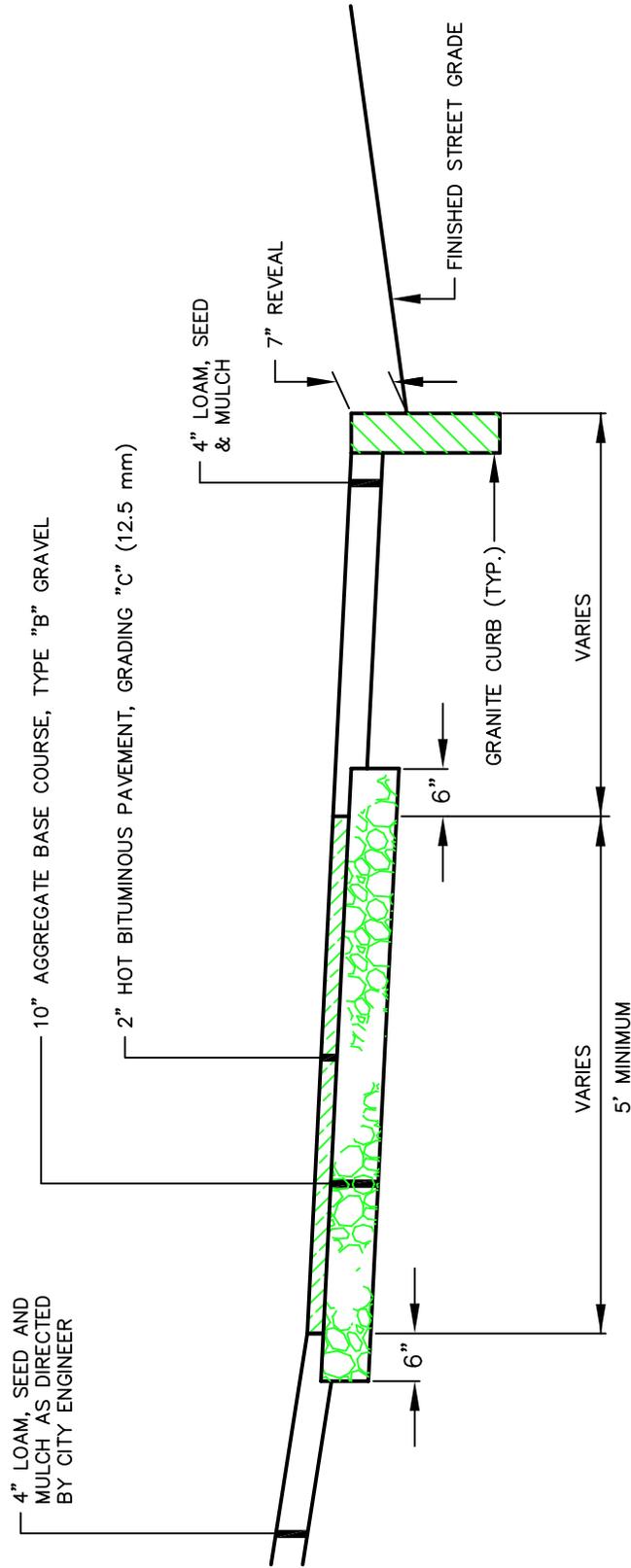
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FIGURE:

**BRICK DRIVEWAY APRON
 WITH BITUMINOUS BASE**

I-11



BITUMINOUS SIDEWALK
 NOT TO SCALE

DATE:
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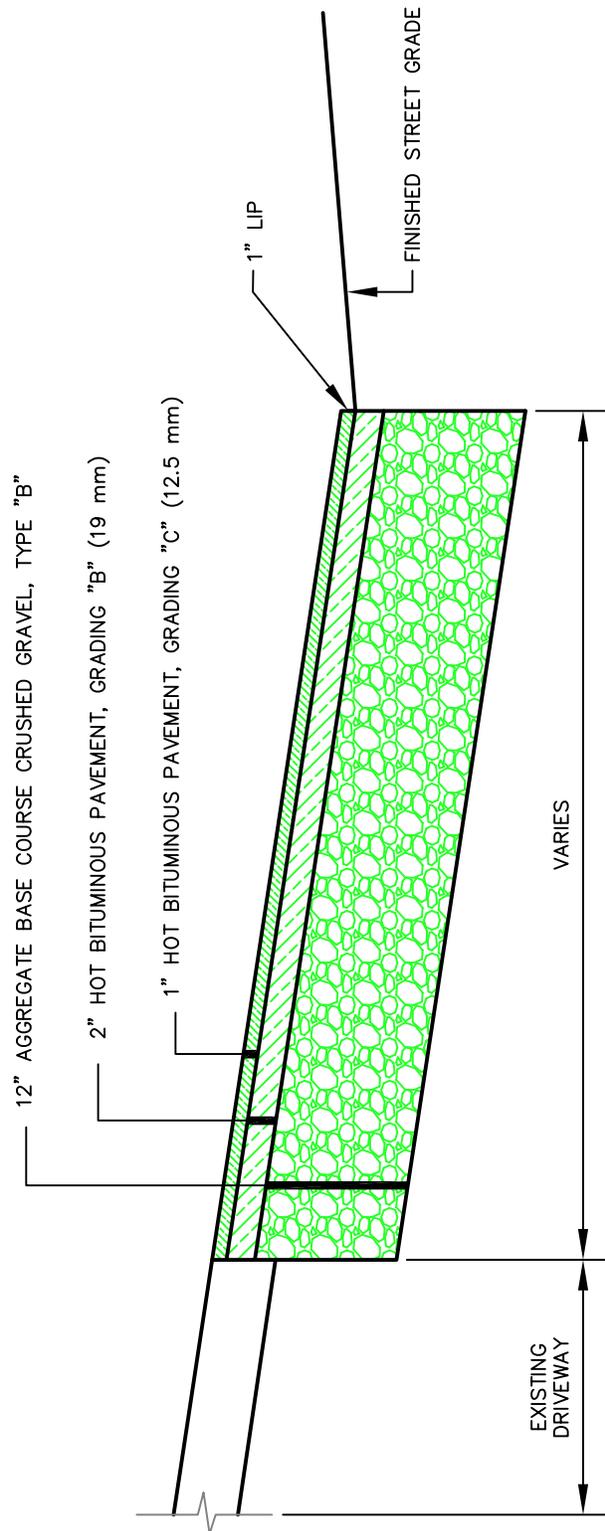
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 SECTION I

FIGURE:

BITUMINOUS SIDEWALK

I-12



BITUMINOUS DRIVEWAY APRON

NOT TO SCALE

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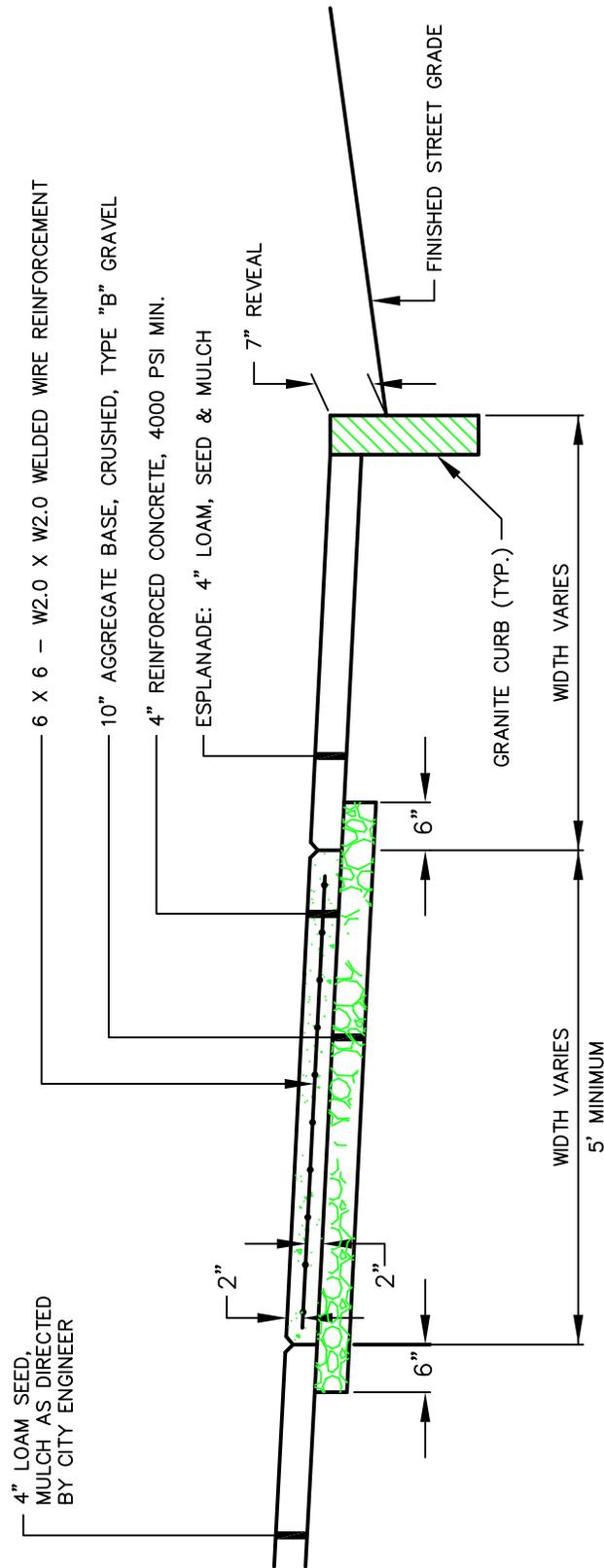
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FIGURE:

BITUMINOUS DRIVEWAY APRON

I-13



REINFORCED CONCRETE SIDEWALK

NOT TO SCALE

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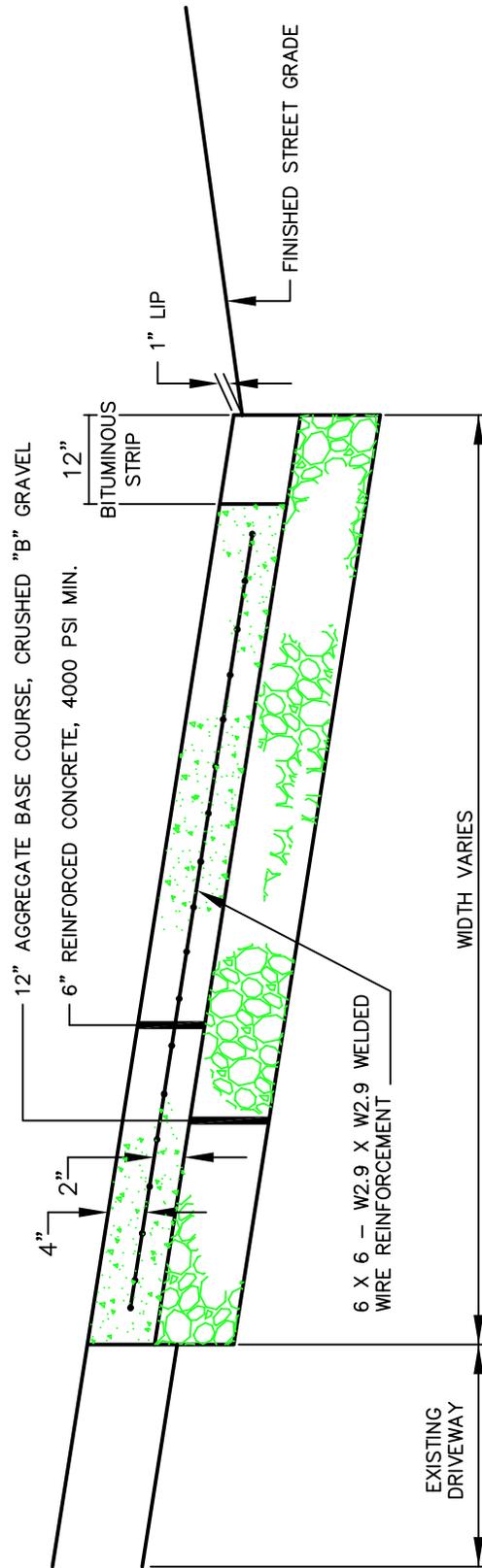
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FIGURE:

REINFORCED CONCRETE SIDEWALK

I-14



REINFORCED CONCRETE DRIVEWAY APRON

NOT TO SCALE

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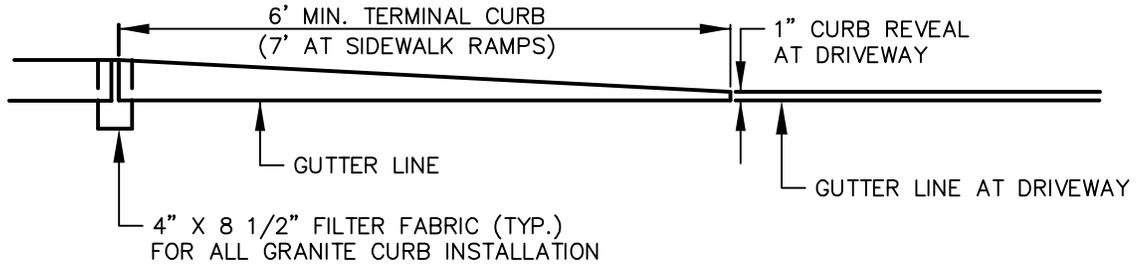
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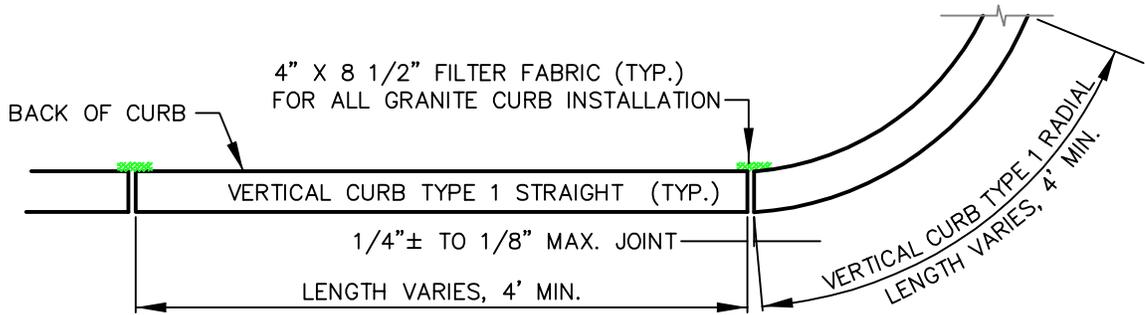
FIGURE:

REINFORCED CONCRETE DRIVEWAY APRON

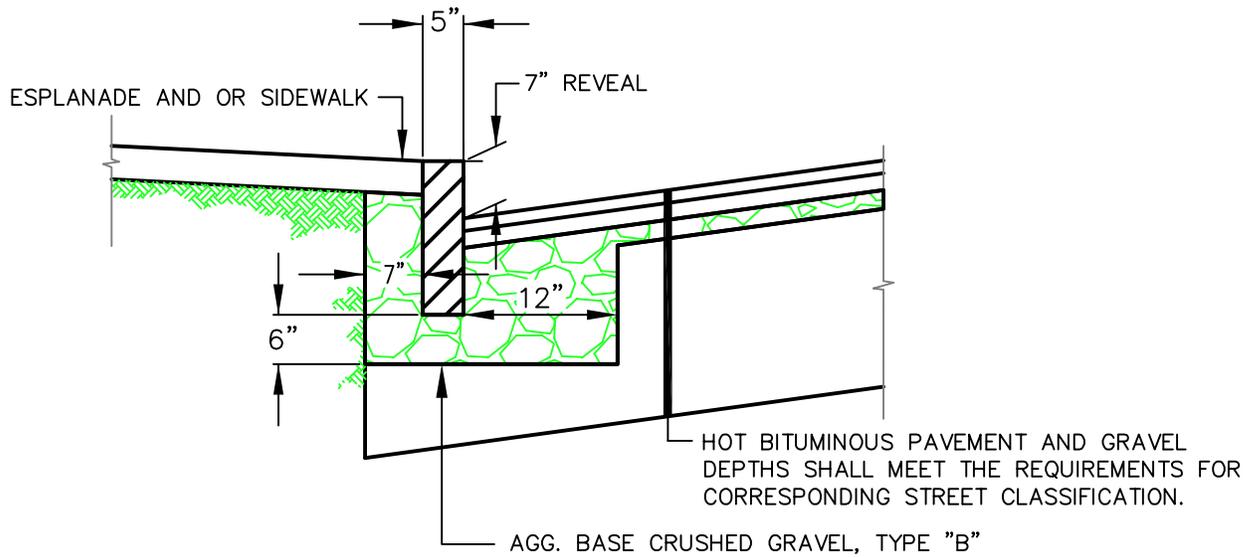
I-15



TERMINAL CURB PROFILE



VERTICAL GRANITE CURB PLAN VIEW



VERTICAL GRANITE CURB CROSS SECTION

VERTICAL GRANITE CURB
FULL DEPTH STREET CONSTRUCTION

NOT TO SCALE

DATE:
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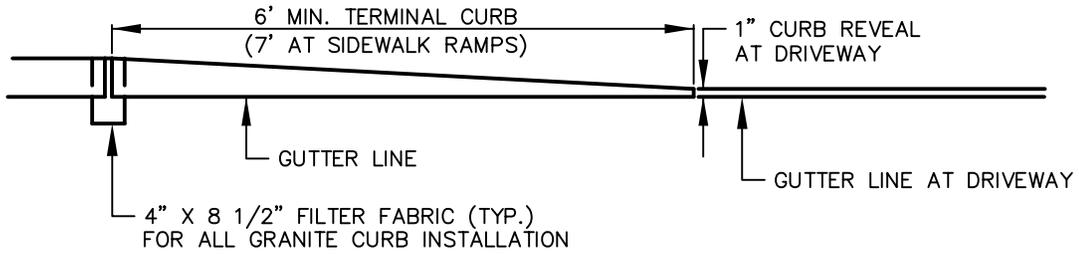
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**TRANSPORTATION SYSTEMS
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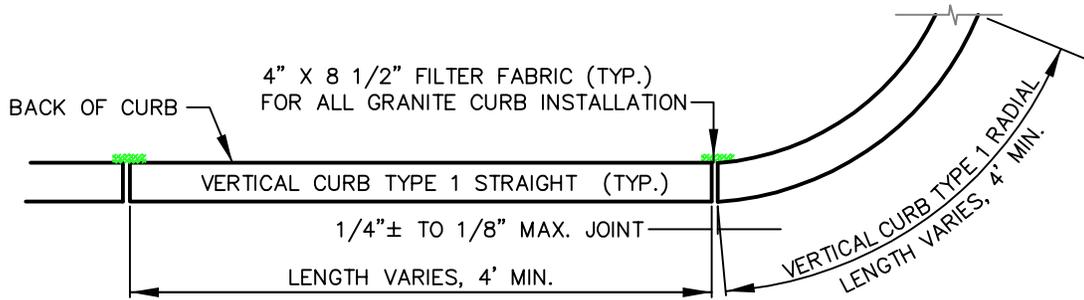
FIGURE:

VERTICAL GRANITE CURB
FULL DEPTH STREET CONSTRUCTION

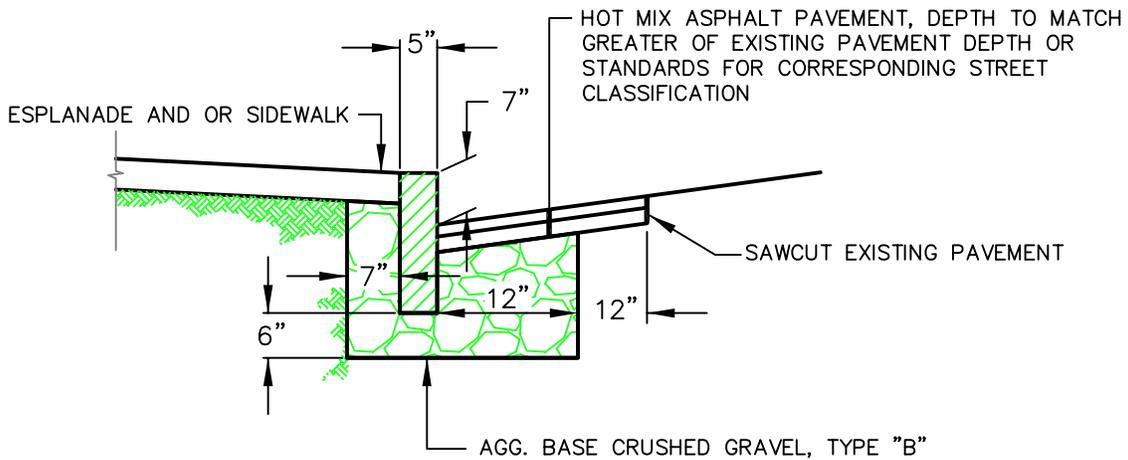
I-16
49



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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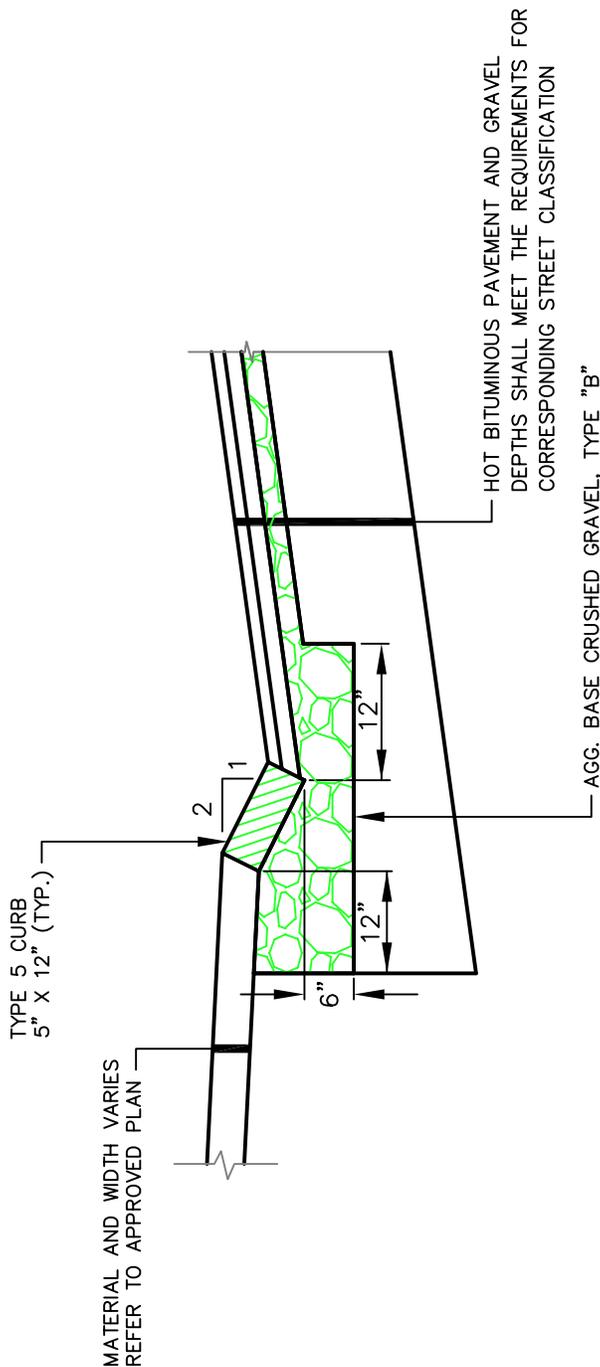
TRANSPORTATION SYSTEMS
AND STREET DESIGN
SECTION I

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

NOT TO SCALE

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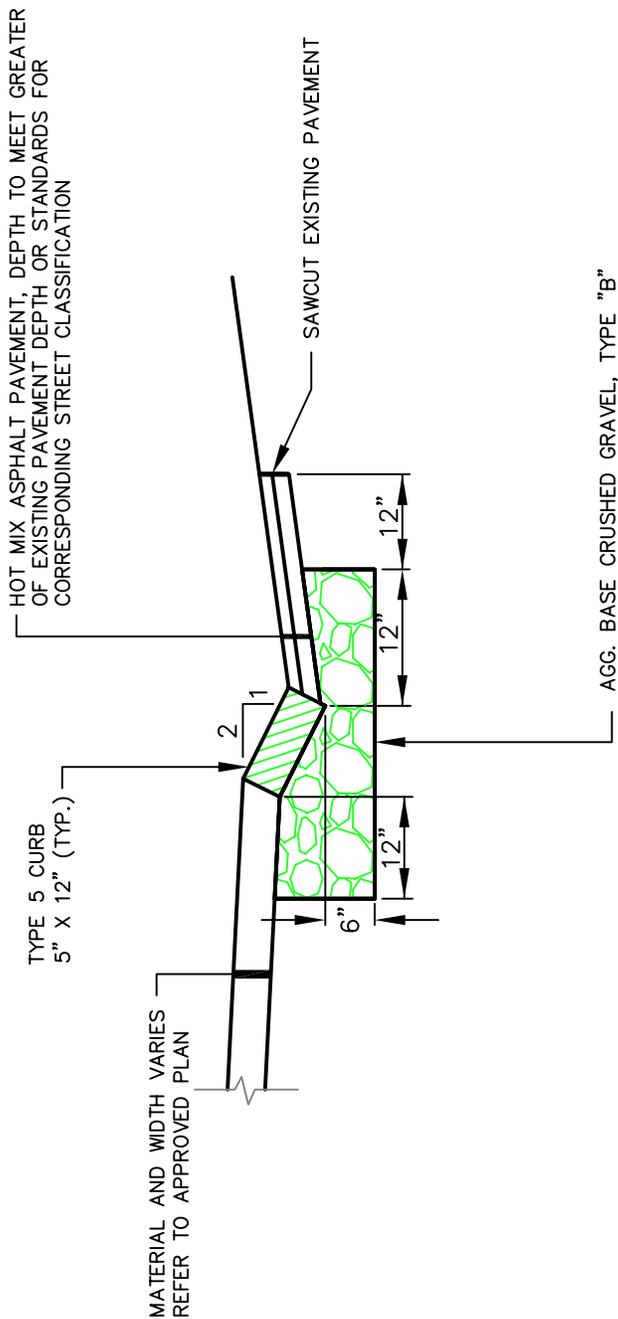
**TRANSPORTATION SYSTEMS
 AND STREET DESIGN**
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FIGURE:

**SLOPED GRANITE CURB
 FULL DEPTH STREET CONSTRUCTION**

I-18

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



SLOPED GRANITE CURB – INSTALLATION IN EXISTING STREETS

NOT TO SCALE

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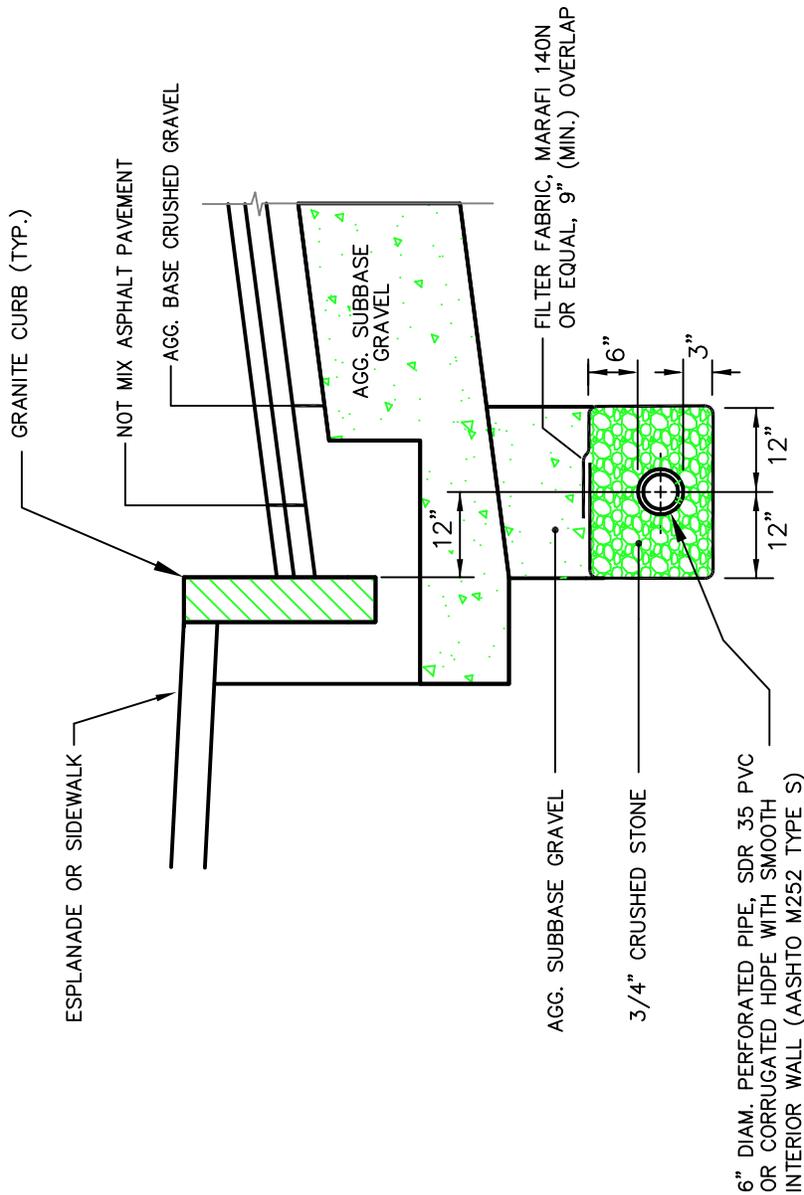
**TRANSPORTATION SYSTEMS
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FIGURE:

**SLOPED GRANITE CURB
 INSTALLATION IN EXISTING STREETS**

I-19

- 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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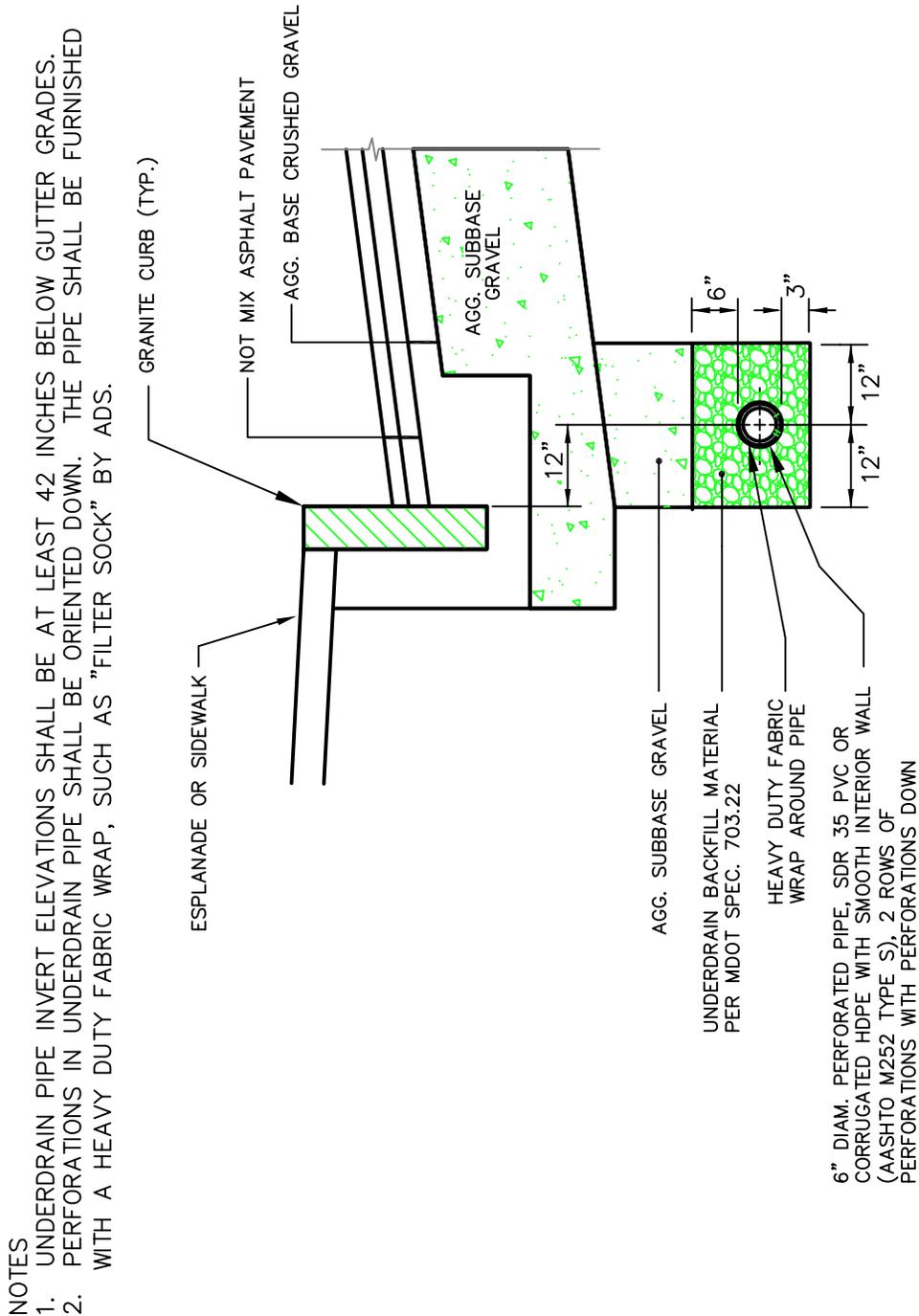
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FIGURE:

**UNDERDRAIN INSTALLATION
 ALTERNATIVE A**

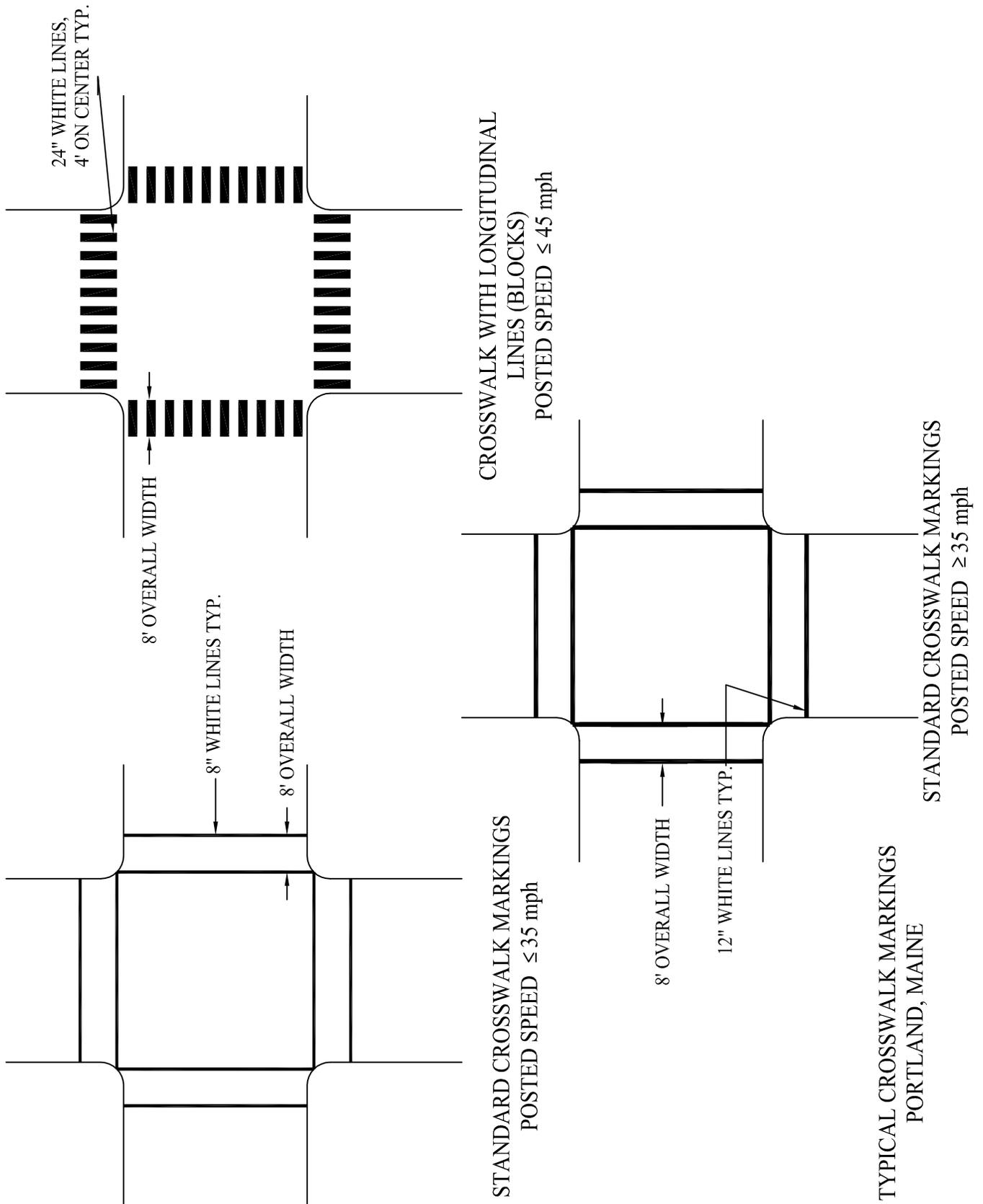
I-20



UNDERDRAIN INSTALLATION -- ALTERNATIVE "B"

NOT TO SCALE

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<p align="center">UNDERDRAIN INSTALLATION ALTERNATIVE B</p>			<p align="center">I-21</p>



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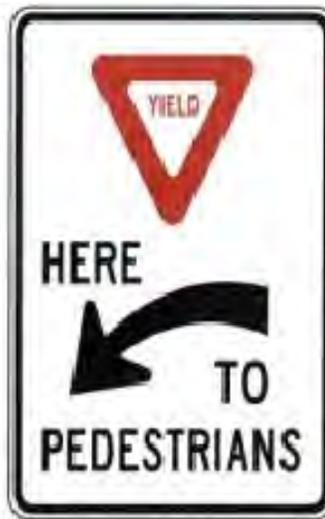
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FIGURE:
I-22

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:

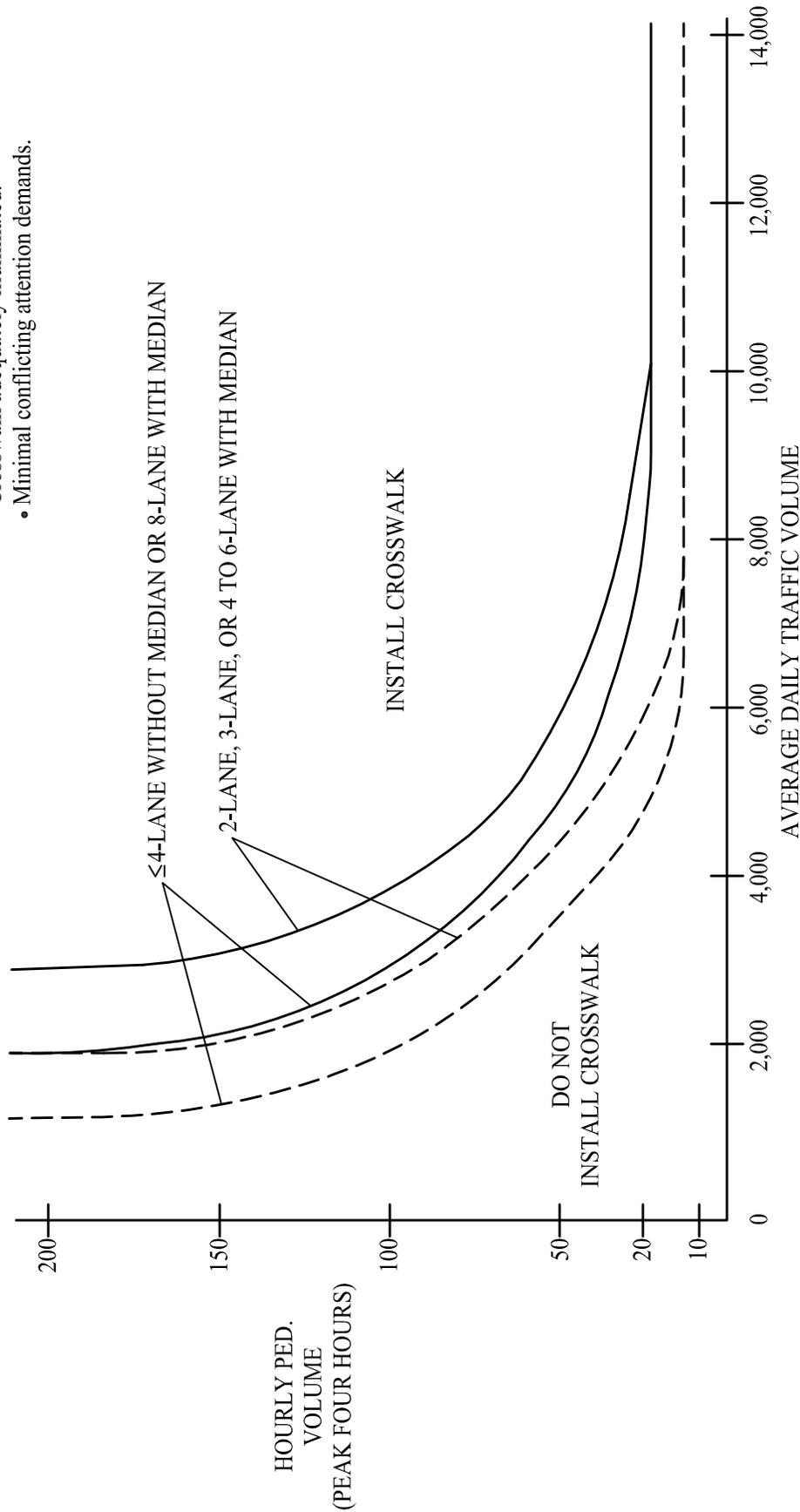
I-24

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:

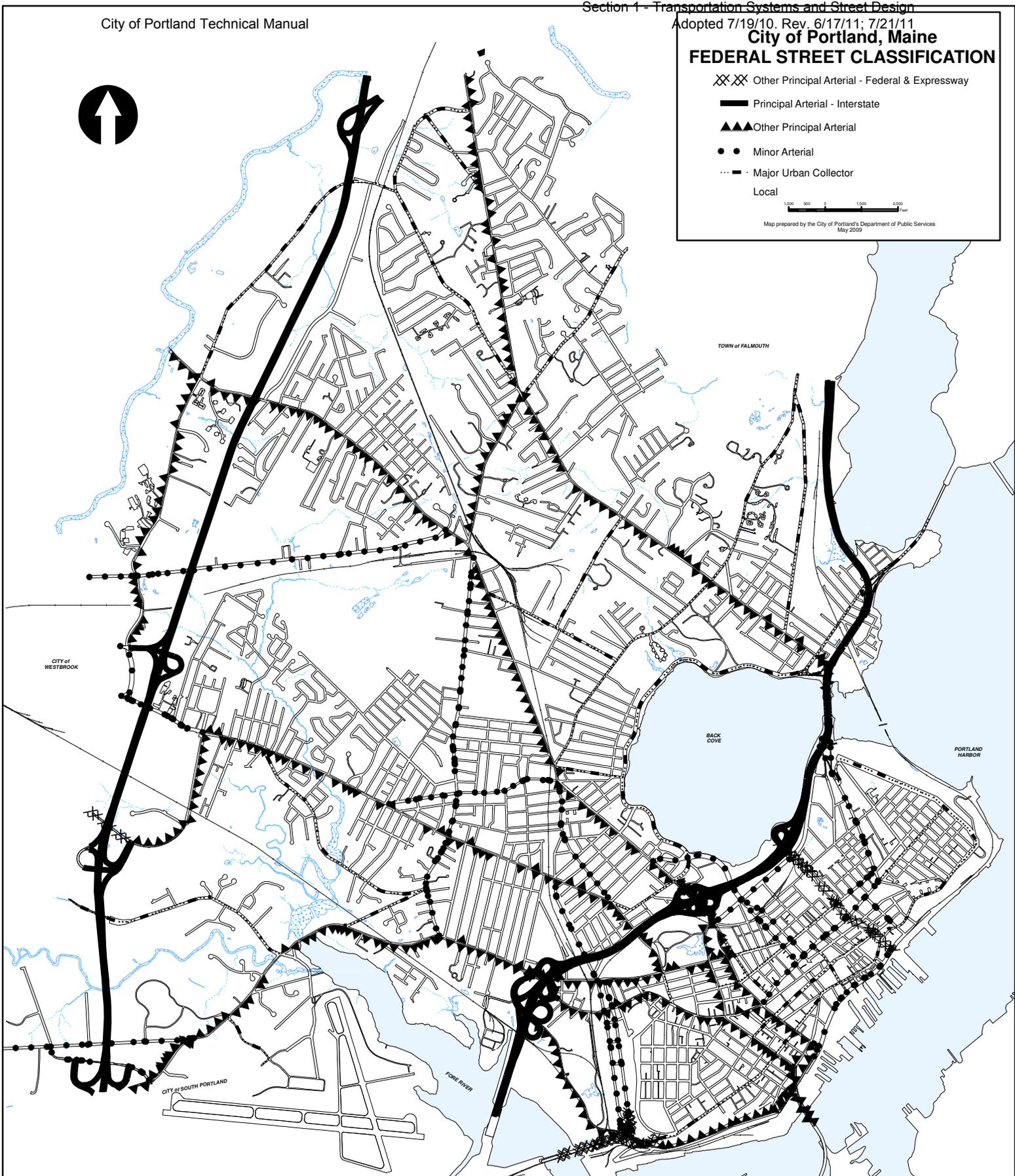
**GUIDELINES FOR CROSSWALK INSTALLATION AT
 UNCONTROLLED INTERSECTIONS AND
 MID-BLOCK CROSSINGS**

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



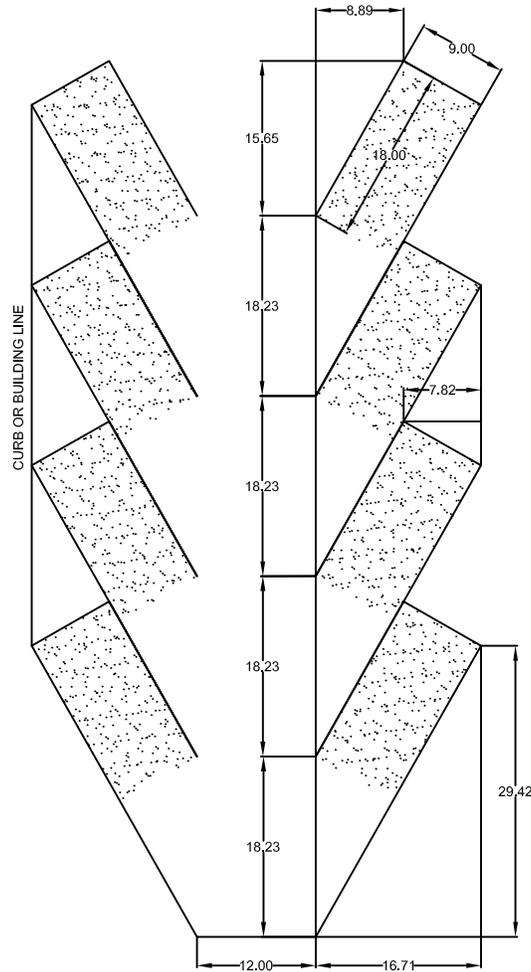
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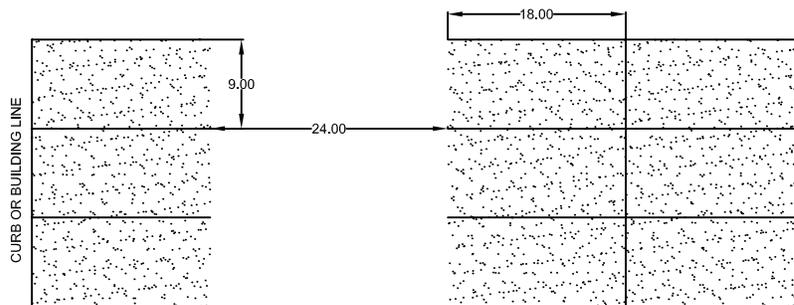
TRANSPORTATION SYSTEMS
AND STREET DESIGN
SECTION I

FIGURE:

FEDERAL STREET CLASSIFICATION



30° PARKING @ 9' x 18'



90° PARKING @ 9' x 18'

STANDARD PARKING SPACES

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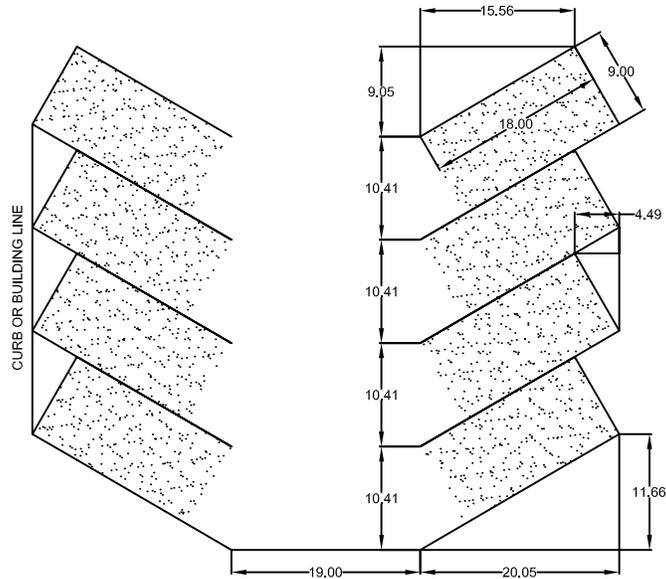
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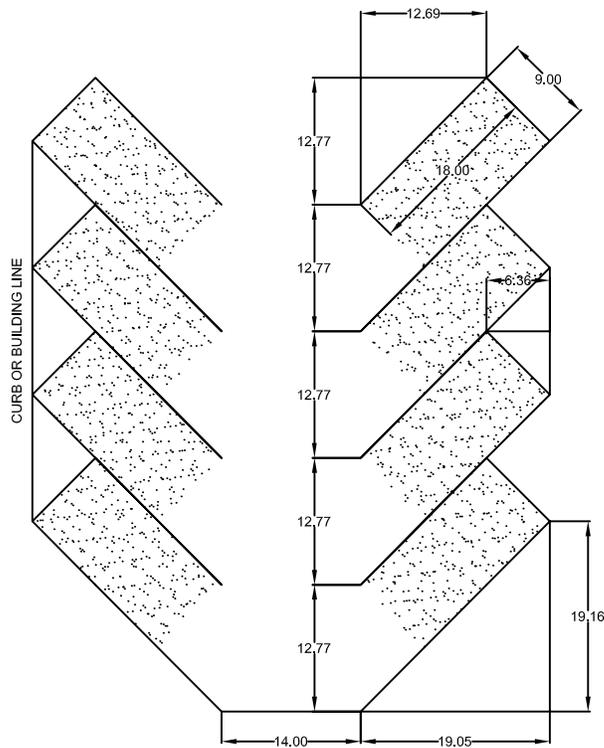
FIGURE:

STANDARD PARKING SPACES

I-27
 60



60° PARKING @ 9' x 18'



45° PARKING @ 9' x 18'

STANDARD PARKING SPACES

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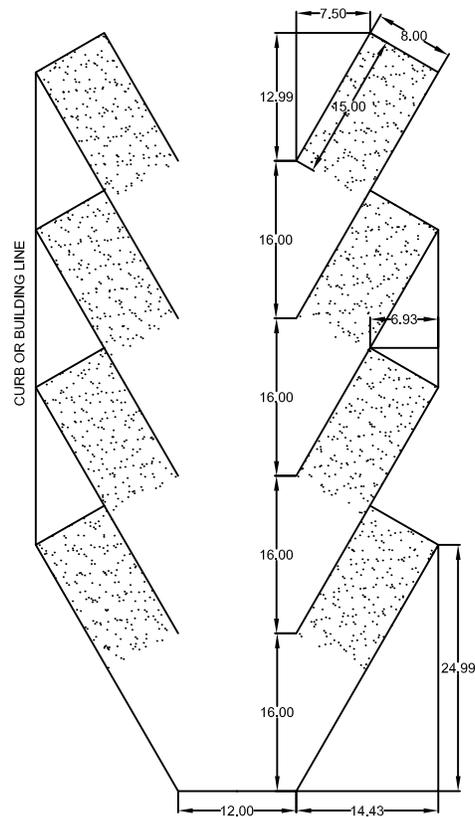
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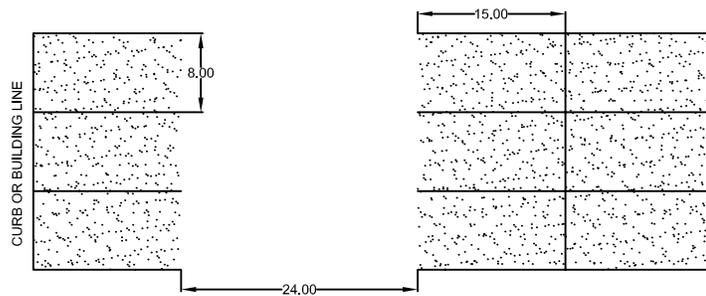
FIGURE:

STANDARD PARKING SPACES

I-28
 61



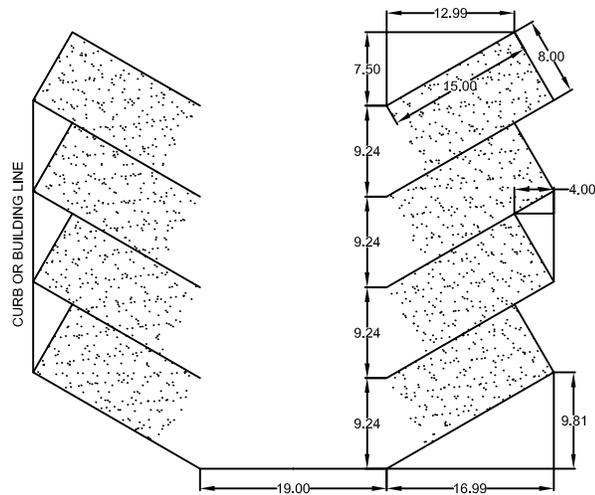
30° PARKING @ 8' x 15'



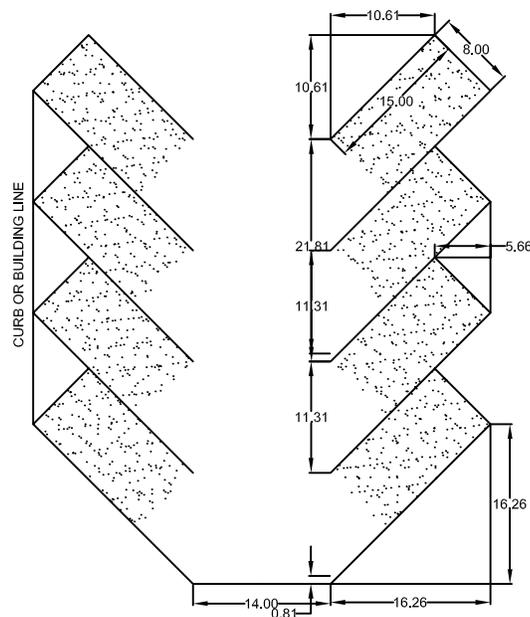
90° PARKING @ 8' x 15'

COMPACT PARKING SPACES

DATE: AUGUST 2009 REVISED:	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	TRANSPORTATION SYSTEMS AND STREET DESIGN SECTION I	FIGURE:
COMPACT PARKING SPACES			I-29 62



60° PARKING @ 8' x 15'



45° PARKING @ 8' x 15'

COMPACT PARKING SPACES

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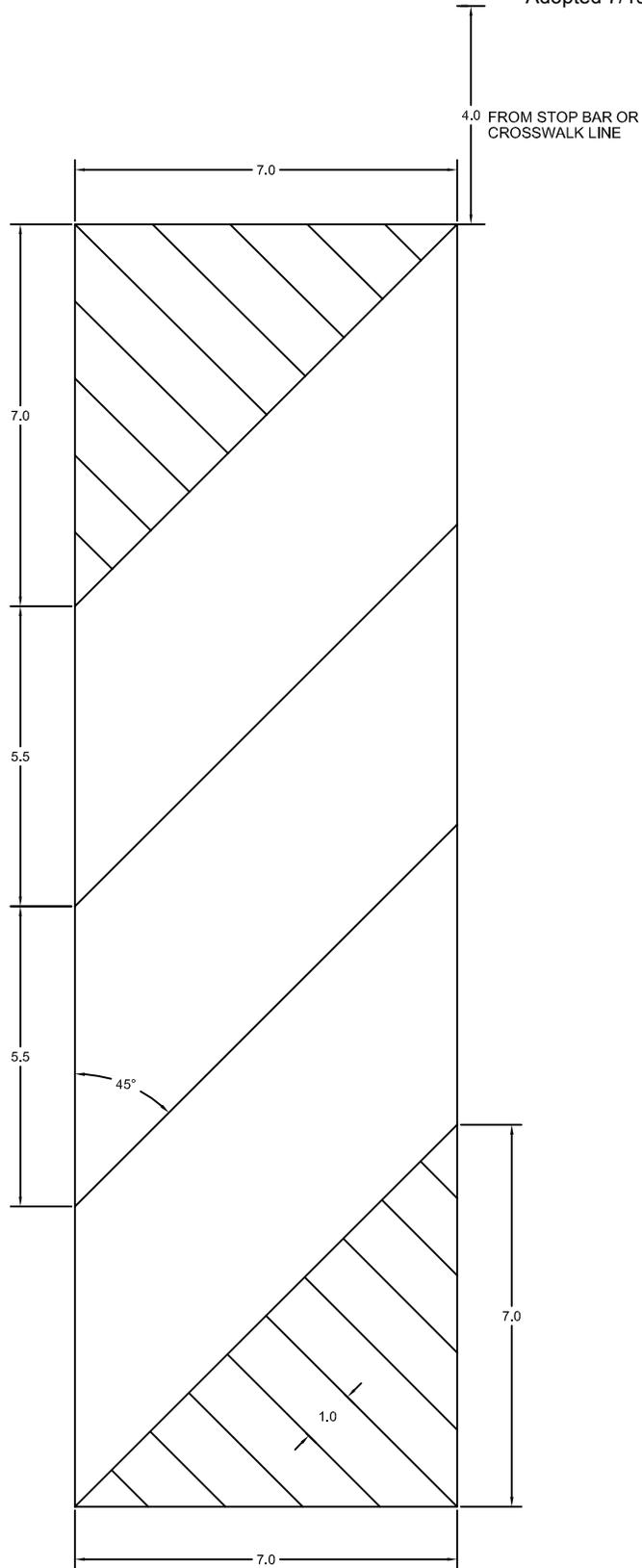
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FIGURE:

COMPACT PARKING SPACES

I-30
63



MOTORCYCLE PARKING

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

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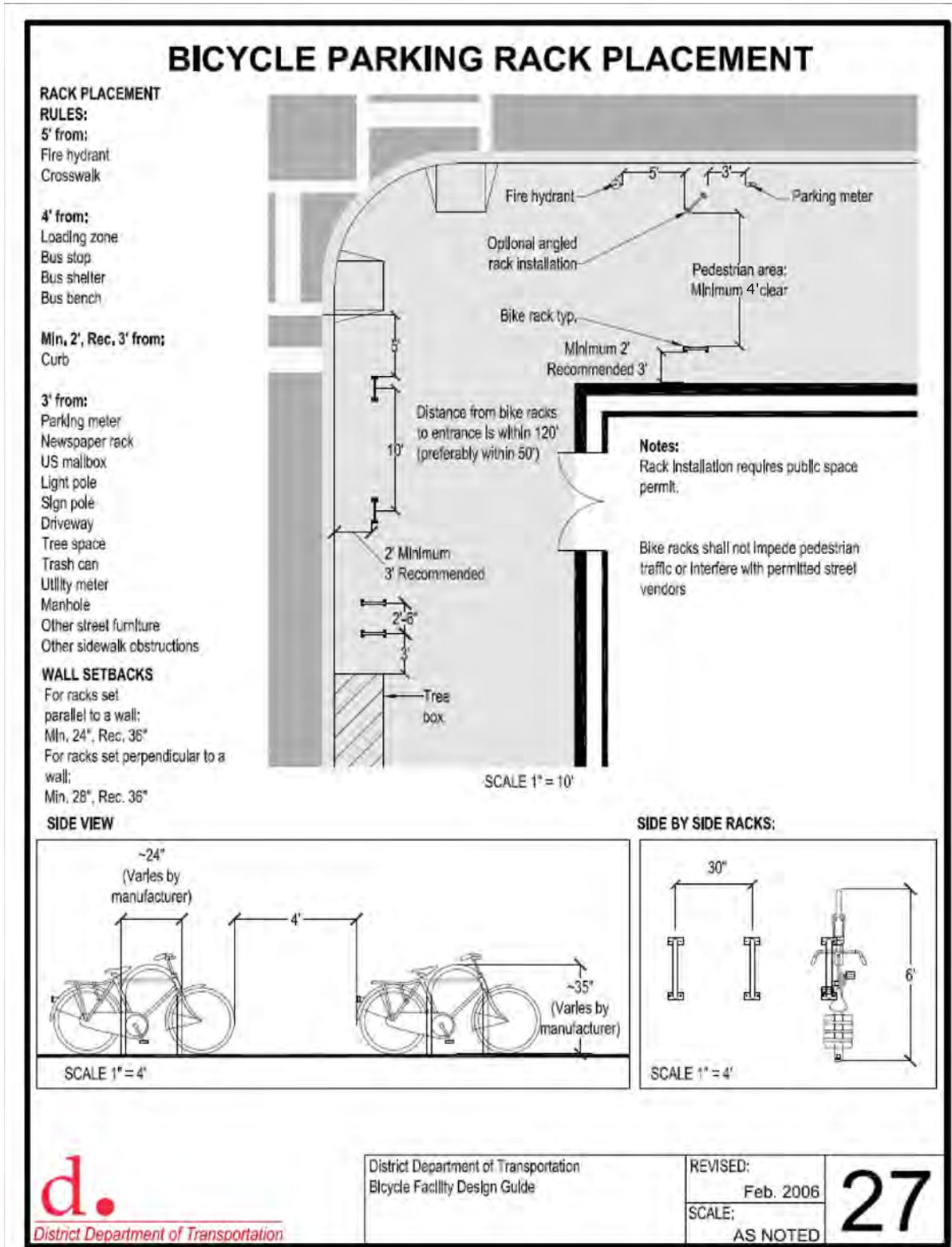
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FIGURE:

MOTORCYCLE PARKING

I-31



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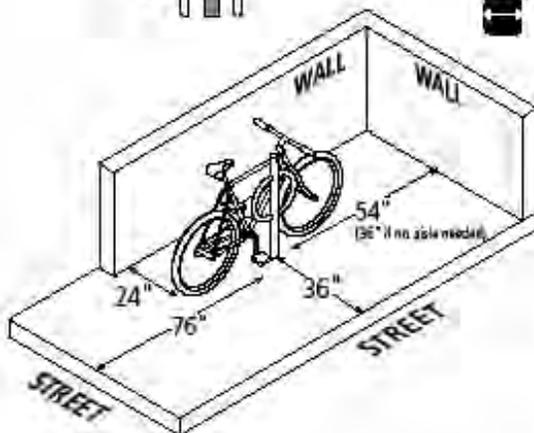
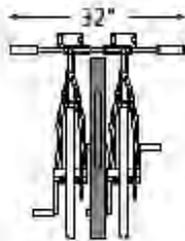
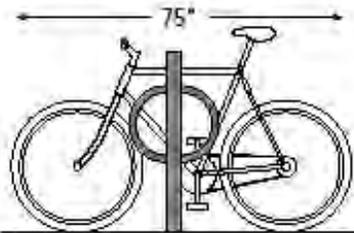
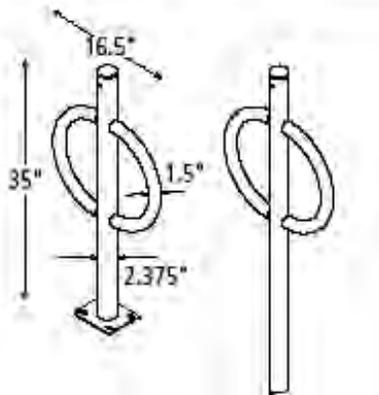
**TRANSPORTATION SYSTEMS
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FIGURE:
I-32
65

BICYCLE PARKING RACK PLACEMENT GUIDELINES

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. 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. 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

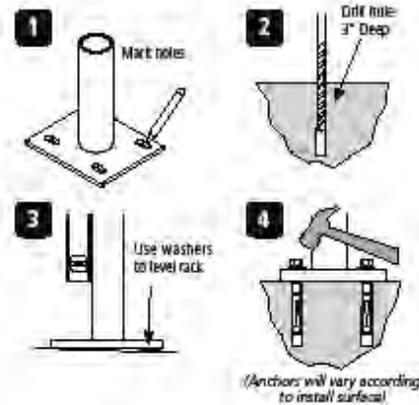
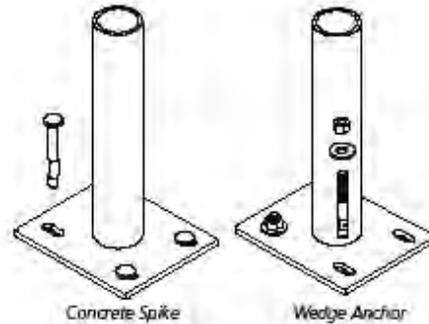
- Tape Measure
- Marker or Pencil
- Masonry Drill Bit
- Drill (Hammer drill recommended)
- Hammer
- Wrench 9/16"
- Level
- Washers (for leveling if necessary)

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.



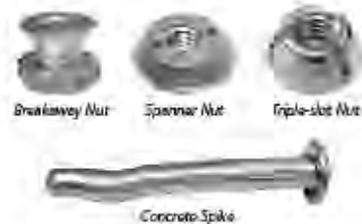
Tamper Resistant Fasteners

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
 67



BIKE HITCH

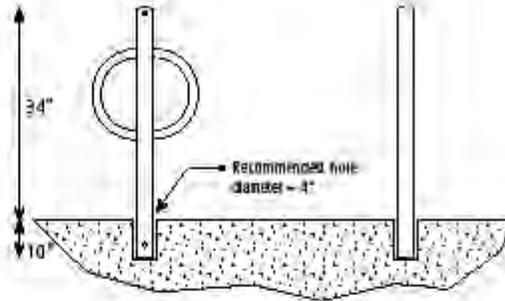
In-ground Installation Instructions

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

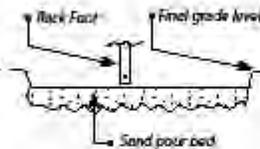
Core holes no less than 3" diameter (4" recommended) and no less than 6" deep into sidewalk. Place Bike Hitch into hole making sure the rack is level. Fill hole with Por-Rok or epoxy grout. 34-36" of the Bike Hitch should remain above the surface. Make sure Hitch is level and held in place until the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



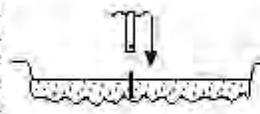
Installing into a New Sidewalk:

Stake Method:

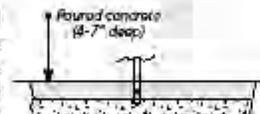
1 Use rack to measure exact location in pour bed.



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 3/5" above final grade level. The stake keeps the rack straight while the concrete is being poured.

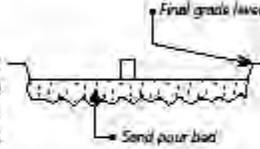


3 Make sure the rack is level and true. Pour concrete around the rack. Make sure the rack is not touched until the concrete has completely set.

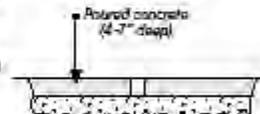


Sleeve Method:

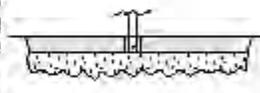
1 Place corrosion resistant sleeve (min. 3" inside diameter) in sand pour bed in exact location where rack will be installed. Make sure top of sleeve is at same level as desired finished concrete surface. Fill sleeve with sand to keep it in place and prevent it from filling with concrete.



2 Pour concrete and allow to cure.

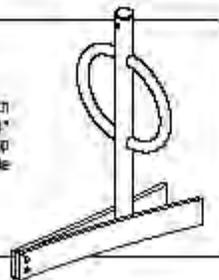


3 After appropriate cure time, dig out sand from sleeves and insert racks, making sure they are level and at the appropriate height. Pour in Por-Rok or epoxy grout and allow to set.

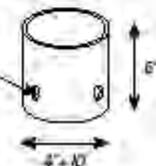


INSTALL TIP

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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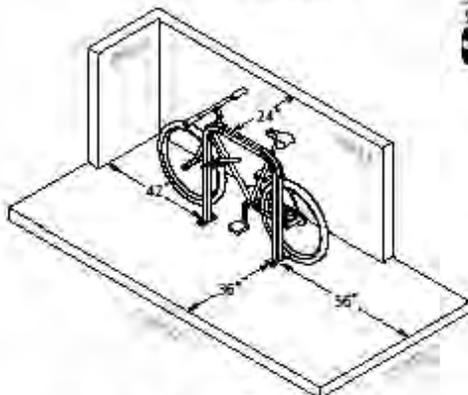
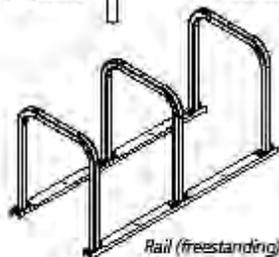
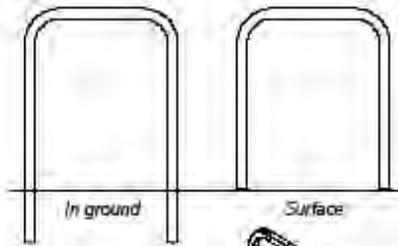
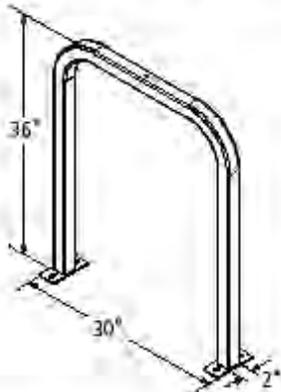
FIGURE:

BICYCLE RACK SPECIFICATION - BIKE HITCH

I-33c
68

DERO DOWNTOWN RACK

Specifications and Space Use



Product: Dero Downtown Rack
 As manufactured by Dero (Nile 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
 69

DERO DOWNTOWN RACK

Installation Instructions - Surface Mount

Tools Needed for Installation

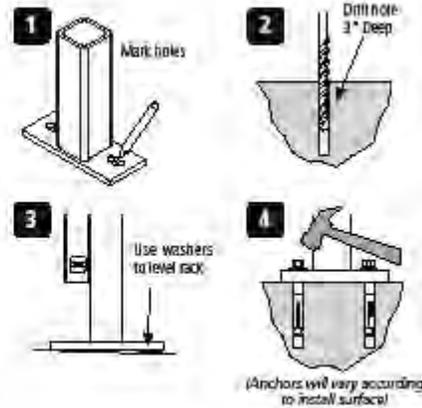
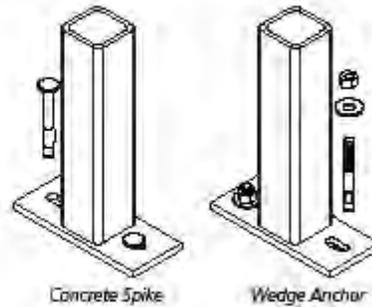
- Tape Measure
- Marker or Pencil
- Masonry Drill Bit
- Drill (Hammer drill recommended)
- Hammer
- Wrench 9/16" (Level)

Recommended Base Materials:

Solid concrete is the best base material for installation. To ensure the proper anchors are shipped with your Dero 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:

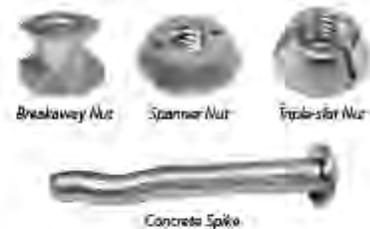
3/8" anchors are shipped with the rack. Place the rack in the desired location. Use a marker or pencil to outline the holes of the flange onto the base material. Drill the holes in accordance with the specifications shipped with the anchors. Make sure the holes are at least 3" away from any cracks in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

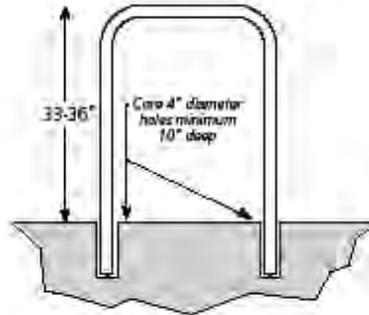
I-34b
70

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) |
| Towel | |



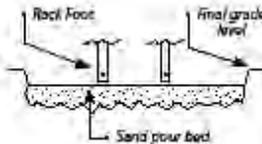
Installing into Existing Sidewalk

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.

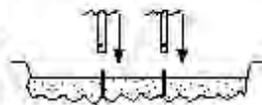
Installing into a New Sidewalk:

Stake Method:

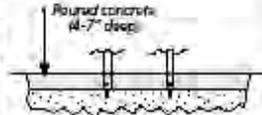
1 Use rack to measure exact location in pour bed.



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.

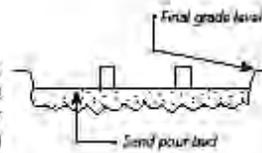


3 Make sure the rack is level and true. Pour concrete around the rack. Make sure the rack is not touched until the concrete has completely set.

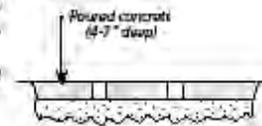


Sleeve Method:

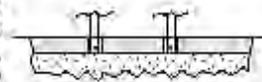
1 Place corrosion resistant sleeve (min. 4" inside diameter) in sand pour bed in exact location where rack will be installed. Make sure top of sleeve is at same level as desired finished concrete surface. Fill sleeve with sand to keep it in place and prevent it from filling with concrete.



2 Pour concrete and allow to cure.

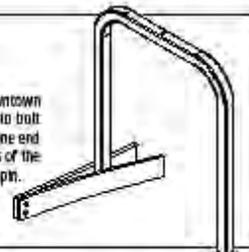


3 After appropriate cure time, dig out sand from sleeves and insert racks, making sure they are level and at the appropriate height. Pour in Por-Rok or epoxy grout and allow to set.

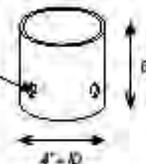


INSTALL TIP

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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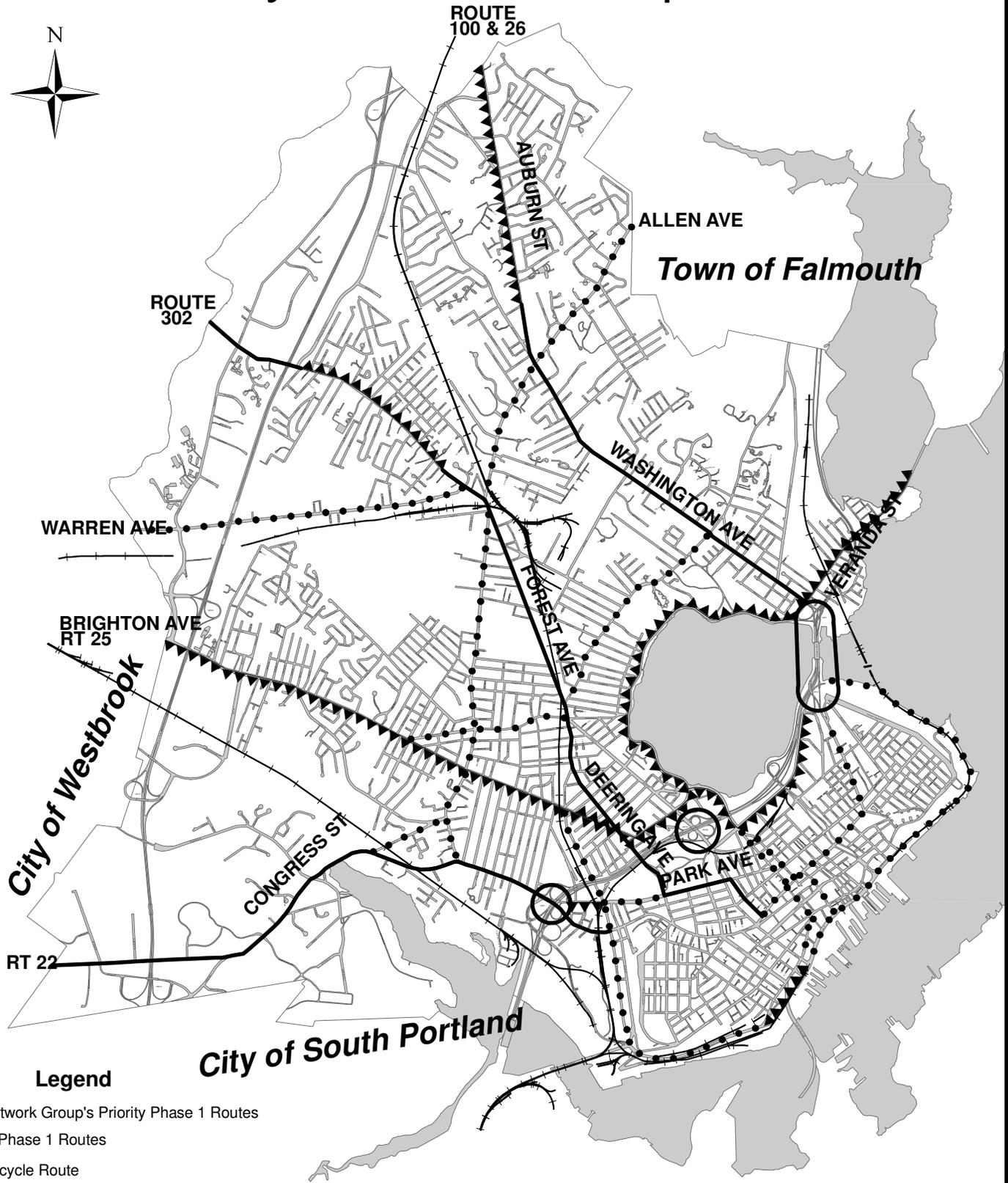
TRANSPORTATION SYSTEMS
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FIGURE:

BICYCLE RACK SPECIFICATION - DOWNTOWN RACK

I-34c
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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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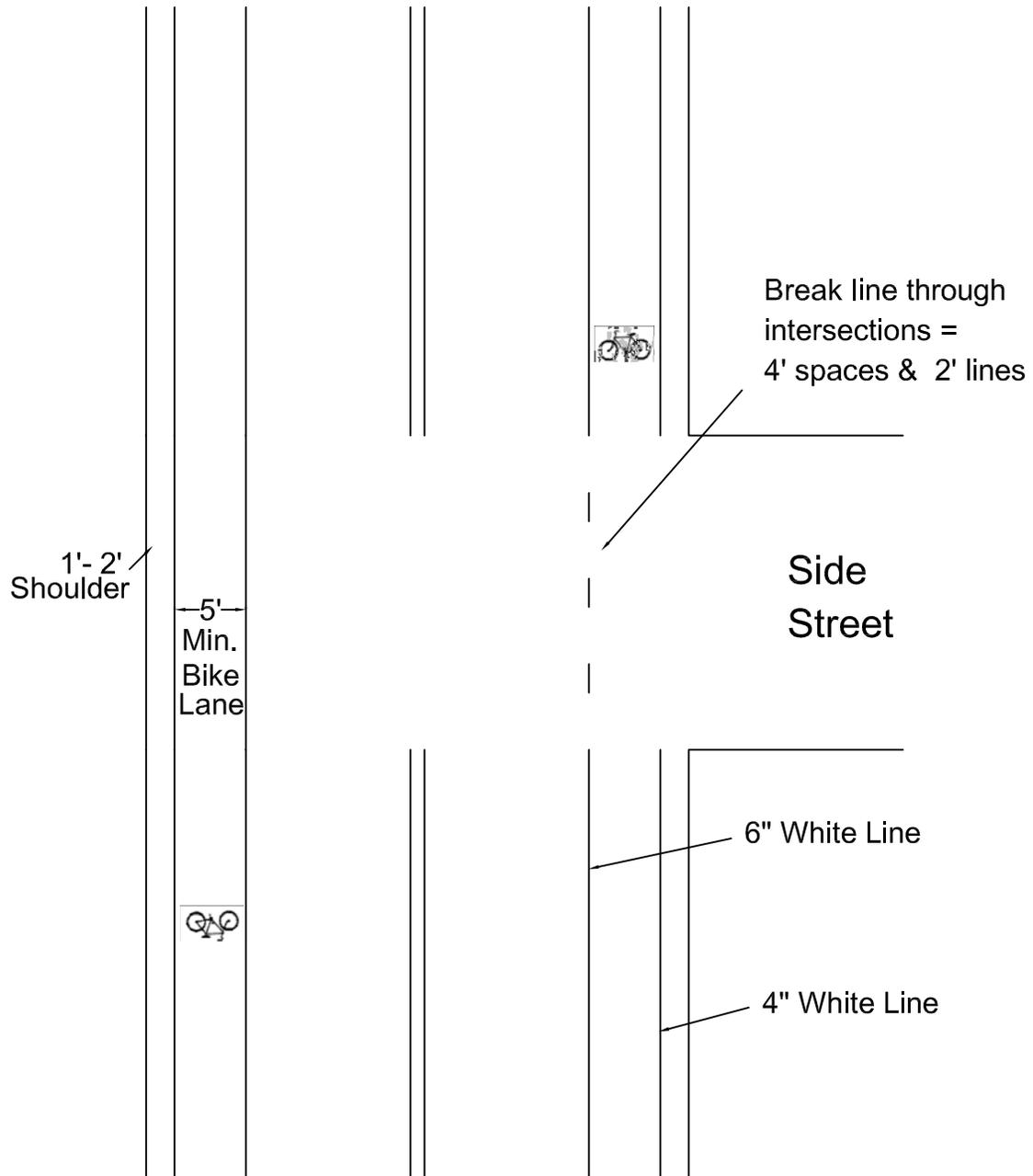
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FIGURE:

BICYCLE NETWORK MAP

I-35



City Street w/ Bike Lanes

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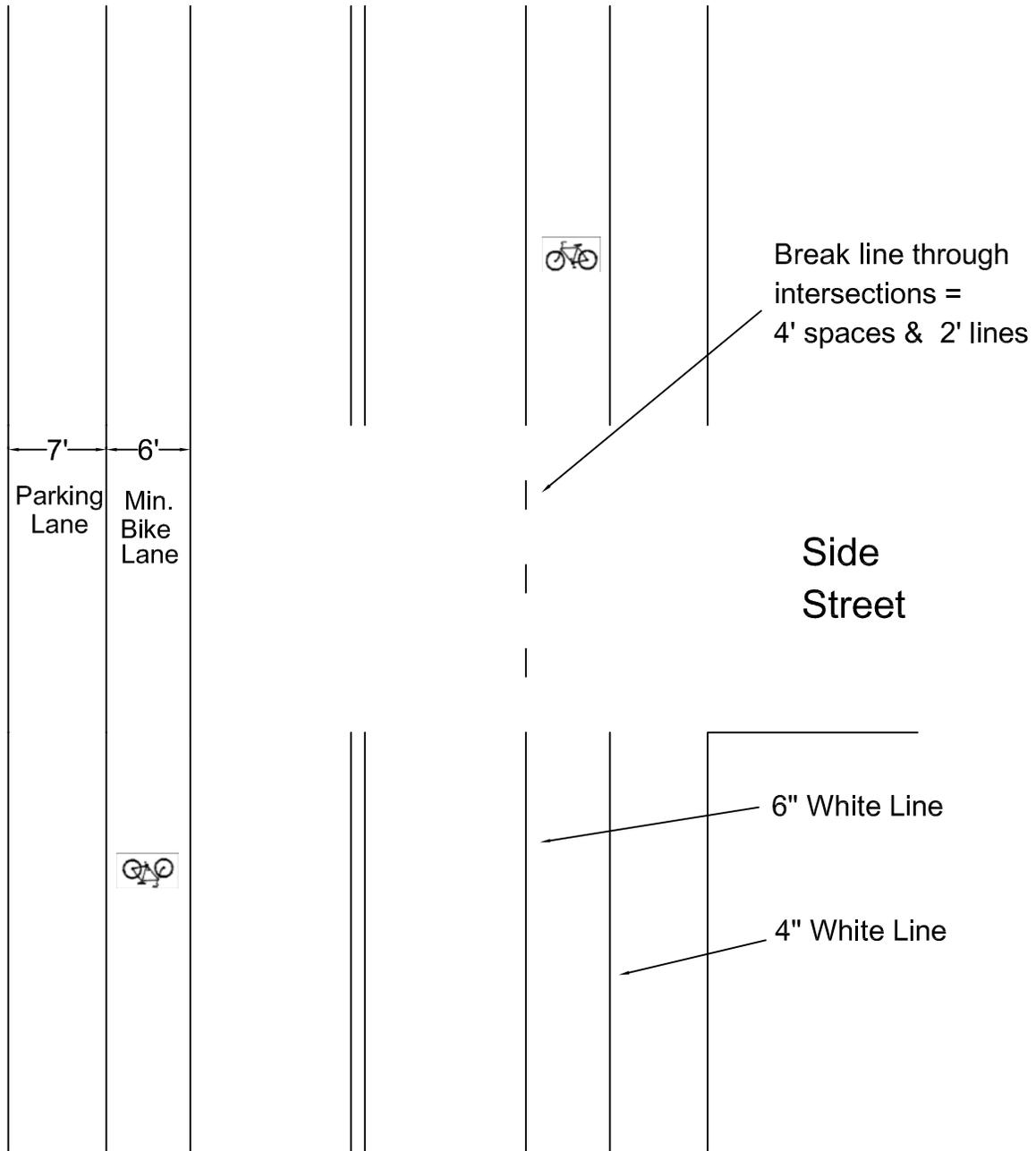
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FIGURE:

CITY STREET W/BIKE LANES

I-36
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City Street w/ Parking & Bike Lanes

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FIGURE:

CITY STREET W/ PARKING & BIKE LANES

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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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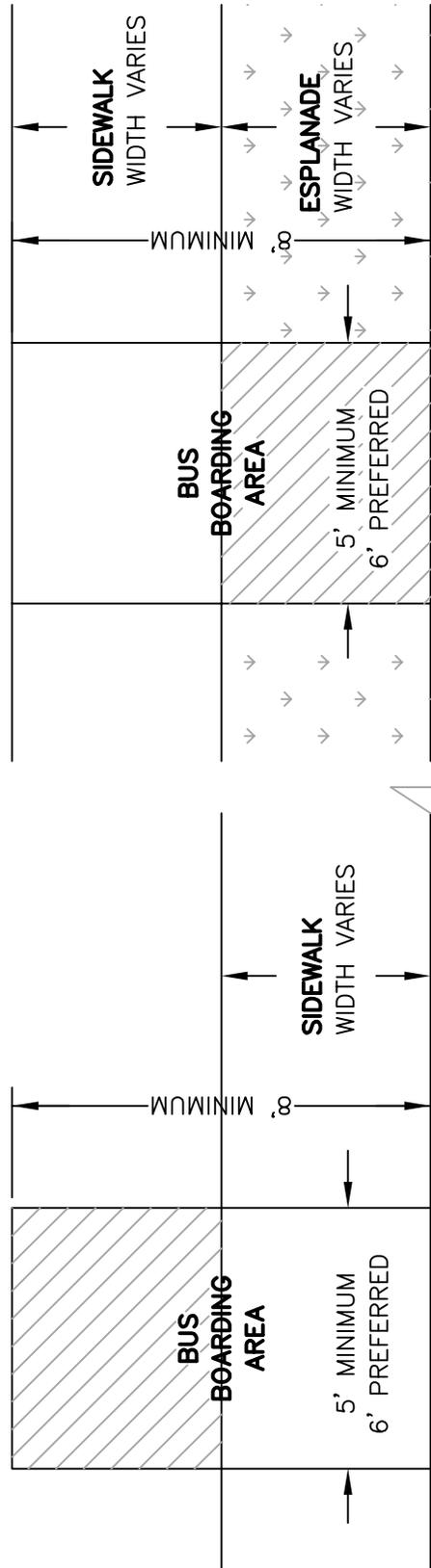
FIGURE:

**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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FIGURE:

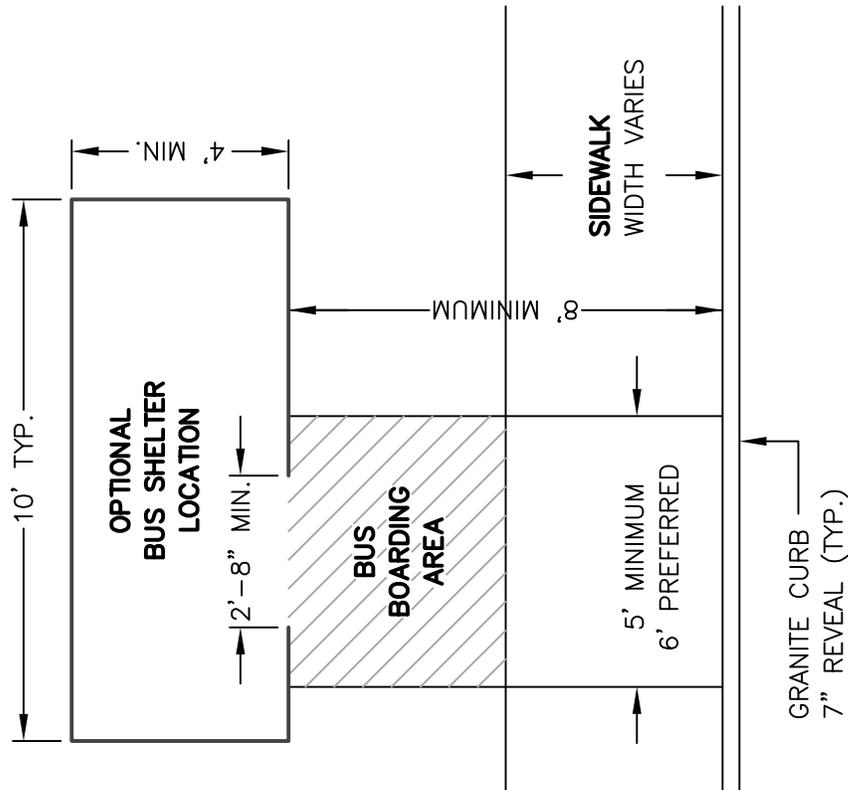
**BUS STOP BOARDING AREA LAYOUT FOR
SIDEWALK WITH OR WITHOUT ESPLANADE**

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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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 use 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:

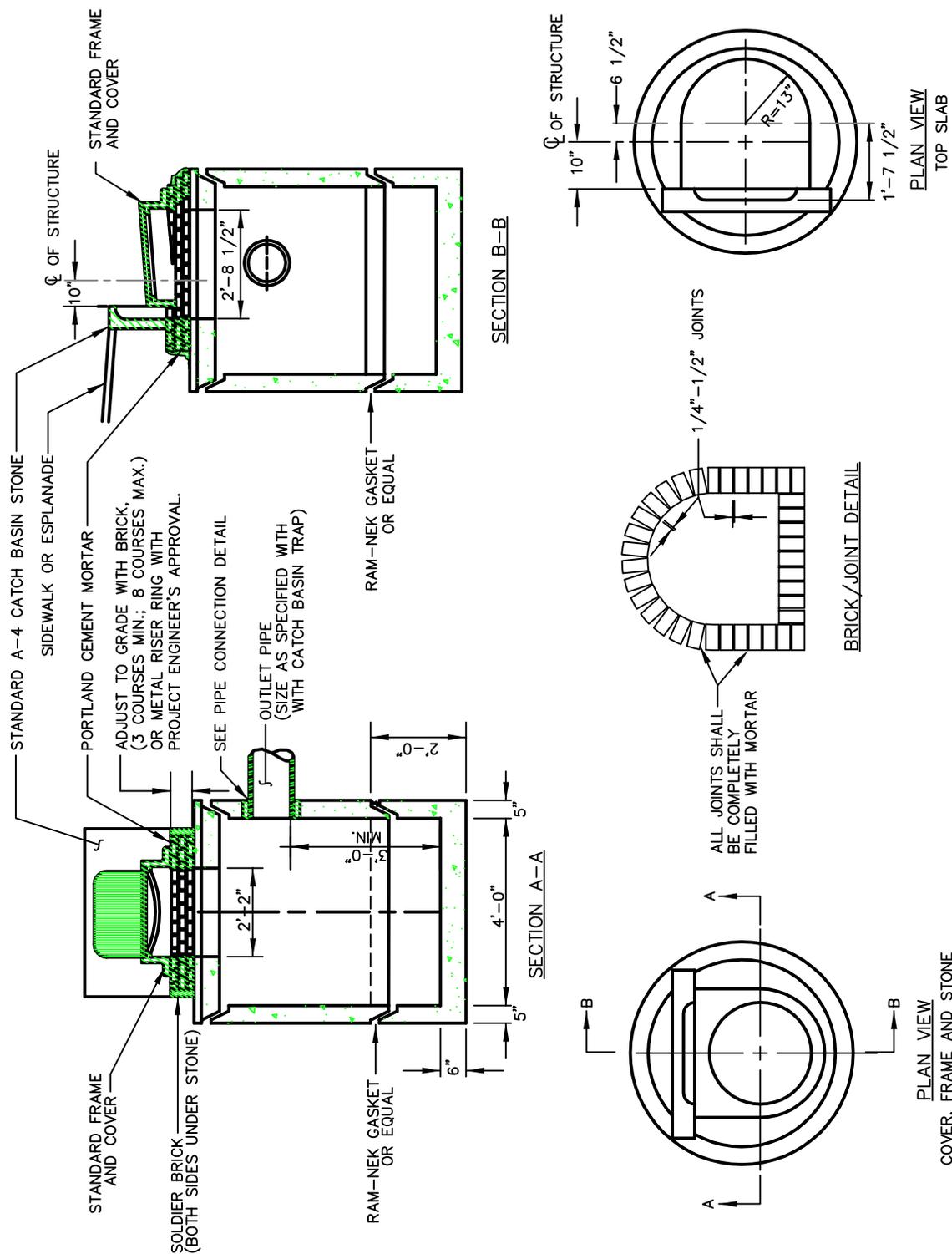
Sieve Designation	Percentage by Weight Passing Square Mesh Sieve
1 ¼ inch	100
3/8 inch	20-55
No. 4	0-10

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.

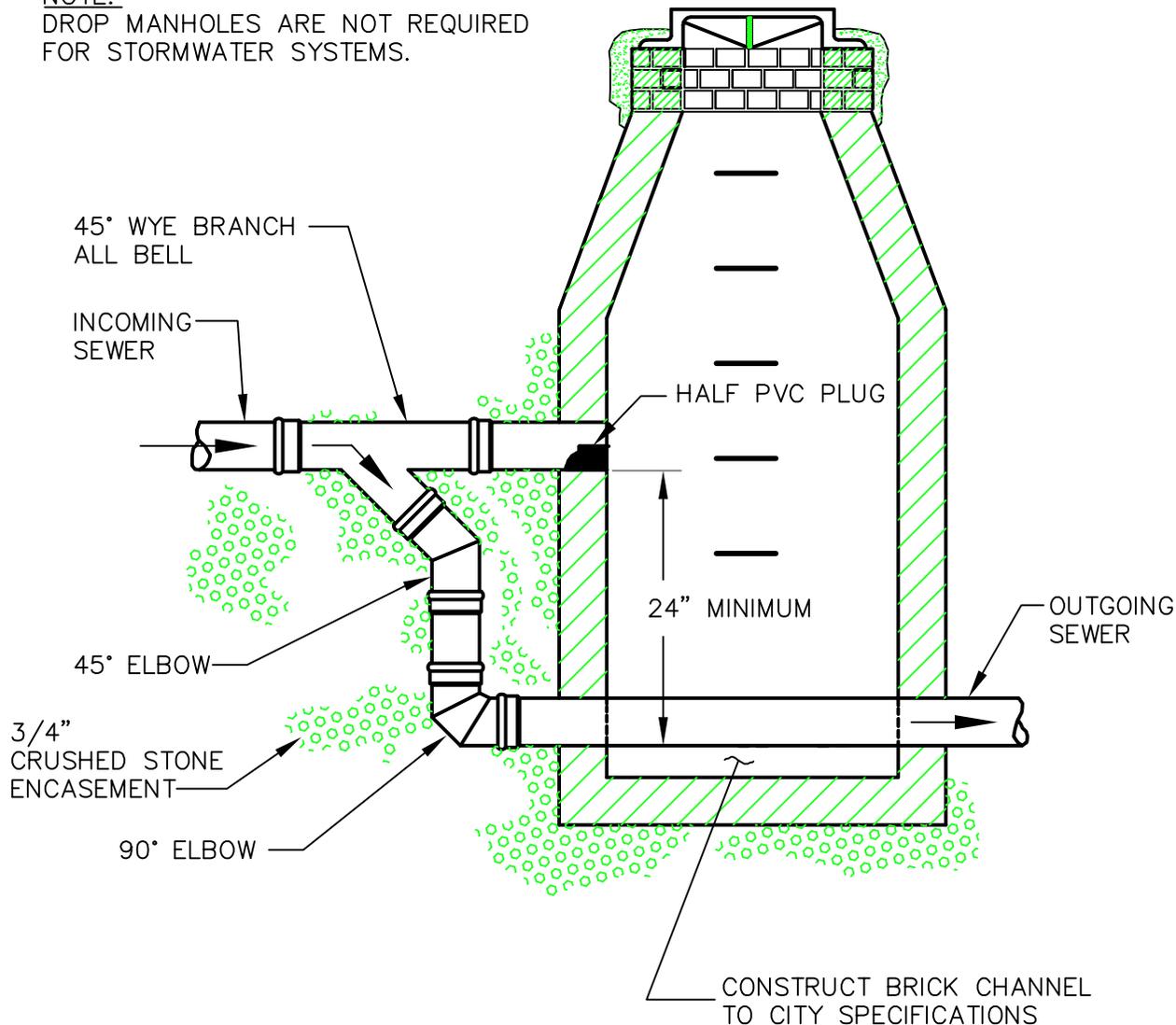
2.10.2. Developers are required to obtain a permit through the City of Portland Inspections Division prior to the installation of any subsurface wastewater disposal system identified on an approved site plan.



PRECAST CONCRETE 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
 DRAIN DESIGN STANDARDS**
 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:

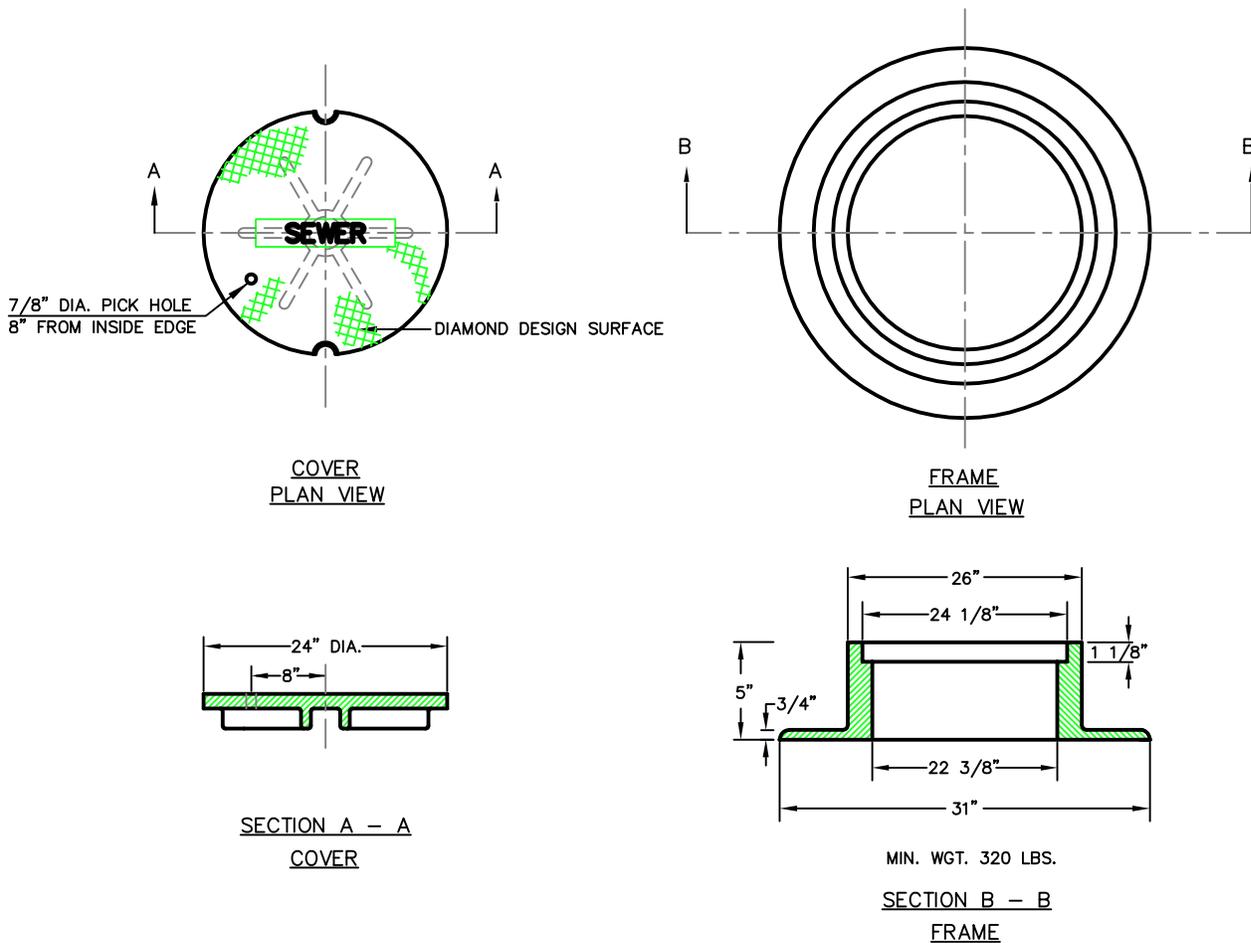
**GENERAL NOTES FOR
 MANHOLES AND CATCH BASINS**

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

DATE:
 AUGUST 2009
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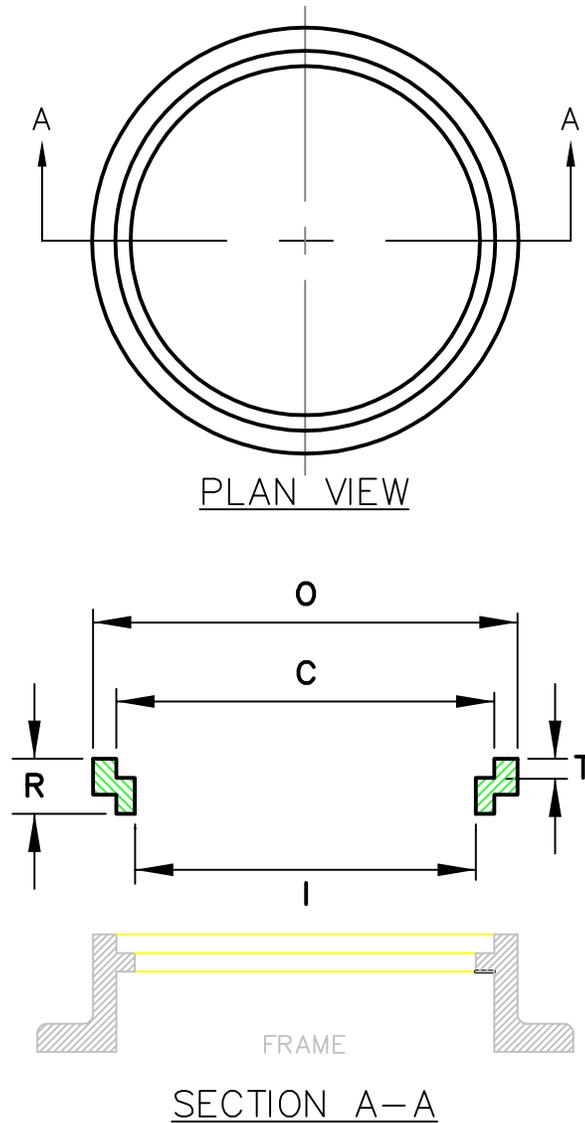
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 TECHNICAL STANDARDS MANUAL

**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

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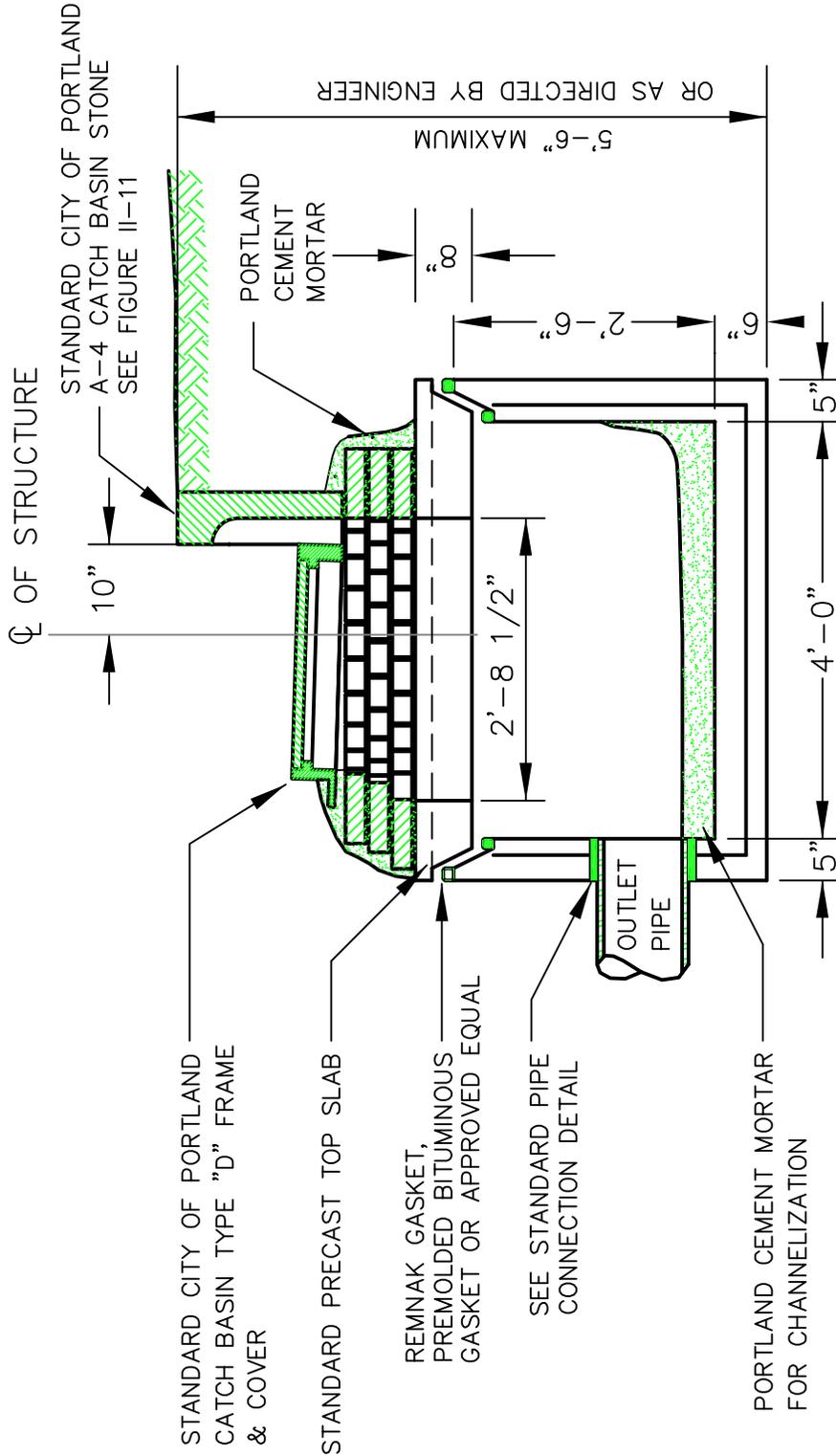
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 SECTION II

FIGURE:

MANHOLE RISER RING

II-6



CATCH BASIN INLET
 NOT TO SCALE

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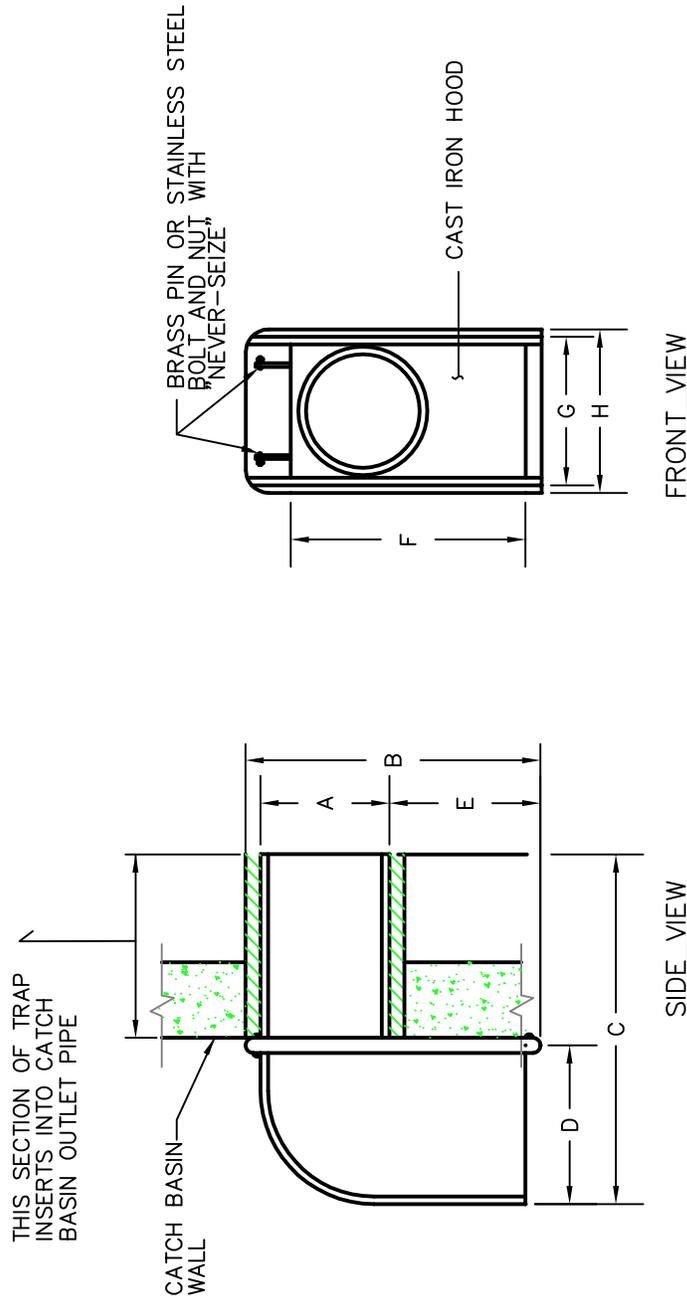
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FIGURE:

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:

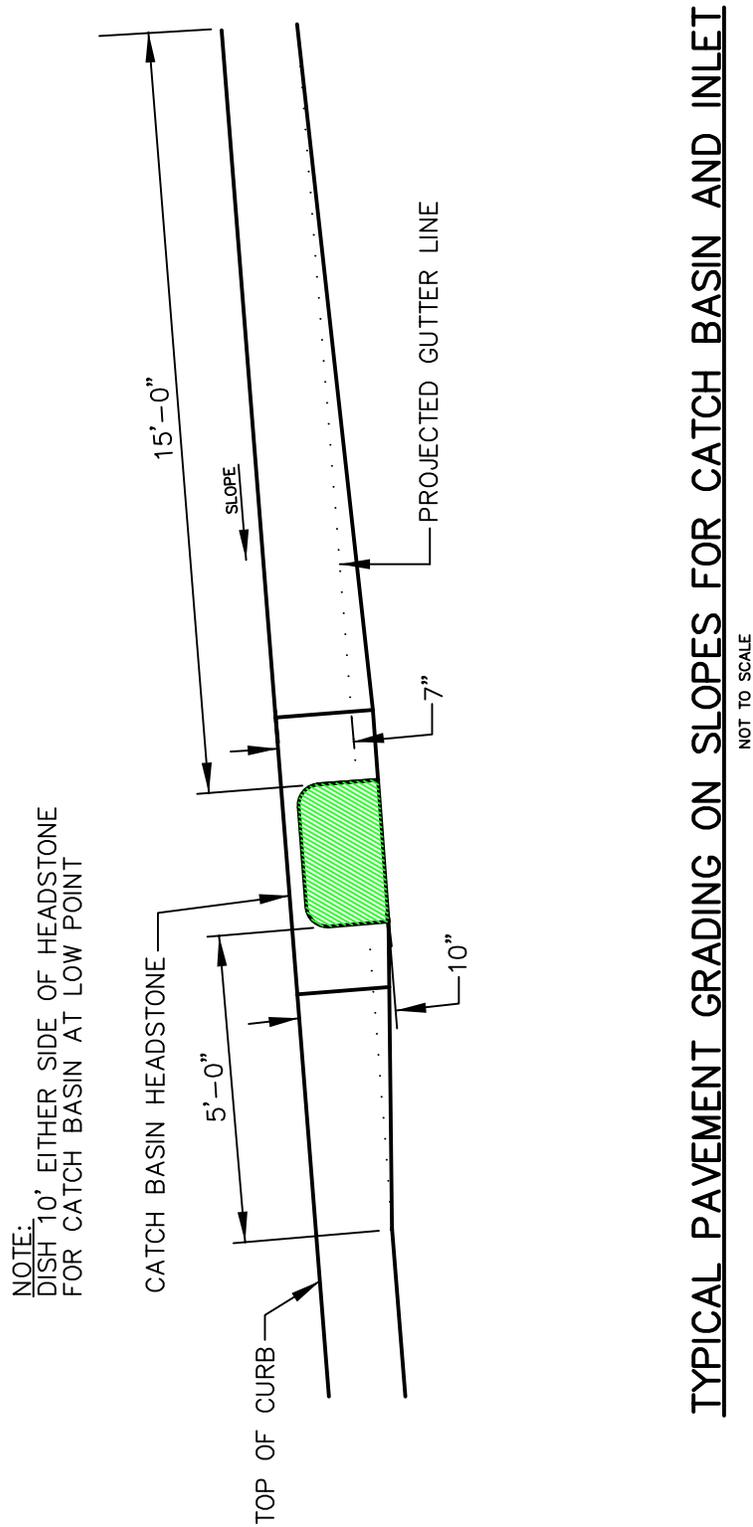
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**SANITARY SEWER AND STORM
DRAIN DESIGN STANDARDS**
SECTION II

FIGURE:

CASCO TRAP

II-9



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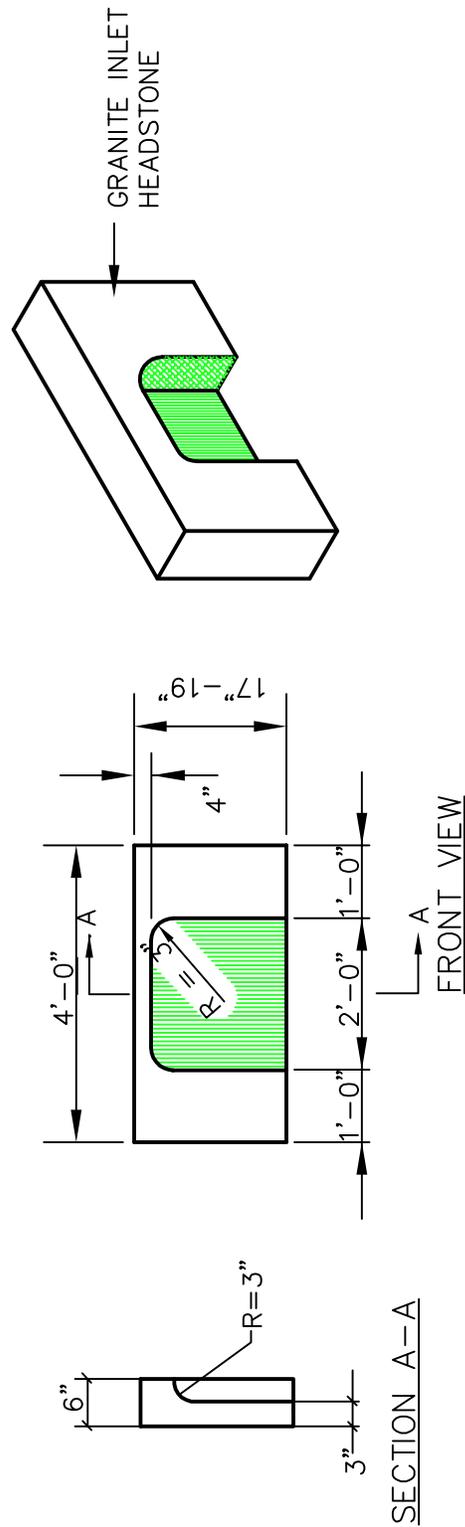
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**SANITARY SEWER AND STORM
 DRAIN DESIGN STANDARDS**
 SECTION II

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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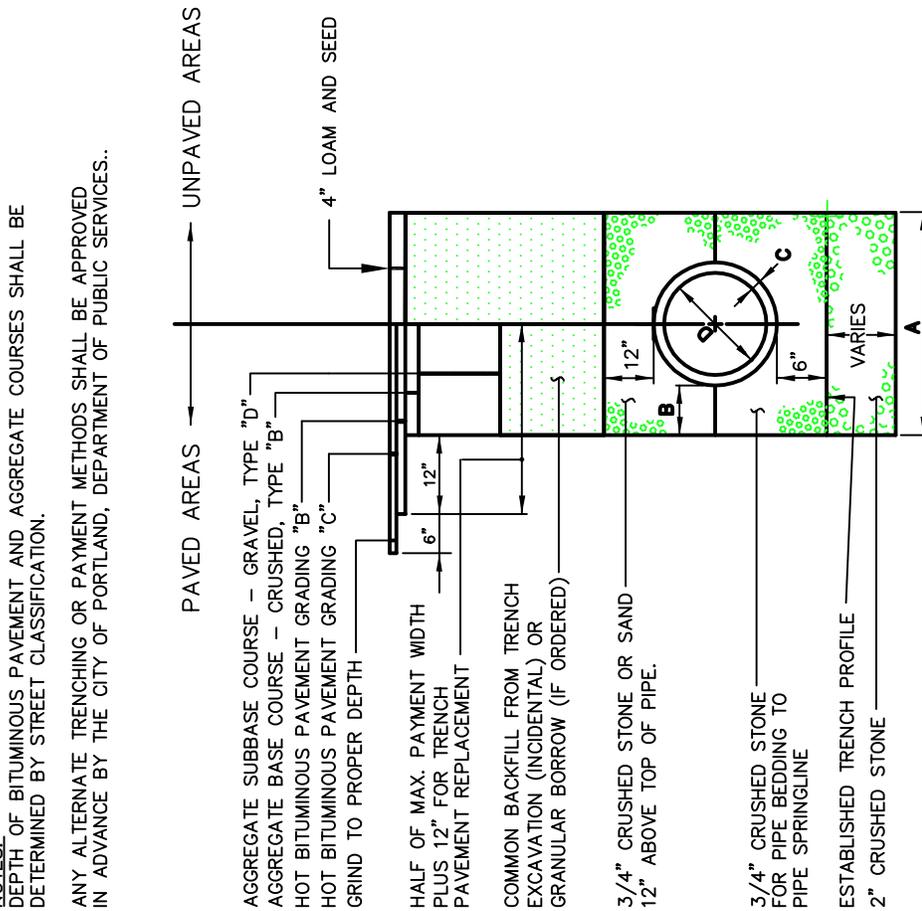
FIGURE:

4' GRANITE HEADSTONE FOR CATCH BASIN INLET

II-11

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

1. ALTERNATE TRENCHING OR PAYMENT METHODS SHALL BE APPROVED IN ADVANCE BY THE CITY OF PORTLAND, DEPARTMENT OF PUBLIC SERVICES..
2. ANY ALTERNATE TRENCHING OR PAYMENT METHODS SHALL BE APPROVED IN ADVANCE BY THE CITY OF PORTLAND, DEPARTMENT OF PUBLIC SERVICES..
3. 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.
4. 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". 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

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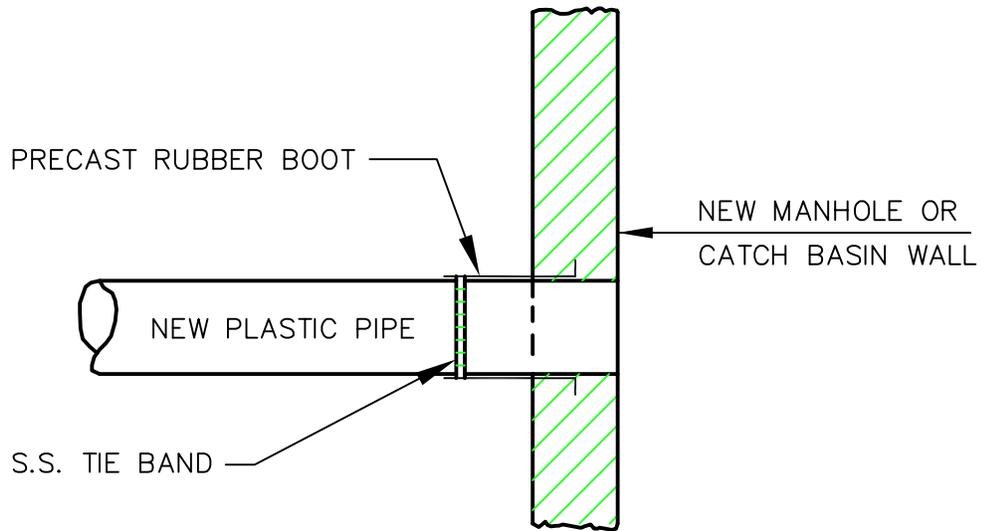
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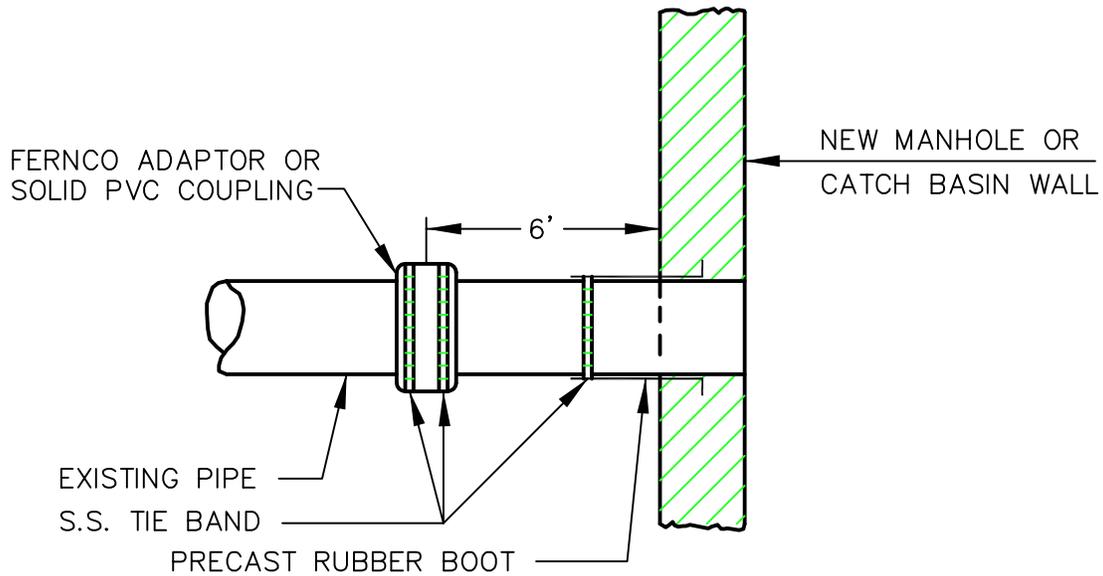
FIGURE:

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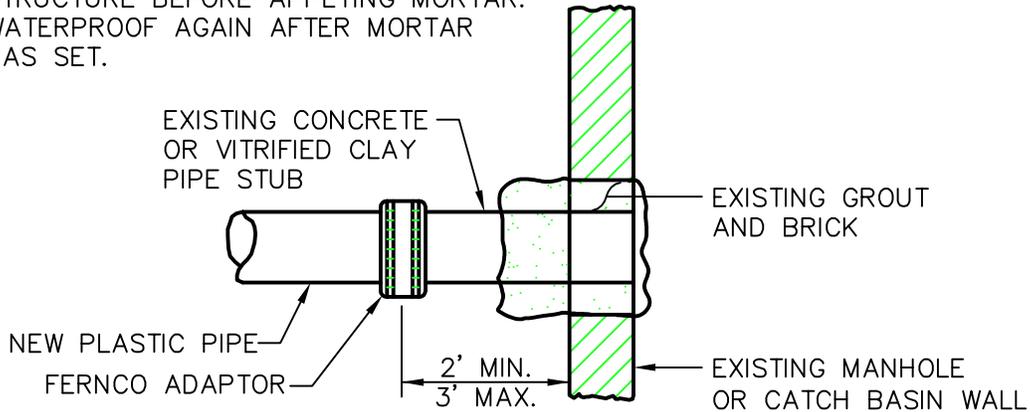
**SANITARY SEWER AND STORM
 DRAIN DESIGN STANDARDS**
 SECTION II

FIGURE:

PLASTIC PIPE CONNECTION METHODS 1 & 2

II-13

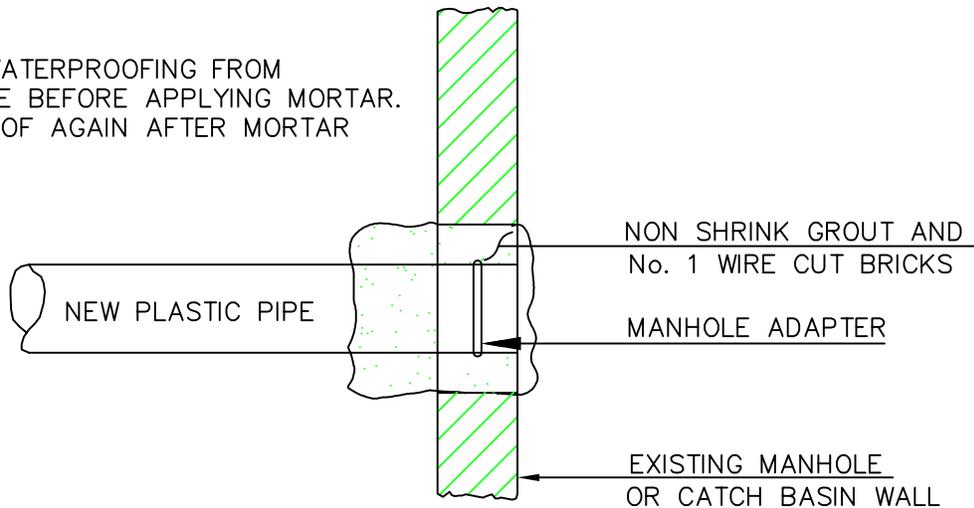
NOTE:
 REMOVE WATERPROOFING FROM
 STRUCTURE BEFORE APPLYING MORTAR.
 WATERPROOF AGAIN AFTER MORTAR
 HAS SET.



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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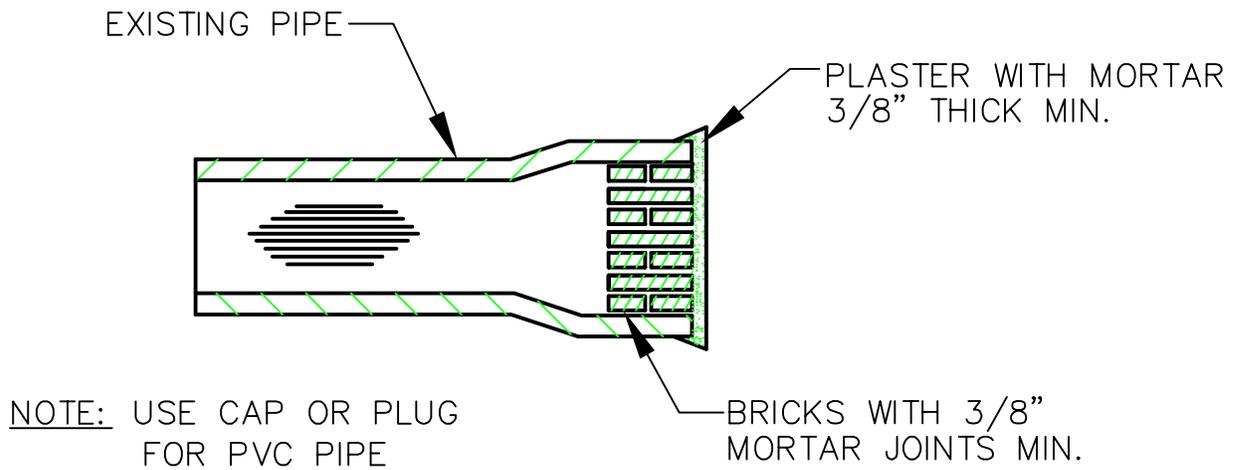
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FIGURE:

PLASTIC PIPE CONNECTION METHODS 3 & 4

II-14



MASONRY PLUG

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FIGURE:

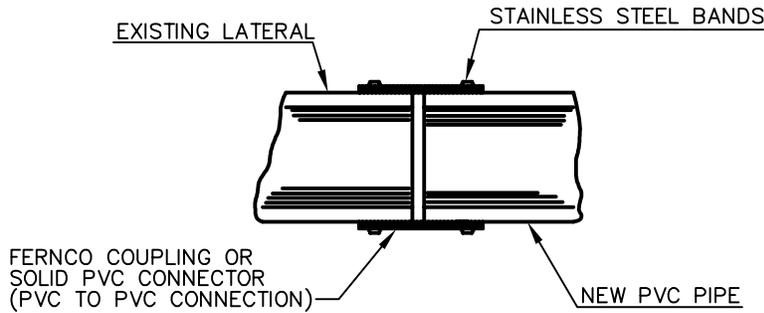
MASONRY PLUG

II-15

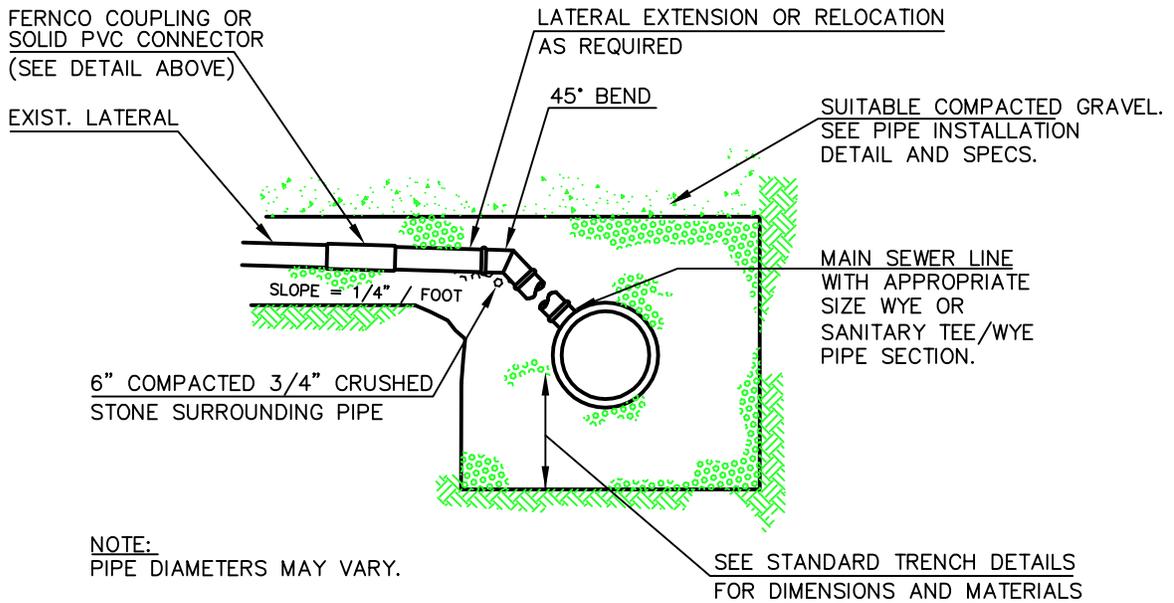
NOTE:

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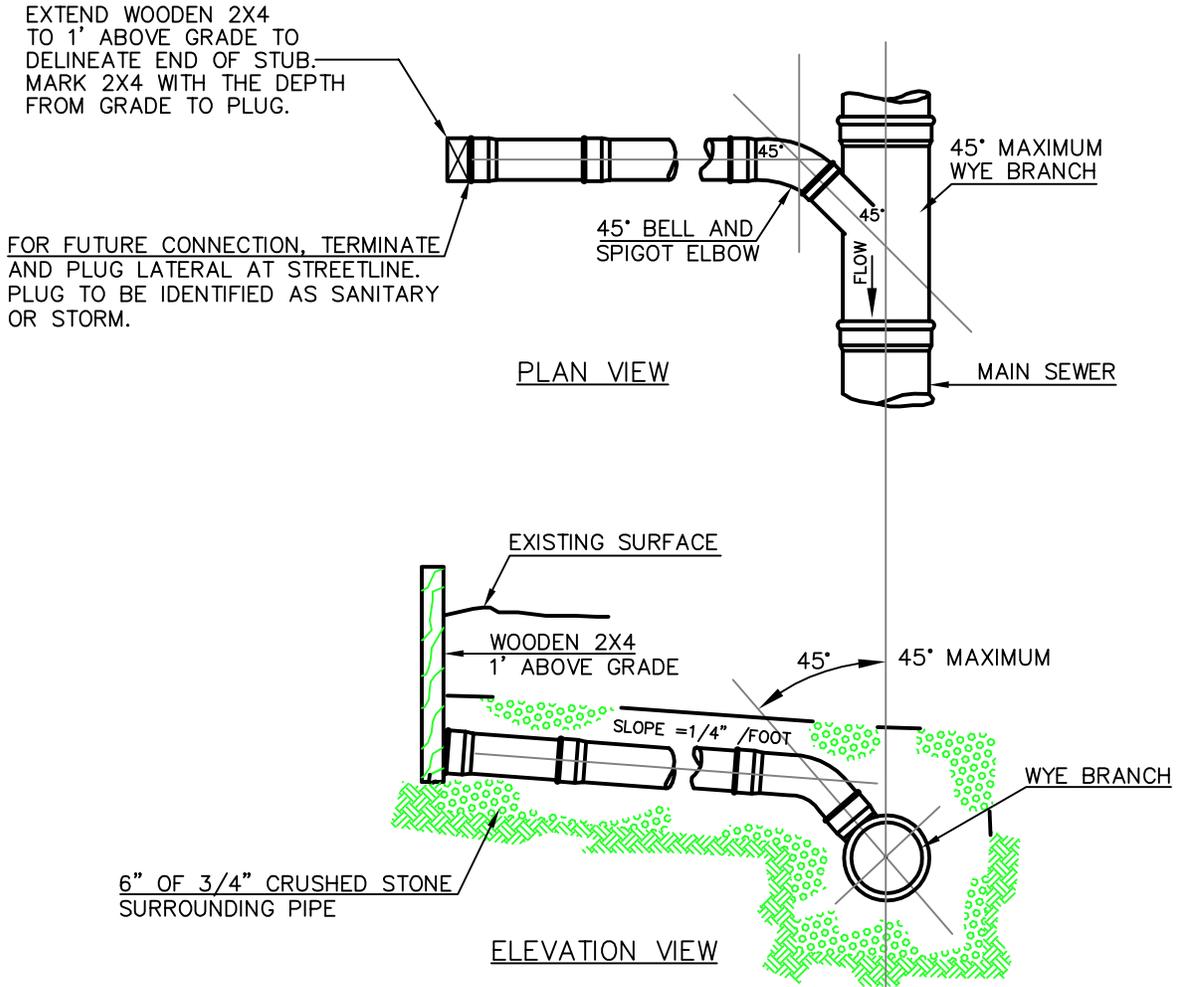
**SANITARY SEWER AND STORM
 DRAIN DESIGN STANDARDS**
 SECTION II

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:
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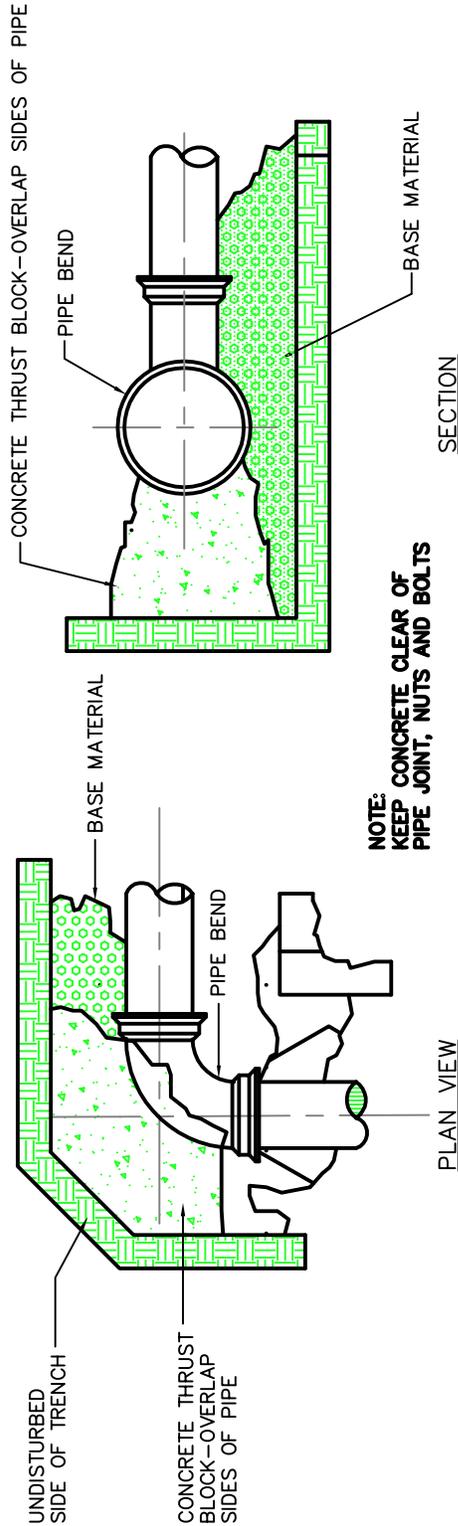
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 DRAIN DESIGN STANDARDS**
 SECTION II

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**

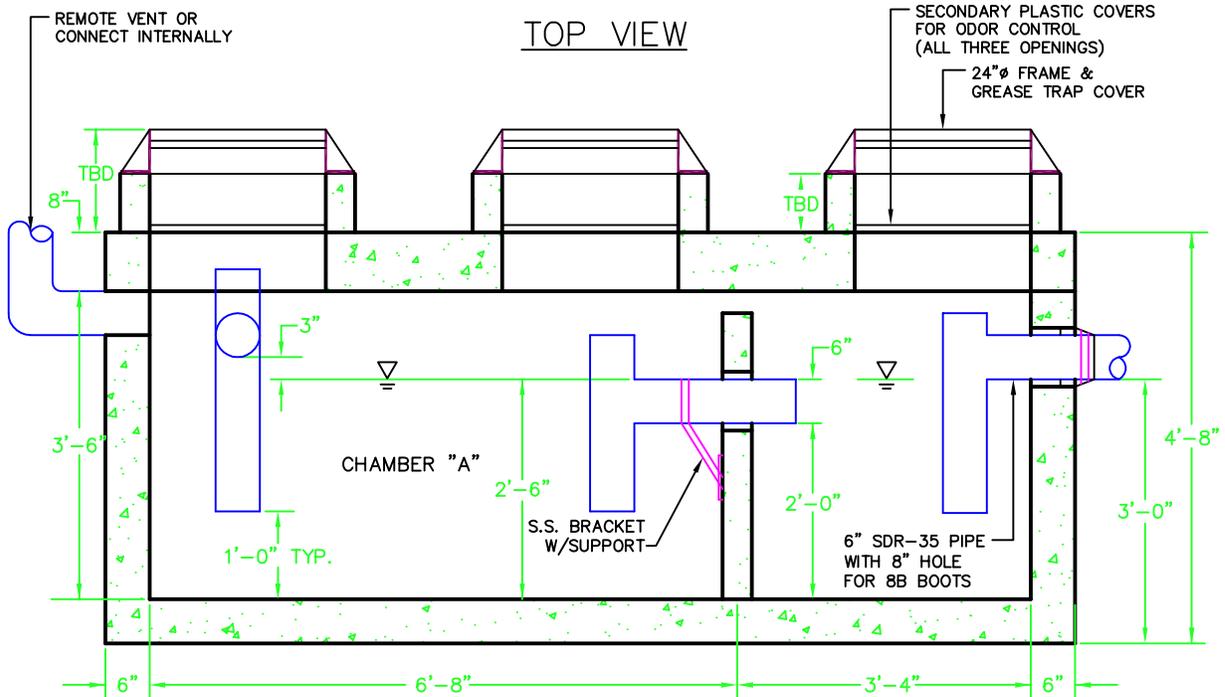
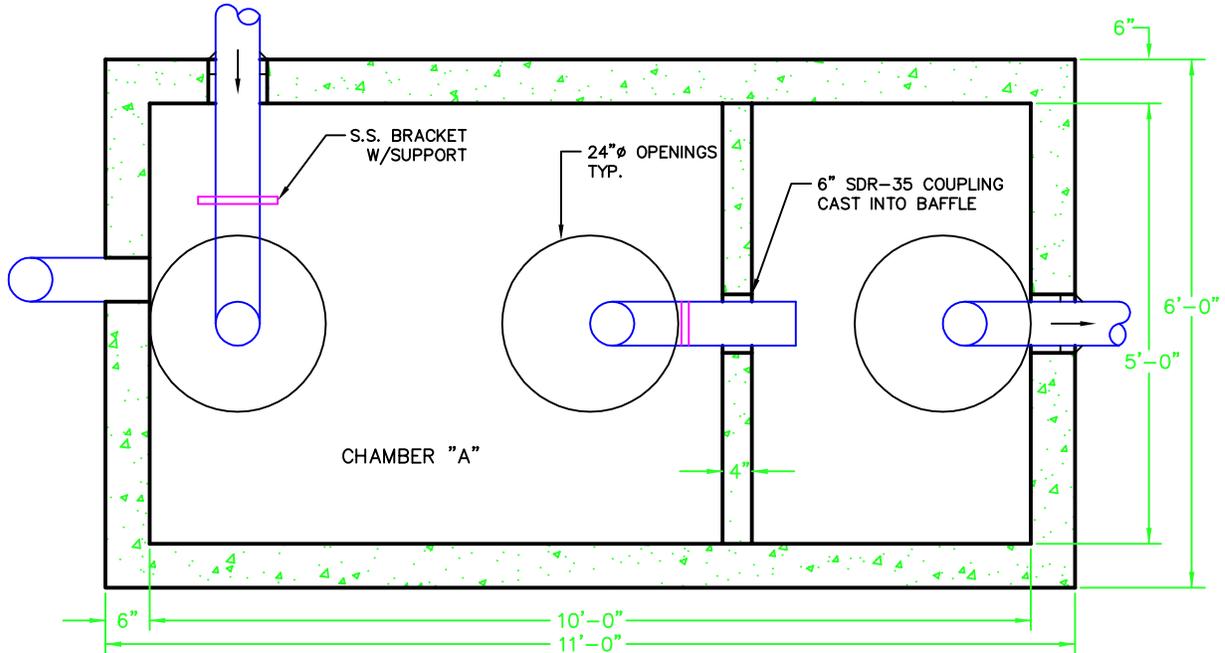
II-18

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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 DRAIN DESIGN STANDARDS**
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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 the City of Portland shall have a hydrant within five hundred (500') feet of all structures.
- 3.2.2. All hydrants, private and public, shall comply with city code Chapter 10 and Portland Water District 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.
- 3.2.4. A 6 ft. clear space shall be maintained around the circumference of fire hydrants, private or public, except as otherwise required or approved.

3.3. SINGLE AND TWO FAMILY RESIDENTIAL DEVELOPMENT

- 3.3.1. As of September 16, 2010 all new construction of one- and two-family homes are required to be sprinkled in compliance with adopted NFPA code.

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 84 x 24 inch stretcher.
- 3.4.7 Street name and street numbering shall be determined during development / subdivision review and shall comply with Portland's 911 numbering system.
- 3.4.8. 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

- 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*).

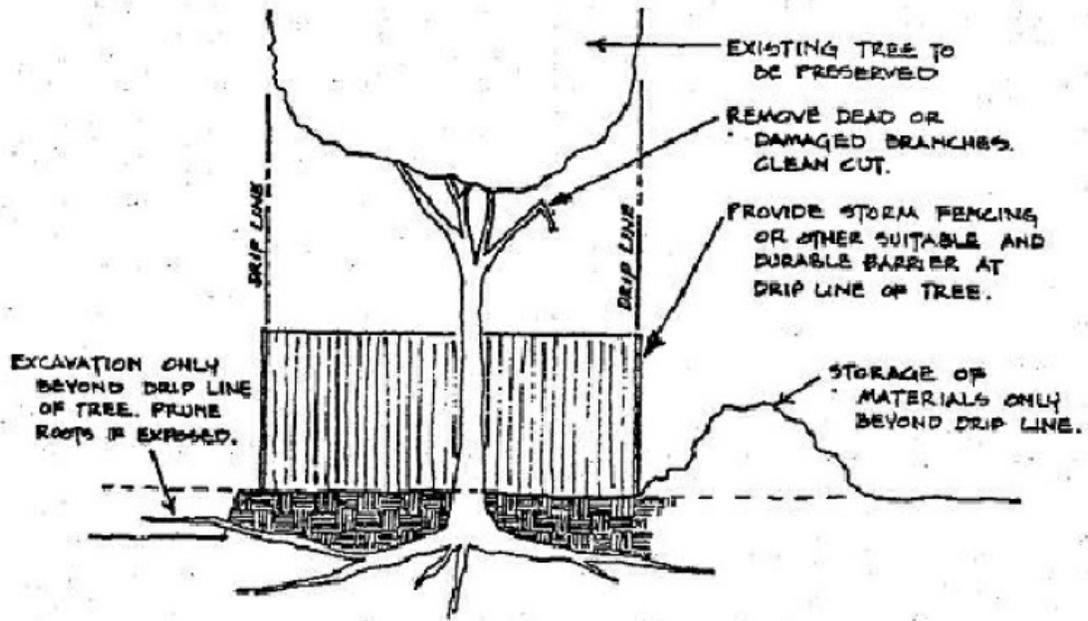
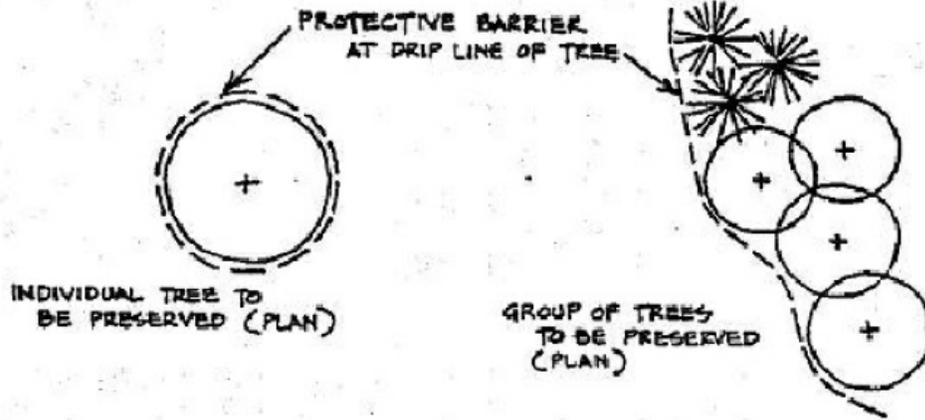
- 4.7.5. Trees selected from the Recommended Tree List of this Section shall conform, at a minimum, to the sizes specified on the list.
- 4.7.6. All upright deciduous and evergreen shrubs shall be a minimum of 3 feet tall at mature height. All spreading evergreen and deciduous shrubs shall be a minimum 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									
Small Trees - (Mature Height < 25')		Medium Trees 25' > 45'							
Common Name	Botanical Name	Cultivars	Street-Tree	Native	Uses	Notes	Common Name	Botanical Name	Cultivars
1 Hedge Maple	Acer campestre	"Queen Elizabeth"	X		St		1 River Birch	Betula nigra	
2 Paperbark Maple	Acer griseum				O		2 Yellow Birch	Betula lenta	
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	3 Hackberry	Celtis laevigata	
4 Striped Maple	Acer pennsylvanicum		X		S/O	Interesting bark, good Fall color	4 Shagbark Hickory	Carya ovata	
5 "Three-flower" Maple	Acer triflorum		X		N/O		5 Yellowwood	Cladrastis kentukea	
6 Serviceberry	Amelanchier spp.	"Cumulus", "Robin Hill Pink"	X	X			6 Turkish Filbert	Corylus colurna	
7 European Hornbeam	Carpinus betulus	Upright forms available	X		St		7 Katsurates	Cercidiphyllum japonicum	
8 American Hornbeam	Carpinus caroliniana		X	X	St		8 Korean Mtn. Ash	Sorbus alnifolia	
9 Kousa Dogwood	Cornus kousa	Many cultivars			O		9 Thornless Honeylocust	Gleditsia triacanthos var. inermis	
10 Thornless Cockspear Hawthorn	Crataegus crusgalli inermis		X		St		10 Corktree	Phellodendron amurense	
11 Winter King Hawthorn	Crataegus viridis "Winter King"				N/O		11 English Oak	Quercus robur	
12 "Leoprechtaum" 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				

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

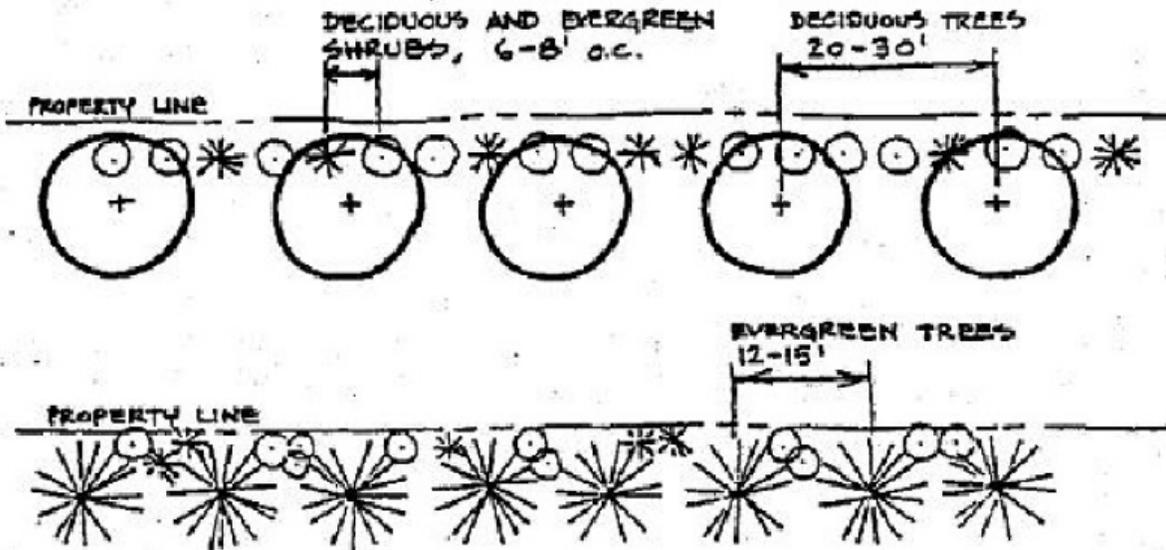
Large Trees 45'+ Common Name	Botanical Name	Cultivars	Street-Tree	Native	Uses	Notes:
1 Red Maple	Acer rubrum	"Karpick", "Red Sunset", "Armstrong", Upright	X	X	St	
2 Sugar Maple	Acer saccharum	"Green Mountain"		X	N	
3 Northern Catalpa	Catalpa speciosa		X		St	
4 American Beech	Fagus grandifolia			X	N	
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	N	
12 Swamp White Oak	Quercus bicolor		X	X	St	
13 Pin Oak	Quercus palustris		X		St	
14 Chestnut Oak	Quercus prinus	"Green Pillar"		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			

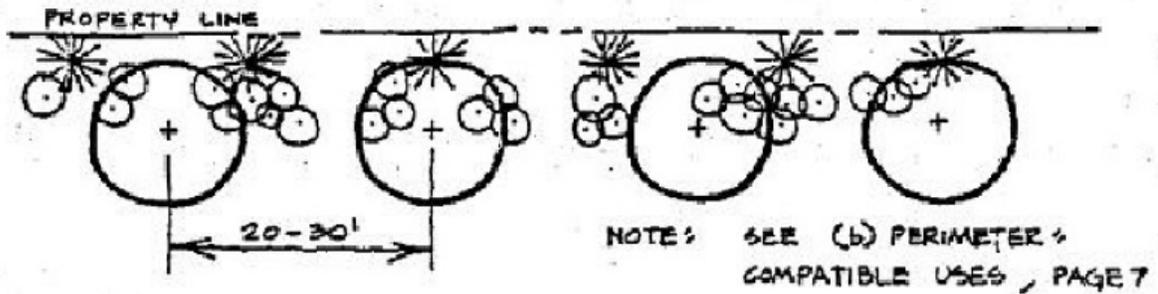


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<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>STDS FOR LANDSCAPING AND PRESERVATION OF EXISTING VEGETATION SECTION IV</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>TREE PRESERVATION DETAIL</p>		<p>IV-2</p>



A. Commercial/Industrial Screening



NOT TO SCALE

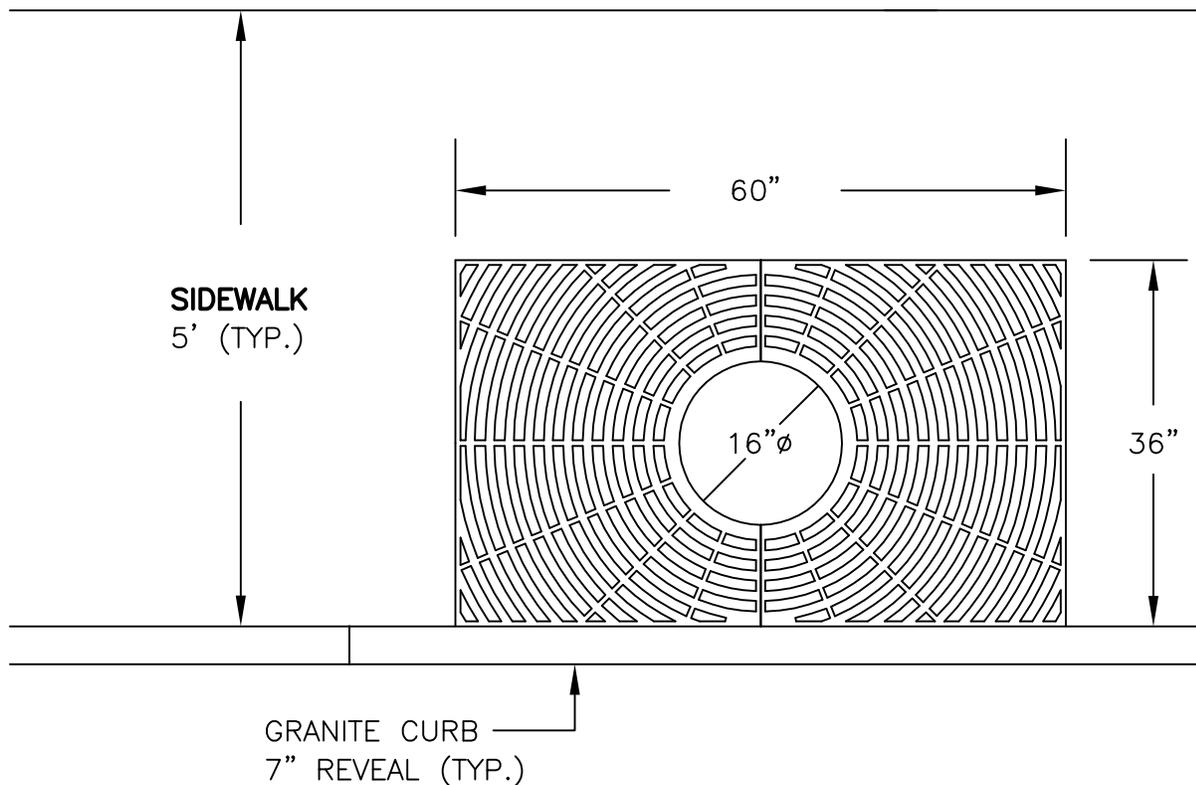
<p>DATE: AUGUST 2009</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL</p>	<p>STDS FOR LANDSCAPING AND PRESERVATION OF EXISTING VEGETATION SECTION IV</p>	<p>FIGURE:</p>
<p>REVISED:</p>	<p>LANDSCAPING BETWEEN COMPATIBLE USES</p>		<p>IV-3</p>

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:

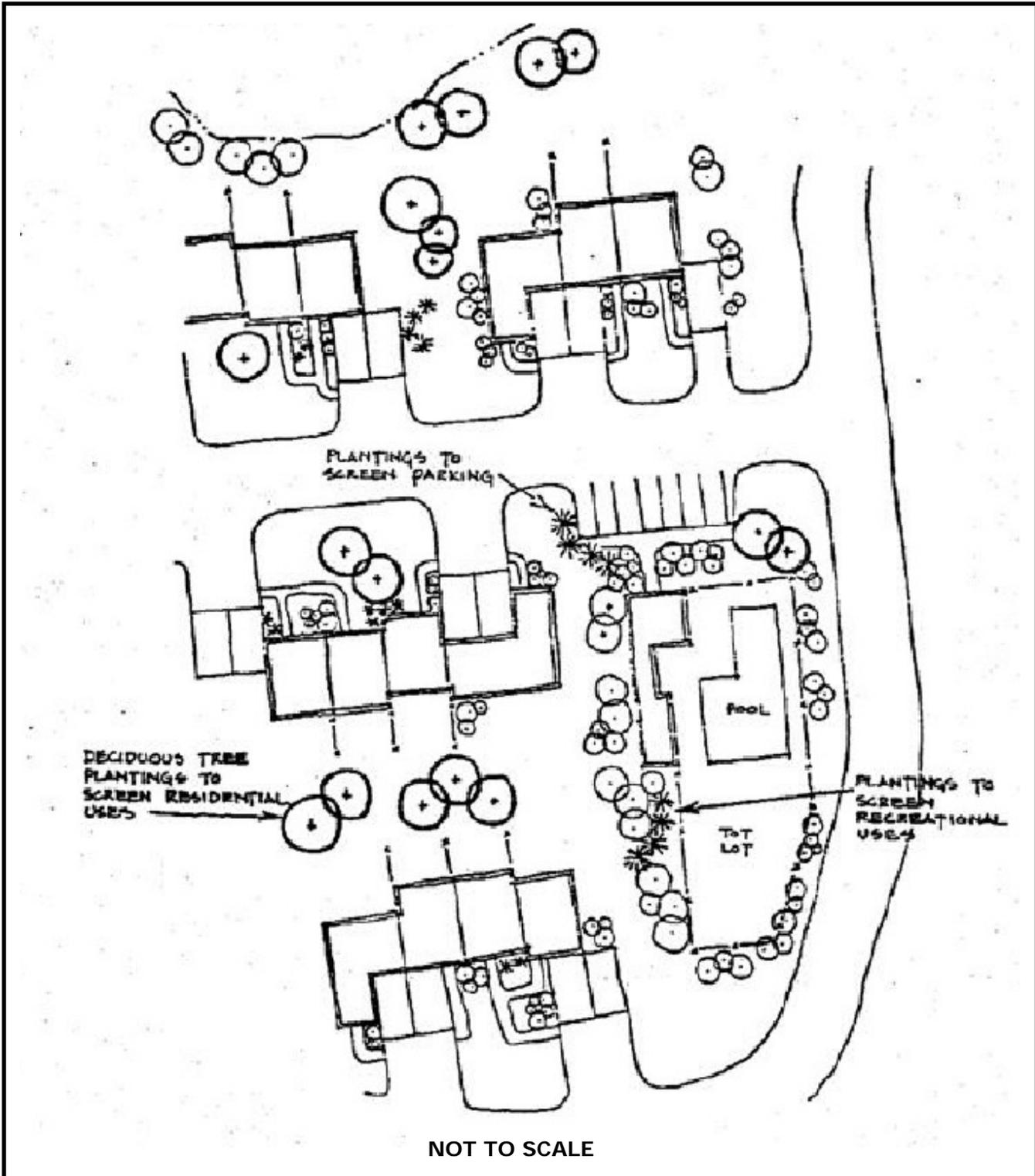
CITY OF PORTLAND, MAINE
 TECHNICAL STANDARDS MANUAL

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

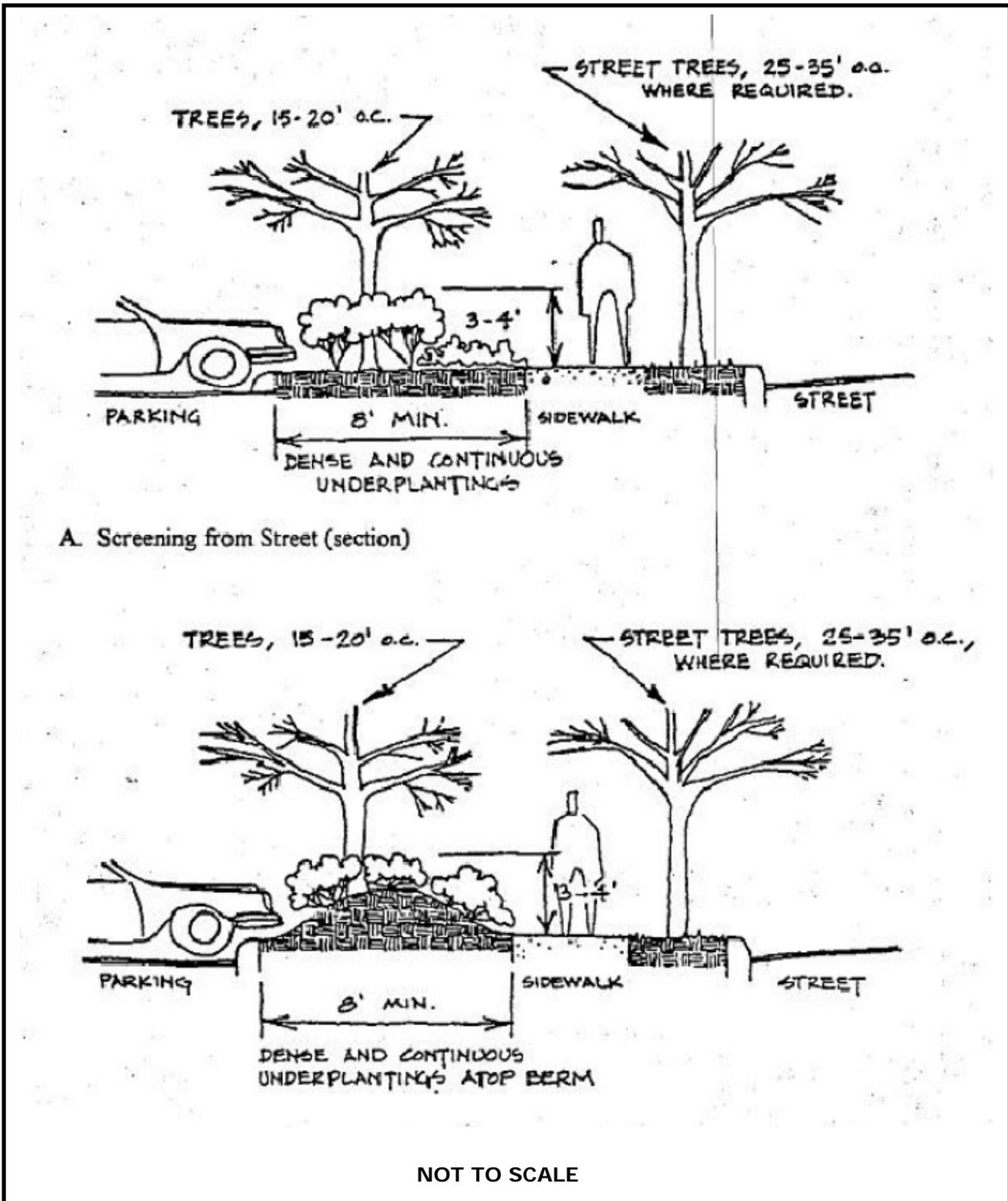
FIGURE:

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

IV-4A



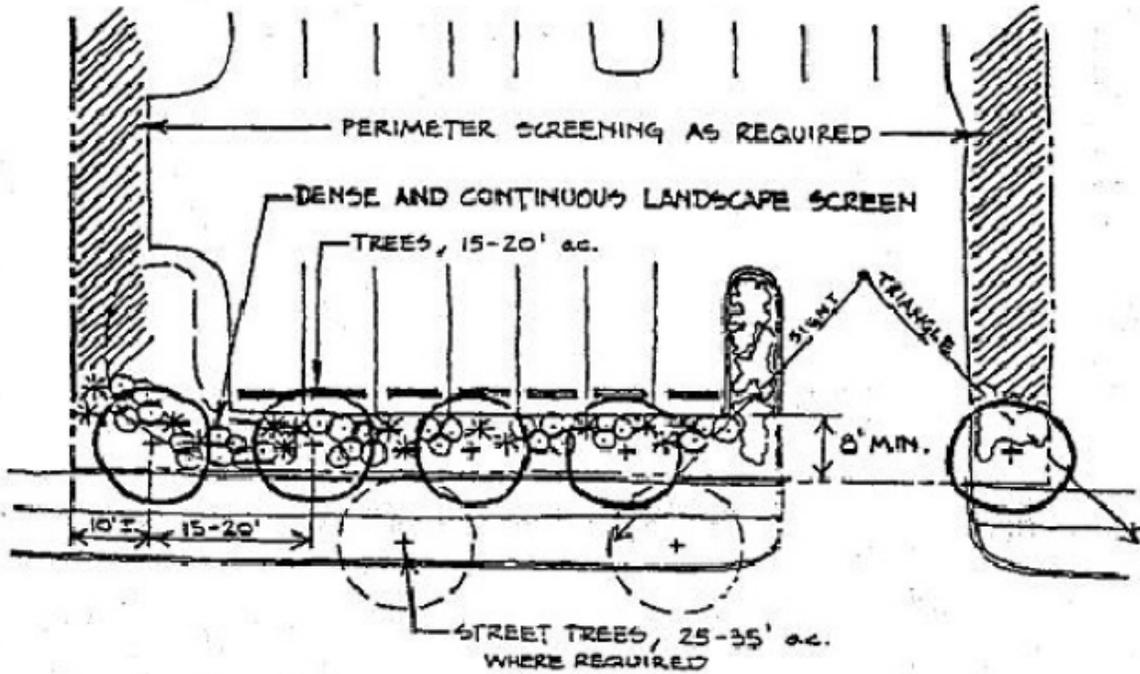
DATE: AUGUST 2009	CITY OF PORTLAND, MAINE TECHNICAL STANDARDS MANUAL	STDS FOR LANDSCAPING AND PRESERVATION OF EXISTING VEGETATION SECTION IV	FIGURE:
REVISED:	INTERIOR SITE LANDSCAPING		IV-5



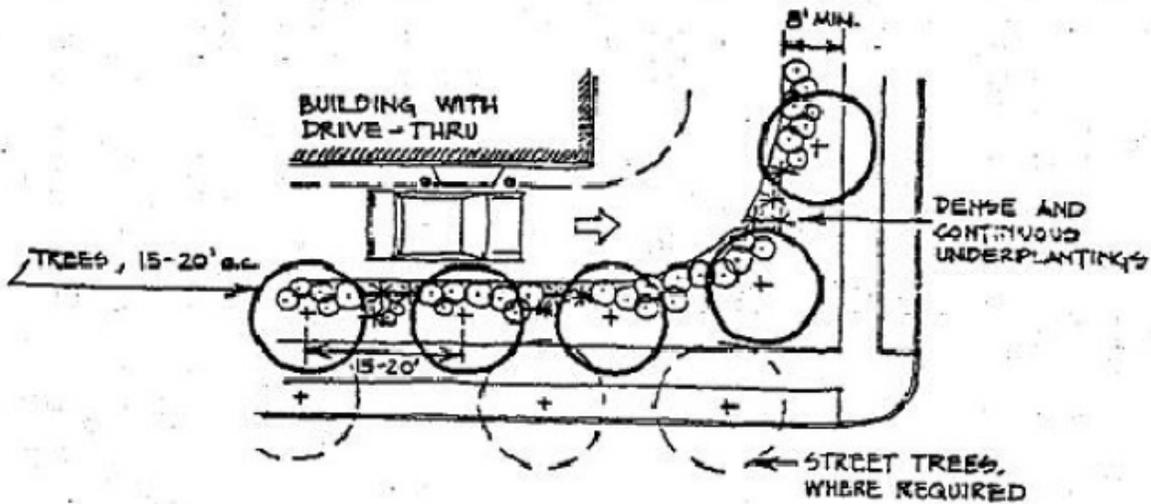
A. Screening from Street (section)

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>



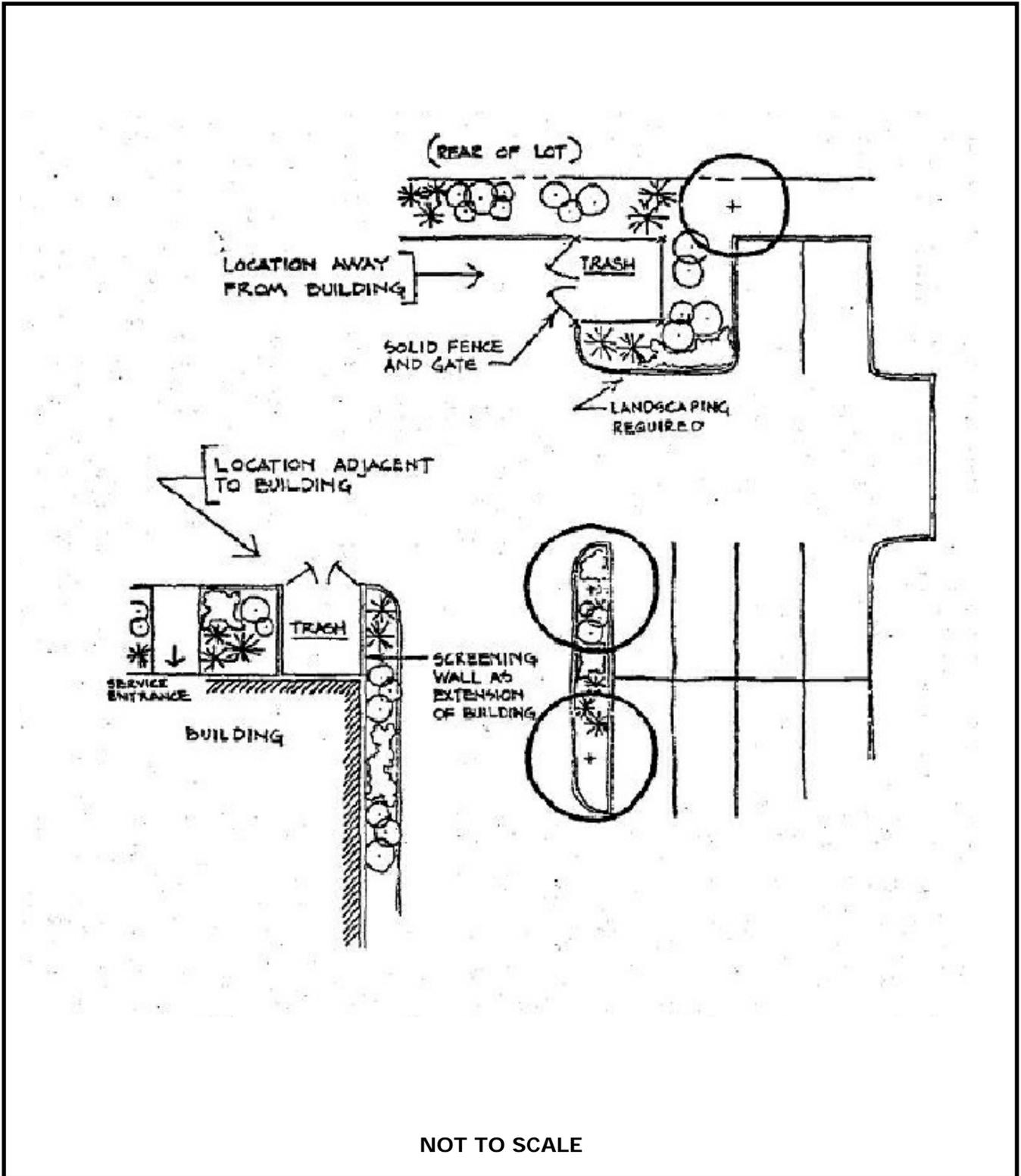
C. Screening from Street (plan)



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 in order to protect and improve water quality and meet Clean Water Act requirements. The Technical Manual standards support the review criteria contained in Portland's site plan and subdivision ordinances and with the stormwater management requirements within Chapter 32. Please see Chapter 32 of the City Code of Ordinances for regulations governing stormwater systems, illicit discharges and Post-Construction Stormwater Management Plans in Portland.

II. APPLICABILITY IN PORTLAND

PROJECTS REQUIRING STATE PERMITS:

Projects that require a Stormwater Permit pursuant to 38 M.R.S.A. Sec. 420-D (Stormwater Management Law) and projects that may substantially affect the environment and require a site location of development (Site Law) permit pursuant to 38 M.R.S. A Sec 481-490 shall be reviewed for conformance with Chapter 500 under the City's Delegated Review Authority or by the Maine Department of Environmental Protection.

PROJECTS REQUIRING MUNICIPAL REVIEW IN PORTLAND:

The City of Portland's applicability requirements for all development within Portland, which are specified below, supersede the applicability thresholds specified within the Chapter 500 Rules. The City of Portland conducts reviews under the City's Code of Ordinances, specifically Chapter 32 Stormwater and Chapter 14 Land Use Code. With the intent of improving water quality within Portland's urban environment, the City has adopted codes and regulations that require development proposals of a scale smaller, than the thresholds established under the state laws, to comply with the provisions of Chapter 500.

As outlined in the Section 14-526 of the City of Portland Code of Ordinances, the developments specified below shall comply with the Urban Impaired Stream, Basic, General, and Flooding Standards of the most recent version of the Maine Department of Environmental Protection (Maine DEP) Chapter 500 Rules for Stormwater Management (<http://www.maine.gov/dep/land/stormwater/storm.html>)

- A. Development within Urban Impaired Stream Watersheds: All development, except single and two-family homes, subject to City of Portland review under the Level I: Minor Residential Application, 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 the following watersheds:
- Capisic Brook,
 - Fall Brook,
 - Nasons Brook,
 - As listed in the most recent version of the Maine DEP Chapter 502 Rules.

Developments which will result in the creation of up to 1,000 square-feet of new impervious area or up to 10,000 square-feet of new non-impervious developed area, as defined under Definitions in the Maine DEP Chapter 500, are considered de minimis and are exempt from the Urban Impaired Stream Standard. Development within the Long Creek watershed shall be subject to the requirements set forth by the Long Creek Watershed Management District.

The City of Portland has an approved Compensation Fee Utilization Plan (CFUP) and can therefore receive in-lieu-fee payments to meet the UIS Standard.

- B. Basic Erosion and Sedimentation Control Standards for all Development: All development subject to City of Portland site plan review, including but not limited to Level I: Site Alteration, Level II, and Level III site plans, shall comply with the Basic Standard pursuant to Maine DEP Chapter 500 Stormwater Management Rules; single and two-family homes (Level I: Minor Residential Applications) shall be exempt from the Inspection and Maintenance Documentation Requirements of Appendix B1c.
- C. Stormwater Management Plans for New Development: Except as provided in below, the following development proposals shall submit a stormwater management plan pursuant to the regulations of Maine DEP Chapter 500 Stormwater Management Rules, including General and Flooding standards:
1. Level I: Site Alteration, which will result in the creation of more than 1,000 square-feet of new impervious area or 10,000 square-feet of new non-impervious developed area, as defined under Developed Area and listed under Definitions of Chapter 500.
 2. Level II and Level III Site Plans.
 3. Subdivisions as defined in the Land Use Code Section 14-493 except for those projects, which do not result in the creation of more than 1,000 square-feet of new impervious area or 10,000 square-feet of new non-impervious developed area, as defined under Developed Area and listed under Definitions of Chapter 500.

4. Other projects that the Planning Authority determines that special conditions warrant a stormwater management plan; and
5. 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 M.R.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.

Exemption:

1. Level I Minor Residential, as defined in the Land Use Code - Section 14-522.
- D. Redevelopment Projects: All projects not subject to requirements of an existing Site Law or Stormwater Management Law Permit that include redevelopment of non-roof impervious area greater than 5,000 square-feet and are subject to City of Portland review shall provide stormwater quality treatment in accordance with the General Standards for no less than 50% of the redeveloped impervious area. The runoff from any upgradient area must be either directed away from the stormwater treatment measure or that measure must be sized to treat the runoff from the upgradient area.
- E. Low Impact Development and Stormwater Quality Treatment: Developments that are not required to comply with the General and Flooding standards are encouraged to incorporate Low Impact Development (LID) and stormwater quality treatment techniques in their design to the maximum extent practicable; however, only projects that meet or exceed the General and Flooding Standards may qualify for a credit from the Stormwater Service Charge in accordance with the Stormwater Credit Manual. A separate application must be completed and submitted to the City for consideration of Stormwater Service Charge credits.

III. STORMWATER MANAGEMENT STANDARDS

Developments as specified under Section II Applicability in Portland must comply with the most recent version of the Maine Department of Environmental Protection (Maine DEP) Chapter 500 Rules for Stormwater Management(<http://www.maine.gov/dep/land/stormwater/storm.html>), including but not limited to the standards for Urban Impaired Stream, Basic, General, and Flooding Standards for the suitability, design, installation, and maintenance of systems to comply with the General and Flooding Standards are provided in Volume III of the Maine Stormwater Best Management Practices Manual.

Developments shall also comply with Chapter 32 Stormwater of the City Code and with the Subdivision and Site Plan Ordinances contained in the Land Use Code, Chapter 14

IV. Submission Requirements

Applicants are required to submit a stormwater management and drainage plan as part of development review application and to provide the following submission items to demonstrate compliance with the applicable stormwater management standards:

- **Urban Impaired Stream Standard:** Calculations for the Compensation Fee or Mitigation Credit per the tables provided in Chapter 500 Rules and other associated Maine DEP regulations. (Note: The City of Portland has an approved Compensation Fee Utilization Plan (CFUP) and can therefore receive in-lieu-fee payments to meet the UIS Standard.)
- **Basic Standard:** An Erosion & Sediment Control management plan, notes, and details per the Chapter 500 Rules
- **General Standard:** Written narrative demonstrating compliance, site plans showing grading and drainage infrastructure, site plan showing water quality treatment area(s) with table showing compliance, BMP sizing calculations, construction details, and a Post-Construction Stormwater Inspection & Maintenance Plan per Maine DEP Chapter 500 Appendix B with reporting requirements per Chapter 32 of City of Portland Code of Ordinances, and a Stormwater Maintenance Agreement.
- **Flooding Standard:** Subcatchment plans with flow paths, full hydrology computations/model output of pre- and post-development conditions, summary of pre- and post-development flowrates, and a written request for waiver with rationale for waiver as noted in Section 5.II.F. (as applicable)

The following references provide guidance on LID techniques:

- *LID Guidance Manual for Maine Communities*, prepared for the Maine Coastal Program, dated September 21, 2007.
- *Low-Impact Development Design Strategies – An Integrated Design Approach*, prepared by Prince George’s County, Maryland & Department of Environmental Resources, Programs and Planning Division, dated June 1999.

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:

Street lighting on city streets and public rights-of-way not subject to decorative street lighting shall follow the General Standards under 10.2 of this section.

In addition to the General Standards for lighting applicable throughout the city, the City of Portland has established special street lighting standards for decorative lighting in the following areas and according to the tables and figures in this section:

- Downtown (includes portions of Cumberland Avenue)
- Old Port
- Peninsula - Eastern Waterfront and Bayside
- Waterfront - Commercial/Thames Street
- Off-Peninsula/Forest Avenue
- Historic Landscape Districts (including Baxter Boulevard, the Eastern and Western Promenades, Lincoln Park, and Deering Oaks Park)
- Trails and pathways (including Eastern Promenade Trail, Fore River Trail, and Bayside Trail).

Decorative street lighting specifications include but are not limited to fixture type, pole and base type, pole height to top of fixture, pole spacing, and color. Please refer to Section 10.4 Standards for Decorative Lighting and Figure X-4 for the map of Portland's decorative lighting locations.

Developments subject to Level II and 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 type and number of street lights along all frontages.

Where lighting is being installed in the public way as part of a private development, 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 an existing metered service, unless otherwise directed by the City. 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.

10.2. GENERAL STANDARDS:

Location: For areas not designated with decorative lighting, street lighting may be placed on only one side of the street within the furnishing zone. However, when deemed necessary for traffic safety, the Reviewing Authority may require some street lights to be placed the opposite side of a street.

Specification: For areas not designated with decorative lighting, the City of Portland has adopted the following typical street light pole and fixture standards:

- Residential (Local/Minor) Street [see *Figure X-1*]
 - a) The standard pole height is a minimum 14', not to exceed 15' and shall be black aluminum . Poles shall be mounted on reinforced concrete pole bases with at least 2" but no more than 4" reveal above grade, 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 Works.
 - b) Light levels and pole spacing shall be in accordance with the table in section 10.2.1
 - c) Streetlights shall be full cutoff, using LEDs at a 3000 Kelvin color temperature, and shall seek to match uniformity, lumen output, and color of existing streetlights along the roadway, where applicable.
- Commercial/Industrial (Arterial/Collector) Road [see *Figures X-2A to X-2G*]
 - a) The standard pole height shall be either 20' or 30' according to the table in section 10.2.1 and shall be a grey.
 - b) Poles selection and finish:
 - Within .5 mi. of shoreline shall use Beacon RSA-B-SHO-S AA-10 Cobra [Figure X-2F]
 - More than .5 mi. away from shoreline shall use Hubbell RTA Upsweep Style [Figure X-2G]
 - c) Poles shall be mounted on reinforced concrete pole bases with at least 2" but no more than 4" reveal above grade, with 4 bolts per pole.
 - d) Light levels, pole spacing shall be in accordance with the tables in 10.2.1.
 - e) 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 Lighting Design – Standard street lighting design shall conform to the following table:

STREET CLASSIFICATION	COMMERCIAL/INDUSTRIAL		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)

STANDARD COBRAHEAD				
<i>Fixture – Figures X-2A through X-2G</i>				
Location	Fixture Type	Fixture Height	Spacing + Layout	Color
One-lane Roadways: Without parking with low traffic	COBRAHEAD A	20'	One side: 65' – 70' Alt. sides: 125' – 135'	Grey (Manufacturer's Specification)
One-lane Roadways: With on-street parking with low traffic	COBRAHEAD A	30'	One side: 70' – 80' Alt. sides: 120' – 130'	
Two-lane Roadways: With on-street parking with medium traffic	COBRAHEAD B	20'	One side: 75' – 80' Alt. sides: 145' – 155'	
Two-lane Roadways: With on-street parking with low traffic	COBRAHEAD B	30'	One side: 80' – 90' Alt. sides: 175' – 185'	
Two-lane Roadways: With on-street parking with medium traffic	COBRAHEAD C	20'	One side: 90' – 100' Alt. sides: 180' – 190'	
Two-lane Roadways: With on-street parking with medium traffic	COBRAHEAD C	30'	One side: 100' – 110' Alt. sides: 200' – 210'	
Two or more lane Roadways: With on-street with high/medium traffic	COBRAHEAD D	20'	One side: 95' – 105' Alt. sides: 195' – 210'	
Two or more lane Roadways: With on-street parking with high traffic	COBRAHEAD D	30'	One side: 115' – 125' Alt. sides: 245' – 255'	
	COBRAHEAD E	20'	One side: 100' – 110' Alt. sides: 200' – 215'	
	COBRAHEAD E	30'	One side: 115' – 130' Alt. sides: 240' – 255'	

10.2.2. New Metered Services for Light Fixtures

- New light fixtures shall:
 - a) Not to be tied to the existing power utility leased lighting system.
 - b) Be provided with a NEMA 7-pin receptacle for future connection to the City of Portland lighting control system. Coordinate with the City of Portland for final connection and control testing.
 - c) Be specified with a color temperature of 3000K.
- The developer is to provide a new metered electrical service in an APX outdoor rated enclosure (see section 10.3.1 for unit specification), preventing any new fixtures from being directly connected to the power utility.
- The developer will be required to:
 - a) Provide an astronomical timeclock inside the electrical enclosure (see section 10.3.1 for unit specification) to control light fixtures or
 - b) Provide a standard photocell for each fixture, to be used until lighting control module is installed.

10.3. ACCESSORIES & BOLLARDS:

10.3.1. Cabinets – The city standard cabinet specifications are as follows:

CABINET				
Location	Fixture Type	Fixture Height	Layout	Color
Public Right-of-way	APX Enclosures, Inc. Cabinet APX NEMA 3R Pedestal Enclosure APXPE401615	Per Manufacturer's Specification	Mounted on the back side of sidewalk with door facing street, meter facing building street wall. If site constraints require box to be mounted within sidewalk furnishing zone, then door should face building/private property and meter should be mounted opposite side of travel direction.	Grey/Silver or Clear Coat (Manufacturer's Specification)

- Cabinet base can be stand-alone type other than above, provided it is not in a sidewalk or on the edge of a plowed pathway, street, or parking lot. Circuits may also be wired into existing traffic signal boxes or other light circuit boxes. This will be determined on a case-by-case basis.

- Additional specifications for multiuse box with external power for festivals and special events (not required – determined by Department of Public Works):
 - Square D power panel QO816L100DF/S or QO112L125G with cover QO16US
 - Circuits required:
 - 1= 125/250V 50 Amp NEMA 14-50 Receptacle
 - 1= 125/250V 30 Amp NEMA 14-30 Receptacle
 - 2= 125V 20A Standard Receptacle

10.3.2 Wiring & Electrical

- 2" inch conduit (minimum) underground in light pole bases and cabinet base.
- Each light fused individually at base Fuse holder type is a (Buchanan 65 kit Cat # 65U)
- Regular outlet on each pole just below the fixture to be fused at the bottom of the pole base with the same fuse kit as listed above.
- Any single photo cell control for all lights shall be in the cabinet, rated for the circuit. This may require an all-purpose contactor.
- Wire size and circuit size shall be calculated by the design engineer and inspected by the city inspector to make sure it is correct. This would be done on a case by case basis because not all circuits, lights and systems are the same.

10.3.3 Bollards

This section includes standards for typical lighted bollards. Non-lighted bollards appear in *Section 1. Transportation Systems and Street Design Standards*.

Location: Bollards may be used in areas such as underpasses and similar conditions where height is restricted for pedestrian lighting. Spacing and number to be determined by Department of Public Works. Locations must be approved by Department of Public Works and the Planning Authority. The City may approve additional bollard types for streetscape or special projects such as parks or as use for security bollards; any additional bollard selection must be of equivalent structural strength as approved bollards.

Specification:

- Bollards shall be mounted on reinforced concrete bases with at least 2" but no more than 4" reveal above grade, with 4 bolts per pole.
- The City of Portland has adopted the following typical lighted bollard standards:

LIGHTED BOLLARD				
<i>Fixture – Figure X-3</i>				
Location (including but not limited to)	Fixture Type	Fixture Height	Spacing + Layout	Color
Underpasses: Park Avenue, St. James Street, St. John Street, Forest Avenue, Preble Street, Franklin Street, Commercial Street, Harborview Park, Tukey’s Bridge, Veranda Street	Holophane Freeport Series	45”	To be determined by Department of Public Works	Black (Manufacturer’s Specification)
Waterfront Piers				

10.4. STANDARDS FOR DECORATIVE LIGHTING:

Locations, Specifications, and Finish:

- Figure X-4 identifies the decorative street light locations. The following tables and Figures X-5 through X-12 illustrate the requirements for **fixture type, height, layout, and finish for each decorative light fixture**, according to street.
- All light poles shall be mounted on reinforced concrete pole bases with at least 2” but no more than 4” reveal above grade, with 4 bolts per pole.

DECORATIVE LIGHT – Downtown				
<p><i>Map - Figures X-5A, X-5D</i> <i>Fixtures – Figures X-5B, X-5C, X-5E, X-5F</i> <i>The Technical Manual supersedes the previously adopted City of Portland Downtown Sidewalk and Street Lighting Plan (1994); that plan may be used for reference or clarification of the standards in this manual.</i></p>				
Location	Fixture Type	Fixture Height	Spacing + Layout	Color
<p>Oak Street, Casco Street, Brown Street, Chestnut Street, Shepley Street Center Street: Congress to Free St</p> <p>Cross Street: Free to Spring St</p> <p>Monument Square and Monument Way: Pedestrian ways</p>	PEDESTRIAN 1 – Single or Double Arm [Figure X-5B]	12' 6"	One side: 60' – 80' Alt. sides: 100' – 175' Single-arm fixture placed in furnishing zone with luminaire oriented over sidewalk. Double-arm fixture placed with bracket arms parallel to sidewalk. If sidewalk space is limited, Planning Authority may approve lights within private property or attached to building.	Dark Green – Tiger Drylac RAL 6012
	PEDESTRIAN 2 [Figure X-5C]	25' 0"	One side: 90' – 100' Alt. sides: 175' – 225' Double-arm fixture placed with bracket arms parallel to sidewalk.	Dark Green – Tiger Drylac RAL 6012
<p>Congress Street</p> <p>Other locations on a case-by-case basis</p>	STREET – Single or Double Arm [Figure X-5E]	30' 0"	One side: 90' – 100' Alt. sides: 175' – 225' Double-arm fixture used in median conditions with luminaire overhanging street.	Dark Green – Tiger Drylac RAL 6012
<p>Congress Street: St. John to Franklin St</p> <p>Cumberland Avenue: High to Franklin St</p> <p>Spring Street: High to Temple/Union St</p> <p>Free Street: Between High St and Temple St</p> <p>Forest Avenue: Congress to Cumberland Ave</p> <p>Center Street: Free to Spring St</p> <p>Temple Street: Congress to Spring/Middle St</p>	STREET/PED COMBO [Figure X-5F]	30' 0"	One side: 90' – 100' Alt. sides: 175' – 225'	Dark Green – Tiger Drylac RAL 6012
<p>Myrtle, Chestnut, Elm and Preble Streets: Congress to Cumberland Ave</p> <p>Federal Street: Congress to Temple St</p>	STREET/PED COMBO [Figure X-5F]	30' 0"	One side: 90' – 100'	Dark Green – Tiger Drylac RAL 6012

DECORATIVE LIGHT – Old Port				
<i>Map - Figure X-6A</i> <i>Fixture – Figure X-6B</i>				
Location	Fixture Type	Fixture Height	Spacing + Layout	Color
Exchange Street: Congress to Fore St	STREET [Figure X-6B]	14' 3"	Alt. sides: 60' - 80'	Black (Manufacturer's Specification)
Fore Street: Center to Franklin Ave				
Streets between Spring/Middle to Commercial Street: Center Street, Cotton Street, Cross Street, Union Street, Dana Street, Patton Court, Moulton Street, Market Street, Silver Street, Pearl Street, Custom House Street, Portland Square, Milk Street, Wharf Street, Gold Street				
Federal Street W, Middle Street, Newbury Street W: Temple/Union to Franklin St				
Church Street				
Parks: Tommy's, Post Office Park				

DECORATIVE LIGHT – Peninsula				
<i>Map - Figures X-7A, X-7C</i> <i>Fixtures – Figures X-7B, X-7D, X-7E</i>				
Location	Fixture Type	Fixture Height	Spacing + Layout	Color
Wilmot Street, Chapel Street, Stone Street, and Cedar Street Alder St, Hanover St, Parris St, Brattle St, Mechanic St Mountfort St, Hancock St, Hampshire St, Newbury St E, Federal St E Preble Street and Elm Street: Cumberland Ave to Marginal Way Pearl St, Chestnut St, Myrtle St: Cumberland Ave to Marginal Way Oxford Street W, Lancaster Street, Kennebec Street, Somerset Street Portland Street Anderson St: Everett to Plowman St Fox Street Washington Ave: Congress to I-295 India Street Middle Street: Franklin to Hancock St Fore Street: Franklin to Waterville St	MEDIUM STREET (Figure X-7B)	19' 3"	One side: 80' – 100' Use Type 2 IES distribution. Fixture placed in furnishing zone overhang towards the street; where fixture conflicts with overhead utilities, may be placed on back of sidewalk with light overhanging sidewalk. Where street lighting is provided by existing cobrahead fixtures, decorative fixtures are not needed on that side of street. If a project includes placing utilities underground, street/pedestrian lighting provided by decorative fixtures.	Black (Manufacturer's Specification)
Marginal Way Forest Avenue: Cumberland Ave to Park/Portland St	LARGE STREET (Figure X-7D)	24' 3"	One side: 90' – 110' Alt. sides: 175' – 225'	Black (Manufacturer's Specification)
* No streets shall use PEDESTRIAN scale light unless site conditions such as sidewalk width or overhead utilities prevent installation of MEDIUM STREET fixture (Figure X-7D)	PEDESTRIAN (Figure X-7E)	14' 6"	One side: 60' – 80' Alt. sides: 100' – 175' Fixture shall be oriented to overhang sidewalk. Fixture placed in furnishing zone unless space is limited. Placement on back of sidewalk or private property overhanging sidewalk may be accommodated where space is a constraint.	Black (Manufacturer's Specification)

DECORATIVE LIGHT – Trails, Waterfront

Map - Figure X-8A
Fixture – Figure X-8B
Trails - This fixture appropriate for any city trail installation. Standard lighted bollard may also be used in appropriate circumstances.
Bayside Trail - This fixture should only be used on the Bayside Trail if replacing six or more of the existing fixtures.
Waterfront – Commercial/Thames Street, this fixture is suitable to supplement standard cobrahead lighting.

Location	Fixture Type	Fixture Height	Spacing + Layout	Color
Fore River Trail: Casco Bay Bridge to US-1; Harborview Park trail path	TRAIL – Single Arm	18' 4"	One side: 90' – 125' Alt. sides: 175' – 225'	Black (Manufacturer's Specification)
Commercial Street: Fore River Parkway to India St	TRAIL – Single Arm	18' 4"	Supplemental pedestrian lighting as-needed. One side: 90' – 125' Alt. sides: 175' – 225'	Black (Manufacturer's Specification)
Thames Street: India St to Eastern Promenade Trail	TRAIL – Single Arm	18' 4"	One side: 90' – 125' Alt. sides: 175' – 225'	Black (Manufacturer's Specification)
Eastern Promenade Trail	TRAIL – Single or Double Arm	18' 4"	One side: 90' – 125' Alt. sides: 175' – 225' Single arm fixture oriented to overhang trail; Double arm fixture for medians or similar.	Black (Manufacturer's Specification)

DECORATIVE LIGHT – Off-Peninsula

Map - Figure X-9A
Fixture – Figure X-9B
In addition to the specific locations indicated below, this fixture is suitable for off-peninsula, commercial corridors to supplement standard cobrahead lighting.

Location	Fixture Type	Fixture Height	Spacing + Layout	Color
Forest Avenue: Marginal Way to Woodlawn Ave	PEDESTRIAN – Single or Double Arm	18' 6"	One side: 60'-80' Alt. sides: 100' - 175' Placement on back of sidewalk with single arm fixture oriented to overhang sidewalk; Where site constraints require placement in furnishing zone, use double arm fixture parallel to sidewalk.	Graphite (Manufacturer's Specification)

DECORATIVE LIGHT – Historic Landscape Street				
Map - Figure X-10A Fixture – Figure X-10B Fixture placement should comply with adopted master plans.				
Location	Fixture Type	Fixture Height	Spacing + Layout	Color
Eastern Promenade (park side of street only): North St to Vesper St Western Promenade (park side of street only): Bramhall to Vaughan St Baxter Boulevard (both sides of street): Forest Ave to Bates St	STREET – with shield	21' 0"	One side: 90' – 100' Alt sides: 175' – 225'	Black (Manufacturer's Specification)
Deering Oaks Park (Abutting Streets, park side only): Deering Ave, Park Ave, Forest Ave	STREET – without shield	21' 0"	One side: 90' – 100' Park side of street only	Black (Manufacturer's Specification)
Deering Oaks Park (within park): High Street, State Street	STREET – without shield	21' 0"	One side: 90' – 100' Alt. sides: 175' – 225'	Black (Manufacturer's Specification)

DECORATIVE LIGHT – Historic Landscape Pedestrian				
Map - Figure X-11A Fixture - Figures X-11B Fixture placement should comply with adopted master plans.				
Location	Fixture Type	Fixture Height	Spacing + Layout	Color
Eastern Promenade: Pedestrian paths	Pedestrian	14' 6"	One side: 60' – 80'	Black (Manufacturer's Specification)
Western Promenade: Pedestrian paths	Pedestrian	14' 6"	One side: 60' – 80'	Black (Manufacturer's Specification)
Deering Oaks Park (Interior): Pedestrian paths, High and State streets	Pedestrian	14' 6"	Use existing light locations or refer to the Deering Oaks Master Plan (2003) for revised locations	Black (Manufacturer's Specification)

DECORATIVE LIGHT – Deering Oaks Bridge				
Fixture –Figure X-12 Fixture placement should comply with adopted master plans.				
Location	Fixture Type	Fixture Height	Spacing + Layout	Color
Deering Oaks Park (Bridge)	Bridge Light	6' 0" (match existing)	Match existing	Match existing

10.5. City of Portland 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 an existing metered service, unless otherwise directed by the City (see Section 10.2.2 for new metered services for lighting). The responsibilities of the construction contractor are as follows:

Construction Contractor Responsibilities:

- a) 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 standards for the given project location.
- b) Concrete foundation bases for new street lighting poles. Poles shall be mounted on reinforced concrete pole bases with at least 2" but no more than 4" reveal above grade, with 4 bolts per pole. The installation of the foundation bases shall be coordinated with sidewalk details and requirements as stipulated by the City of Portland Department of Public Works.
- c) 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 meter, as well as to an existing service connection.
- d) 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).
- e) Upon completion of the erection of the street lighting fixtures, including the installation of all lighting poles and conduit/wire, the construction contractor shall notify the City that the system is ready for operation. **THE LUMINAIRES SHALL BE ENERGIZED PRIOR TO THE CONSTRUCTION CONTRACTOR'S REQUEST FOR A CITY CERTIFICATE OF OCCUPANCY.**
- f) 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.

City of Portland Responsibilities:

- a) To approve the proposed point of connection for electrical service for new municipal street lighting where a new metered service is provided.
- b) Connection of the construction contractor's secondary service conductors at an existing service point, where a new service is provided.
- c) To review and approve the location of the street light fixtures within the public right-of-way.

10.6. Reserved.**10.7. Submission Requirements:**

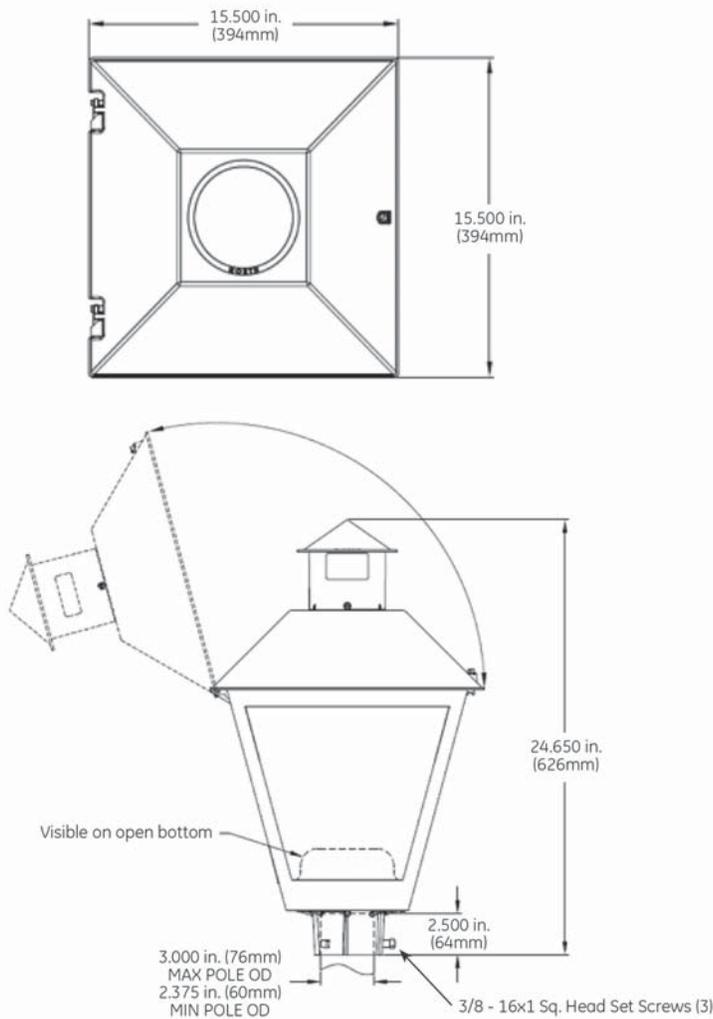
A lighting plan shall be provided which shall show the quantity and location of all existing and proposed street lights. This shall be incorporated into the site plan or presented on an individual lighting plan. Descriptive information including engineering detail drawings depicting the entire proposed fixture (luminaire, bracket arm, slip fitter) along with the proposed finish shall be included on the individual lighting plan.



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**Street & Sidewalk Lighting
 STANDARD - RESIDENTIAL**

Town & Country Post Top (EPTT)



LUMINAIRE

GE Evolve LED Post Top Town & Country (EPTT)
 Model: EPTT-01-0-06-D-A-30-A-P-BLCKR-R

Die-case aluminum housing with acrylic refractor in white opal.

Pole-mounted, secondary surge protection
 Voltage (120 through 277V)
 Asymmetric HO, 56 watt
 LED 3000K color temperature

LIGHTING POLE

Aluminum, smooth tapered pole with 5/32" thickness (.156").

EPA rating from 4.6 to 6.9 (using 110mph wind speed ratings from AAHTO).

Maximum weight capacity = 75-100 lbs.

Base bolt pattern: 10" diagonal.

DIMENSIONS

Pole Height = 15' max.
 Pole Diameter = 6" base tapered to 3"

FINISH

Black (standard)

APPLICATION

Standard sidewalk lighting for residential streets not specified for decorative lighting.

Spacing: According to Section 10.2.1

Fixture placed in furnishing zone unless space is limited. Placement on back of sidewalk or private property near sidewalk may be accommodated where space is a constraint.

Date:
 March, 2019

CITY OF PORTLAND, MAINE
 TECHNICAL MANUAL

MUNICIPAL STREET
 LIGHTING STANDARDS
 SECTION 10

Figure:

X-1

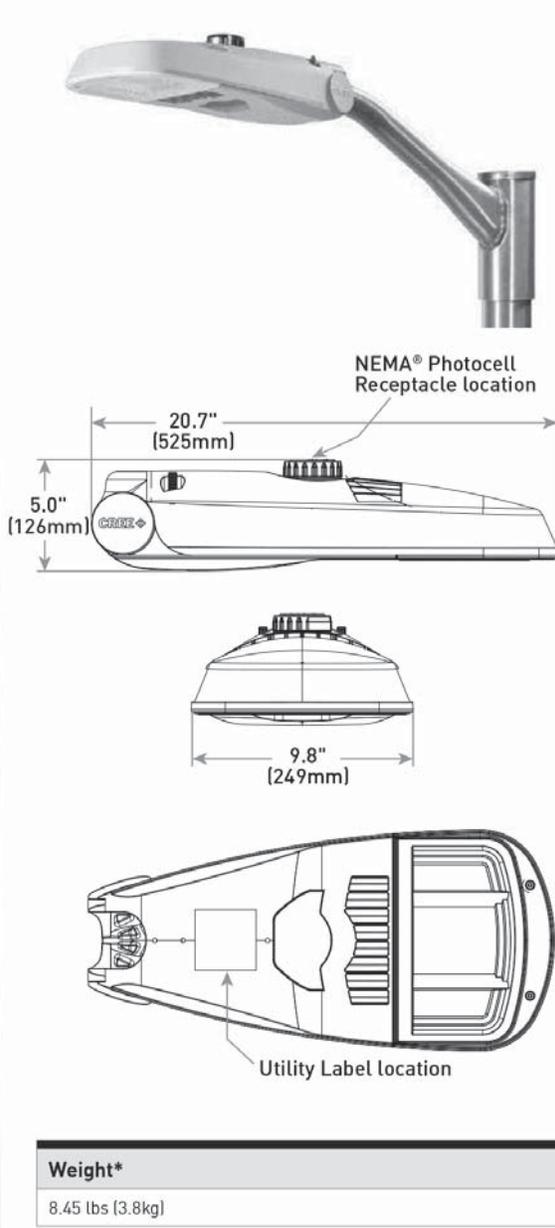
Revised Date:

RESIDENTIAL



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**Street & Sidewalk Lighting
 STANDARD - COBRAHEAD A**



LUMINAIRE

Cree RSW series LED streetlight
 Model: RSWS-A-HT-3ME-3L-30K7-UL-GY-N-X3

Small, horizontal tenon
 Optics IES Type III Medium, 2,756 lumens
 23 watts
 Universal voltage (120-227V)
 7-pin photocell receptacle
 LED 3000K color temperature

LIGHTING POLE

Mount to existing pole or according to Section 10.2.1

DIMENSIONS

Pole Height = 20' or 30'

FINISH

Grey: GY (standard)

APPLICATION

Standard street lighting for streets not specified for decorative lighting.

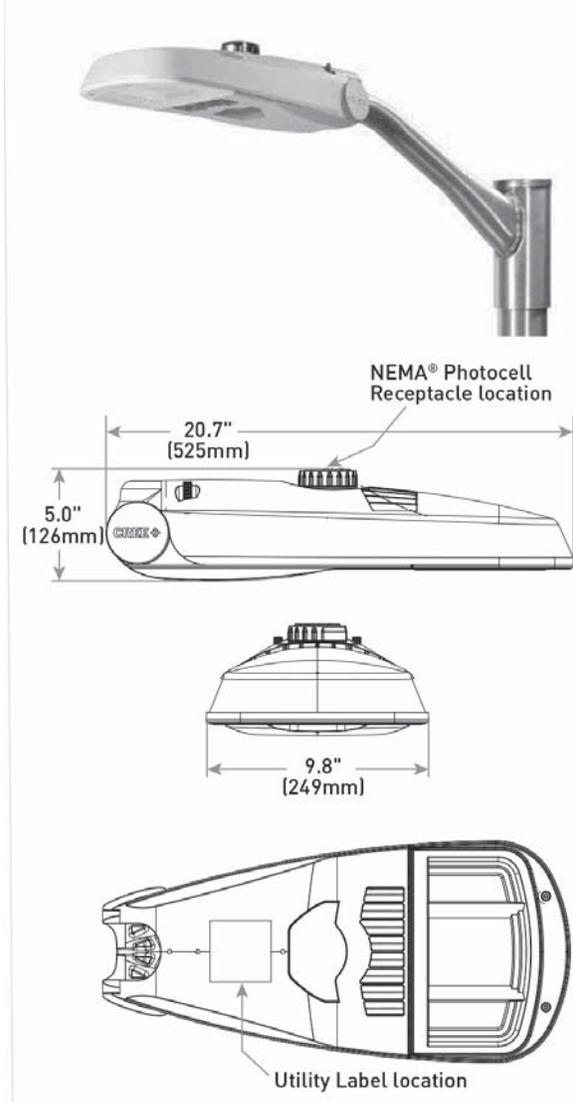
Fixture placed in furnishing zone unless space is limited. Placement on back of sidewalk or private property overhanging sidewalk may be accommodated where space is a constraint.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-2A
Revised Date:	COBRAHEAD A		



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**Street & Sidewalk Lighting
 STANDARD - COBRAHEAD B**



Weight*
8.45 lbs (3.8kg)

*RSW-BLSS Accessory: add 0.4 lbs. (0.2kg)

LUMINAIRE
 Cree RSW series LED streetlight
 Model: RSWS-A-HT-3ME-5L-30K7-UL-GY-N-X1

Small, horizontal tenon
 Optics IES Type III Medium, 3,617 lumens
 30 watts
 Universal voltage (120-277V)
 7-pin photocell receptacle
 LED 3000K color temperature

LIGHTING POLE
 Mount to existing pole or according to Section 10.2.1

DIMENSIONS
 Pole Height = 20' or 30'

FINISH
 Grey: GY (standard)

APPLICATION
 Standard street lighting for streets not specified for decorative lighting.

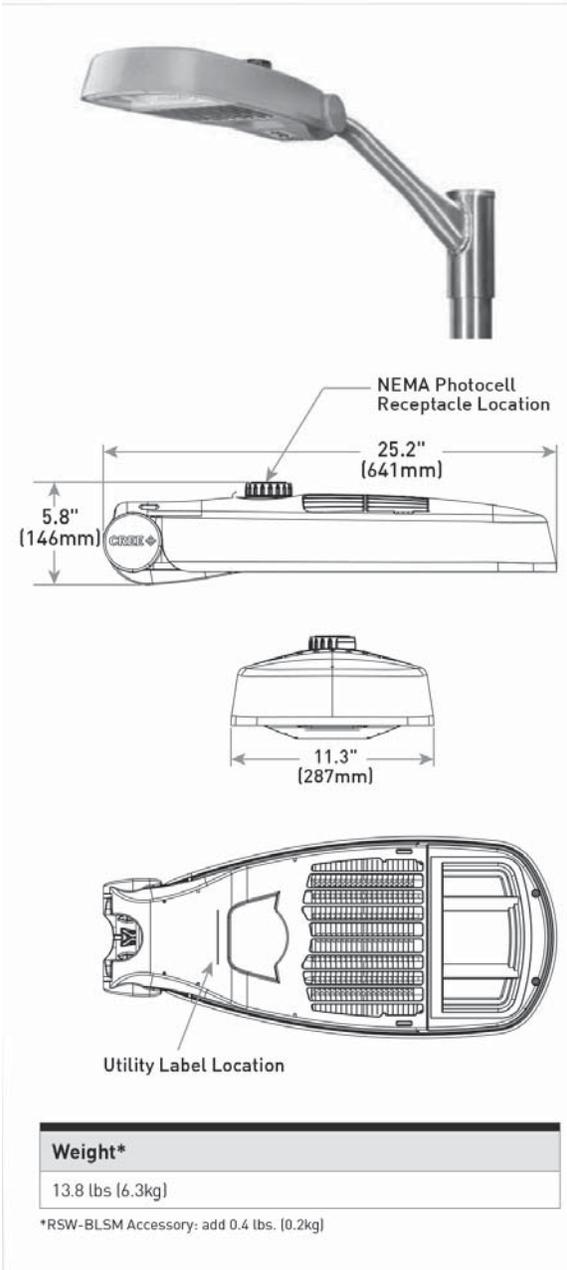
Fixture placed in furnishing zone unless space is limited. Placement on back of sidewalk or private property overhanging sidewalk may be accommodated where space is a constraint.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-2B
Revised Date:	COBRAHEAD B		



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**Street & Sidewalk Lighting
 STANDARD - COBRAHEAD C**



LUMINAIRE

Cree RSW series LED streetlight
 Model: RSWM-A-HT-3ME-9L-30K7-UL-GY-N-X1

Medium, horizontal tenon
 Optics IES Type III Medium, 6,500 lumens
 50 watts
 Universal voltage (120-227V)
 7-pin photocell receptacle
 LED 3000K color temperature

LIGHTING POLE

Mount to existing pole or according to Section 10.2.1

DIMENSIONS

Pole Height = 20' or 30'

FINISH

Grey: GY (standard)

APPLICATION

Standard street lighting for streets not specified for decorative lighting.

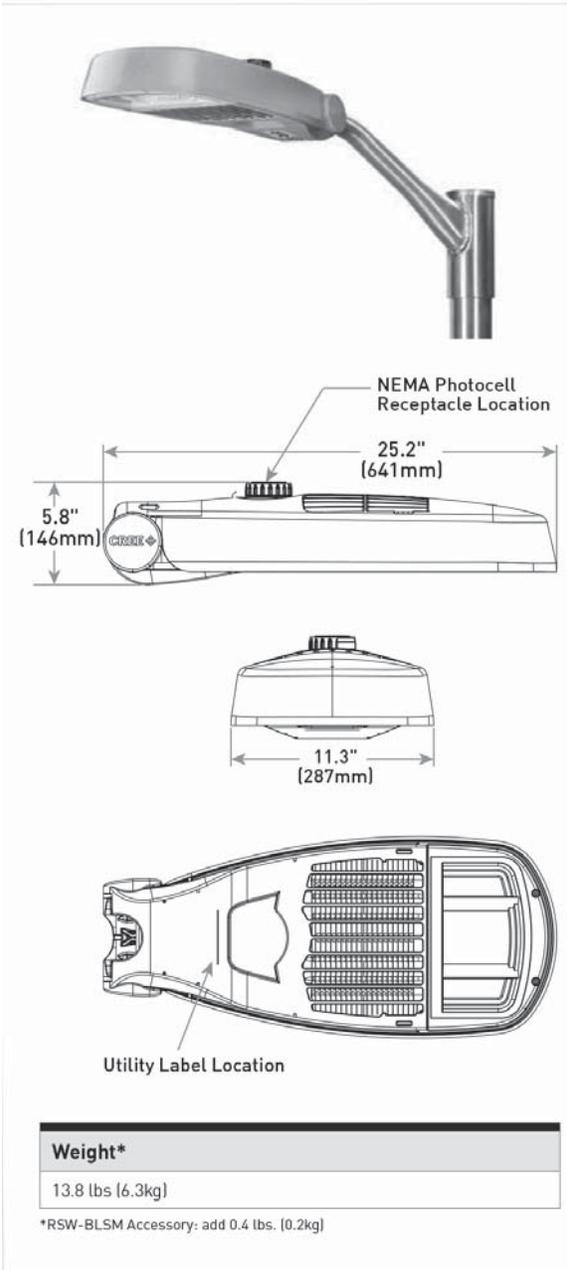
Fixture placed in furnishing zone unless space is limited. Placement on back of sidewalk or private property overhanging sidewalk may be accommodated where space is a constraint.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-2C
Revised Date:	COBRAHEAD C		



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**Street & Sidewalk Lighting
 STANDARD - COBRAHEAD D**



LUMINAIRE

Cree RSW series LED streetlight
 Model: RSWM-A-HT-3ME-9L-30K7-UL-GY-N-X6

Medium, horizontal tenon
 Optics IES Type III Medium, 8,975 lumens
 75 watts
 Universal voltage (120-227V)
 7-pin photocell receptacle
 LED 3000K color temperature

LAMP

Vertical mounted, LED 3000K color temperature

LIGHTING POLE

Mount to existing pole or according to Section 10.2.1

DIMENSIONS

Pole Height = 20' or 30'

FINISH

Grey: GY (standard)

APPLICATION

Standard street lighting for streets not specified for decorative lighting.

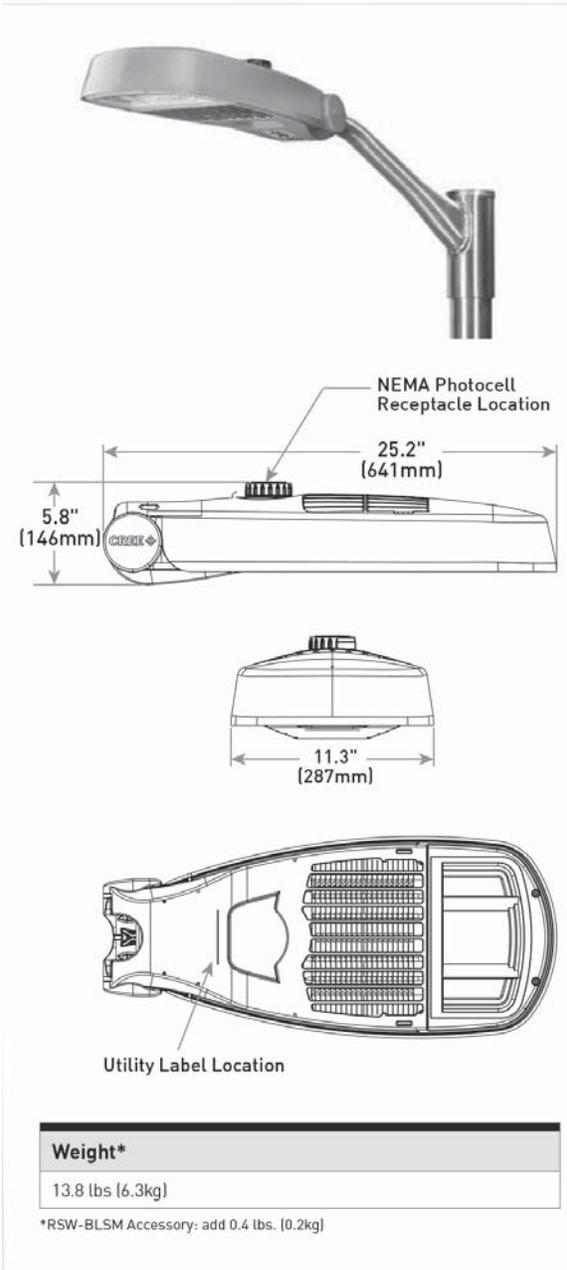
Fixture placed in furnishing zone unless space is limited. Placement on back of sidewalk or private property overhanging sidewalk may be accommodated where space is a constraint.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-2D
Revised Date:	COBRAHEAD D		



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**Street & Sidewalk Lighting
 STANDARD - COBRAHEAD E**



LUMINAIRE

Cree RSW series LED streetlight
 Model: RSWM-A-HT-3ME-9L-30K7-UL-GY-N

Medium horizontal tenon
 Optics IES Type III Medium, 9,325 lumens
 83 watts
 Universal voltage (120-227V)
 7-pin photocell receptacle
 LED 3000K color temperature

LIGHTING POLE

Mount to existing pole or according to Section 10.2.1

DIMENSIONS

Pole Height = 20' or 30'

FINISH

Grey: GY (standard)

APPLICATION

Standard street lighting for streets not specified for decorative lighting.

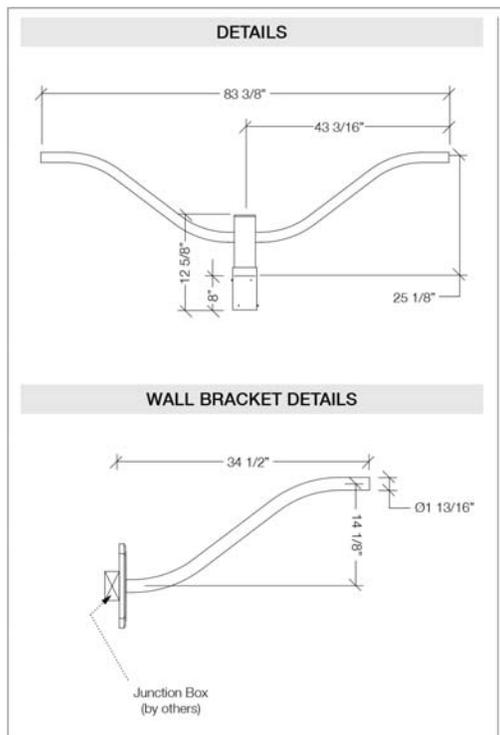
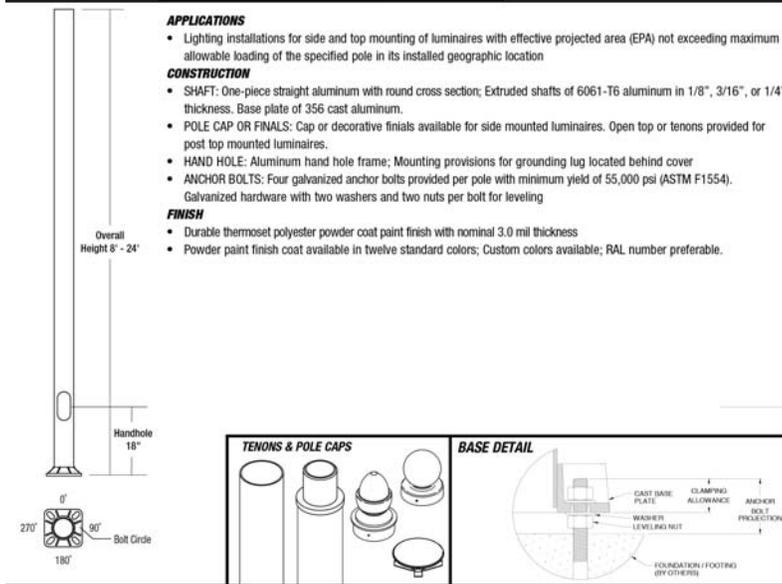
Fixture placed in furnishing zone unless space is limited. Placement on back of sidewalk or private property overhanging sidewalk may be accommodated where space is a constraint.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-2E
Revised Date:	COBRAHEAD E		



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Street & Sidewalk Lighting STANDARD - COBRAHEAD POLE



LIGHTING POLE (see Section 10.2)

Pole: Beacon RSA-B-SHO-S Series

Model:

RS-B-SHO-S-16-40-A/B/C-CAP-2L-B3-DBT-VM2

Aluminum, smooth tapered pole of 6061-T6 aluminum.

Arm: Beacon AA-10 Cobra

Model: AA-10-S-5-B-P-GYS

Smooth profile on arms with copper alloy A356. All extruded aluminum parts shall be alloy 6061-T6, 6063-T5 or equal.

Performance standards for locations near shoreline (AAMA 2604, ASTM D522, resists surface impacts of up to 160 inch-pounds).

Base bolt pattern: Four galvanized anchor bolts per pole with minimum yield of 55,000 psi (ASTM F1554). Galvanized hardware with two washers and two nuts per bolt for leveling.

DIMENSIONS

Pole Height = 20' or 30' (according to Section 10.2.1)

FINISH

Grey: GYS Grey Smooth (standard)

Thermoset polyester powder coat paint finish with nominal 3.0 mil thickness.

Corrosion-resistant polyester powder-coat electrostatically applied meeting AAMA 2604 performance specification.

APPLICATION

Standard street lighting for streets not specified for decorative lighting.

To be used within .5 mi. of shoreline and where existing poles are not available for mounting cobrahead fixture.

Spacing: According to Section 10.2.1

Follow established pattern and orientation - typically single arm overhanging towards street.

Fixture placed in furnishing zone unless space is limited. Placement on back of sidewalk or private property overhanging sidewalk may be accommodated where space is a constraint.

Date:
March, 2019

CITY OF PORTLAND, MAINE
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MUNICIPAL STREET
LIGHTING STANDARDS
SECTION 10

Figure:

X-2F

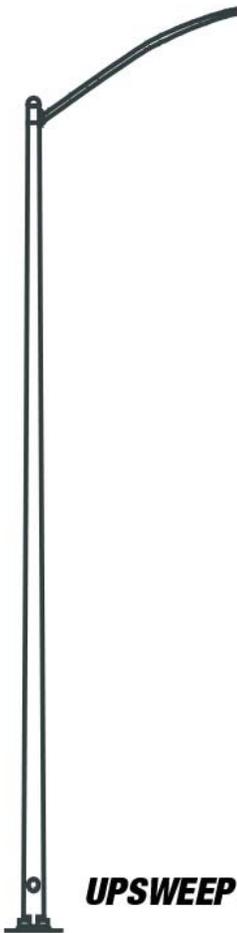
Revised Date:

COBRAHEAD POLE - WATERFRONT



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**Street & Sidewalk Lighting
 STANDARD - COBRAHEAD POLE**



UPSWEEP STYLE

LIGHTING POLE (see Section 10.2)

Hubbell FTA Series - Upsweep Style
 Model: RTA

Standard aluminum, smooth tapered pole.

DIMENSIONS

Pole Height = 20' or 30' (according to Section 10.2.1)

FINISH

Grey (standard)

APPLICATION

Standard street lighting for streets not specified for decorative lighting.

To be used further than .5 mi. from shoreline and where existing poles are not available for mounting cobrahead fixture.

Spacing: According to Section 10.2.1

Follow established pattern and orientation - typically single arm overhanging towards street.

Fixture placed in furnishing zone unless space is limited. Placement on back of sidewalk or private property overhanging sidewalk may be accommodated where space is a constraint.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-2G
Revised Date:	COBRAHEAD POLE - NON-WATERFRONT		

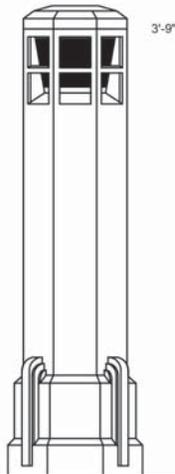


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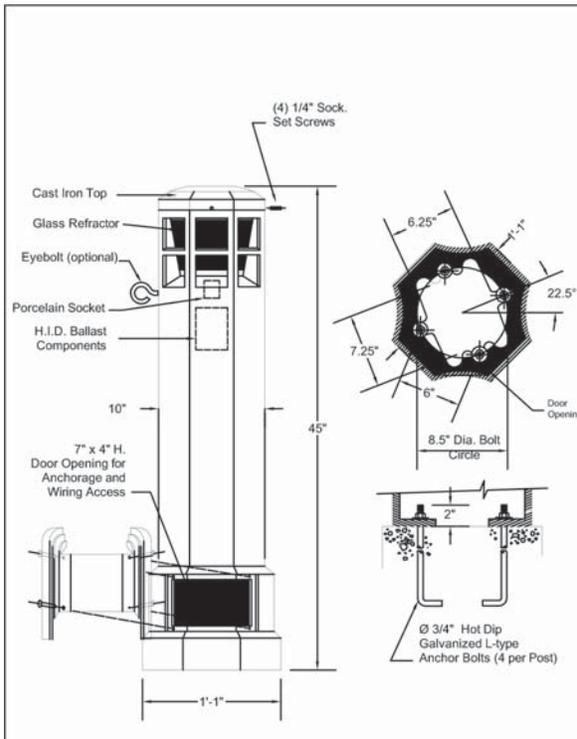
**Street & Sidewalk Lighting
 BOLLARD**

Freeport Series

Cast Iron Lighted Bollard



BOL/FP45/13/L-CI



LUMINAIRE

Holophane Freeport Series Cast Iron Lighted Bollard
 Model: BOL-FP45-13-LCI/BK-M70-II

Bollard shall be cast iron construction with a classic octagonal design.

The bollard shall be provided with an optical assembly including a glass refractor, and an octagonal top. Borosilicate glass refractor with IES Type II distribution.

Bollard shall be made from a one-piece casting; the top shall be attached to the bollard with four tamper resistant set screws.

LAMP

Light source shall be 70 watt Metal Halide. When bollard is made available in LED, light source must be LED option. 3000K color temperature.

DIMENSIONS

Height = 3'-9" or manufacturer's specification
 Base Diameter = 13" octaflute base
 Top Diameter = 10" octagonal top

MATERIALS

ASTM-A48 Class 30 cast iron
 Refractor: Borosilicate glass with IES Type II dist.
 Hardware: Exposed hardware shall be tamper resistant stainless steel. Anchor bolts to be completely hot dip galvanized.

FINISH

Black: CI/BL = Cast Iron/Black (standard)

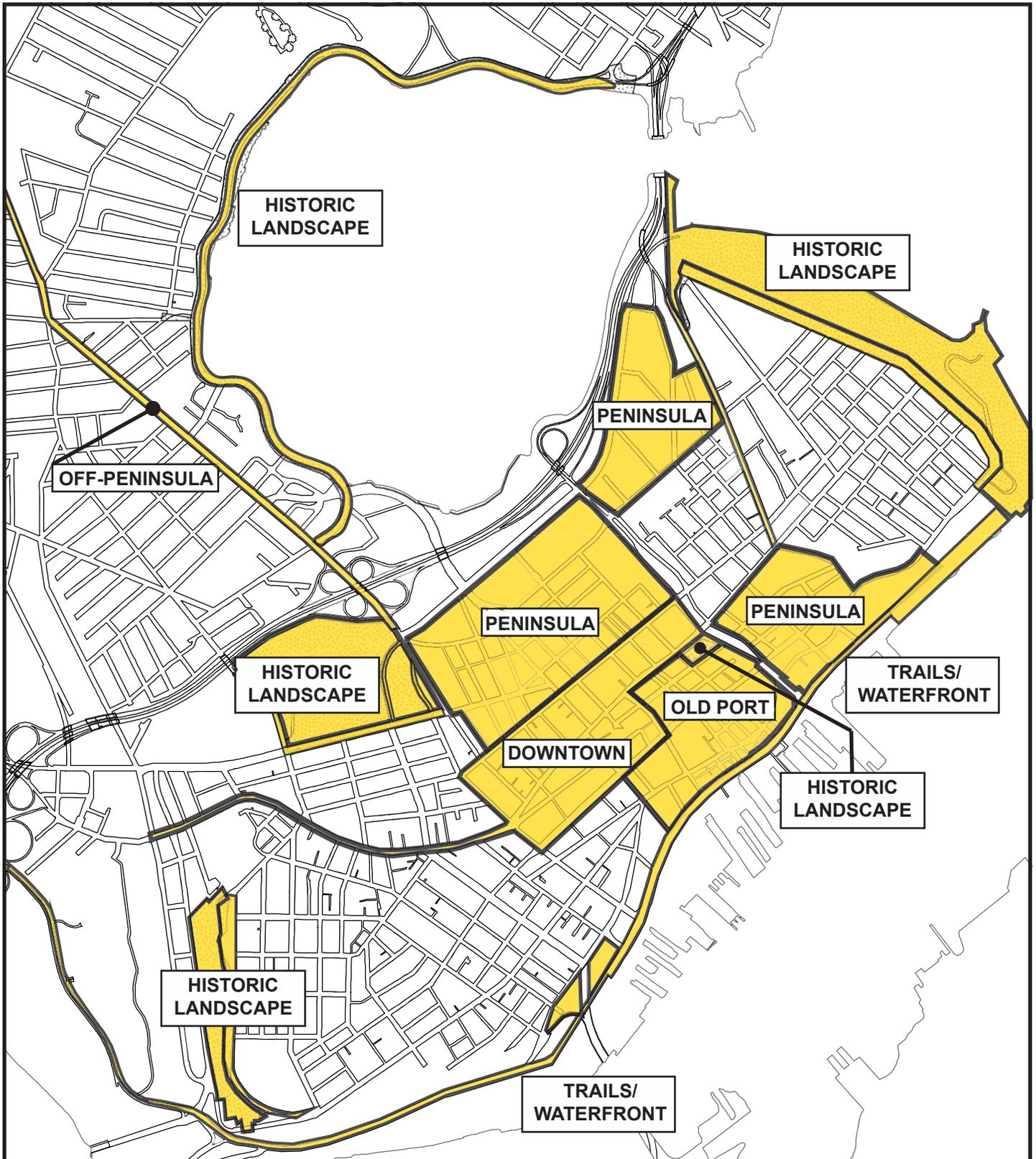
APPLICATION

Sidewalk lighting where height is limited - underpasses, parks, piers

Can be used as a security bollard.

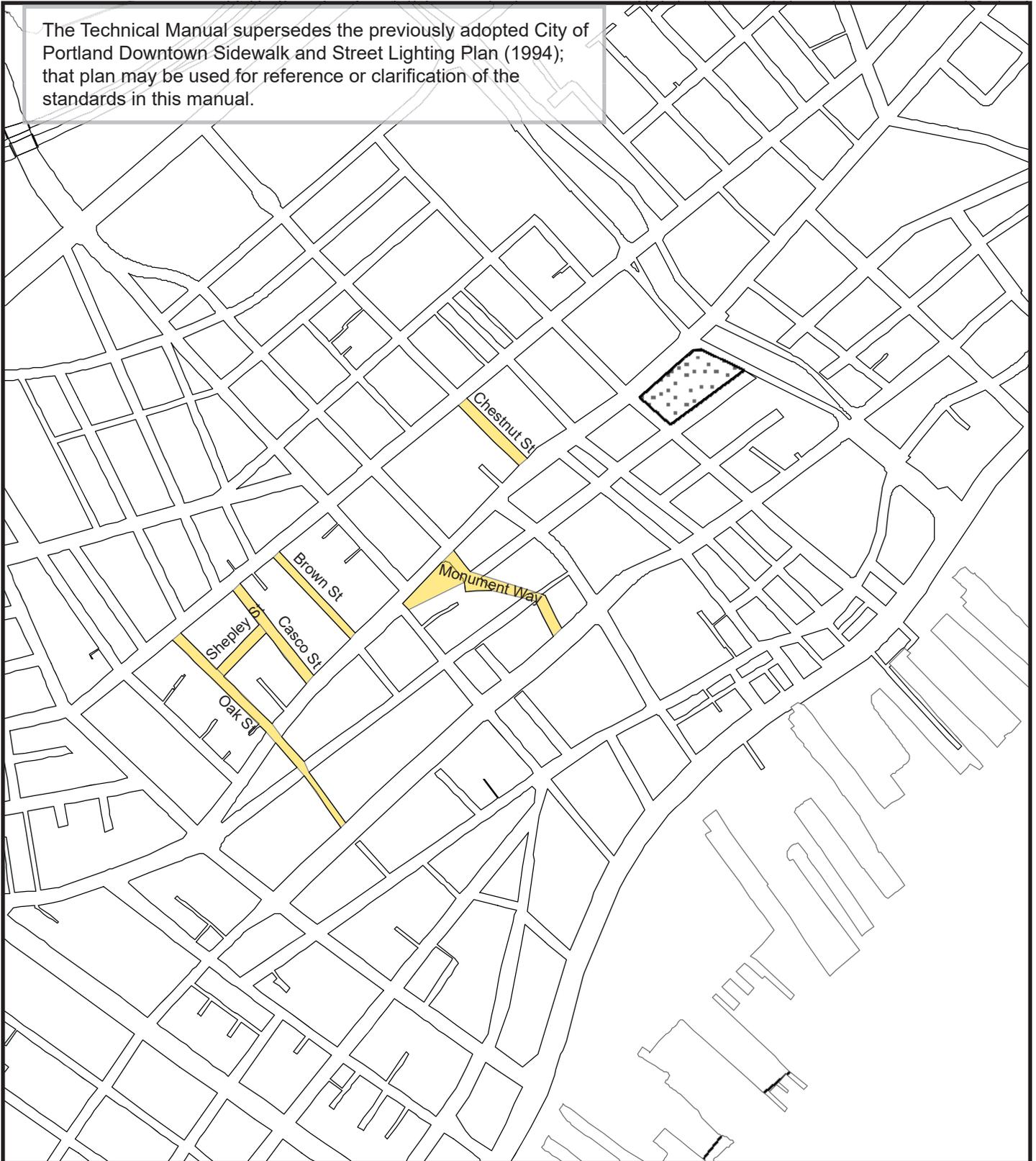
Spacing: To be determined by Department of Public Works per specific project

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-3
Revised Date:	LIGHTED BOLLARD		



Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-4
Revised Date:	MAP: DECORATIVE LIGHTING AREAS		

The Technical Manual supersedes the previously adopted City of Portland Downtown Sidewalk and Street Lighting Plan (1994); that plan may be used for reference or clarification of the standards in this manual.

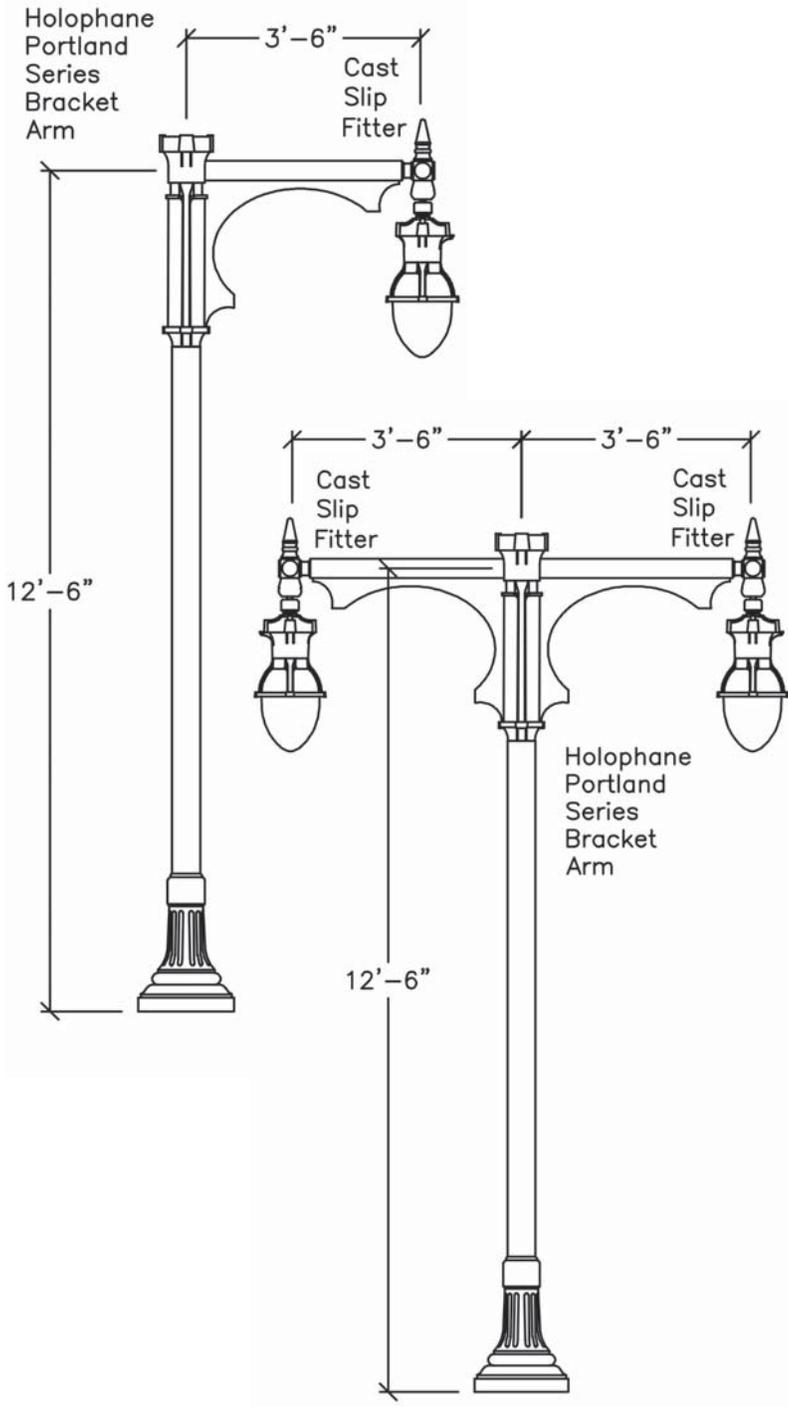


Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-5A
Revised Date:	MAP: Decorative Light - DOWNTOWN PEDESTRIAN		



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**Street & Sidewalk Lighting
DECORATIVE LIGHT - DOWNTOWN**



LUMINAIRE

Holophane Esplanade LED II
Model:
ESL2-P20S-30K-AS-CMC-TG3-S-P7-NL2X2-BHDF13-200CMC

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 IV distribution pattern. Luminaire shall include an integral ballast with modular wiring connectors and multi-voltage taps. Provide an internal receptacle type photocell control. LED 3000K color temperature

BRACKET ARM

Holophane Portland Series (custom)
Model PD42CA-RAL6012

Portland Series steel crossarm with a post-top fitting for a 3-1/2" by 8" tenon.

SLIP FITTER

Holophane
Model :WLLF200SCA-RAL6012
2-3/8" O.D. with swivel cast fitter.

LIGHTING POLE AND BASE

Holophane North Yorkshire Cast Steel
Model NY-S-13-FTB-P13-ABG-RAL6012

Cast steel pole, smooth 5" diameter shaft with integrated base 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.

DIMENSIONS

Overall Height = 12' 6"
Bracket Arm Length = 3' 6"
Base Diameter = 17"

FINISH

Dark Green: RAL-6012 (custom)

APPLICATION

Sidewalk lighting or pedestrian lighting areas

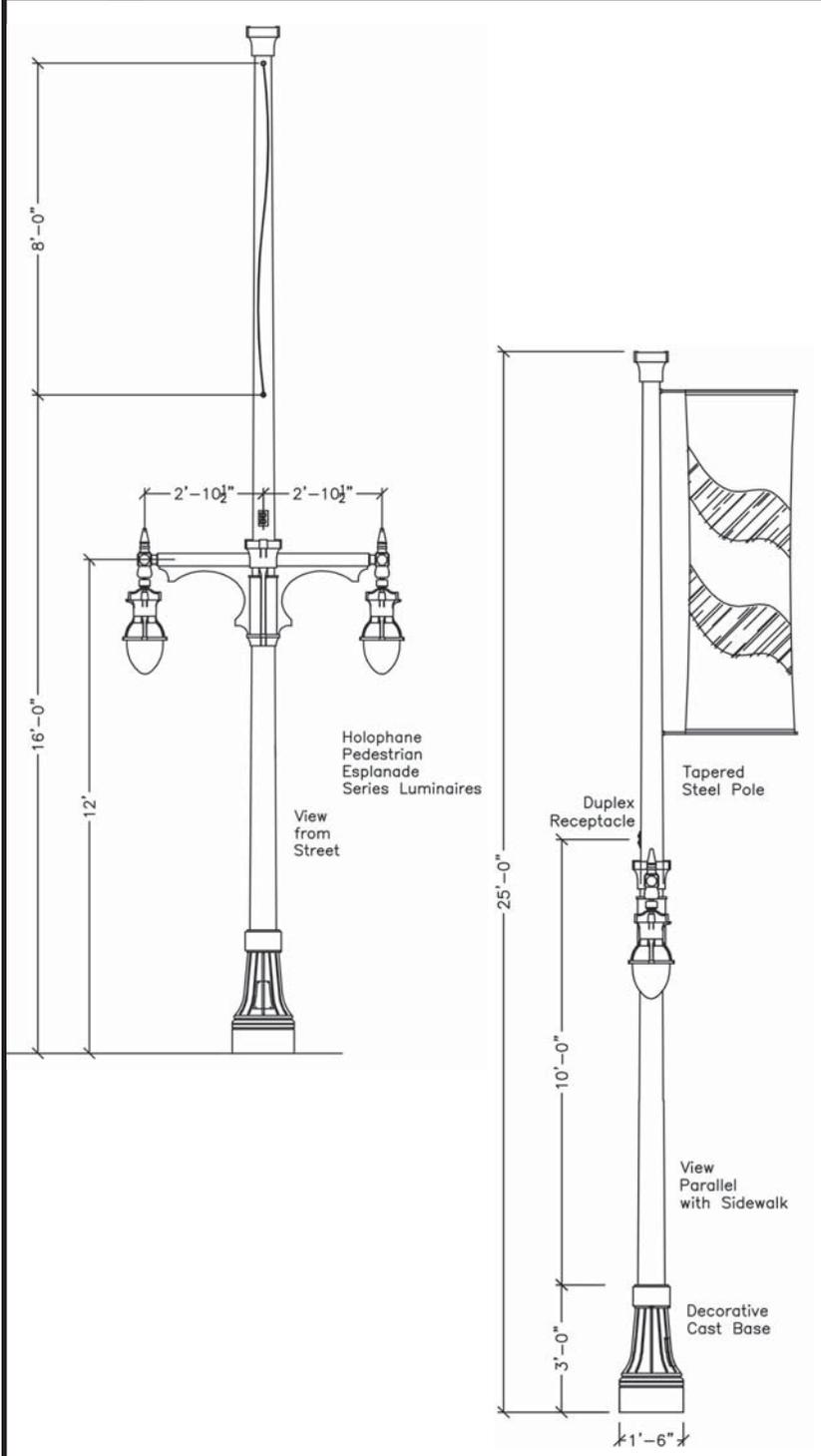
Spacing:
One side: 60' - 80' on center
Alternating sides: 100' - 175' on center

Single-arm fixture placed in furnishing zone with luminaire oriented over sidewalk. Double-arm fixture placed with bracket arms parallel to sidewalk. If sidewalk space is limited, Planning Authority may approve lights within private property or attached to building.

<p>Date: March, 2019</p>	<p>CITY OF PORTLAND, MAINE TECHNICAL MANUAL</p>	<p>MUNICIPAL STREET LIGHTING STANDARDS SECTION 10</p>	<p>Figure: X-5B</p>
<p>Revised Date:</p>	<p>DOWNTOWN PED 1</p>		



**Street & Sidewalk Lighting
DECORATIVE LIGHT - DOWNTOWN**



LUMINAIRE

Holophane Esplanade LED II
Model:
ESL2-P20S-30K-AS-CMC-TG3-S-P7-NL2X2-BHDF13-200CMC

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 IV distribution pattern. Luminaire shall include an integral ballast with modular wiring connectors and multi-voltage taps. Provide an internal receptacle type photocell control. LED 3000K color temperature.

BRACKET ARM

Holophane Portland Series steel dual crossarm (custom)
Model: PD69-CA-RAL6012

SLIP FITTER

Holophane
Model: WLLF200S-CA-RAL6012
2-3/8" O.D. with swivel cast fitter

LIGHTING POLE

Holophane
Model: PM-18-CSB-CA-RAL6012

Tapered steel pole smooth 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.

DECORATIVE BASE

Holophane
Model: PM18CSB-CA-RAL6012
Decorative clamshell cast aluminum base. Hardware shall be stainless steel.

DIMENSIONS

Overall Height = 25' 0"
Bracket Arm Length = 2' 10 1/2"
Base Diameter = 18"

FINISH

Dark Green: RAL-6012 (custom)

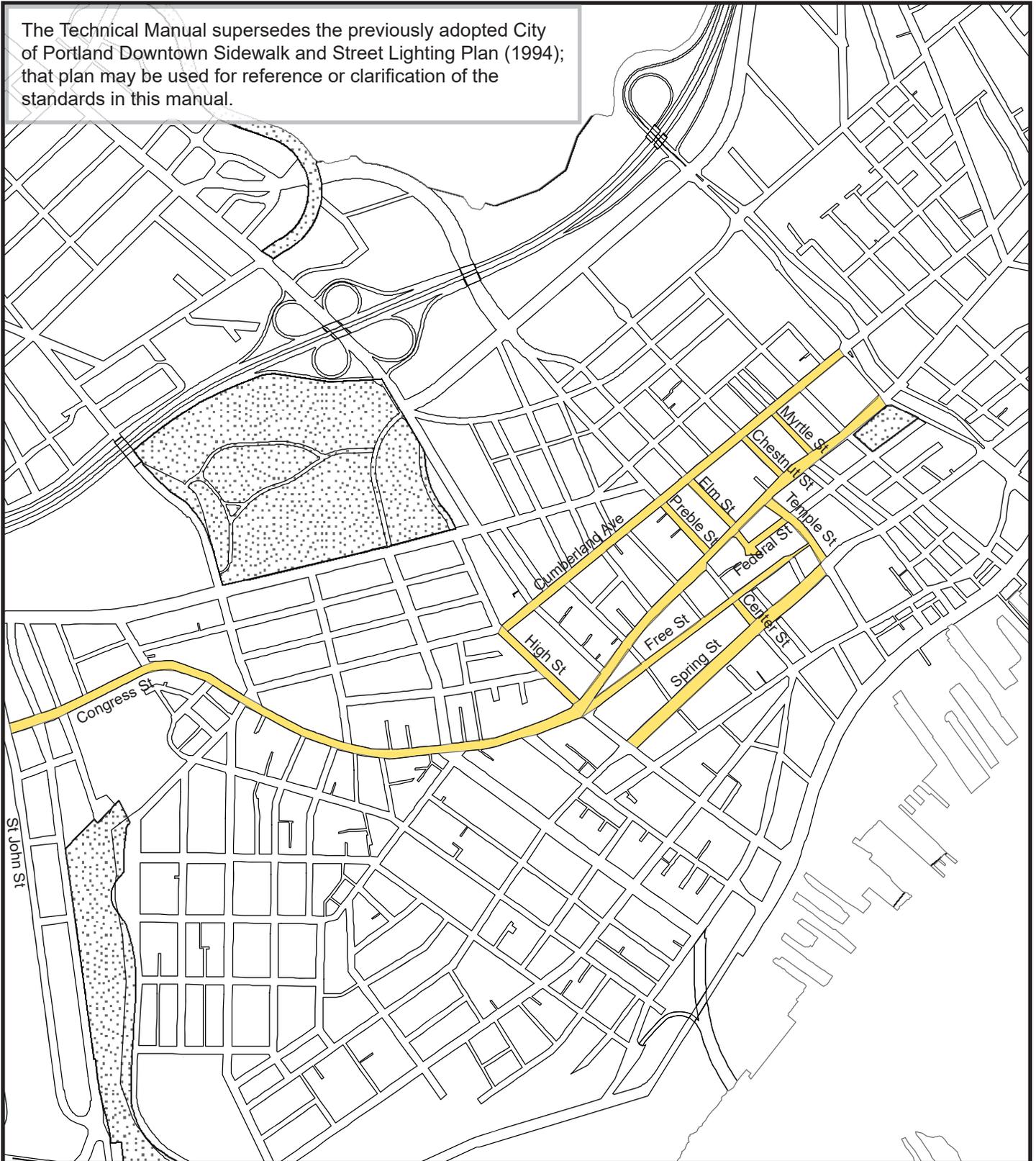
APPLICATION

Sidewalk lighting or pedestrian lighting areas
Suggested layout:
One side: 90' - 100' on center
Alternating sides: 175' - 225' on center

Double-arm fixture placed with bracket arms parallel to sidewalk. If sidewalk space is limited, Planning Authority may approve lights within private property or attached to building.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-5C
Revised Date:	DOWNTOWN PED 2		

The Technical Manual supersedes the previously adopted City of Portland Downtown Sidewalk and Street Lighting Plan (1994); that plan may be used for reference or clarification of the standards in this manual.

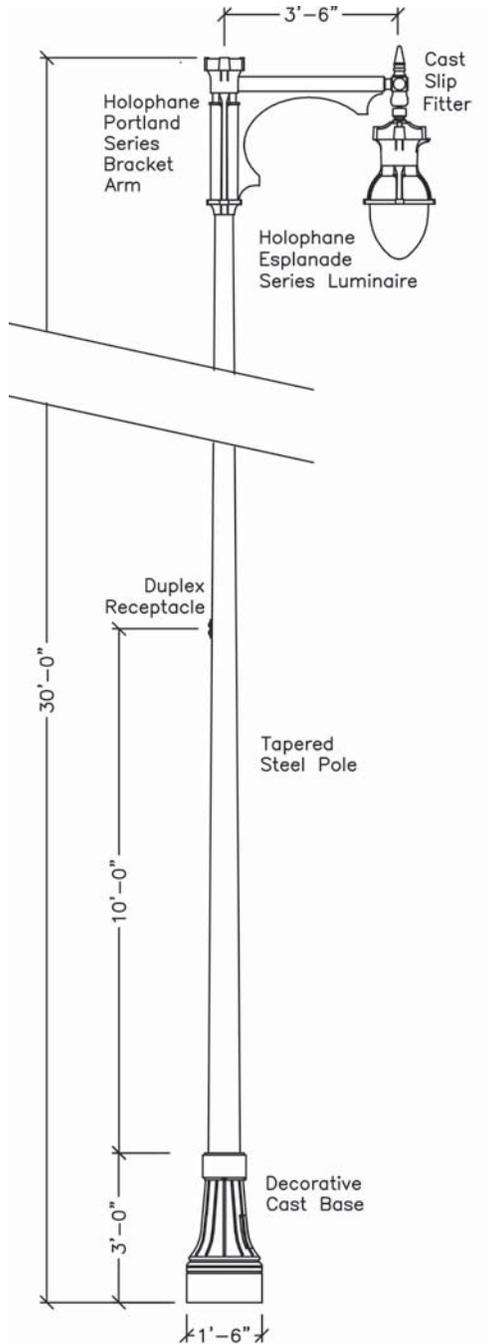


Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-5D
Revised Date:	MAP: Decorative Light - DOWNTOWN STREET		



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**Street & Sidewalk Lighting
 DECORATIVE LIGHT - DOWNTOWN**



LUMINAIRE

Holophane Esplanade LED II
 Model:
 ESL2-P20S-30K-AS-CMC-TG3-S-P7-NL2X2-BHDF13-200CMC
 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 IV distribution pattern. Luminaire shall include an integral ballast with modular wiring connectors and multi-voltage taps. Provide an internal receptacle type photocell control. LED 3000K color temperature.

BRACKET ARM

Holophane Portland Series steel crossarm (custom)
 Model: PD42-CA-RAL6012
 Steel crossarm with a post-top fitting for a 3 1/2" by 8" tenon

SLIP FITTER

Holophane
 Model: WLLF200S-CA-RAL6012
 2-3/8" O.D. with swivel cast fitter.

LIGHTING POLE

Holophane
 Model: PM-18-CSB-CA-RAL6012
 Tapered steel pole smooth 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.

DECORATIVE BASE

Holophane
 Model: PM18CSB-CA-RAL6012
 Decorative clamshell cast aluminum base. Hardware shall be stainless steel.

DIMENSIONS

Overall Height = 30' 0"
 Bracket Arm Length = 3' 6"
 Base Diameter = 18"

FINISH

Dark Green: RAL-6012 (custom)

APPLICATION

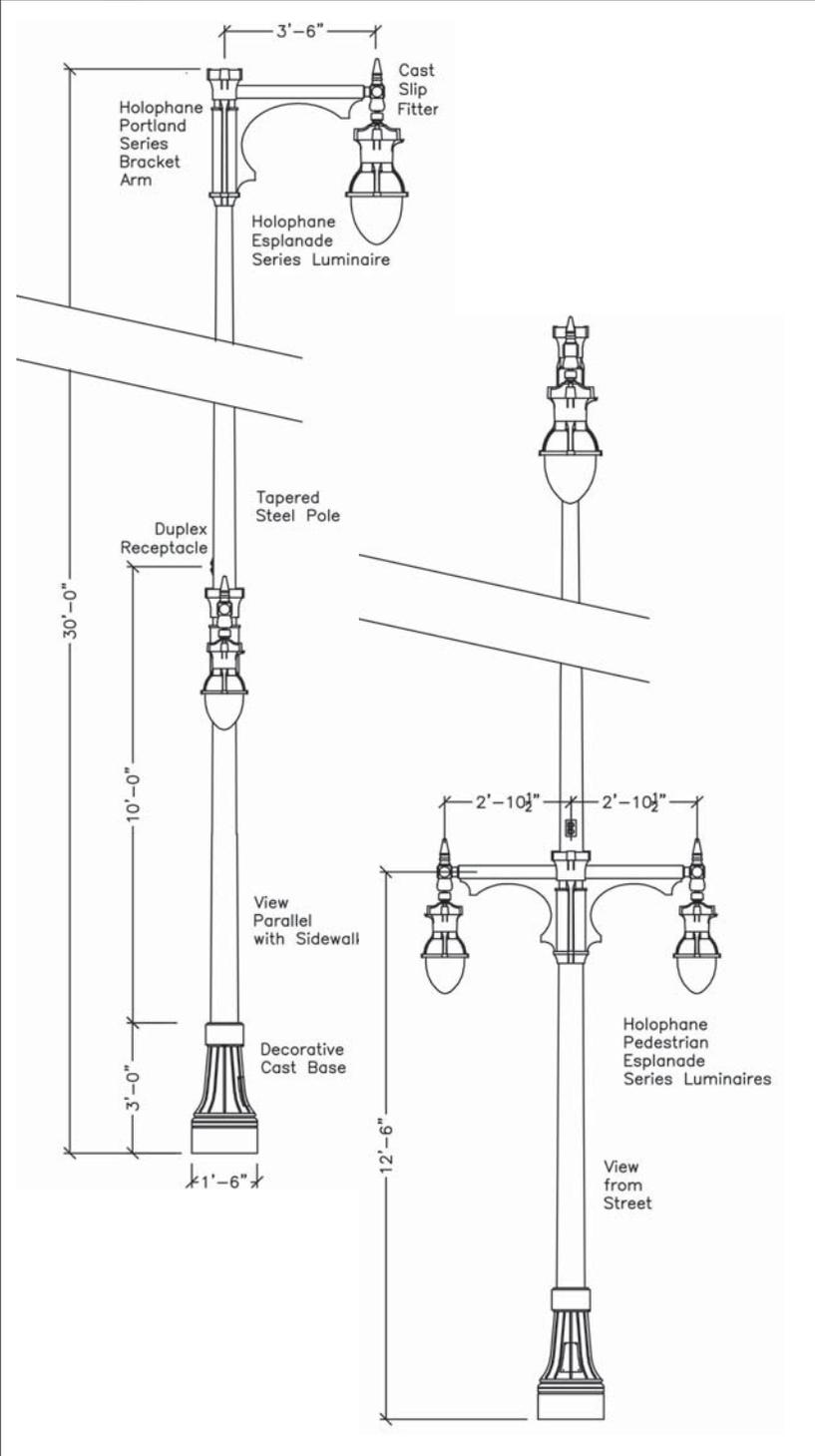
Street lighting
 Spacing:
 One side: 90' - 100' on center
 Alternating sides: 175' - 225' on center

Single-arm fixture placed in furnishing zone with luminaire oriented over sidewalk. Double-arm fixture placed with bracket arms parallel to sidewalk or in medians. If sidewalk space is limited, Planning Authority may approve lights within private property or attached to building.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-5E
Revised Date:	DOWNTOWN STREET		



**Street & Sidewalk Lighting
 DECORATIVE LIGHT - DOWNTOWN**



LUMINAIRE

Holophane Esplanade LED II
 Model:
 ESL2-P20S-30K-AS-CMC-TG3-S-P7-NL2X2-BHDF13-200CMC

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 IV distribution pattern. Luminaire shall include an integral ballast with modular wiring connectors and multi-volatage taps. Provide an internal receptacle type photocell control. LED 3000K color temperature

BRACKET ARM

Holophane Portland Series steel (custom)
 Top Bracket Arm: Steel crossarm with a post-top fitting for a 3 1/2" by 8" tenon
 Model: PD42-CA-RAL6012
 Lower Bracket Arm: Steel dual crossarm
 Model: PD69-CA-RAL6012

SLIP FITTER

Holophane
 Model: WLLF200S-CA-RAL6012
 2-3/8" O.D. with swivel cast fitter.

LIGHTING POLE

Holophane
 Model: PM-18-CSB-CA-RAL6012

Tapered steel pole smooth 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.

DECORATIVE BASE

Holophane
 Model: PM18CSB-CA-RAL6012
 Decorative clamshell cast aluminum base. Hardware shall be stainless steel.

DIMENSIONS

Overall Height = 30' 0"
 Upper Bracket Arm Length = 3' 6"
 Lower Bracket Arm Length = 2' 10 1/2"
 Base Diameter = 18"

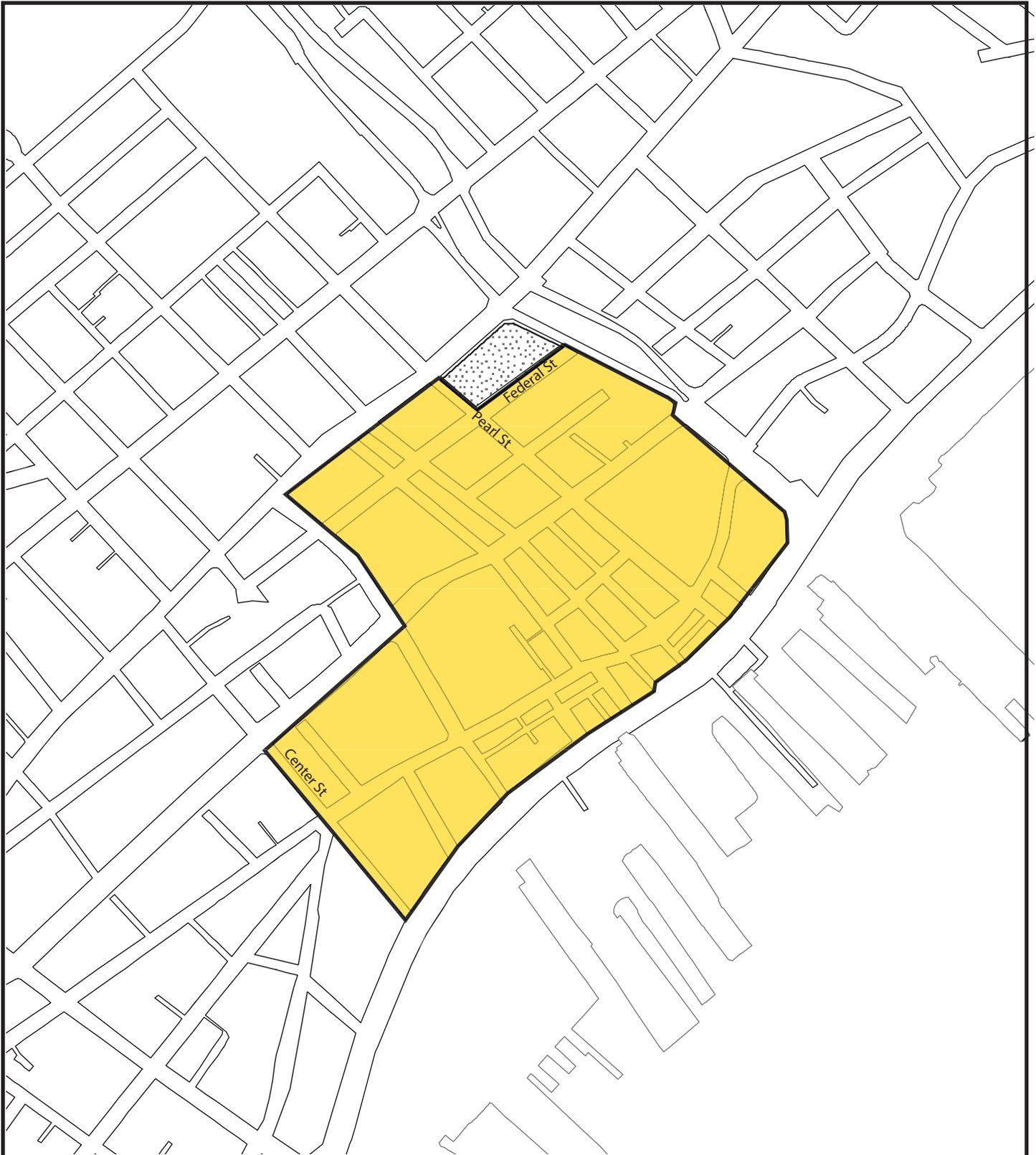
FINISH

Dark Green: RAL-6012 (custom)

APPLICATION

Street/pedestrian lighting combination.
 Spacing:
 One side: 90' - 100' on center
 Alternating sides: 175' - 225' on center
 Double-arm bracket arms parallel to sidewalk.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-5F
Revised Date:	DOWNTOWN COMBO		

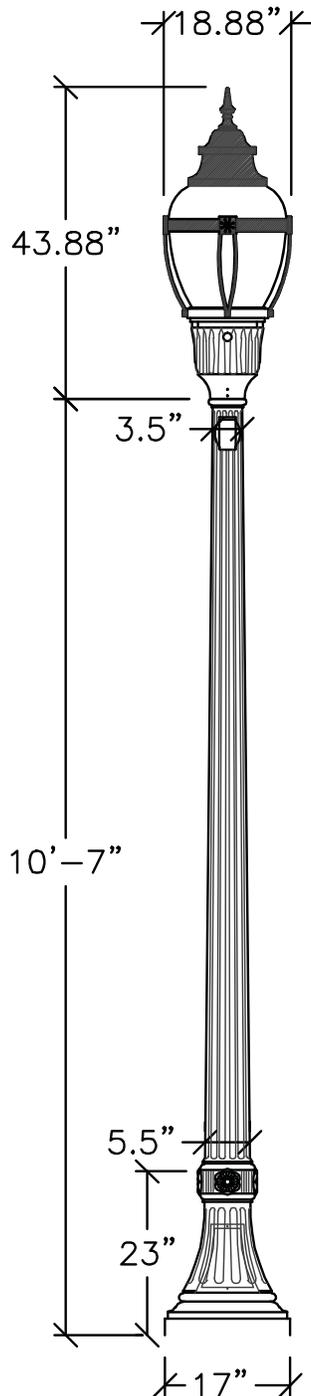


Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-6A
Revised Date:	MAP: Decorative Light - OLD PORT		



PORTLAND | me

Street & Sidewalk Lighting
 DECORATIVE LIGHT - OLD PORT



LUMINAIRE

Holophane Washington Postlite II LED - Acrylic
 Model: WAUE2-P20-30K-AS-BK-3-BK-6-P7-F-PCLL
 Cast aluminium housing with stainless steel hardware.
 Thermal resistant acorn borosilicate glass refractor with IES Type asymmetric Type IV distribution.
 Luminaire shall include decorative ribs, solid band, and spike finial, with internal twist-lock receptacle type photocell control. LED 3000K

LAMP

IES Type asymmetric Type IV distribution
 LED 3000K color temperature

LIGHTING POLE

Holophane North Yorkshire - Aluminum pole and base
 Model: NYA-11-FTJ-17-P07-ABG-BK-R126A
 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 GFI rated duplex receptacle outlet.
 Lighting pole shall be hot dipped galvanized prior powder coat paint.

DIMENSIONS

Overall Height = 14' 3"
 Pole Height = 10' 7"
 Taper = 5.5" to 3.5"
 Base Diameter = 17"

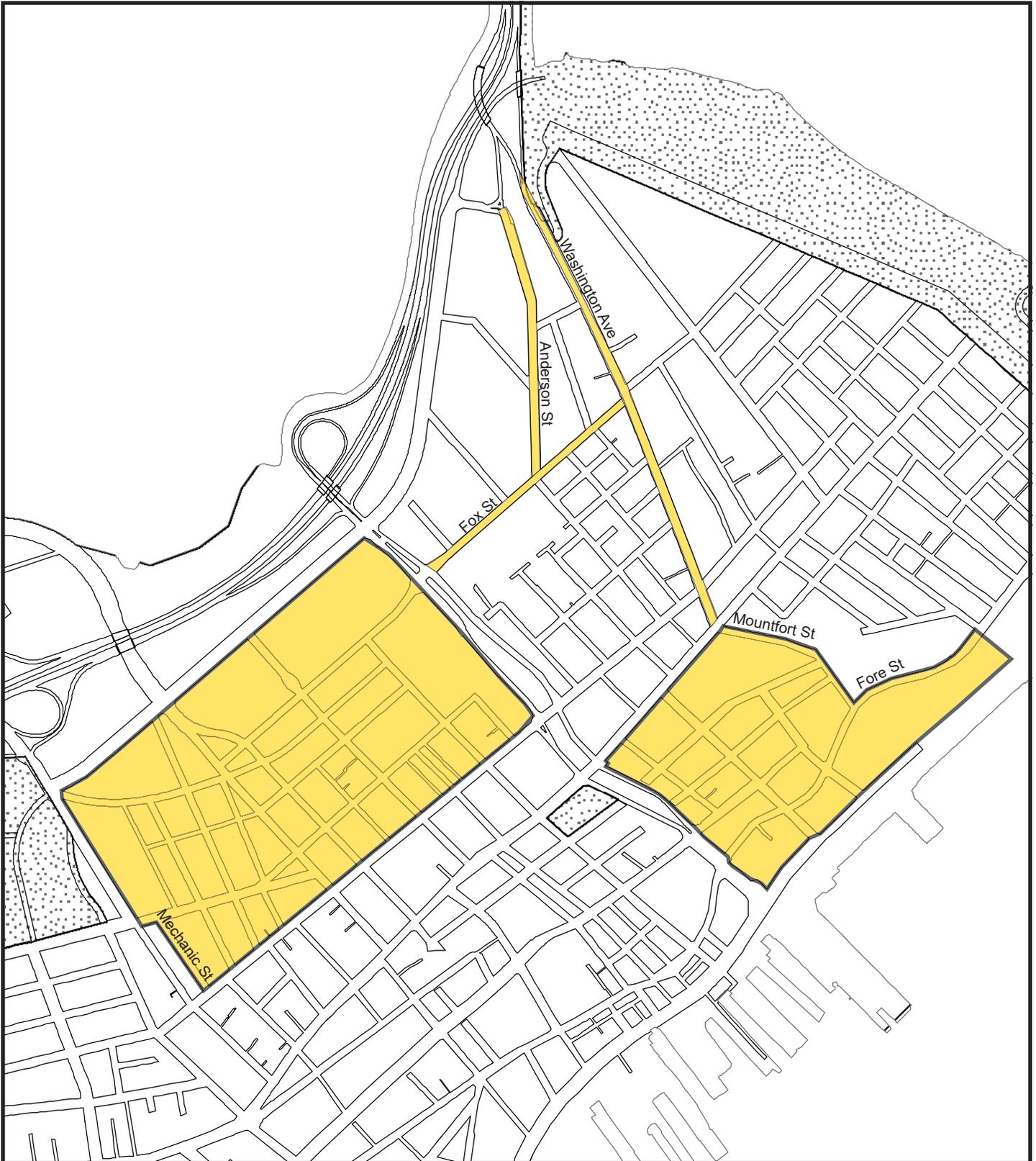
FINISH

Black (standard)

APPLICATION

Street/Sidewalk lighting for two-way streets with parking on both sides.
 Spacing: 60' - 80' on center (staggered pattern both sides of street)

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-6B
Revised Date:	OLD PORT		

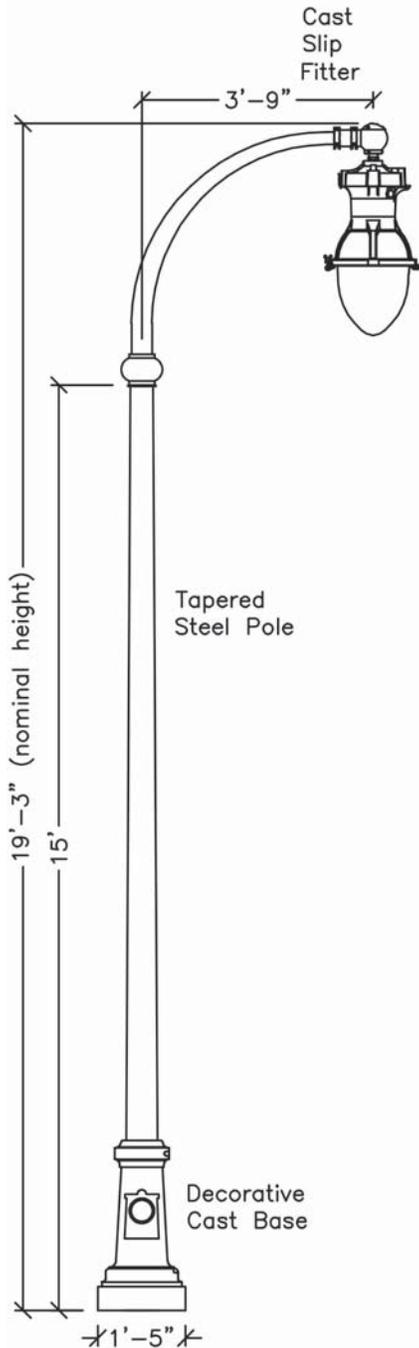


Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-7A
Revised Date:	MAP: Decorative Light - PENINSULA MEDIUM STREET		



PORTLAND | me

**Street & Sidewalk Lighting
 DECORATIVE LIGHT - PENINSULA**



LUMINAIRE

Holophane Esplanade LED II
 Model: ESL2-P20S-30K-AS-CMC-TG3-S-P7-NL2X2-BHDF13-200CMC
 or Spring City Columbia Series
 Model: ALMCLU-LE080/EVX/X2-30-CR3-GR14-LACLB-FED-CU
 Pendant mount, 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 IV distribution pattern. LED 3000K color temperature.

BRACKET ARM

Holophane OUC Roadway Arm
 Model: OUC 6063-T6
 or Spring City Columbia Arm
 Model: AARCLA-1S-51-53-TN2.38/7.00-CU
 Aluminum crossarm with a post-top fitting for a 3 1/2" by 8" tenon. Single Arm 45" Oriented 180 degrees.

SLIP FITTER

Holophane Boston Harbor Series
 Model: BHLF-200-SCA/AS
 2 3/8" O.D. with swivel cast fitter.

LIGHTING POLE

Holophane
 Model: CM17CSB-CA-RAL6012
 or Spring City Cambridge Series
 Model: SSHSM-G11-7.00-15.00-TN3.50/8.00-CU
 Smooth, tapered steel pole smooth 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 powdercoat paint.

DECORATIVE BASE

Holophane Cambridge Series
 Model: CM17CSB
 or Spring City Cambridge Series
 Model: DWBCMB-17-CU
 Decorative clamshell cast aluminum base. Hardware shall be stainless steel.

DIMENSIONS

Overall Height = 19' 3"
 Pole Height = 15' 0"
 Base Diameter = 17" to 18"

FINISH

Black (standard)

APPLICATION

Street/sidewalk lighting. Decorative fixture not needed on same side of street as existing cobrahead fixtures.
 Spacing: 80' - 100' on center
 Place in furnishing zone overhang towards street; where fixture conflicts with overhead utilities, may be placed on back of sidewalk.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-7B
Revised Date:	PENINSULA MEDIUM STREET		

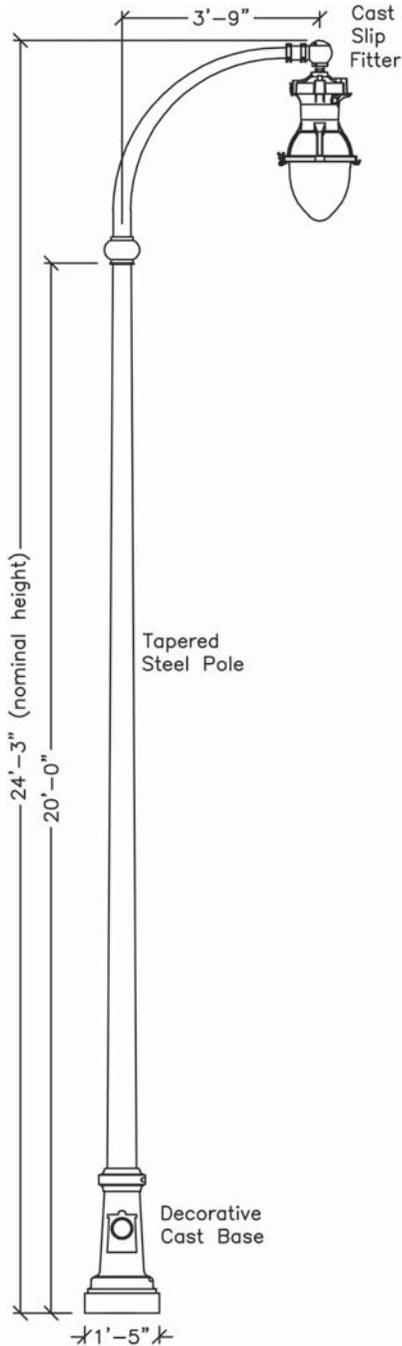


Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-7C
Revised Date:	MAP: Decorative Light - PENINSULA LARGE STREET		



PORTLAND | me

**Street & Sidewalk Lighting
 DECORATIVE LIGHT - PENINSULA**



LUMINAIRE

Holophane Esplanade LED II
 Model: ESL2-P20S-30K-AS-CMC-TG3-S-P7-NL2X2-BHDF13-200CMC or Spring City Columbia Series
 Model: ALMCLU-LE080/EVX/X2-30-CR3-GR14-LACLB-FED-CU
 Pendant mount, 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 IV distribution pattern. LED 3000K color temperature.

BRACKET ARM

Holophane OUC Roadway Arm
 Model: OUC 6063-T6 or Spring City Columbia Arm
 Model: AARCLA-1S-51-53-TN2.38/7.00-CU
 Aluminum crossarm with a post-top fitting for a 3 1/2" by 8" tenon. Single Arm 45" Oriented 180 degrees.

SLIP FITTER

Holophane Boston Harbor Series
 Model: BHLF-200-SCA/AS
 2 3/8" O.D. with swivel cast fitter.

LIGHTING POLE

Holophane
 Model: CM17CSB-CA-RAL6012 or Spring City Cambridge Series
 Model: SSHSM-G11-7.00-15.00-TN3.50/8.00-CU
 Smooth, tapered steel pole smooth 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 powdercoat paint.

DECORATIVE BASE

Holophane Cambridge Series
 Model: CM17CSB or Spring City Cambridge Series
 Model: DWBCMB-17-CU
 Decorative clamshell cast aluminum base. Hardware shall be stainless steel.

DIMENSIONS

Overall Height = 24' 3"
 Pole Height = 20' 0"
 Bracket Arm = 3' 9"
 Base Diameter = 18"

FINISH

Black (standard)

APPLICATION

Street/Sidewalk light. Spacing: One side: 90' - 110' o.c. Alt. sides: 175' - 225' on center
 Place in furnishing zone overhang towards street; where fixture conflicts with overhead utilities, may be placed on back of sidewalk.

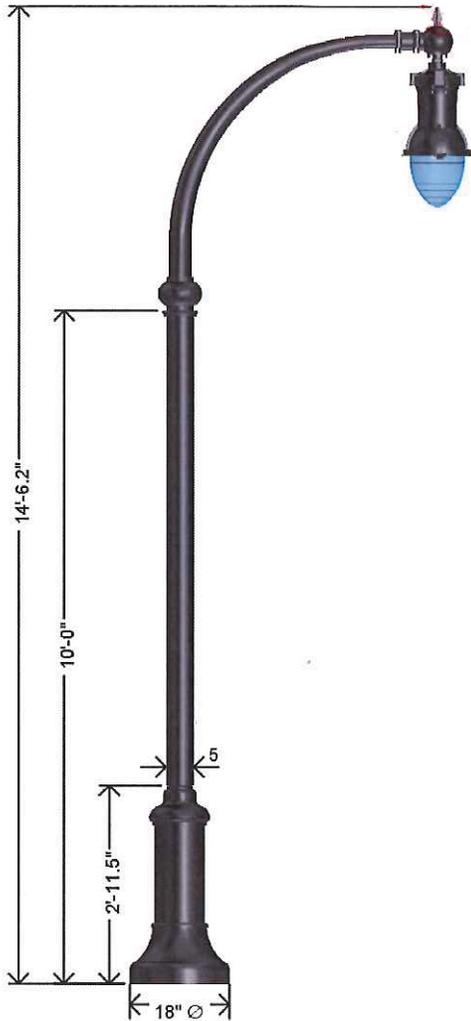
Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-7D
Revised Date:	PENINSULA LARGE STREET		



PORTLAND | me

**Street & Sidewalk Lighting
 DECORATIVE LIGHT - PENINSULA**

*Waiver required: This fixture to be implemented in special circumstances only.
 See 10.4 STANDARDS FOR DECORATIVE LIGHTING.



Anchorage/Orientation Plan

LUMINAIRE

Holophane Esplanade LED II
 Model: ESPL2-P20-30L-AS-S-B-4-SS-P7
 IES Type IV Distribution

Pendant mount, quick lock stem mount
 Auto-sensing 50/60 hz (120-225V), 38 watts
 LED 3000K color temperature.

BRACKET ARM

Holophane OUC Roadway Arm
 Model: OUC 45/1-CA-BK

Aluminum crossarm with a post-top fitting for a 3 1/2" by 8" tenon.
 Single Arm 45" Oriented 180 degrees.

SLIP FITTER

Holophane Boston Harbor Decorative Arm Fitter
 Model: WLLF200S-CA-RAL6012

2 3/8" O.D. with swivel cast fitter.

LIGHTING POLE AND BASE

Holophane Rockford Harbor Aluminum Pole
 Model: RHA-10-S5J-18-P15-ABG-BK

Pole is aluminum, smooth 5" diameter, .25 wall
 Assembly meets wind load of 90 mph.

DIMENSIONS

Overall Height = 14' 6"
 Pole Height = 10' 0"
 Pole Diameter = 5"
 Base Diameter = 18"
 Arm = 45"

FINISH

Black (standard)

APPLICATION

Sidewalk lighting only when MEDIUM STREET fixture cannot be accommodated.

Spacing:
 One side: 60' - 80' on center
 Alternating sides: 100' - 175' on center

Fixture shall be oriented to overhang sidewalk.

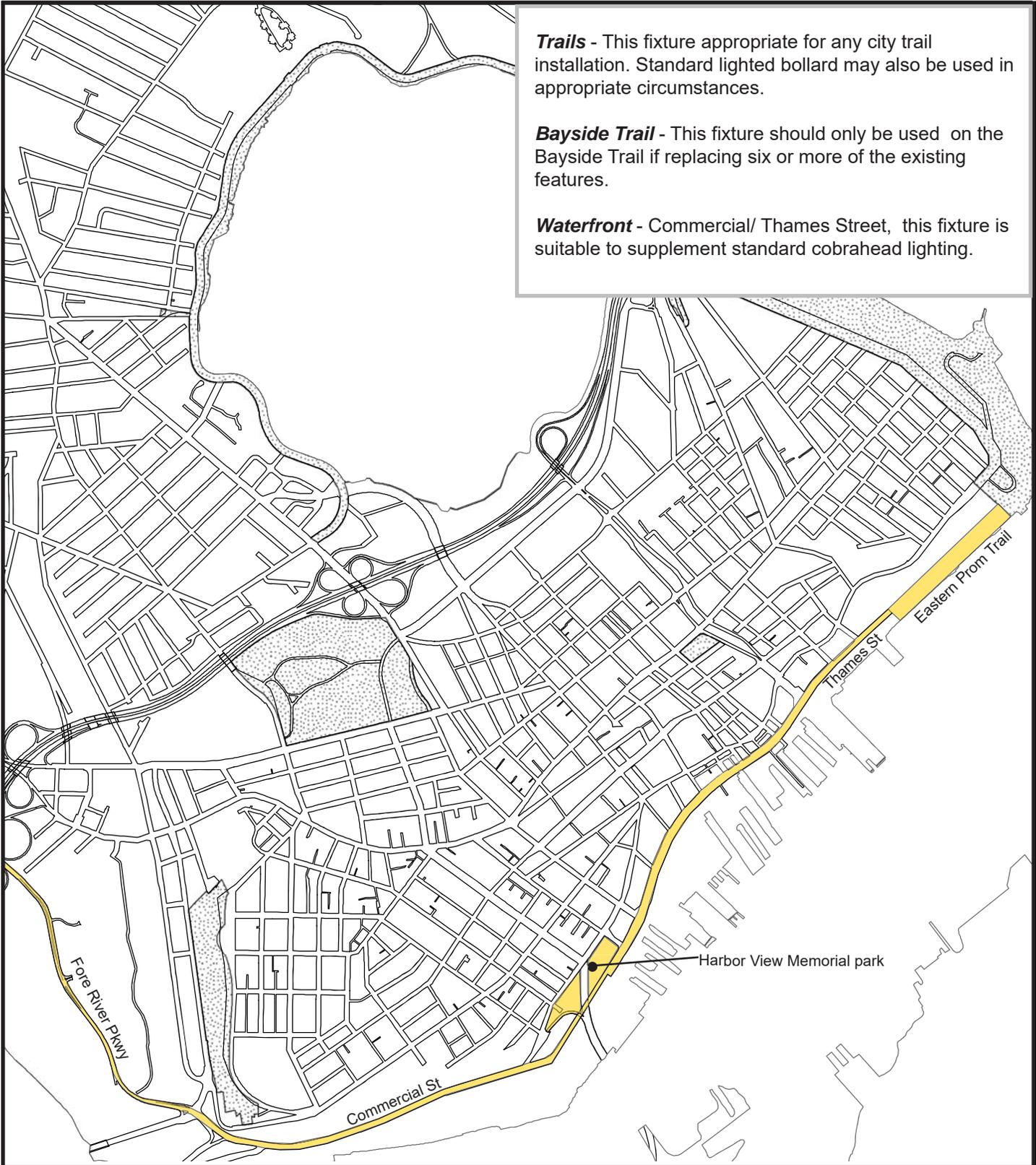
Place in furnishing zone unless space is limited.
 Placement on back of sidewalk or private property overhanging sidewalk may be accommodated where space is a constraint.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-7E
Revised Date:	PENINSULA PED *waiver required		

Trails - This fixture appropriate for any city trail installation. Standard lighted bollard may also be used in appropriate circumstances.

Bayside Trail - This fixture should only be used on the Bayside Trail if replacing six or more of the existing features.

Waterfront - Commercial/ Thames Street, this fixture is suitable to supplement standard cobrahead lighting.

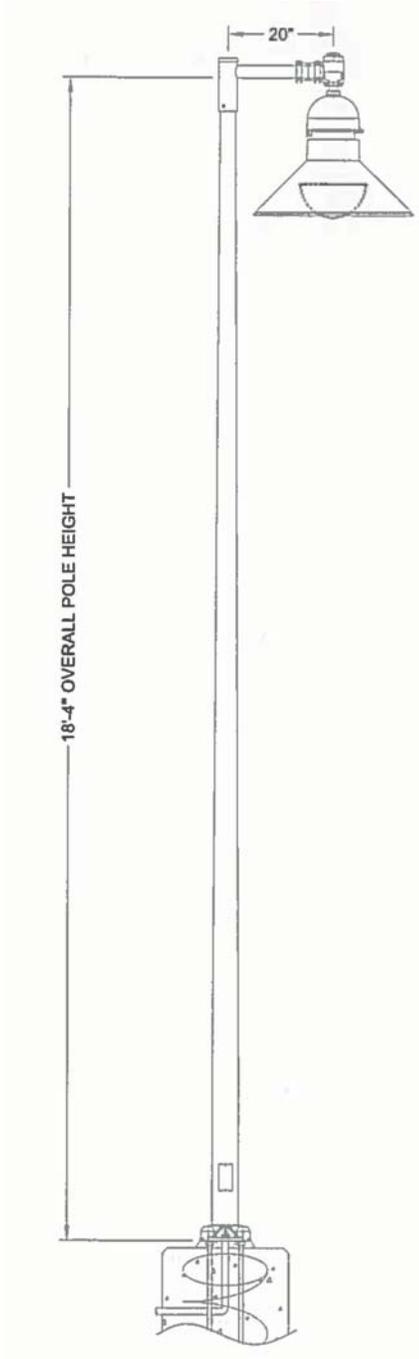


Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-8A
Revised Date:	MAP: Decorative Light - TRAILS/ WATERFRONT		



PORTLAND | me

**Street & Sidewalk Lighting
 DECORATIVE LIGHT - TRAIL/WATERFRONT**



LUMINAIRE

Holophane GlasWerks LED Hallbrook Series
 Model: GELB-050-3K-AS-4-B-3-P7E-DM

Pendant mount
 IES Type IV Distribution
 Thermal resistant prismatic glass lens held in a formed aluminum door frame.
 50 watts
 Universal Voltage (120-277V)
 Dimming driver with 7-pin photocontrol receptacle
 LED 3000K color temperature

BRACKET ARM

Aluminum crossarm with a post-top fitting for a 2-3/8" by 6" tenon.

SLIP FITTER

Holophane Glasswerks Slip Fitter
 Model SG20/1-BK

2-3/8" O.D. with swivel cast fitter.

LIGHTING POLE

Holophane
 Model: RTA1850E-PL-ND-BK-4

Aluminum pole shaft rated for a 90 mph 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 to powder coat paint.

DIMENSIONS

Overall Height = 18' 4"
 Bracket Arm = 1' 6"

FINISH

Black (standard) - polyester powder coat

APPLICATION

Trails: Appropriate for any city trail installation.
 Waterfront (Commercial/Thames St): Supplemental pedestrian lighting to standard cobrahead lighting.

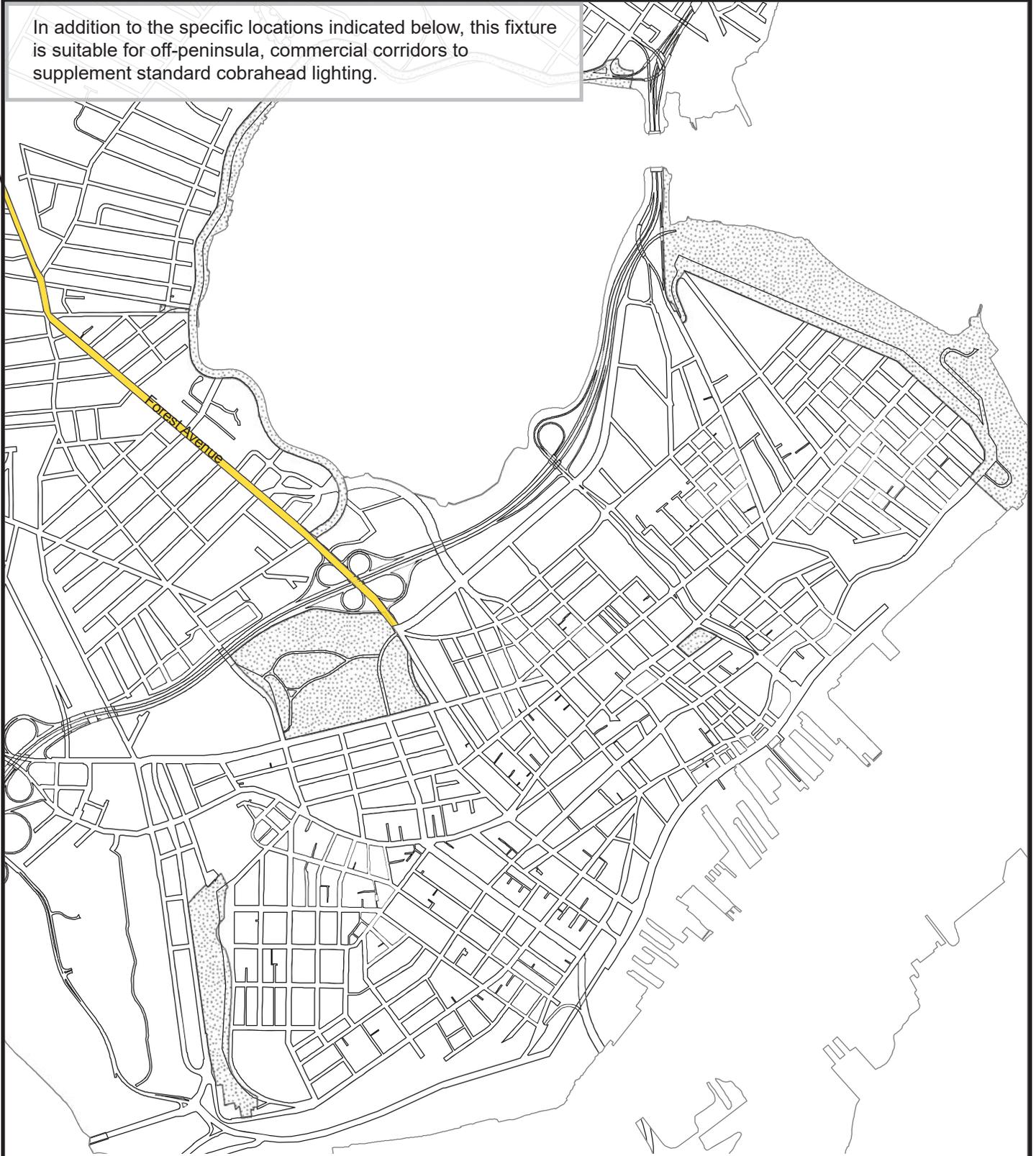
Spacing:
 One side: 90' - 125' on center
 Alternating sides: 175' - 225' ft on center

Follow established pattern. Single arm oriented over trail or street; Double-arm used in medians or similar.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-8B
Revised Date:	TRAILS / WATERFRONT (COMMERCIAL/THAMES STREET)		

to Morrill's Corner

In addition to the specific locations indicated below, this fixture is suitable for off-peninsula, commercial corridors to supplement standard cobrahead lighting.

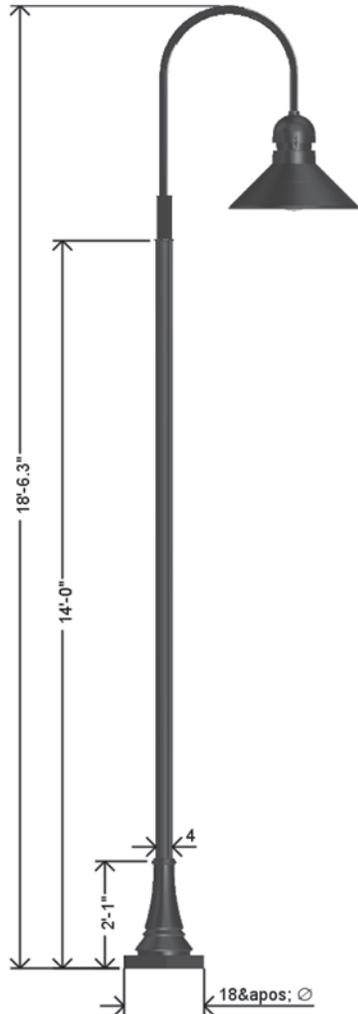


Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-9A
Revised Date:	MAP: Decorative Light - OFF-PENINSULA		

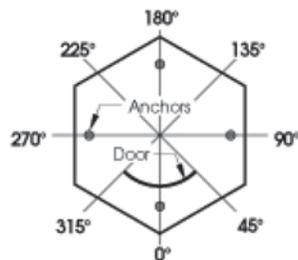


PORTLAND | me

**Street & Sidewalk Lighting
 DECORATIVE LIGHT - OFF-PENINSULA**



Anchorage/Orientation Plan



LUMINAIRE

Holophane Hallbrook Ext GalsWerks LED Bowl Glass
 Model: GELB-050-3K-AS-H-3
 IES Type III Distribution
 Pendant mouting (1.5 NPT). Dropped refractor shall be thermal resistant borosilicate glass held in a formed aluminum door frame. Asymmetric bowl glass.
 Auto-sensing voltage (120-277V)
 50 watt, LED 3000K color temperature

BRACKET ARM

Holophane Bishops Crook Arm
 Model : 1-BC-90R-15F-XX (for single arm 90 degree)

Tenon mounted, using a 1 1/2" NPT fitting for luminaire mounting. Arm shall be 1 1/2" sch. 80 aluminum pipe (6061-T6 alloy). Mounting hub for the arm shall be 3" sch. 40 x 10" long aluminum pipe (6061-T6 alloy). All hardware shall be stainless steel. The arm shall be heat-treated to a T6 condition after fabrication.

LIGHTING POLE + BASE

Holophane Princeton Aluminum Pole, Smooth Base
 Model: PSA-14-F4J-18-P09-ABG-GH

One-piece construction, aluminum pole (heavy wall cast aluminum ASTM 356), smooth shaft 4" dia. rated for a 90mph wind load with a 1.3 gust factor with integral 18" hexagonal smooth base. All hardware shall be tamper resistant stainless steel. Provide four hot-dipped galvanized steel L-type anchor bolts. Lighting pole shall be hot dip galvanized prior to powder coat paint.

DIMENSIONS

Overall Height = 18' 6"
 Pole Height = 14' 0"
 Pole Diameter = 4"
 Base Diameter = 18"

FINISH

Graphite (Standard) - powder coat paint finish

APPLICATION

Sidewalk lighting to supplement standard lighting off-peninsula.

Spacing:

One side: 60' - 80' on center
 Alternating sides: 100' - 175' on center

Fixture orientation should be consistent with established pattern. In some cases, a double-arm bracket parallel to the street may be appropriate. Fixture placed in furnishing zone unless space is limited. Placement on back of sidewalk or private property overhanging sidewalk may be accommodated where space is a constraint.

Date:
March, 2019

**CITY OF PORTLAND, MAINE
 TECHNICAL MANUAL**

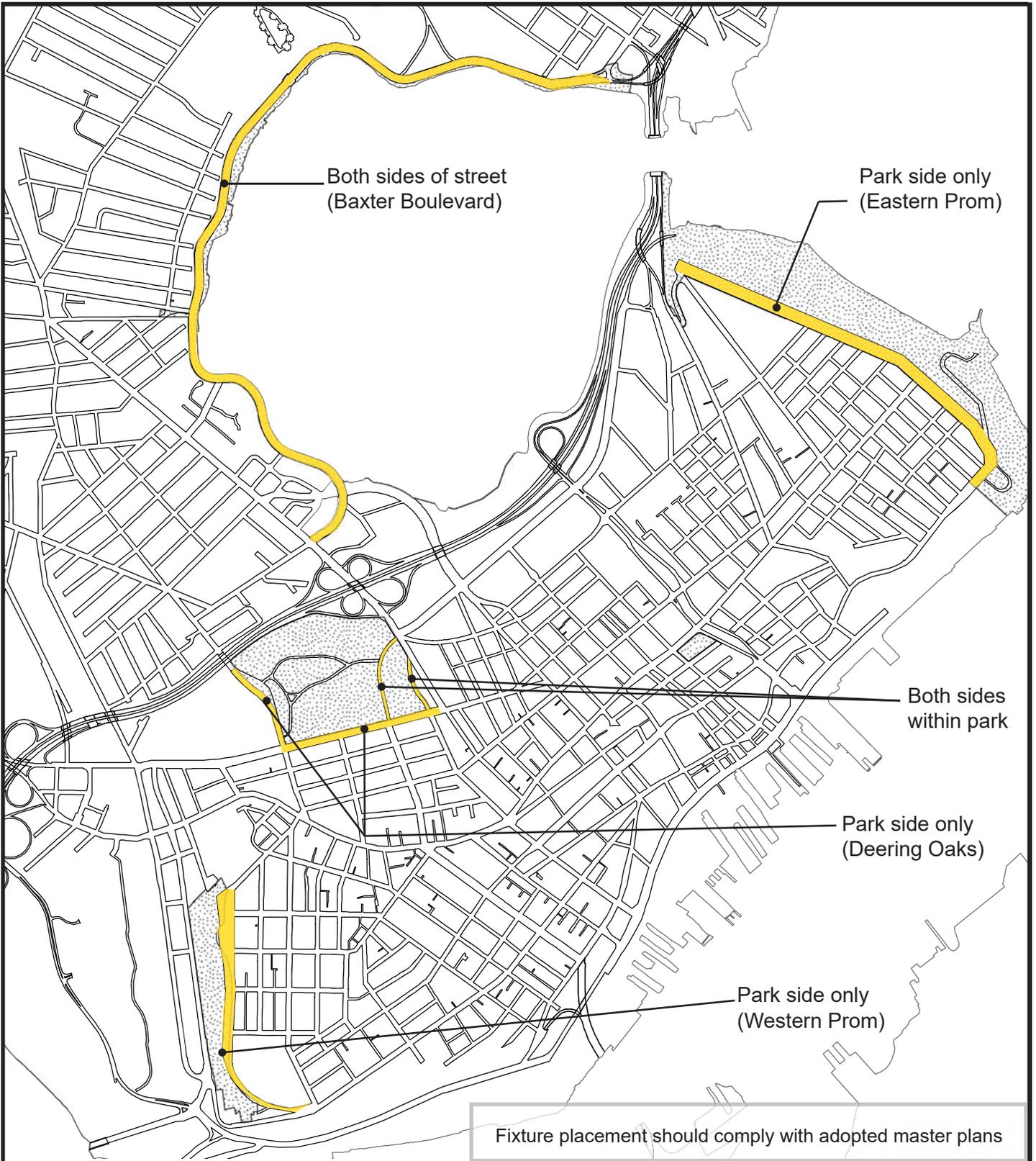
**MUNICIPAL STREET
 LIGHTING STANDARDS
 SECTION 10**

Figure:

X-9B

Revised Date:

OFF-PENINSULA PED

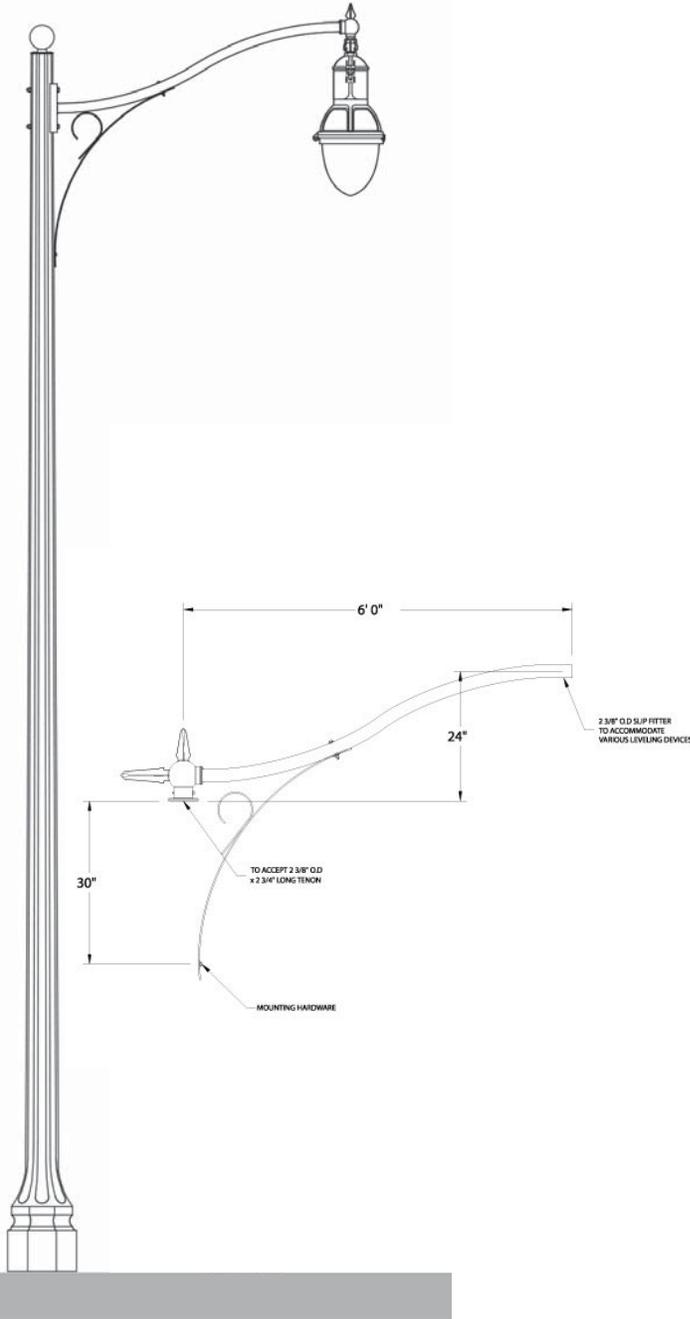


Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-10A
Revised Date:	MAP: Decorative Light - HISTORIC LANDSCAPE STREET		



PORTLAND | me

**Street & Sidewalk Lighting
 DECORATIVE - HISTORIC STREET**



LUMINAIRE

Holophane Espalanade LED II
 Model:
 ESL2-P20S-30K-AS-CMC-TG3-S-P7-NL2X2-BHDF13-200CMC
 or Spring City Columbia Series
 Model: LMCLU-LE080/EVX/X2-30-CR3-GR14-LACLB-FED-CU

With Shield: Deering Oaks Park
 Without Shield: All other locations

LED Auto-sensing 39 watt
 Voltage (120 - 277V)
 IES Type V Distribution
 LED 3000K color temperature

BRACKET ARM

King Luminaire/StressCrete: Scroll Arm with Decorative
 Scroll
 Model: KA30-T

Single arm with finials and decorative scroll.
 Slip fitter 2 3/8" O.D. to accommodate various leveling
 devices. At pole, to accept 2 3/8" O.D. x 2 3/4" Long
 tenon.

LIGHTING POLE

King Luminaire/StressCrete: The Talisman - Concrete
 Model: KTH20

The American Series - The Talisman, 8-fluted concrete
 Footing details, tenon size, options per specific project

DIMENSIONS

Overall Height = 21'0"
 Pole Height = 20' 0"
 Pole Base Flare = 18"
 Bracket Arm Length = 6' 0"

FINISH

Luminaire: Black (standard)
 Pole: Eclipse Black, acrylic coating (standard)

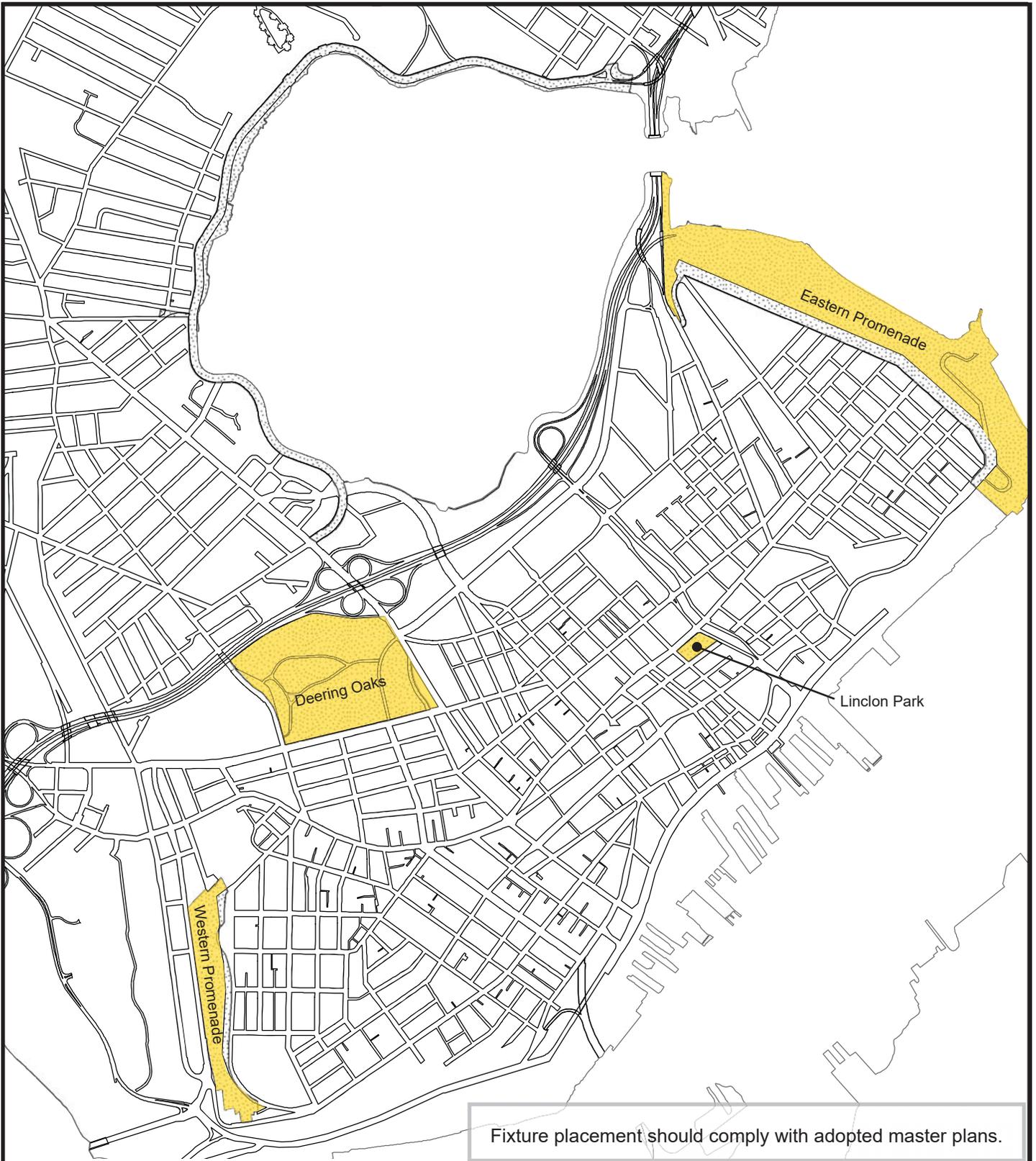
APPLICATION

Decorative street lighting for historic landscapes.

Spacing:
 One side: 90' - 100' on center
 Alt. sides: 175' - 225' on center

Fixture locations must comply with adopted Historic
 Master Plans.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-10B
Revised Date:	HISTORIC LANDSCAPE STREET		

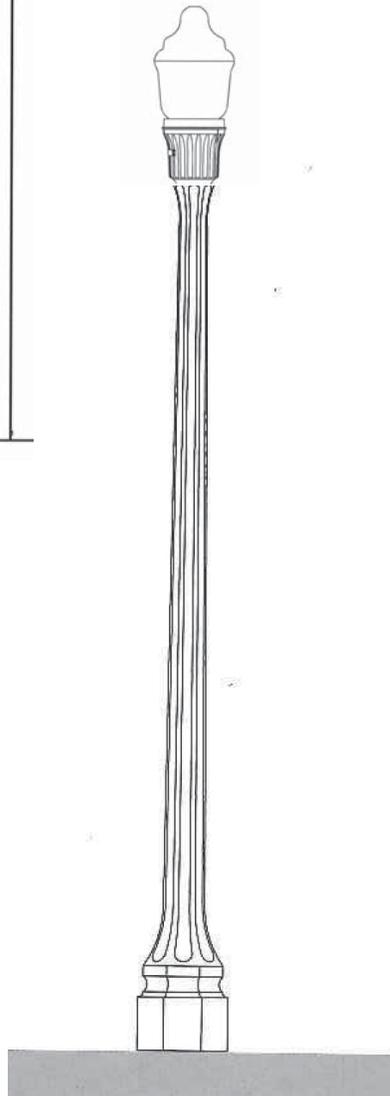
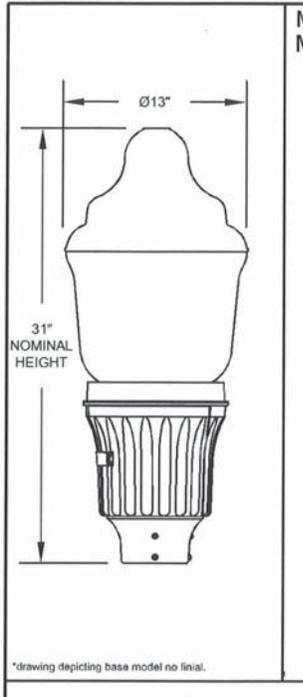


Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-11A
Revised Date:	MAP: Decorative Light - HISTORIC LANDSCAPE PEDESTRIAN		



PORTLAND | me

**Street & Sidewalk Lighting
 DECORATIVE - HISTORIC LANDSCAPE PED**



LUMINAIRE

Holophane GranVille II LED
 Model: GVD2-P20-30K-AS-M-BK-5-N-N-U

Prismatic Style: Glass Classic
 Housing Size: Utility
 No Trim or finial, Modern Housing
 Slip fitter accommodates 2-7/8" to 3-1/8" dia. tenon

LED Auto-sensing 39 watt
 Voltage (120 - 277V)
 IES Type V Distribution
 LED 3000K color temperature

LIGHTING POLE

King Luminaire/StressCrete: The Talisman - Concrete
 Model: KT-12-E-11-DB-140 30/30-A

The American Series - The Talisman, 8-fluted concrete
 Talisman Non-Flared Top 12'
 Footing details, tenon size, options per specific project

DIMENSIONS

Overall Height = 14' 6"
 Pole Height = 12' 0"

FINISH

Luminaire: Black (standard)
 Pole: Eclipse Black, acrylic coating (standard)

APPLICATION

Decorative pedestrian lighting for historic landscapes.

Spacing: 60' - 80' on center

In some instances, the fixture will replace existing fixtures.

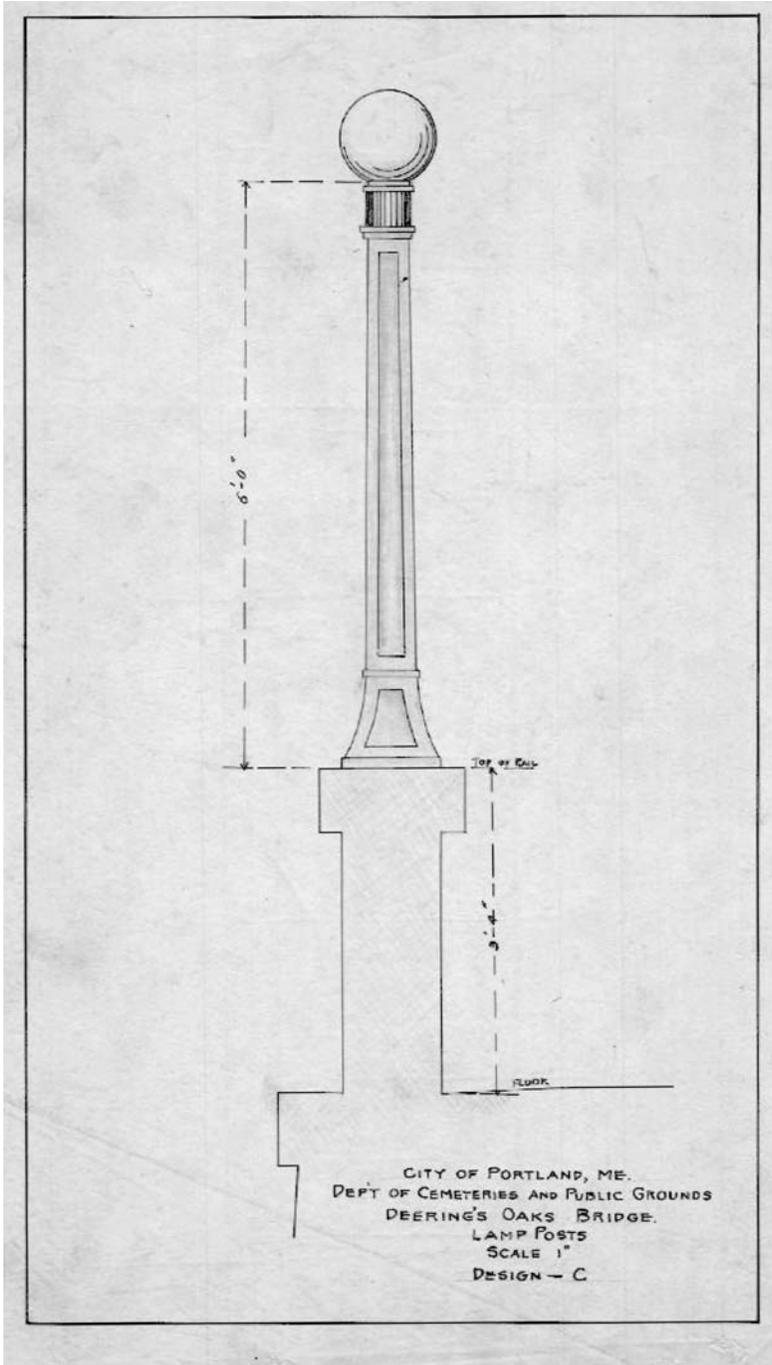
Fixture locations must comply with adopted Historic Master Plans.

Date: March, 2019	CITY OF PORTLAND, MAINE TECHNICAL MANUAL	MUNICIPAL STREET LIGHTING STANDARDS SECTION 10	Figure: X-11B
Revised Date:	HISTORIC LANDSCAPE PED		



PORTLAND | me

**Street & Sidewalk Lighting
 DECORATIVE - HISTORIC LANDSCAPE**



LUMINAIRE

Match existing and according to historic resources.

LAMP

LED 3000K color temperature

LIGHTING POLE

Match existing and according to historic resources.

DIMENSIONS

Match existing and as shown in image.

FINISH

Black: Match existing and according to historic resources.

APPLICATION

Match existing location and installation.

Date:
March, 2019

**CITY OF PORTLAND, MAINE
 TECHNICAL MANUAL**

**MUNICIPAL STREET
 LIGHTING STANDARDS
 SECTION 10**

Figure:

X-12

Revised Date:
Month Year

DEERING OAKS BRIDGE

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. PURPOSE

The requirements set forth in this chapter are intended to promote and protect public health, safety and general welfare, and encourage the preservation of the natural nighttime outdoor environment. Specifically, the intent of this chapter is to limit light trespass, glare and light pollution to safeguard adequate safety, night vision, and comfort of the neighboring properties.

12.2. 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.

12.3. GENERAL STANDARDS

Outdoor lighting standards listed below apply to all new developments.

1. Uniformity: As measured in foot candles at grade, maximum to minimum illumination levels shall not exceed a ratio of twenty (20) to one (1.)
2. 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)

Average illuminance levels for exterior areas specified below, measured in foot candles (fc) at ground level unless noted, shall not exceed the following levels:

Uses	Average (Foot candle)	Uniformity Ratio (average-to- minimum)	Maximum (Foot candle)
Automated Teller Machine (ATM) Surrounding Area (10 ft perimeter)	10.0	3:1	20.0
Drive-through Canopy	10.0	3:1	20.0
Minor Gasoline Service Stations:			
• Approaches and Drives	1.5	3:1	3.0
• Service Areas	2.0	3:1	4.0
• Pump Island Areas	10.0	3:1	20.0
Major Gasoline Service Stations:			
• Approaches and Drives	2.0	3:1	6.0
• Service Areas	3.0	3:1	6.0
• Pump Island Areas	10.0	3:1	20.0
Parking Lots:			
• Surface	0.5	3:1	4.0
• Structure	0.8	3:1	2.0

3. Lumens: No fixture shall exceed 20,000 lumens (± 3%).

Types of Lighting	Maximum Lumens Allowed
Path lighting	1,500 lumens
Building Entrance	3,500 lumens
Residential/ Commercial Pole at 20'	15,000 Lumens
Industrial Pole at 30'	20,000 lumens
Automated Teller Machine (ATM)	
Drive-Through Canopy	6,000 lumens
Minor Vehicle Service Station	
• Approaches and Drives	4,000 lumens
• Service Areas	6,000 lumens
• Pump Island Areas	8,000 lumens per fuel pump
Major Vehicle Service Station	
• Approaches and Drives	6,000 lumens
• Service Areas	8,000 lumens
• Pump Island Areas	10,000 lumens per fuel pump

4. **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. When a commercial or industrial use abuts a public right-of-way, or another commercial or industrial use, lighting must be designed so that the illumination at the property boundary line does not exceed 1.0 foot-candles.

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 (see 12.3.5.1) may be necessary to comply with this standard.

5. **Luminaire Types:** All fixtures must be LED and shall not exceed 3000K Correlated Color Temperature (CCT). Screw in light fixtures must have LED lamps specified to be maximum of 3000K CCT.
6. **Full Cut-off Fixtures and Shielding Required:** All outdoor lighting fixtures, including pole mounted and wall mounted luminaires, shall be constructed Full "cut-off" or with full shielding, 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.

Where the light source from an outdoor light fixture is visible beyond the property line, shielding shall be required to reduce glare so that the light source is not visible from within any residential dwelling unit.

Light fixtures mounted under a canopy shall be recessed so that the lens cover is recessed into, or flush with, the underside (ceiling) of the canopy.

7. **Pedestrian Walkway Lighting:** Pedestrian walkway light fixtures can be a combination of freestanding pole, bollard, in-place step or building mounted fixtures. For building mounted fixtures, the proposed fixture type will be in scale with the building elevation on which it is to be installed and meet the fixture height provisions of 12.3.8. Pedestrian lighting (bollards) shall meet the technical manual standards for full cut-off or an exception may be considered under 12.2.11.
8. **Fixture Height:** Fixtures shall be mounted at the lowest height necessary to meet city standards and the height is measured from grade to the bottom of the lighting fixture.

Type of Lighting	Maximum Fixture Height
Residential (Pedestrian) Uses	20 feet
Commercial/ Office Uses	20 feet
Large Industrial Uses (50,000 sf or more- gross floor area)	30 feet
Building Mounted/ Entrances	below the roof eave and not to exceed 20 feet, whichever is lower
Bollard Fixtures	42 inches (3.5 feet)

9. Lighting Curfew: For surface and structured parking, 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.
10. Continued Maintenance: Lighting installations must be maintained in good repair to meet the provision of this ordinance on an on-going basis.
11. General Exceptions: 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. The Planning Authority may grant exceptions to the lighting standards with the finding that the light impacts do not create a public nuisance for abutting residential property. Unless otherwise specified below, exterior lighting shall conform to the recommendations put forth in Lighting for Exterior Environments RP-33-14, or its successor, published by the Illuminating Engineering Society of North America (IESNA). Lighting fixtures other than full cut-off fixtures may be allowed only if acceptable luminaires shall include internal and/or external glare control louvers and installed so as to minimize uplight and offsite light trespass.
12. Historic District, Architectural and Pedestrian Walkway Exception: Sites which are part of an historic district or require specific decorative lighting fixtures as means to achieve compatibility within an existing architectural context must meet the following standards:
 - a. Lighting fixtures other than full cut-off fixtures may be allowed only if acceptable luminaires shall include internal and/or external glare control louvers and installed so as to minimize uplight and offsite light trespass.
 - b. Low pressure sodium and metal halide lamps are prohibited.

12.4. Reserved.

12.5. ARCHITECTURAL AND SPECIALTY LIGHTING AND UPLIGHTING:

1. Lighting shall be designed to minimize lighting of night sky and shall accentuate individual architectural or aesthetic elements, not the entire structure.
2. 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. 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, shall be fully shielded from view off-site, and shall use a narrow cone of light for the purpose of confining the light to the object.

3. Building façade lighting. The exterior of a building may be lighted provided the following standards are met:
 - a. The lighting is done to accentuate an architectural or aesthetic element of the building, not the entire building.
 - b. The light must only be directed onto the building façade and not spillover beyond the plane of the building.
 - c. Upward aimed lighting must not exceed 4,000 mean lumens per accent feature, must be fully shielded, and mounted as flush to the wall as possible.
 - d. Lighting exceeding 4,000 mean lumens per accent feature must be aimed downward, fully shielded, and mounted as flush to the wall as possible.
 - e. Stripe Lighting: Stripe lighting along building structures as articulation may be approved as specialty architectural lighting, provided that it does not create nuisance.
4. Flag poles, statues and similar monuments. A flag pole bearing a state flag, a flag of the United States or a flag of a foreign nation may be illuminated, provided the following standards are met:
 - a. The luminaires must be fully shielded.
 - b. Upward aiming luminaires must be placed as close to the base as possible.
 - c. The luminaires must not collectively exceed 20,000 mean lumens. Public statues, memorials or other similar monuments may also be lighted upon approval by the Historic Preservation authority, provided the above standards are met.

12.6. SUBMISSION REQUIREMENTS, PHOTOMETRIC PLANS:

1. The Lighting Plan shall be depicted on a site plan, indicating the location of each current and proposed outdoor lighting fixture with projected hours of use. This plan will need to be stamped and certified by a licensed professional, such as an architect or engineer. The lighting plan must include a KEY to the proposed lighting that provides the following information:
 - a. Type and number of luminaire equipment (fixtures), including the "cut off characteristics", indicating manufacturer and model number(s).
 - b. Lamp source type (bulb type, i.e. LED), lumen output, and wattage.
 - c. Mounting height with distance noted to the nearest property line for each luminaire.
 - d. Types of timing devices used to control the hours set for illumination, as well as the proposed hours when each fixture will be operated.
 - e. Lighting manufacturer-supplied specifications ("cut sheets") that include photographs of the fixtures, indicating the certified "cut off characteristics" of the fixture.
2. 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

15. SOLAR ENERGY GENERATION TECHNICAL STANDARDS

15.1 APPLICABILITY

15.1.1 All solar energy generation systems are subject to the standards set out in the *Solar Energy Generation Ordinance* section **14-780 (a)**, whether permitted (and subject to a building permit) or site plan/conditional (requiring site plan review and a building permit). Section 14-779 (a) *Permitting* of this ordinance outlines the level of review required for solar energy generation systems.

15.1.2 Permitted solar energy systems include most small roof mounted and small ground mounted solar energy systems as per **14-779 (a) Permitting**). They must comply with section **14-780 (a)** as above as well as technical, safety and maintenance standards as per Building and Fire Code requirements and as determined by the Permitting and Inspections Department when a building permit is submitted. Permitted solar energy systems must obtain a building permit but are not subject to the detailed Technical Standards in 15.2 below.

15.1.3 It should be noted that roof mounted systems potentially present a safety issue for the Fire Department in the event of a fire, and it is recommended that any roof mounted solar energy system be discussed with the Fire Department prior to design.

15.1.4 The following technical standards in 15.2 below apply to any solar energy generation system that requires a Level II or Level III site plan approval/Planning Board approval (through the Planning Division) in accordance with the ordinance section **14-779 (a) Permitting**. These solar energy systems also require a Building Permit and other permits as required by Permitting and Inspections Department. The Permitting and Inspections Department may have additional submittal requirements for solar energy systems.

15.1.5 The following technical standards are referenced in section **14-780 (a)** of the *Solar Energy Generation Ordinance* and aim to complement this ordinance and the existing codes and site plan review standards. Together the aim is to ensure safe, effective and efficient installation of solar energy systems compatible with surrounding uses. Within this aim the overall intent is to encourage the installation of solar energy systems.

15.2 TECHNICAL STANDARDS

15.2.1 Site Layout: Wherever possible solar energy systems should be located on the side or rear (ie least visible) part of the site as specified in Sections **14-780 (b), (c) and (d)** of the Ordinance. This also applies to associated features such as lighting and infrastructure. Applicants shall take all reasonable efforts to place utility connections underground, unless making use of existing lines, or as otherwise required by the utility. The proposed placement of new poles for

electrical connections shall be included in the site plan and construction management plan.

15.2.2 Site Plan Review Standards: Proposals should address the specific requirements of the *Solar Energy Generation* ordinance sections **14-780 (b), (c) and (d)** and the *Site Plan* Standards in section **14-526**. It is recognized that some of the *Site Plan* standards in **14-526** may not be relevant, as determined by the Planning Division/Planning Board during the review. It is likely that the review of any solar energy system would focus on how the proposals avoid or minimize impacts on the following:

- Existing vegetation and other natural resources - location on brownfield sites and on areas that are already impervious are encouraged;
- Wetlands and areas subject to flooding - DEP approval may be required;
- Wildlife and wildlife habitats - information may be requested on resources, impacts and potential mitigation eg through specified maintenance regimes;
- Septic systems, leach fields (unless explicitly allowed by the relevant regulator);
- Existing topography - ensure adequate temporary and permanent erosion and sedimentation control;
- Water quality of the stormwater runoff;
- Airport flight paths (FAA approval may be required);
- Other specific or local site characteristics as referenced in ordinance standards.

15.2.3 Security: The siting and design of the solar energy installation shall ensure that unauthorized access is prevented, and shall be in conformance with all applicable electrical code requirements. Knox boxes at gates (or similar arrangements as approved during the review) shall be provided for emergency access. [DC1]

15.2.4 Screening: The ordinance specifies screening from nearby residential/institutional uses and public ways. The proposals should take advantage of existing topography and vegetation where possible to integrate the development (including fencing, infrastructure and connections to the grid) into the landscape, and introduce vegetated buffer areas. Fencing shall be wildlife friendly and as unobtrusive as possible, utilizing measures such as locating the fencing along topographical contours and screening with planting. The selection of new planting would be in accordance with the *Technical Standards* in Section 4 *Site Landscaping*.

15.2.5 Construction Impacts: Proposals should include information regarding the methods of construction and a Construction Management Plan may be requested. Clearing of existing trees and vegetation shall be restricted to the minimum amount needed for construction access and to avoid shading of the solar development. Construction work should be performed in such a way that erosion

and sedimentation is minimized, and measures should be taken to permanently stabilize disturbed areas of the site as soon as possible.

15.2.6 Lighting, signage and materials: Where lighting is necessary it should be at the lowest level to meet functional needs, activated by motion sensors, fully shielded and of cut off design to meet the *Site Lighting* standards in Section 12 of the *Technical Standards*. Similarly, signage should meet functional needs of safety/security and emergency contacts and not include advertising. Materials would ideally be of neutral colors and manufactured with a low “carbon footprint”.

15.2.7 Stormwater Management: A new solar development will be required to comply with the *Technical Standards* in Section 5 *Portland Stormwater Management Standards* and Maine DEP Chapter 500 Stormwater Management.

15.3 SAFETY STANDARDS

15.3.1 Building Permit: All solar energy systems require a building permit prior to installation, whatever level of site plan review. All shall be installed by a qualified solar installer.

15.3.2 Certification: Solar energy systems shall be designed, erected and installed in accordance with all applicable codes, regulations and standards, with equipment approved under a certification program certified by the US Department of energy or similar. Experimental, homebuilt and prototype models would not be permitted.

15.3.3 Hazardous Materials: The city is concerned about the creation of hazardous waste in the future and requires a statement from the applicant regarding the content of toxic materials (eg cadmium) in the proposed system. Where the panels contain potentially toxic materials, the Operations and Maintenance Plan (for medium and large ground mounted or dual use systems - see below) shall address future disposal.

15.4 MAINTENANCE STANDARDS

15.4.1 Maintenance: Maintenance includes, but is not limited to: cleaning, mowing, painting, structural repairs, integrity of security measures, maintenance of site access adequate for emergency and maintenance services, planned maintenance of fencing, stormwater systems and vegetation/ground cover, plans for cleaning panels and any specific mowing or other regimes to support the wildlife habitat value of the site.

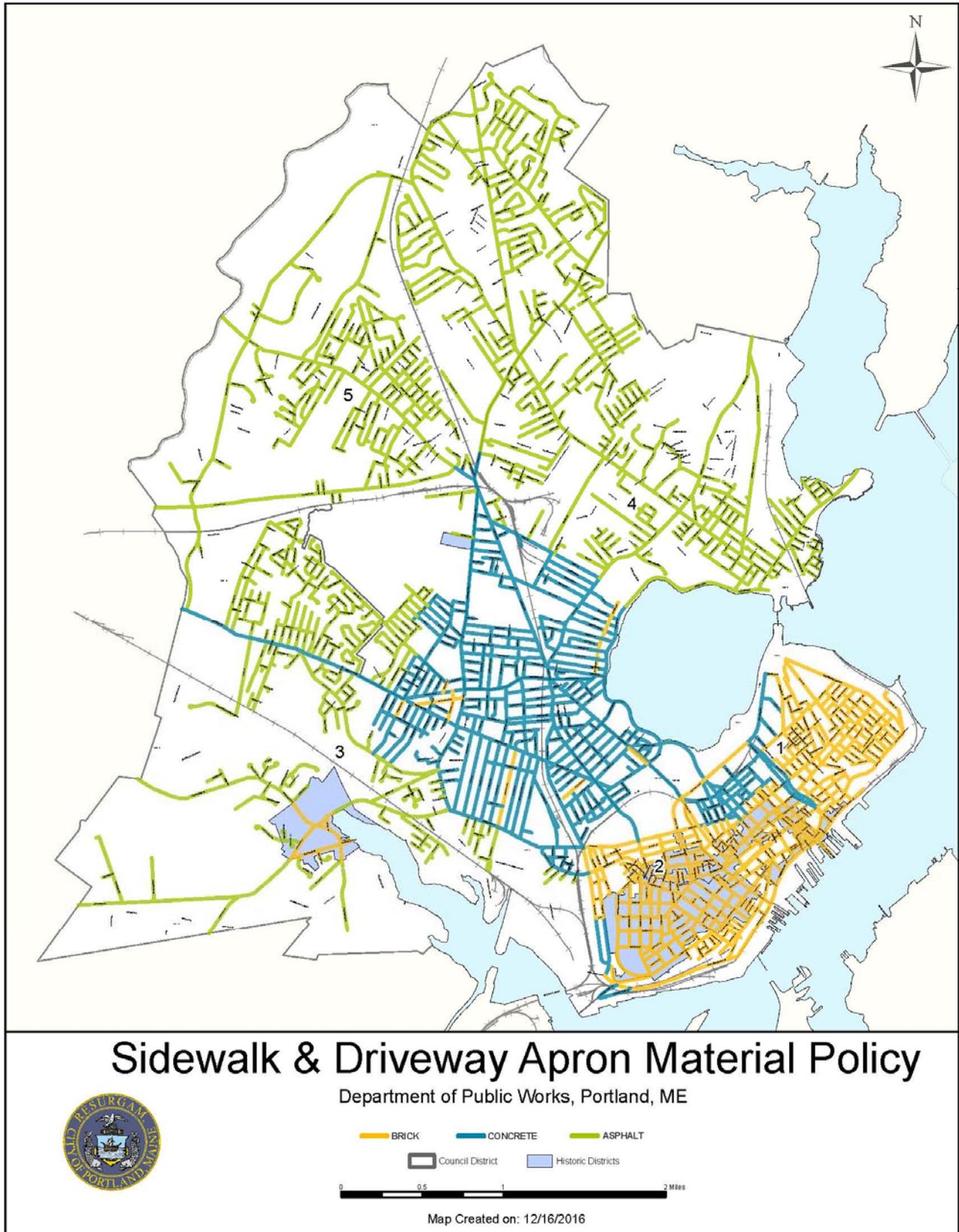
15.4.2 Operations and Maintenance Plan: Under 14-782 of the Ordinance all medium and large ground mounted systems, and dual-use systems of an equivalent scale, are required to provide an *Operations and Maintenance Plan* that is prepared and stamped by a licensed Professional Engineer or other licensed

professional as appropriate. The *Plan* will vary depending on the site, the method of connecting to the grid, and the number and type of panels- but is expected to address the maintenance items listed in 15.4.1 and any operational time tables as relevant, and include the following:

- Clarification of the responsible party;
- Any maintenance items that are particularly important from a public safety perspective;
- An estimate of the life of the project
- What options/actions are anticipated when it has reached the end of its estimated useful life; and
- How the disposal of any toxic materials will be handled when the system is dismantled.

APPENDICES

A. CITY SIDEWALK & DRIVEWAY APRON MATERIALS POLICY



The following policy is intended to be used as a standard for all sidewalk construction in the City of Portland, Maine. This policy will be employed when reviewing development proposals involving public infrastructure within the City of Portland.

Sidewalk Material

The Sidewalk Material map identifies three sidewalk materials, brick, concrete, and asphalt, specific to each city street. Within the City's historic districts, only brick shall be used.

Note that the following exceptions may apply:

- *Exception to brick sidewalks:* On sidewalks, or sections of sidewalks, where the slope exceeds 10% percent, the Department of Public Works may approve the use of alternative material in lieu of brick if such alternative material would provide a more slip resistant surface to improve pedestrian safety. The alternative material includes concrete for sidewalks outside of the designated historic districts, and Pinehall/Pathway Lachance item #193623 Brick Pavers, for sidewalks within all designated historic districts.
- *Partial replacement:* The Department of Public Works may approve a deviation from the sidewalk material policy to match existing sidewalks in cases where:
 1. A substantial portion of sidewalks adjacent to and in the area surround the portion to be constructed or disturbed are of a material other than that designated on the Sidewalk Material map, and:
 - a. Existing sidewalks on the affected street frontage, other than those in the area to be disturbed, are in sound conditions, and
 - b. Less than 50% of the existing sidewalk on the affected block is to be disturbed; or
 2. Other unusual circumstances exist, subject to the approval of the City Manager.

Driveway Aprons

- All driveway aprons shall be constructed of the designated sidewalk material within the pedestrian zone.
- Driveway apron material replacement shall not occur if it can be identified that the homeowner has installed the existing apron at their expense and the driveway is in good condition. Otherwise, driveway replacement shall conform to the accepted policy.

Curbing

All curb material shall be granite curb. The recycling of existing curb shall be employed in historic districts as a priority and in other districts where appropriate.

ADA Handicap Accessible Sidewalk Ramps

Ramps shall be constructed of the same sidewalk material as designated for that respective street, with the exception of the required detectable surface within the ramp.

Upgrades

The Department of Public Works may approve a change in sidewalk or apron material to an alternative, higher grade material, so long as such sidewalks and aprons are built to applicable City standards and adequate protections are made on behalf of the City with respect to the terms of repair and replacement.

B. 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: [Book 1](#) and [Book 2](#). 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.