22-I-1 **#2014-079**

81 E. Oxford Street

Bayside Anchor

MAINTENANCE TOOLS, SAFETY EQUIPMENT AND SUPPLIES

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes.

MAINTENANCE VISIT PROCEDURE

1. Inspection of FocalPoint® and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes | no
Damage to HPMBS System	yes | no
to Overflow conveyance	yes | no
Is Bypass Clear	yes | no

If yes answered to any of these observations, record with close-up photographs (numbered).

2. Removal of Silt / Sediment / Clay

- Dig out silt (if any) and mulch and remove trash & foreign items.

Record on Maintenance Report the following:

Silt / Clay	yes | no
Cups / Bags	yes | no
Leaves	yes | no

Volume of material removed _____

3. Removal of debris, trash and mulch

- After removal of mulch and debris, measure distance from the top of the FocalPoint® engineered media soil to the flow line elevation of the adjacent overflow conveyance. If this distance is greater than that specified on the plans (typ. 6" - 12"), add FocalPoint® media (not top soil or other) to recharge to the distance specified.

Record on Maintenance Report the following:

Distance to from media surface to flow line of overflow conveyance (inches) _____

# of Buckets of Media Added _____

4. Mulch Replacement

Most maintenance visits require only replacement mulch (if utilized). Bags of clean, double shredded hardwood mulch are typically used for smaller biofiltration beds, however larger systems may require truck loads of mulch. For smaller projects, one cubic foot of mulch will cover four square feet of biofiltration bed, and for larger projects, one cubic yard of mulch will cover 108 square feet of biofiltration bed. Some visits may require additional FocalPoint® engineered soil media available from the VAR/Contractor.

- Add double shredded mulch evenly across the entire biofiltration media bed to a depth of 3".

- Clean accumulated sediment from energy dissipation system at the inlet to the FocalPoint® system to allow for entry of trash during a storm event.

5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if dead or dying.

- Prune as necessary to encourage growth in the correct directions

Record on Maintenance Report the following:

Height above Grate (feet) _____

Width at Widest point (feet) _____

Health alive | dead

Damage to Plant yes | no

6. Clean area around FocalPoint®

- Clean area around unit and remove all refuse to be disposed of appropriately.

7. Complete paperwork

- Deliver Maintenance Report and photographs as appropriate.

- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

FocalPoint

BIOFILTRATION SYSTEM

FocalPoint Warranty

Seller warrants goods sold hereunder against defects in materials and workmanship only, for a period of (1) year from date the Seller activates the system into service. Seller makes no other warranties, express or implied.

Seller's liability hereunder shall be conditioned upon the Buyer's installation, maintenance, and service of the goods in strict compliance with the written instructions and specifications provided by the Seller. Any deviation from Seller's instructions and specifications or any abuse or neglect shall void warranties.

In the event of any claim upon Seller's warranty, the burden shall be upon the Buyer to prove strict compliance with all instructions and specifications provided by the Seller.

Seller's liability hereunder shall be limited only to the cost or replacement of the goods. Buyer agrees that Seller shall not be liable for any consequential losses arising from the purchase, installation, and/or use of the goods

fabco® Industries Inc

CONVERGENT WATER TECHNOLOGIES

FocalPoint
BIOFILTRATION SYSTEMS

Maintenance Checklist

Element	Problem	What To Check	Should Exist	Action
Inlet	Excessiver sediment or trash accumulation	Accumulation of sediment or trash impair free flow of water into FocalPoint	Inlet free of obstructions allowing free flow into FocalPoint System	Sediments or trash should be removed
Mulch Cover	Trash and floatable debris accumulation	Excessive trash or debris accumulation.	Minimal trash or other debris on mulch cover	Trash and debris should be removed and mulch cover raked level. Ensure that bark nugget
Mulch Cover	Ponding of water on mulch cover	Ponding in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils	Stormwater should drain freely and evenly over mulch cover.	Recommend contact manufacturer or VAR
Plants	Plants not growing, or in poor condition	Soil/mulch too wet, evidence of spill. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer or VAR for advice.
Plants	Plant growth excessive	Plants should be appropriate to the species and location of FocalPoint		Trim/prune plants in accordance with typical landscaping and

SPECIFICATIONS FOR A
HIGH PERFORMANCE MODULAR BIOFILTRATION SYSTEM (HPMBS)
Material, Performance and Installation Specification

I. Summary

The following general specifications describe the components and installation requirements for a High Performance Modular Biofiltration System (HPMBS) for filtration of storm water that utilizes physical, chemical and biological mechanisms of a soil, plant and microbe complex to remove pollutants typically found in urban storm water runoff. The modular treatment system in which the biologically active biofiltration media is used shall be a complete, integrated system designed to be placed in Square Foot or Linear Foot increments per the approved drawings to treat contaminated runoff from impervious surfaces.

The High Performance Modular Biofiltration System (HPMBS) is comprised of the following components:

A. Plant Component

1. Manufacturer shall provide a regionalized list of acceptable plants.

2. Plants, as specified in the approved drawings/manufacturer's plant list, shall be installed at the time the HPMBS is commissioned for use.

3. Plants and planting are typically included in landscape contract.

B. Biofilter Component

1. This component employs a high performance cross-section in which each element is highly dependent on the others to meet the performance specification for the complete system. It is important that this entire cross-section be provided as a complete system, and installed as such.

2. As indicated in the approved drawings, the elements of the Biofilter include:

    A. *A mulch protective layer (if specified).*

    B. *An advanced high infiltration rate biofiltration planting media bed which utilizes physical, chemical and biological mechanisms of the soil, plant, and microbe complex, to remove pollutants found in storm water runoff.*

    C. *A separation layer which utilizes the concept of 'bridging' to separate the biofiltration media from the underdrain without the use of geotextile fabrics.*

D. *A wide aperture mesh layer utilized to prevent bridging stone from entering the underdrain/storage element.*

E. *A modular, high infiltration rate 'flat pipe' style underdrain/storage system which is designed to directly infiltrate or exfiltrate water through its surface.*

C. Energy Dissipation Component

1. An Energy Dissipation Component is typically specified to slow and spread out water as it enters the system. This component is dependent upon the design in the approved drawings, but typically consists of a rock gabion, rock filter dam or dense vegetation element, such as native grasses, either surrounding the Biofiltration Component or located immediately upstream of it.

D. Pretreatment Component

1. Pretreatment, when specified, is typically accomplished by locating the Biofiltration Component within a traditional vegetated BMP such as a vegetated swale, vegetated depression, traditional bioretention system, vegetated filter strip, sediment forebay, etc. These BMPs provide primary TSS removal when desirable.

E. Observation and Maintenance Component

1. An Observation and Maintenance Port shall be installed per the approved drawings to provide for easy inspection of the underdrain/storage element, and cleanout access if needed.

F. Extreme Event Overflow (by others)

1. An Extreme Event Overflow should be located external to, but near the Biofiltration element to provide bypass when needed. This may be an overland flow bypass structure, grated inlet, safe overland surface flow, or any configuration that serves the purpose. In the case of an inlet, it must be designed to minimize the likelihood of clogging by vegetative material. Typical inlet solutions involve inclined or dome style inlet grates with a StormSack by FABCO Industries.

II. Quality Assurance and Performance Specifications

The quality and composition of all system components and all other appurtenances and their assembly process shall be subject to inspection upon delivery of the system to the work site.

Installation is to be performed only by skilled work people with satisfactory record of performance on earthworks, pipe, chamber, or pond/landfill construction projects of

comparable size and quality.

A. Plants

1. Plants must be compatible with the HPMBS media and the associated highly variable hydrologic regime. Plants are typically facultative with fibrous roots systems such a native grasses and shrubs.

2. Manufacturer shall provide a regionalized list of acceptable plants.

3. All plant material shall comply with the type and size required by the approved drawings and shall be alive and free of obvious signs of disease.

B. Mulch (if specified)

1. Mulch, typically double shredded hardwood (non-floatable), shall comply with the type and size required by the approved drawings, and shall be screened to minimize fines.

C. Biofiltration Media

1. Biologically active biofiltration media shall be visually inspected to ensure appropriate volume, texture and consistency with the approved drawings, and must bear a batch number marking from the manufacturer which certifies performance testing of the batch to meet or exceed the required infiltration rate.

2. Manufacturer shall have a minimum of 5 years experience and a minimum of 4,000 systems installed operational units.

3. Within 90 days after project completion, the infiltration rate shall be confirmed at the manufacturer or installer's expense, by a wetted condition hydraulic conductivity test.

    a. *Failure to pass this test will result in removal and replacement of all media in the system at no cost to the project owner/operator.*

    b. *Test must utilize the equipment and follow the standard operating procedures found in the Harris County Texas manual entitled, Low Impact Development & Green Infrastructure Design Criteria for Storm Water Management (2011).*

    c. *Replacement media, if required, must be taken from a different batch than the original.*

4. Manufacturer shall provide, at no additional cost to the project owner/operator, maintenance of the biofiltration system for a period of one year.

5. Pollutant Removal performance, composition and characteristics of the

Biofiltration Media must meet or exceed the following minimum standards as demonstrated by testing acceptable to the project engineer:

Pollutant	**Removal Efficiency**
TSS	85%
Total Nitrogen	43%
Heavy Metals	58-82%
Phosphorus	65 %
Oil & Grease	90%
Bacteria	60%
Composition and Characteristics	
Sand - Fine	< 5%
Sand – Medium	10% - 15%
Sand – Coarse	15% - 25%
Sand – Very Coarse	40% - 45%
Gravel	10% - 20%
Infiltration Rate	>100 inches per hour
Peat Moss*	5% - 15%
*** Peat Moss Specification** Listed by Organic Materials Review Institute 100% natural peat (no composted, sludge, yard or leaf waste) Total Carbon >85% Carbon to Nitrogen Ratio 15:1 to 23:1 Lignin Content 49% to 52% Humic Acid >18% pH 6.0 to 7.0 Moisture Content 30% to 50% 95% to 100% passing 2.0mm sieve > 80% passing 1.0mm sieve	

D. Underdrain/Storage System

1. Underdrain/storage components shall be manufactured in an ISO certified facility and be manufactured from at least 90% post consumer recycled materials.

2. Underdrain/storage components shall meet or exceed the following characteristics:

Property	Value
Surface Void Area	≥ 85%
Unit Weight	3.25 lbs/cf
Service Temperature	-14° to 167°
Unconfined Crush Strength	32.48 psi
180 Day Creep Test	
Load Applied – Initial and Sustained	11.16 psi
• Creep Sustained – After 180 Days	0.20 inches
• Creep Sustained – After 180 Days	1.13 %
• Projected Creep – 40 years	1.72%

E. Separation Mesh

1. Separation Mesh shall be composed of high-tenacity monofilament polypropylene yarns that are woven together to produce an open mesh geotextile which shall be inert to biological degradation and resistant to naturally encountered chemicals, alkalis and acids. The mesh shall meet or exceed the following characteristics:

Properties	Test Method	Unit	Min Ave Roll Value	
			MD	CD
Tensile Strength	ASTM D4595	kN/m (lbs/ft)	21 (1440)	25.3 (1733)
Creep Reduced Strength	ASTM D5262	kN/m (lbs/ft)	6.9 (471)	8.3 (566)
Long Term Allowable Design Load	GRI GG-4	kN/m (lbs/ft)	5.9 (407)	7.2 (490)
UV Resistance (at 500 hours)	-	% strength retained	90	
Aperture Size (machine direction)	-	mm (in)	2 (0.08)	
Aperture Size (cross machine direction)	-	mm (in)	2 (0.08)	
Mass/Unit Area	ASTM D5261	g/m^2 (oz/yd^2)	197 (5.8)	

F. Bridging Stone

1. Bridging Stone shall be 3/8" pea gravel, or other diameter sized to prevent migration of filter media, as specified by manufacturer.

2. Stone must be washed and free from sediment, soil and contaminants.

III. Delivery, Storage and Handling

A. Protect all materials from damage during delivery and store UV sensitive materials under tarp to protect from sunlight including all plastics, when time from delivery to installation exceeds one week. Storage should occur on smooth surfaces, free from dirt, mud and debris.

B. Biofiltration media shall be segregated from any other aggregate materials and shall be protected against contamination, including contamination from any stormwater runoff from areas of the site which are not stabilized.

IV. Submittals

A. Product Data

1. Submit manufacturer's product data and approved Installation Manual as well as manufacturer's Operations and Maintenance Manual for the system. It will be the responsibility of the system owner/operator or their contractor to ensure the system is operated and maintained in accordance with the manual.

B. Certification

1. Manufacturer shall submit a letter of certification that the complete system meets or exceeds all technical and packaging requirements. Biofiltration media packaging must bear a batch number marking from the manufacturer which matches a letter from the manufacturer certifying performance testing of the batch to meet or exceed the required infiltration rate.

C. Drawings

1. Manufacturer shall provide dimensional drawings including details for construction, materials, specifications and pipe connections.

D. Manufacturer's Warranty

1. Manufacturer shall provide a warranty for all components of the HPMBS for a period of one year provided the unit is installed, operated and maintained in accordance with the manual. Improper operation, maintenance or accidental or illegal activities (i.e. dumping of pollutants, vandalism, etc.) will void the warranty. Biofiltration media shall be warranted to pass the post-installation infiltration test described in this document.

E. Substitutions

1. Any proposed equal alternative product substitution to this specification must be submitted for review and approved prior to bid opening. Review package should include third party reviewed performance data for both flow rate and pollutant

removal of biofiltration media. Pollutant removal data must follow specified protocols. All components must meet or exceed Quality Assurance and Performance Criteria indicated herein.

V. Project Conditions

A. Review manufacturer's recommended installation procedures and coordinate installation with other work affected, such as grading, excavation, utilities, construction access and erosion control to prevent all non- installation related construction traffic over the completed HPMBS.

B. Cold Weather

1. Do not use frozen materials or materials mixed or coated with ice or frost.
2. Do not build on frozen ground or wet, saturated or muddy subgrade.
3. Care must be taken when handling plastics when air temperature is at 40 degrees or below as plastic becomes brittle.

C. Protect partially completed installation against damage from other construction traffic when work is in progress and following completion of backfill by establishing a perimeter with highly visible construction tape, fencing, or other means until construction is complete.

D. Soil stabilization of the surrounding site must be complete before the Biofiltration System can be brought online. Soil stabilization occurs when 90% of the site has been paved or vegetated. Temporary erosion control and/or sedimentation prevention measures shall be implemented to reduce the possibility of sediments being transported into the Biofiltration System prior to full stabilization of the site. Significant sediment loads can damage the HPBMS and lead to failure if not prevented or remediated promptly.

VI. PRODUCTS

A. Acceptable HPBMS

FocalPoint High Performance Biofiltration System

B. Acceptable Manufacturer or Authorized Sales Representative

FABCO Industries, Inc.
97 Walnut Street
South Portland, ME 04106
207-831-2795
sgorneau@fabco-industries.com
www.fabco-industries.com

VII. Packaging

A. HPMBS is assembled on site.

B. Modular underdrain/storage unit is shipped flat and modules are assembled prior to installation.

C. Biofiltration media is delivered in one ton super sacks each labeled with manufacturer's batch number and/or in bulk with accompanying manufacturer's certification.

D. Other components are delivered in bulk.

VIII. Execution

A. Excavation and Backfill

1. Base of excavation shall be smooth, level and free of lumps or debris, and compacted unless infiltration of storm water into subgrade is desired. A thin layer (3") of compacted base material is recommended to establish a level working platform (may not be needed in sandy soils). If the base of the excavation is pumping or appears excessively soft, a geotechnical engineer should be consulted for advice. In many cases, a stabilization geotextile and 6" of compactable material that drains well will be sufficient to amend the bearing capacity of the soil.

2. Most applications require 8 oz Non-Woven Geotextile or equivalent nonwoven geotextile with a nominal weight of 8 oz per square yard to line the excavation to separate in situ soils and the HPMBS. (Applications requiring water to infiltrate the in situ sub-soils should use a bridging stone rather than geotextile to provide a separation layer between the HPMBS and the in situ soils). Geotextile, when utilized, should be placed on the bottom and up the sides of the excavation. Absolutely no geotextiles should be used in the water column. If an impermeable liner is specified, it shall be installed according to manufacturer's instructions and recommendations.

3. Specified backfill material must be free from lumps, debris and any sharp objects that could penetrate the geotextile. Material is used for backfill along the sides of the system as indicated in engineering detail drawings.

B. Inspection

1. Examine prepared excavation for smoothness, compaction and level. Check for presence of high water table, which must be kept at levels below the bottom of the under drain structure at all times. If the base is pumping or appears excessively soft, a geotechnical engineer should be consulted for advice.

2. Installation commencement constitutes acceptance of existing conditions and responsibility for satisfactory performance. If existing conditions are found to be

unsatisfactory, contact Project Manager or Engineer for resolution prior to installation.

IX. Cleanup and Protection during Ongoing Construction Activity

A. Perform cleaning during the installation and upon completion of the work.

B. Remove from site all excess materials, debris, and equipment. Repair any damage to adjacent materials and surfaces resulting from installation.

C. If surrounding drainage area is not fully stabilized, a protective covering of geotextile fabric should be securely placed to protect the Biofiltration Media.

D. Construction phase erosion and sedimentation controls shall be placed to protect the inlet(s) to the Biofiltration System. Excessive sedimentation, particularly prior to establishment of plants may damage the HPMBS.

E. Strictly follow manufacturer's guidelines with respect to protection of the HPMBS between Installation and Commissioning phases.

X. Commissioning

A. Commissioning should only be carried out once the contributing drainage area is fully stabilized. If Commissioning must be carried out sooner, it is imperative that appropriate erosion and sediment controls be placed to prevent the entry of excessive sediment/pollutant loads into the system.

B. Commissioning entails removing the protective covering from the Biofiltration Media, planting the plant material in accordance with the approved drawings, and placing mulch if specified.

1. Dig planting holes the depth of the root ball and two to three times as wide as the root ball. Wide holes encourage horizontal root growth that plants naturally produce.

2. With trees, you must ensure you are not planting too deep. Don't dig holes deeper than root balls. The media should be placed at the root collar, not above the root collar. Otherwise the stem will be vulnerable to disease.

3. Strictly follow manufacturer's planting guidance.

C. Cover the exposed root ball top with mulch. Mulch should not touch the plant base because it can hold too much moisture and invite disease and insects. Evenly place 3 inches of double-shredded hardwood mulch (if specified) on

the surface of the media.

D. Plantings shall be watered-in at installation and temporary irrigations shall be provided, if specified.

XI. Using the HPMBS

A. Maintenance Requirements

1. Each correctly installed HPMBS is to be maintained by the manufacturer for a minimum period of one year. The cost of this service is to be included in the price of the system.

2. Annual maintenance consists of two (2) scheduled visits unless otherwise specified.

3. Each maintenance visit consists of the following:

    1. *Complete system inspection*
    2. *Removal of foreign debris, silt, plant material, trash and mulch (if needed)*
    3. *Evaluation of biofiltration media*
    4. *Evaluation of plant health*
    5. *Inspection of underdrain/storage system via Observation/Maintenance Port*
    6. *Properly dispose of all maintenance refuse items (trash, mulch, etc.)*
    7. *Take photographs documenting plant growth and general system health*
    8. *Update and store maintenance records*
    9. *To ensure long term performance of the HPMBS, continuing annual maintenance should be performed per the manufacturer's Operations and Maintenance Manual.*

4. If sediment accumulates beyond an acceptable level in the underdrain/storage system, it will be necessary to flush the underdrain. This can be done by pumping water into the Observation/Maintenance Port or adjacent overflow structure, allowing the turbulent flows through the underdrain to re- suspend the fine sediments. If multiple Observation/Maintenance Ports have been installed, water should be pumped into each port to maximize flushing efficiency.

Sediment-laden water can be pumped out and either captured for disposal or filtered through a Dirtbag filter bag, if permitted by the locality.

XII. Measurement and Payment

Given the integrated nature of the HPMBS, measurement and payment will be based not on the individual component prices, but on the size of the Biofiltration Media bed. The external dimension as indicated in the approved plans and executed in the installation will be measured in Square Feet and payment will be made per Square Foot of the HPMBS.

APPENDIX C

FocalPoint Sizing Summary

Bayside Anchor Stormwater Management Narrative
City of Portland
81 East Oxford St
Portland, Maine

FOCALPOINT SIZING AND CALCULATION SHEET

Evolved Stormwater Solutions

PROJECT: PORTLAND HOUSING PROJECT

PREPARED BY: ROB WOODMAN, PE – FABCO INDUSTRIES, INC.

PREPARED FOR: JOHN MAHONEY, PE – RANSOM CONSULTING, INC.

DATE: JUNE 29, 2014

Based on the following data provided by the project engineer, Fabco Industries has calculated the proposed sizing of the FocalPoint system and the ability of the system to treat the Water Quality Volume (W_{QV}) prior to overflow/bypass:

- Tributary Impervious Area = 6,301 sf
- Tributary Pervious Area = 0 sf
- Water Quality Volume (W_{QV})* = 525 cf ---- use **525 cf** for water quality goal -----

* The Water Quality Volume is based on the Maine DEP Chapter 500 requirement to treat 1.0" of runoff from impervious areas and 0.4" from pervious areas.

Using the *ACF FP and RT Calc version 1.8*, the proposed size of the FocalPoint unit shall be **32 sf** with a minimum ponding volume of **92 cf** above the unit prior to overflow. The chart below summarizes the associated calculation and performance verification. The unit is capable of treating **557 cf** prior to overflow (32 cf more than the required WQV) – equal to a treated tributary area of **6,684 sf.**

FocalPoint
BIOFILTRATION SYSTEMS

ACF FP and RT Calc 1.8

Water Quality Volume and Design Event			**Directions**
Water Quality Volume (WQv)	525	ft³	Water Quality Volume calculated from previous Sheet
Design Event	557	ft³	Total event volume calculated from previous sheet
System Configuration			
Is FocalPoint used?	Yes		Enter Yes if FocalPoint used. Enter No if runoff flows directly into RTank and proceed to RTank Design worksheet
Step 4 - FocalPoint Configuration			
4.1 - FocalPoint Factor of Safety	1		Enter optional factor-of-safety
4.2 - FocalPoint bed area	32	ft²	Enter target FocalPoint footprint, 20 SF min. (See Step 4.5)
4.3 - Storage volume above FocalPoint provided	92	ft³	Enter available surface storage volume (See Step 4.5)
4.4 - Desired treatment time	24	hours	Select 24, 48, 72 or 96 hrs from toggle
4.5 - Water Quality Volume treated prior to overflow?	Yes		If Yes = WQv has been treated If No = larger FocalPoint bed (Step 4.2) and/or surface storage volume (Step 4.3) required
4.6 - FocalPoint drain within desired time?	Yes		If Yes = time goal has been met If No = larger FocalPoint bed (Step 4.2) required
4.7 - Flow in excess of storage volume above	To RTank		Select routing location for overflow/bypass vol. from toggle: Off site to disregard flow, RTank to store for retention / detention, harvesting, or infiltration
Step 5 - Evaluation of Design			
5.1 - Volume treated prior to overflow	No Overflow	ft³	Result = Volume ft3 treated prior to overflow/bypass
5.2 - Total volume treated	557	ft³	Result = Total Volume ft3 treated

APPENDIX D

Soil Infiltration Testing

Bayside Anchor Stormwater Management Narrative
City of Portland
81 East Oxford St
Portland, Maine

RANSOM
Consulting, Inc.

Consulting
Engineers
and Scientists

Project 131.06132.100

Technical Memorandum: Soil Infiltration Testing

Date:	June 24, 2014
To:	City of Portland
From:	John Mahoney, P.E.
Peer Review:	Jay Johonnett, P.E.
Subject:	Soils Infiltration Testing for Bayside Anchor Development

Ransom Consulting, Inc. (Ransom) completed four test holes and field saturated hydraulic conductivity (soil infiltration) tests on June 12, 2014. The purpose of this work was to assess the potential for infiltrating stormwater on the Bayside Anchor site as well as the infiltration potential of the low area in the center of the block (identified by the closed 12 contour) on Sheets C1, C5 and C6. The following sections outline the work performed by Ransom and our findings.

SUBSURFACE EXPLORATIONS

Four test holes, designated INF-1 through INF-4, were excavated on June 12, 2014 at the approximate locations shown on Sheets C1, C5 and C6. Two test holes were located in the proposed patio area behind the building where we intend to install subsurface stormwater detention using the R-Tank system and two test holes were located in the low area downstream of the development, described above. Test pits were performed by hand using the soil and sizing augers included with the Guelph Permeameter testing Kit. All test pits were terminated in a layer of Loam Fill with characteristics of "Urban Fill".

Ransom representatives monitored the test pits, made visual observations for seasonal high groundwater and performed field saturated hydraulic conductivity tests. Soils observed by Ransom were visually classified in general accordance with visual manual procedures (ASTM D 2488) and described using modified Burmister Soil Classification System descriptors and United States Department of Agriculture (USDA) soil types. Ransom collected soil samples, placed them in sealed containers and returned the samples to our office for further evaluation and potentially laboratory testing, if required. Elevations of the ground surface at the test pits were inferred based on a topographic survey plan for the Bayside Anchor site (INF-1 & INF-2) and from the City of Portland's GIS contours (INF-3 & INF-4).

400 Commercial Street, Suite 404, Portland, Maine 04101, Tel (207) 772-2891, Fax (207) 772-3248
Pease International Tradeport, 112 Corporate Drive, Portsmouth, New Hampshire 03801, Tel (603) 436-1490
12 Kent Way, Suite 100, Byfield, Massachusetts 01922, Tel (978) 465-1822
2127 Hamilton Avenue, Hamilton, New Jersey 08619, Tel (609) 584-0090
60 Valley Street, Building F, Suite 106, Providence, Rhode Island 02909, Tel (401) 433-2160

www.ransomenv.com

SUBSURFACE CONDITIONS

Soils

Soils observed in all the infiltration test holes were Loam Fill consisting of dark brown fine to medium sand, with some silt and trace fine to coarse gravel. Soils contained small percentages (5% to 10%) of materials characteristic of "urban fill" such as bricks, concrete, ash and wood.

Based on visual classification, samples from all 4 infiltration test holes appeared to be the same fill material and with the observation that soils from test holes INF-3 and INF-4 (lower area) appeared to have somewhat more loam and less sand or "urban fill" type materials than INF-1 and INF-2. The soils observed during test hole excavations did not appear to change with depth in any of the test holes and no soil horizons were observed.

Groundwater

Soils were excavated 6 inches to 1 foot below the elevation at which the infiltration tests were conducted. Groundwater was not observed in any of the test holes conducted. No mottling or evidence of a seasonal high groundwater table was observed in the test hole excavations.

SATURATED HYDRAULIC CONDUCTIVITY TESTING

Ransom performed field saturated hydraulic conductivity testing in test pits INF-1, INF-2, INF-3 and INF-4 in site soils at depths ranging from approximately 4 inches to 15 inches below grade.

- INF-1 and INF-2 were excavated 12 inches to 14 inches BGS along the 17 contour to target elevation 16 which is approximately elevation of the bottom of R-Tank system proposed below the patio.

- INF-3 and INF-4 were excavated to more shallow depths in order to target infiltration rates at the ground surface, 4-inches and 8-inches BGS respectively.

The tests were performed using a Guelph Permeameter (ASTM International designation: D 5126-90) with the combined reservoir method. Soil permeability (saturated hydraulic conductivity) was calculated by averaging two single head tests.

More information about the Guelph Permeameter can be found here:
http://www.soilmoisture.com/prod_details.asp?prod_id=292

The approximate depth and elevation to the bottom of the test hole and the field saturated hydraulic conductivity rate measured in each test hole are provided in the following table.

Test Pit Designation	Approximate Bottom of Guelph Permeameter Test Hole			Field Saturated Hydraulic Conductivity Rate (inches per hour)	Soil Classification
	Approximate Surface EL (feet)	Approximate Depth BGS (inches)	Test EL (feet)		
INF-1	17.0	15"	15.8	0.65	Loam Fill
INF-2	17.0	14"	15.8	0.36	Loam Fill
INF-3	11.7	4"	11.4	0.42	Loam Fill
INF-4	11.5	8"	10.8	0.09	Loam Fill

Note: The field saturated hydraulic conductivity rates reported are the average of two single head tests.

Individual tests only measure hydraulic conductivity in the immediate vicinity of the test, and may not be representative of the average hydraulic conductivity of the soil at the Site; additionally, field determined hydraulic conductivity is generally accurate only to an order-of-magnitude. Various factors may influence test results, including soil saturation, a non-homogeneous soil profile surrounding the test interval, the presence of large gravel or cobbles, or variation in soil density. Hydraulic conductivity rates selected for design should be evaluated based on the measured data in conjunction with published values for the material.

SOILMOISTURE Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm²

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 7.5

Enter the Borehole Radius ("a" in cm): 2.5

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.5000

α^*= 0.12 cm^{-1}

C = 1.20101

Q = 0.2935

K_{fs} = 4.58E-04 cm/sec
2.75E-02 cm/min
4.58E-06 m/sec
1.08E-02 inch/min
1.80E-04 inch/sec

Φ_m = 3.82E-03 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm²

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 7.5

Enter the Borehole Radius ("a" in cm): 2.5

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
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Steady State Rate of Water Level Change ("R" in cm/min): 0.5000

α^*= 0.12 cm^{-1}

C = 1.20101

Q = 0.2935

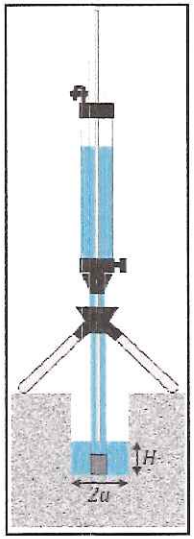
K_{fs} = 4.58E-04 cm/sec
2.75E-02 cm/min
4.58E-06 m/ses
1.08E-02 inch/min
1.80E-04 inch/sec

Φ_m = 3.82E-03 cm^2/min

Average

K_{fs} = 4.58E-04 cm/sec
2.75E-02 cm/min
4.58E-06 m/s
1.08E-02 inch/min
1.80E-04 inch/sec

Φ_m = 3.82E-03 cm^2/min



Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm), and α^* is macroscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zhang et al., 1998).

Soil Texture-Structure Category	α^*(cm^{-1})	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.632}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.483}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.684}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.316}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.684}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.316}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm²/s), α^* is Macroscopic capillary length parameter (from Table ?), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm), H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	$\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi(2H_2H_2(H_2 - H_1) + a^2(H_2C_2 - H_2C_1))}$ $G_2 = \frac{H_2 C_2}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_2C_2 - H_2C_1))}$ $K_{fs} = G_2Q_2 - G_2Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi(2H_2H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	$G_4 = \frac{(2H_2^2 + a^2C_1)C_2}{2\pi(2H_2H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $\Phi_m = G_3Q_1 - G_4Q_2$

Guelph Permeameter

SOILMOISTURE

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm²

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 7.5

Enter the Borehole Radius ("a" in cm): 2.5

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
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3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.1600

α*= 0.12 cm^{-1}

C = 1.20101

Q = 0.09392

K_{fs} = 1.47E-04 cm/sec
8.79E-03 cm/min
1.47E-06 m/sec
3.46E-03 inch/min
5.77E-05 inch/sec

Φ_m = 1.22E-03 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm²

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 7.5

Enter the Borehole Radius ("a" in cm): 2.5

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
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4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.4000

α*= 0.12 cm^{-1}

C = 1.20101

Q = 0.2348

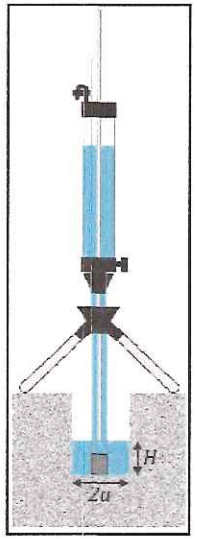
K_{fs} = 3.66E-04 cm/sec
2.20E-02 cm/min
3.66E-06 m/ses
8.65E-03 inch/min
1.44E-04 inch/sec

Φ_m = 3.05E-03 cm^2/min

Average

K_{fs} = 2.56E-04 cm/sec
1.54E-02 cm/min
2.56E-06 m/s
6.06E-03 inch/min
1.01E-04 inch/sec

Φ_m = 2.14E-03 cm^2/min



Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is macroscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	α^*(cm^{-1})	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_1/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm²/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm), H_2 is the second head of water established in borehole (cm) and C_1 is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = R_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$
One Head, Inner Reservoir	$Q_1 = R_1 \times 2.16$	$\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
Two Head, Combined Reservoir	$Q_1 = R_1 \times 35.22$ $Q_2 = R_2 \times 35.22$	$G_1 = \frac{H_2 C_2}{\pi(2H_2H_1(H_2 - H_1) + a^2(H_2C_2 - H_2C_1))}$ $G_2 = \frac{H_2 C_2}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_2C_2 - H_2C_1))}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi(2H_2H_2(H_2 - H_1) + a^2(H_2C_2 - H_2C_1))}$
Two Head, Inner Reservoir	$Q_1 = R_1 \times 2.16$ $Q_2 = R_2 \times 2.16$	$G_4 = \frac{(2H_2^2 + a^2C_2)C_2}{2\pi(2H_2H_2(H_2 - H_1) + a^2(H_2C_2 - H_2C_1))}$ $\Phi_m = G_3Q_1 - G_4Q_2$

13
TRAFFIC AND PARKING MANAGEMENT

Traffic Forecast, Parking Assessment and TDM Plan

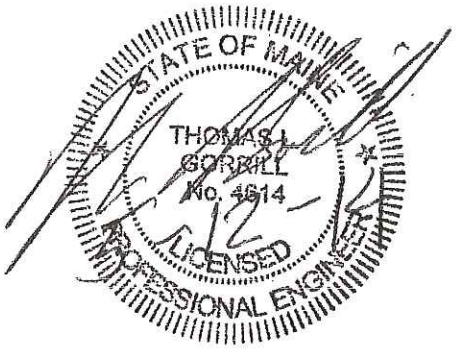
for

Bayside Anchor
Portland, Maine

Prepared for:

Portland Housing Corporation
14 Baxter Blvd
Portland, ME 04101

May 2014



Prepared by:

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Traffic Forecast, Parking Study and Transportation Demand Management Plan
Bayside Anchor
Portland, Maine

Index

Executive Summary

The following Executive Summary is prepared for the reader's convenience, but is not intended to be a substitute for reading the full report.

Gorrill-Palmer Consulting Engineers, Inc. was retained by Portland Housing Corporation (PHA) to prepare this traffic forecast, parking study and Transportation Demand Management Plan for their proposed Bayside Anchor project. The project consists of 45 residential units, including 36 affordable units, a relocated head start program, administration offices for Portland Housing and a neighborhood police office. The site is located in the northwest quadrant of the intersection of Oxford and Boyd Streets. The site currently consists of a 26 space paved parking lot. Based on this study, our office has determined the following:

1. The proposed development is forecast to generate 24 and 29 trip ends in the weekday AM and PM peak hours respectively. (Note: A trip end is either a trip in or out of the site. Thus a round trip would equal two trip ends). At this level of trip generation, this project does **not** require a Maine Department of Transportation (MaineDOT) Traffic Movement Permit.

2. Gorrill-Palmer Consulting Engineers, Inc. referenced the Maine DOT collision records to determine if there were any high crash locations in the project vicinity. No high crash locations were identified in the vicinity of the project site.

3. Gorrill-Palmer Consulting Engineers, Inc. completed a parking inventory of the East Bayside Portland Housing Authority Properties. Based on this study, we found that there is sufficient parking within this "campus" area to accommodate the additional uses proposed with this project.

4. PHA is proposing a Transportation Demand Management (TDM) Plan which will support the City's transportation and environmental sustainability goals by encouraging and promoting bicycling, walking, and use of transit.

Based on these findings, it is the opinion of Gorrill-Palmer Consulting Engineers, Inc. that the proposed project can be accommodated by the City's transportation system.

I. *Existing and Proposed Site*

The proposed site is located on the northwest quadrant of the intersection of Oxford Street and Boyd Street in Portland. The site currently consists of a paved 26 space parking lot.

Proposed for the site are 45 units of residential housing including 36 affordable units, a relocated head start program, administration offices for Portland Housing and a neighborhood police office. Parking for the project will be accommodated within the existing parking lots on the PHA properties and on street.

II. *Background Conditions*

Gorrill-Palmer Consulting Engineers, Inc. based the study on the following information:

- A site plan prepared by Carroll Associates.
- Crash data for 2010-2012 provided by the Maine Department of Transportation.
- Parking inventory performed at the existing East Bayside PHA properties, the adjacent streets, and at similar projects in Portland.

III. *Trip Generation*

Gorrill-Palmer Consulting Engineers, Inc. used the Institute of Transportation Engineers (ITE) publication *Trip Generation*, 9th Edition to estimate the potential trip generation for each land use component of the proposed building.

Apartments: The proposed project will have 45 units with 36 of those being affordable. The project includes 5 efficiency units, 34 one bedroom and 6 two bedroom units. Based on Land Use Code (LUC) 220, Apartment, with 45 units, the proposed housing is anticipated to generate the following trips (note- a trip end is a trip into or out of the site; thus a round trip is equal to two trip ends):

Weekday	396 trip ends
AM Peak Hour	26 trip ends
PM Peak Hour	42 trip ends

ITE trip rates are based on surveys of predominantly ~~sub~~urban locations rather than urban. In addition, these surveys to not take into account the high percentage of affordable units which typically have less cars. Therefore, our office reviewed a trip generation count we had on file for Pearl Place which was taken on Tuesday, October 5, 2010 from 3:30 to 5:30. Based upon the counts, the actual trip generation was low; only twenty peak hour trips were recorded at the site driveway for the 60 units in place when the count was done, and no on-street parking associated with the facility was observed during the count. It should be noted that significant pedestrian trips to and from the site were observed which is also anticipated for the Bayside Anchor project. This results in a

PM peak hour trip rate of .33 for this existing facility. Applying this rate to the proposed 45 units yields 15 trip ends during the PM peak hour.

Given these results and the fact that the project is in an urban area, that 80 % of the units will be affordable, and that the area is very bikeable and walkable, our office has reduced the rates derived from the ITE LUC 220 for apartments by 50% resulting in the following forecast for the housing component of the project:

Weekday	198 trip ends
AM Peak Hour	13 trip ends
PM Peak Hour	21 trip ends

Head Start Program: The head start program anticipates that there will be 17 children enrolled with three staff during the school year only. Based on Land Use Code (LUC) 520, Elementary School with 17 students, the proposed head start is anticipated to generate the following trips:

Weekday	22 trip ends
AM Peak Hour	8 trip ends
PM Peak Hour	5 trip ends

This estimate is likely high given that many of the students who will be attending are living in the neighborhood and will walk.

Offices: The Portland Housing Authority office and a community police station will also be located within the building. The total square footage of these two uses combined is 1502. Based on Land Use Code (LUC) 715, Single Tenant Office Building with 1502 square feet, the proposed office component of the building is anticipated to generate the following trips:

Weekday	17 trip ends
AM Peak Hour	3 trip ends
PM Peak Hour	3 trip ends

Total Traffic Forecast: Combining the trip generation forecast for each component of the building results in the following traffic forecast for the project:

Weekday	237 trip ends
AM Peak Hour	24 trip ends
PM Peak Hour	29 trip ends

This level of traffic increase will not have a notable effect on the adjacent roadway system.

IV. Crash Data

In order to evaluate whether a location has a crash problem, Maine DOT uses two criteria to define High Crash Locations (HCL). Both criteria must be met in order to be classified as an HCL.

1. 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. A CRF of less than 1.00 indicates a rate less than average) and:

2. A minimum of 8 crashes over a three-year period.

Our office reviewed the 2010-2012 crash data in this area and found there were no high crash locations in the vicinity of the project site. A copy of the collision history is included in the Appendix.

V. Parking Evaluation

While PHA wants to provide adequate parking for the project, parking results in loss of open space and increasing stormwater impacts, and uses valuable urban land. At the same time, providing too little parking would have adverse impacts on residents and the surrounding neighborhood. The applicant's goal through the parking demand analysis process is to find the appropriate ratio of parking spaces. Our office has data suggesting actual parking demand will be well below one space per unit. To estimate the parking demand for the proposed project, Gorrill-Palmer Consulting Engineers, Inc. consulted two additional sources; a parking use inventory completed by our office for the existing East Bayside PHA properties; and secondly, relevant parking studies we have completed. Each of these are summarized below:

Parking study of existing East Bayside PHA Properties and On Street Parking- Our office completed an inventory of occupied and available parking spaces for the East Bayside PHA Properties as well as the adjacent neighborhood streets on Sunday evening, May 4th 2014 for each hour from 9 PM to midnight. This represents a time period when most residents would be parked in the neighborhood. A summary of the results for the peak period at 12 midnight is presented below. A summary of the complete parking survey is included in the Appendix of this report:

Parking Survey Results within East Bayside PHA Properties
Highest Demand observed in PHA Parking Lots: 91 spaces
Total Parking Lot Spaces: 157 spaces
Total Available Spaces in Parking Lots: 66 spaces

According to occupancy information furnished by PHA, 162 units of the 164 total were occupied as of May 1, 2014. Therefore, the parking ratio within the PHA off street lots was 0.56 spaces per unit.

On Street Parking for Area Bounded by Anderson, Cumberland and Boyd Streets

Highest On Street Demand observed: 137 spaces
Total on Street Spaces: 298 spaces
Total Available Spaces on street: 161 spaces

This data clearly shows that there is substantial available parking within the neighborhood today. While there are 66 spaces available within the PHA parking lots, some residents are parking on the streets. Therefore, to estimate the total parking demand associated with the existing PHA properties, we have included the number of spaces which were occupied adjacent to PHA properties which were estimated to be 58 spaces. Adding these additional spaces to the 91 spaces occupied in the existing PHA lots results in an overall existing parking ration of 0.92 spaces per occupied unit today for the PHA housing properties. This is likely a high rate since we have been conservative (estimated on the high side) when attributing the on street parking to the existing PHA properties.

As can be seen from the parking data in the Appendix compiled for this report, our office also determined the number of unoccupied on and off street spaces available within 300 and 500 feet of the proposed building. This data is summarized below for 12 midnight, which was the peak period observed:

Unoccupied parking within 300 feet of the project:

- Parking lots: 18
- On Street spaces: 73
- Total: 91

Unoccupied parking within 500 feet of the project:

- Parking lots: 58
- On Street spaces: 130
- Total: 188

Other Relevant Parking Studies

Our office also reviewed data from other projects we have on file in our office in estimating an appropriate parking ration for this project which is summarized below:

- Island View Apartments in Portland- This inventory was performed on July 12, 2004 from 6:00 to 9:00 PM. Island View Apartments is a 70-unit apartment building on the corner of North Road and Walnut Road in Portland. It contains a total of 84 parking spaces, 29 of which are designated visitor parking only, and 2 of which are handicap. In the peak half-hour period, a maximum of 49 parking spaces were occupied. This translates to a demand of 0.70 parking spaces per dwelling unit.

- As part of studies for similar projects in the past, our office examined the parking occupancy of apartment buildings in downtown Portland with dedicated parking lots, either behind or within the building as part of another application. Our office completed parking occupancy counts from 10-11 PM (within the peak period, based on ITE and ULI data) at 53 Danforth Street, 645 Congress Street, and Walker Terrace (at the corner of Congress and Walker Street) on Tuesday, October 26, 2010.

  In addition, we referenced the parking supply for Franklin Towers and the recently-completed Oak Street Lofts. Franklin Towers has 200 units, and based upon aerial data, a parking supply of 56 spaces. Oak Street Lofts has 37 units, and 16 parking spaces, although it should be noted that half of these spaces (eight) are for motorcycles. For the purposes of this letter, it is assumed that peak demand at both of these facilities is at 100 percent occupancy.

  Based on the occupancy counts, the following parking demand was determined:

53 Danforth:	43 units, 29 spaces occupied	=	0.67 spaces/unit
645 Congress:	56 units, 28 spaces occupied	=	0.50 spaces/unit
Walker Terrace:	40 units, 20 spaces occupied	=	0.50 spaces/unit
Oak Street Lofts:	37 units, 16 spaces occupied*	=	0.43 spaces/unit
Franklin Towers:	200 units, 58 spaces occupied**	=	0.29 spaces/unit
	AVERAGE:		0.48spaces/unit

*Assumes 100% occupancy at Oak Street.
** Assumes 58 spaces based upon aerial imagery, and 100% occupancy at Franklin Towers.

- This information indicates an average need for 0.48 spaces per apartment within the Portland Peninsula.

Recommended Parking Ratio - Based on the level of demand at the above referenced studies, and the planned implementation of the proposed Transportation Demand Management Plan, it is the opinion of Gorrill Palmer that appropriate parking demand for the proposed Bayside Anchor Project as well as the existing PHA "Bayside campus" properties is 0.75 spaces per unit for the proposed housing.

Evaluation of Parking Supply vs. Demand- The proposed project will result in the loss of the 26 space parking lot currently on the project site. The comparison of the available parking supply vs the anticipated demand upon completion of the project is summarized below:

Parking Supply: The available off and on street parking supplies within 300 and 500 feet upon completion of the project are summarized below:

- Within 300 feet of the project: 118 spaces on street; 36 in PHA lots
- Within 500 feet of the project: 227 spaces on street; 109 in PHA lots

- Combined Totals
  - Within 300 feet:154
  - Within 500 feet:336

Parking Demand: Based on the recommended parking ratio of 0.75 spaces per unit, the proposed 45 unit project is estimated to generate an additional demand of 34 spaces. The resulting parking demands within 300 and 500 feet of the project are summarized below:

- Within 300 feet of the project: 123 spaces
- Within 500 feet of the project: 208 spaces

Comparison of Parking Demand vs Supply: A comparison of the parking demand and supply shows that there is projected to be 31, and 128 spaces within 300 and 500 feet respectively upon completion of the project. It is noted that while the proposed head start and office components of the project will also require parking, these uses are not expected to coincide with the peak parking period which occurs during the evening when residents return from work.

VI. Transportation Demand Management Plan

PHA Housing has requested development of a Transportation Demand Management (TDM) Plan for their campus which will support the City's transportation and environmental sustainability goals by encouraging and promoting bicycling, walking, and use of transit. Avesta will be managing the project for PHA and is very familiar with the importance of a TDM plan. Following is a description of the elements of the Plan.

TDM Coordinator

PHA Housing has a Property Manager who will coordinate the TDM plan. The TDM coordinator will be responsible for posting changes and updates to the Metro schedule and U Car information in the lobby as well as other information relevant to promoting and encouraging the greater use of bicycling, walking, and bus-based transit.

Parking Limits within the Lease

PHA Housing plans to adopt parking policies limiting each household to no more than a single parking permit, i.e. one (1) vehicle per residence.

Automobile Parking Reduction Strategies

The Applicant proposes to take the following measures to reduce the demand for vehicles.

Bicycle Parking

PHA Housing plans to provide a total of 38 parking spaces for bicycles with 30 of these located within the building. These spaces are envisioned to be wall-mounted lockable racks

within controlled-access rooms. This configuration will provide for bicycle security, convenience, and protection from the weather.

Encourage Use of Local Transit Options

PHA's TDM coordinator will provide route maps, schedules, and ticket information in packets along with their lease agreement. Free ride tickets will be available to all tenants of the PHA properties in East Bayside. In addition, maps, routes, and ticket information will be posted clearly in the entry areas in both the existing and future apartment buildings.

U Car Share

Portland is one of 38 municipalities served by U Car Share in the United States. In Portland, the service provides a total of four cars, one of which is 118 Congress Street, a walkable distance from the project. These vehicles are available on an hourly or daily basis. PHA will make residents aware of and encourage use of this service, which will allow for use of a car for certain trips, which can reduce the need for an owned car. Information will be provided to each incoming resident with their lease agreement.

Sidewalk Facilities

Sidewalks surround the proposed project encouraging walking to and from the project. In addition the PHA campus provides a linkage to the Portland Trail system.

Tenant Packets

Upon signing a lease, each tenant will be provided with an extensive packet which will include information on transportation incentives and resources. Tenant packets will, at a minimum, include:

- Information on the free ride tickets on Metro to be provided by PHA
- The Greater Portland Transit Guide and other bus transit trip planning resources
- Registration form and program information for U Car Share.
- Bicycle commuting information and other resources gathered from the Bicycle Coalition of Maine and Bicycle Meet Up commuter program
- Portland Trails map

Education

The on-site information about transportation options will include:

- Transportation information located in the common area/lobby.
- Maps, information on METRO ticket passes available at the PHA office, and other transportation information available in the office

Monitoring

As part of its TDM Plan monitoring program, PHA Housing will assess the utilization of its on- and off-site parking on an on-going basis and monitor the operation of the parking areas. Demand for handicapped parking will be monitored on a monthly basis. PHA Housing will track tenant requests for additional on-site bicycle and scooter-motorcycle parking.

One year after initial occupancy and annually thereafter, PHA Housing will revisit the TDM plan taking into account the following:

- Tenant vehicle ownership (bicycle, scooter-motorcycle, automobile)
- Tenant parking utilization of on and off-site parking, including nearby parking garages and on-street parking spaces
- The means of travel by tenants (bus, walk, bicycle, automobile, scooter-motorcycle, car share, carpool or other)

PHA Housing will update the TDM Plan and submit a draft plan to the City's TDM Manager for review and comments. Should the vehicle ownership of tenants exceed 0.75 spaces/unit or 34 cars, additional TDM measures and/or parking measures will be considered.

Timetable for Action Items

Action Item	Timeframe for Implementation
Appoint/Confirm Property Manager for TDM Coordination	October 2014
Assemble Tenant TDM Packets	June/July 2015 (anticipated)
TDM Plan Implementation / On-site Parking Monitoring	January 2016 (anticipated, Assuming July 2015 occupancy)
Assess success of first 12 months of TDM Program and Report to City on initial effectiveness	July 2016
Submit Year Two TDM Program with needed modifications (and annually thereafter)	March 2018

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☑ Crash Summary I ☐ Section Detail ☑ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Boyd St area

REPORT PARAMETERS

Year 2010, Start Month 1 through Year 2012 End Month: 12

Route: **0560293**	Start Node: **18521**	Start Offset: **0**	☑ Exclude First Node
	End Node: **18929**	End Offset: **0**	☐ Exclude Last Node
Route: **0560847**	Start Node: **18929**	Start Offset: **0**	☑ Exclude First Node
	End Node: **19463**	End Offset: **0**	☐ Exclude Last Node
Route: **0561238**	Start Node: **18919**	Start Offset: **0**	☐ Exclude First Node
	End Node: **19463**	End Offset: **0**	☑ Exclude Last Node
Route: **0560069**	Start Node: **18919**	Start Offset: **0**	☑ Exclude First Node
	End Node: **18921**	End Offset: **0**	☐ Exclude Last Node
Route: **0560493**	Start Node: **18922**	Start Offset: **0**	☑ Exclude First Node
	End Node: **18924**	End Offset: **0**	☐ Exclude Last Node
Route: **0560666**	Start Node: **18915**	Start Offset: **0**	☑ Exclude First Node
	End Node: **18918**	End Offset: **0**	☐ Exclude Last Node
Route: **0560834**	Start Node: **18918**	Start Offset: **0**	☑ Exclude First Node
	End Node: **18924**	End Offset: **0**	☑ Exclude Last Node
Route: **0560234**	Start Node: **18917**	Start Offset: **0**	☑ Exclude First Node
	End Node: **18932**	End Offset: **0**	☑ Exclude Last Node
Route: **0560235**	Start Node: **19464**	Start Offset: **0**	☑ Exclude First Node
	End Node: **18916**	End Offset: **0**	☑ Exclude Last Node
Route: **0560235**	Start Node: **18916**	Start Offset: **0**	☑ Exclude First Node
	End Node: **18923**	End Offset: **0**	☑ Exclude Last Node

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☑ Crash Summary I ☐ Section Detail ☑ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Boyd St area

REPORT PARAMETERS

Year 2010, Start Month 1 through Year 2012 End Month: 12

Route: **0560235**	Start Node: **18923**	Start Offset: **0**	☑ **Exclude First Node**
	End Node: **18920**	End Offset: **0**	☑ **Exclude Last Node**

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary I

Nodes

Node	Route - MP	Node Description	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
18953	0560293 - 0.06	0509373 POR,N.BOYD,FOX ST.	2	3	0	0	1	0	2	33.3	1.997	0.50	0.45	1.11
												Statewide Crash Rate: 0.14		
18952	0560293 - 0.16	0509372 POR,FOX,DIAMOND ST.	2	1	0	0	0	0	1	0.0	1.968	0.17	0.45	0.00
												Statewide Crash Rate: 0.14		
18929	0560293 - 0.21	0509349 POR,ANDERSON,FOX ST.	2	2	0	0	0	1	1	50.0	1.808	0.37	0.46	0.00
												Statewide Crash Rate: 0.14		
18930	0560847 - 0.53	0509350 POR,ANDERSON,EVERETT ST.	2	0	0	0	0	0	0	0.0	0.148	0.00	0.46	0.00
												Statewide Crash Rate: 0.14		
18931	0560847 - 0.56	0509351 POR,ANDERSON,MADISON ST.	2	1	0	0	0	1	0	100.0	0.150	2.22	0.47	4.75
												Statewide Crash Rate: 0.14		
18932	0560847 - 0.59	0509352 POR,E.LANCASTER,ANDERSON ST.	2	0	0	0	0	0	0	0.0	0.132	0.00	0.41	0.00
												Statewide Crash Rate: 0.14		
19464	0560847 - 0.65	0509886 POR,ANDERSON ST,E.OXFORD STR.	2	0	0	0	0	0	0	0.0	0.163	0.00	0.50	0.00
												Statewide Crash Rate: 0.14		
19463	0560847 - 0.74	Int of ANDERSON ST CUMBERLAND AV	2	3	0	0	0	1	2	33.3	2.054	0.49	0.42	1.15
												Statewide Crash Rate: 0.13		
18919	0561238 - 0.84	Int of BOYD ST CUMBERLAND AV	2	3	0	0	0	1	2	33.3	2.449	0.41	0.40	1.01
												Statewide Crash Rate: 0.13		
18910	0561238 - 0.87	Int of CUMBERLAND AV, LOCUST ST	2	2	0	0	0	0	2	0.0	2.390	0.28	0.41	0.00
												Statewide Crash Rate: 0.13		
18922	0561238 - 0.89	Int of CUMBERLAND AV MAYO ST	2	0	0	0	0	0	0	0.0	2.241	0.00	0.41	0.00
												Statewide Crash Rate: 0.13		
18915	0561238 - 0.94	Int of CUMBERLAND AV, SMITH ST	2	3	0	0	0	0	3	0.0	2.266	0.44	0.41	1.07
												Statewide Crash Rate: 0.13		
18920	0560069 - 0.08	0509340 POR,BOYD,E,OXFORD ST.	2	1	0	0	0	0	1	0.0	0.170	1.96	0.51	3.85
												Statewide Crash Rate: 0.14		
18921	0560069 - 0.15	0509341 POR,LANCASTER 1,BOYD ST.	2	0	0	0	0	0	0	0.0	0.068	0.00	-0.18	0.00
												Statewide Crash Rate: 0.14		
18923	0560493 - 0.08	0509343 POR,MAYO,E.OXFORD ST.	2	0	0	0	0	0	0	0.0	0.131	0.00	0.40	0.00
												Statewide Crash Rate: 0.14		
18924	0560493 - 0.16	0509344 POR,KENNEDY,MAYO ST.	2	0	0	0	0	0	0	0.0	0.050	0.00	-0.70	0.00
												Statewide Crash Rate: 0.14		
18916	0560666 - 0.14	0509336 POR,SMITH,E.OXFORD ST.	2	1	0	0	0	0	1	0.0	0.170	1.96	0.51	3.85
												Statewide Crash Rate: 0.14		
18917	0560666 - 0.21	0509337 POR,SMITH,E.LANCASTER ST	2	0	0	0	0	0	0	0.0	0.084	0.00	0.08	0.00
												Statewide Crash Rate: 0.14		
18918	0560666 - 0.22	0509338 POR,KENNEDY,SMITH ST.	2	0	0	0	0	0	0	0.0	0.045	0.00	-0.96	0.00
												Statewide Crash Rate: 0.14		
Study Years: 3.00		**NODE TOTALS:**		20	0	0	1	4	15	25.0	18.484	0.36	0.25	1.43

Crash Summary I

Sections

Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
18521	18953	194034	0 - 0.06	0560293 - 0	0.06	2	0	0	0	0	0	0	0.0	0.00125	0.00	974.19	0.00
Int of FOX ST FRANKLIN ST				RD INV 05 60293											Statewide Crash Rate: 336.58		
18952	18953	194637	0 - 0.10	0560293 - 0.06	0.10	2	1	0	0	1	0	0	100.0	0.00131	184.16	885.84	0.00
0509372 POR,FOX,DIAMOND ST.				RD INV 05 60293											Statewide Crash Rate: 336.58		
18929	18952	194603	0 - 0.05	0560293 - 0.16	0.05	2	0	0	0	0	0	0	0.0	0.00088	0.00	1068.04	0.00
0509349 POR,ANDERSON,FOX ST.				RD INV 05 60293											Statewide Crash Rate: 336.58		
18929	18930	194602	0 - 0.04	0560847 - 0.49	0.04	2	0	0	0	0	0	0	0.0	0.00006	0.00	1031.16	0.00
0509349 POR,ANDERSON,FOX ST.				RD INV 05 60847											Statewide Crash Rate: 336.58		
18930	18931	194605	0 - 0.03	0560847 - 0.53	0.03	2	0	0	0	0	0	0	0.0	0.00004	0.00	525.37	0.00
0509350 POR,ANDERSON,EVERETT ST.				RD INV 05 60847											Statewide Crash Rate: 336.58		
18931	18932	194607	0 - 0.03	0560847 - 0.56	0.03	2	1	0	0	0	0	0	0.0	0.00004	8875.04	351.26	25.27
0509351 POR,ANDERSON,MADISON ST.				RD INV 05 60847											Statewide Crash Rate: 336.58		
18932	19464	194609	0 - 0.06	0560847 - 0.59	0.06	2	5	0	0	1	0	4	20.0	0.00007	25034.05	1177.21	21.27
0509352 POR,E.LANCASTER,ANDERSON ST.				RD INV 05 60847											Statewide Crash Rate: 336.58		
19463	19464	195146	0 - 0.09	0560847 - 0.65	0.09	2	2	0	0	0	0	1	0.0	0.00008	7958.54	1328.15	5.99
Int of ANDERSON ST CUMBERLAND AV				RD INV 05 60847											Statewide Crash Rate: 336.58		
18910	18919	3129300	0 - 0.03	0561238 - 0.84	0.03	2	3	0	0	0	1	2	33.3	0.00069	1442.26	702.55	2.05
Int of CUMBERLAND AV, LOCUST ST				RD INV 05 61238											Statewide Crash Rate: 181.66		
18910	18922	3118713	0 - 0.02	0561238 - 0.87	0.02	2	0	0	0	0	0	0	0.0	0.00045	0.00	757.37	0.00
Int of CUMBERLAND AV, LOCUST ST				RD INV 05 61238											Statewide Crash Rate: 181.66		
18915	18922	3117967	0 - 0.05	0561238 - 0.89	0.05	2	2	0	0	0	1	1	50.0	0.00108	616.01	636.99	0.00
Int of CUMBERLAND AV, SMITH ST				RD INV 05 61238											Statewide Crash Rate: 181.66		
18915	19463	3131702	0 - 0.04	0561238 - 0.94	0.04	2	2	0	0	0	0	2	0.0	0.00082	808.89	677.68	1.19
Int of CUMBERLAND AV, SMITH ST				RD INV 05 61238											Statewide Crash Rate: 181.66		
18919	18920	194589	0 - 0.08	0560069 - 0	0.08	2	4	0	0	0	0	3	0.0	0.00013	10594.45	1444.47	7.33
Int of BOYD ST CUMBERLAND AV				RD INV 05 60069											Statewide Crash Rate: 336.58		
18920	18921	194590	0 - 0.07	0560069 - 0.08	0.07	2	4	0	0	0	0	3	0.0	0.00010	13990.69	1382.73	10.12
0509340 POR,BOYD,E,OXFORD ST.				RD INV 05 60069											Statewide Crash Rate: 336.58		
18922	18923	194592	0 - 0.08	0560493 - 0	0.08	2	1	0	0	1	0	0	100.0	0.00007	4476.68	1260.29	3.55
Int of CUMBERLAND AV MAYO ST				RD INV 05 60493											Statewide Crash Rate: 336.58		
18923	18924	194593	0 - 0.08	0560493 - 0.08	0.08	2	1	0	0	0	0	0	0.0	0.00005	6486.09	899.65	7.21
0509343 POR,MAYO,E.OXFORD ST.				RD INV 05 60493											Statewide Crash Rate: 336.58		
18915	18916	194580	0 - 0.08	0560666 - 0.06	0.08	2	2	0	0	0	0	2	0.0	0.00009	7068.44	1379.02	5.13
Int of CUMBERLAND AV, SMITH ST				RD INV 05 60666											Statewide Crash Rate: 336.58		
18916	18917	194583	0 - 0.07	0560666 - 0.14	0.07	2	1	0	0	0	0	0	0.0	0.00006	5551.62	1082.04	5.13
0509336 POR,SMITH,E.OXFORD ST.				RD INV 05 60666											Statewide Crash Rate: 336.58		
18917	18918	194586	0 - 0.01	0560666 - 0.21	0.01	2	0	0	0	0	0	0	0.0	0.00001	0.00	-	0.00
0509337 POR,SMITH,E.LANCASTER ST				RD INV 05 60666											Statewide Crash Rate: 336.58	18946.64	
18918	18924	194588	0 - 0.04	0560834 - 0	0.04	2	1	0	0	0	0	1	0.0	0.00001	23296.99	-4098.52	0.00
0509338 POR,KENNEDY,SMITH ST.				RD INV 05 60834											Statewide Crash Rate: 336.58		

Crash Summary I

Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
				Sections													
18917	18932	194587	0 - 0.04	0560234 - 0	0.04	2	0	0	0	0	0	0	0.0	0.00001	0.00	-6213.23	0.00
0509337 POR,SMITH,E.LANCASTER ST				RD INV 05 60234											Statewide Crash Rate: 336.58		
18916	19464	194585	0 - 0.02	0560235 - 0.07	0.02	2	0	0	0	0	0	0	0.0	0.00002	0.00	-3362.02	0.00
0509336 POR,SMITH,E.OXFORD ST.				RD INV 05 60235											Statewide Crash Rate: 336.58		
18916	18923	194584	0 - 0.05	0560235 - 0.09	0.05	2	2	0	0	0	0	1	0.0	0.00003	23267.31	-382.86	0.00
0509336 POR,SMITH,E.OXFORD ST.				RD INV 05 60235											Statewide Crash Rate: 336.58		
18920	18923	194591	0 - 0.05	0560235 - 0.14	0.05	2	0	0	0	0	0	0	0.0	0.00002	0.00	-1152.75	0.00
0509340 POR,BOYD,E,OXFORD ST.				RD INV 05 60235											Statewide Crash Rate: 336.58		
Study Years: 3.00				**Section Totals:**	1.27		32	0	0	3	2	20	15.6	0.00787	1355.10	534.30	2.54
				Grand Totals:	1.27		52	0	0	4	6	35	19.2	0.00787	2202.03	676.00	3.26

Crash Summary

Section Details														
Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	Injury Crashes K	A	B	C	PD	Crash Report	Crash Date	Crash Mile Point	Injury Degree
18521	18953	194034	0 - 0.06	0560293 - 0	0	0	0	0	0	0				
18952	18953	194637	0 - 0.10	0560293 - 0.06	1	0	0	1	0	0	2010-14202C	07/09/2010	0.07	B
18929	18952	194603	0 - 0.05	0560293 - 0.16	0	0	0	0	0	0				
18929	18930	194602	0 - 0.04	0560847 - 0.49	0	0	0	0	0	0				
18930	18931	194605	0 - 0.03	0560847 - 0.53	0	0	0	0	0	0				
18931	18932	194607	0 - 0.03	0560847 - 0.56	1	0	0	0	0	0	2010-5508C	02/25/2010	0.57	
18932	19464	194609	0 - 0.06	0560847 - 0.59	5	0	0	1	0	4	2012-904	01/13/2012	0.61	PD
											2010-8633C	04/27/2010	0.61	PD
											2012-42600	10/31/2012	0.62	PD
											2011-8643C	06/05/2011	0.64	B
											2010-4524C	02/27/2010	0.64	PD
19463	19464	195146	0 - 0.09	0560847 - 0.65	2	0	0	0	0	1	2011-3003C	02/11/2011	0.66	PD
											2011-960C	01/21/2011	0.70	
18910	18919	3129300	0 - 0.03	0561238 - 0.84	3	0	0	0	1	2	2011-4295C	02/25/2011	0.85	PD
											2011-3566C	02/15/2011	0.85	PD
											2011-3255	06/23/2011	0.86	C
18910	18922	3118713	0 - 0.02	0561238 - 0.87	0	0	0	0	0	0				
18915	18922	3117967	0 - 0.05	0561238 - 0.89	2	0	0	0	1	1	2010-7683C	03/30/2010	0.90	C
											2010-18272C	08/21/2010	0.90	PD
18915	19463	3131702	0 - 0.04	0561238 - 0.94	2	0	0	0	0	2	2011-3474	06/24/2011	0.95	PD
											2012-48363	12/21/2012	0.97	PD
18919	18920	194589	0 - 0.08	0560069 - 0	4	0	0	0	0	3	2012-32126	07/06/2012	0.02	PD
											2011-6502	08/03/2011	0.04	PD
											2012-25406	04/01/2012	0.07	
											2012-42011	10/26/2012	0.07	PD
18920	18921	194590	0 - 0.07	0560069 - 0.08	4	0	0	0	0	3	2012-45906	12/02/2012	0.10	PD
											2011-20488	12/29/2011	0.13	PD
											2011-19176	12/15/2011	0.14	
											2011-14468	11/03/2011	0.14	PD
18922	18923	194592	0 - 0.08	0560493 - 0	1	0	0	1	0	0	2011-11163	09/27/2011	0.06	B
18923	18924	194593	0 - 0.08	0560493 - 0.08	1	0	0	0	0	0	2012-47097	12/13/2012	0.10	
18915	18916	194580	0 - 0.08	0560666 - 0.06	2	0	0	0	0	2	2011-5271C	03/04/2011	0.10	PD
											2011-2931C	02/06/2011	0.10	PD
18916	18917	194583	0 - 0.07	0560666 - 0.14	1	0	0	0	0	0	2011-21044	12/31/2011	0.16	

Crash Summary

Section Details

Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	Injury Crashes K	A	B	C	PD	Crash Report	Crash Date	Crash Mile Point	Injury Degree
18917	18918	194586	0 - 0.01	0560666 - 0.21	0	0	0	0	0	0				
18918	18924	194588	0 - 0.04	0560834 - 0	1	0	0	0	0	1	2010-9926C	05/16/2010	0.01	PD
18917	18932	194587	0 - 0.04	0560234 - 0	0	0	0	0	0	0				
18916	19464	194585	0 - 0.02	0560235 - 0.07	0	0	0	0	0	0				
18916	18923	194584	0 - 0.05	0560235 - 0.09	2	0	0	0	0	1	2012-2926	02/04/2012	0.12	
											2010-16408C	08/06/2010	0.13	PD
18920	18923	194591	0 - 0.05	0560235 - 0.14	0	0	0	0	0	0				
				Totals:	32	0	0	3	2	20				

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Day and Hour

	AM												PM													
Day Of Week	Hour of Day 12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	Un	Tot
SUNDAY	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	2	0	1	0	7
MONDAY	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	3
TUESDAY	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	1	1	1	1	0	0	0	0	0	9
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	1	0	0	0	2	0	0	0	0	0	6
THURSDAY	1	1	0	0	0	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	7
FRIDAY	0	2	0	0	0	0	0	0	0	3	0	1	0	3	2	0	1	0	1	1	0	0	2	0	0	16
SATURDAY	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	4
Totals	2	3	0	0	1	0	1	1	2	4	2	4	4	3	5	3	2	1	2	4	2	2	3	1	0	**52**

Vehicle Counts by Type

Unit Type	Total
1-Passenger Car	59
2-(Sport) Utility Vehicle	14
3-Passenger Van	3
4-Cargo Van (10K lbs or Less)	1
5-Pickup	9
6-Motor Home	0
7-School Bus	0
8-Transit Bus	1
9-Motor Coach	0
10-Other Bus	0
11-Motorcycle	0
12-Moped	0
13-Low Speed Vehicle	0
14-Autocycle	0
15-Experimental	0
16-Other Light Trucks (10,000 lbs or Less)	0
17-Medium/Heavy Trucks (More than 10,000 lbs)	3
18-ATV - (4 wheel)	0
20-ATV - (2 wheel)	0
21-Snowmobile	0
22-Pedestrian	3
23-Bicyclist	2
24-Witness	12
25-Other	7
Total	**114**

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	10	10	1	0	0	0	21
Ran Off Roadway	1	0	0	0	0	0	1
Failed to Yield Right-of-Way	6	4	0	0	0	0	10
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	2	0	0	0	0	0	2
Drove Too Fast For Conditions	1	1	0	0	0	0	2
Improper Turn	2	1	0	0	0	0	3
Improper Backing	4	1	0	0	0	0	5
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	0	0	0	0	0	0	0
Failed to Keep in Proper Lane	0	1	0	0	0	0	1
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	0	2	0	0	0	0	2
Total	**26**	**20**	**1**	**0**	**0**	**0**	**47**

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	38	32	1	0	0	1	72
Physically Impaired or Handicapped	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	0	1	0	0	0	0	1
Under the Influence of Medications/Drugs/Alcohol	3	1	0	0	0	0	4
Other	0	3	0	0	0	0	3
Total	**41**	**37**	**1**	**0**	**0**	**1**	**80**

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	2	0	0	0	0	2
20-24	14	0	0	0	0	14
25-29	21	0	0	0	0	21
30-39	17	0	0	0	0	17
40-49	15	0	0	0	0	15
50-59	10	0	0	0	0	10
60-69	5	0	0	0	0	5
70-79	3	0	0	0	0	3
80-Over	0	0	0	0	0	0
Unknown	10	2	0	3	0	15
Total	**97**	**2**	**0**	**3**	**0**	**102**

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Most Harmful Event

Most Harmful Event	Total
1-Overturn / Rollover	0
2-Fire / Explosion	0
3-Immersion	0
4-Jackknife	0
5-Cargo / Equipment Loss Or Shift	0
6-Fell / Jumped from Motor Vehicle	0
7-Thrown or Falling Object	0
8-Other Non-Collision	2
9-Pedestrian	0
10-Pedalcycle	0
11-Railway Vehicle - Train, Engine	0
12-Animal	0
13-Motor Vehicle in Transport	30
14-Parked Motor Vehicle	12
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0
16-Work Zone / Maintenance Equipment	0
17-Other Non-Fixed Object	0
18-Impact Attenuator / Crash Cushion	0
19-Bridge Overhead Structure	0
20-Bridge Pier or Support	0
21-Bridge Rail	0
22-Cable Barrier	0
23-Culvert	0
24-Curb	0
25-Ditch	0
26-Embankment	0
27-Guardrail Face	0
28-Guardrail End	0
29-Concrete Traffic Barrier	0
30-Other Traffic Barrier	0
31-Tree (Standing)	0
32-Utility Pole / Light Support	0
33-Traffic Sign Support	0
34-Traffic Signal Support	0
35-Fence	0
36-Mailbox	0
37-Other Post Pole or Support	0
38-Other Fixed Object (wall, building, tunnel, etc.)	0
39-Unknown	6
40-Gate or Cable	0
41-Pressure Ridge	0
Total	**50**

Traffic Control Devices

Traffic Control Device	Total
1-Traffic Signals (Stop & Go)	0
2-Traffic Signals (Flashing)	0
3-Advisory/Warning Sign	0
4-Stop Signs - All Approaches	5
5-Stop Signs - Other	9
6-Yield Sign	0
7-Curve Warning Sign	0
8-Officer, Flagman, School Patrol	0
9-School Bus Stop Arm	0
10-School Zone Sign	0
11-R.R. Crossing Device	0
12-No Passing Zone	0
13-None	38
14-Other	0
Total	**52**

Injury Data

Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	4	5
C	6	7
PD	35	0
Total	**45**	**12**

Road Character

Road Grade	Total
1-Level	34
2-On Grade	15
3-Top of Hill	1
4-Bottom of Hill	2
5-Other	0
Total	**52**

Light

Light Condition	Total
1-Daylight	29
2-Dawn	0
3-Dusk	1
4-Dark - Lighted	20
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	1
7-Unknown	1
Total	**52**

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2010	2011	2012	Total
JANUARY	1	2	2	5
FEBRUARY	2	6	1	9
MARCH	2	1	0	3
APRIL	1	0	1	2
MAY	1	0	1	2
JUNE	0	3	0	3
JULY	1	0	3	4
AUGUST	4	1	1	6
SEPTEMBER	1	2	1	4
OCTOBER	1	1	3	5
NOVEMBER	1	2	0	3
DECEMBER	0	3	3	6
Total	**15**	**21**	**16**	**52**

Report is limited to the last 10 years of data.

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End / Sideswipe	13	3	2	2	0	4	0	0	0	0	0	0	0	24
Head-on / Sideswipe	4	0	0	0	0	0	0	0	0	0	0	0	0	4
Intersection Movement	0	0	8	3	0	2	0	0	0	0	0	0	0	13
Pedestrians	1	0	1	1	0	0	0	0	0	0	0	0	0	3
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	2	0	1	0	0	0	0	0	0	0	0	0	0	3
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	1	0	1	0	0	0	0	0	0	0	0	0	0	2
Other	2	0	1	0	0	0	0	0	0	0	0	0	0	3
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**23**	**3**	**14**	**6**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**52**

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	11	0	0	0	0	0	0	0	0	0	0	11
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	12	1	0	0	0	0	0	0	0	0	1	14
Dusk	1	0	0	0	0	0	0	0	0	0	0	1
Unknown	1	0	0	0	0	0	0	0	0	0	0	1
Cloudy												
Dark - Lighted	2	0	0	0	0	0	0	0	0	0	2	4
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	2	0	0	0	0	0	0	0	0	0	2	4
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	4	4
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	7	7
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	1	0	0	0	0	0	0	0	0	0	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	1	0	0	0	0	0	0	0	0	0	1
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	1	0	0	0	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	1	0	0	0	0	0	2	0	0	0	3
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**29**	**4**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**52**

JN:2876
Project Description: Bayside Anchor, Portland
Project Location: Corner of Oxford and Boyd
Date:5-11-14

Gorrill-Palmer Consulting Engineers, Inc.
P.O. Box 1237
15 Shaker Road
Gray, Maine 04039

Apartment
Land Use Code (LUC) 220

Dwelling Units: 45

Average Rate

Time Period	ITE Trip Rate	Sample Size	Trip Ends		Directional Split * IN	Directional Split * OUT	Directional Distribution IN	Directional Distribution OUT	R^2
Weekday	T = 6.65 (X)	88	299		50%	50%	150	149	N/A
AM Peak Hour of Adj. Street Traffic	T = 0.51 (X)	78	23		20%	80%	5	18	N/A
PM Peak Hour of Adj. Street Traffic	T = 0.62 (X)	90	28		65%	35%	18	10	N/A
AM Peak Hour of Generator	T = 0.55 (X)	83	25		30%	70%	8	17	N/A
PM Peak Hour of Generator	T = 0.67 (X)	85	30		60%	40%	18	12	N/A
Saturday	T = 6.39 (X)	15	288		50%	50%	144	144	N/A
Saturday Peak Hour of Gen.	T = 0.52 (X)	14	23	**	50%	50%	12	11	N/A

* Percentages rounded to nearest 5%
** Not Available (Assumption)

Fitted Curve Equation

Time Period	ITE Trip Rate	Sample Size	Trip Ends		Directional Split * IN	Directional Split * OUT	Directional Distribution IN	Directional Distribution OUT	R^2
Weekday	T = 6.06 (X) + 123.56	88	396		50%	50%	198	198	0.88
AM Peak Hour of Adj. Street Traffic	T = 0.49 (X) + 3.73	78	26		20%	80%	5	21	0.83
PM Peak Hour of Adj. Street Traffic	T = 0.55 (X) + 17.65	90	42		65%	35%	28	14	0.77
AM Peak Hour of Generator	T = 0.54 (X) + 2.45	83	27		30%	70%	8	19	0.82
PM Peak Hour of Generator	T = 0.60 (X) + 14.91	85	42		60%	40%	25	17	0.80
Saturday	T = 7.85 (X) - 256.19	15	97		50%	50%	49	48	0.85
Saturday Peak Hour of Gen.	T = 0.41 (X) + 19.23	14	38	**	50%	50%	19	19	0.56

* Percentages rounded to nearest 5%
** Not Available (Assumption)

JN:2876
Project Description:Bayside Anchor
Project Location: Boyd and Oxford, Portland
Date:5-11-14

Gorrill-Palmer Consulting Engineers, Inc.
P.O. Box 1237
15 Shaker Road
Gray, Maine 04039

Single Tenant Office Building
Land Use Code (LUC) 715

Gross Floor Area (ft^2): 1,502

Average Rate

Time Period	ITE Trip Rate	Trip Ends	Directional Split *		Directional Distribution	
			IN	OUT	IN	OUT
Weekday	T = 11.65 (X)	17	50%	50%	9	8
AM Peak Hour	T = 1.80 (X)	3	90%	10%	3	0
PM Peak Hour	T = 1.74 (X)	3	15%	85%	0	3

* Percentages rounded to nearest 5%

Fitted Curve

Time Period	ITE Trip Rate	Trip Ends	Directional Split *		Directional Distribution	
			IN	OUT	IN	OUT
Weekday	Ln (T) = 0.60 Ln (X) + 4.30	94	50%	50%	47	47
AM Peak Hour	T = 1.67(X) + 21.93	24	90%	10%	22	2
PM Peak Hour	T = 1.52 (X) + 34.60	37	15%	85%	6	31

* Percentages rounded to nearest 5%

JN:2876
Project Description:Bayside Anchor
Project Location: corner of Oxford and Boyd, Portland
Date:

Gorrill-Palmer Consulting Engineers, Inc.
P.O. Box 1237
15 Shaker Road
Gray, Maine 04039

Elementary School
Land Use Code (LUC) 520

Students 17

Average Rate

Time Period	ITE Trip Rate	Trip Ends	Sample Size	Directional Split *		Directional Distribution		R^2
				IN	OUT	IN	OUT	
Weekday	T = 1.29 (X)	22	33	50%	50%	11	11	---
AM Peak Hour of Adj. Street Traffic	---	---	---	---	---	---	---	---
PM Peak Hour of Adj. Street Traffic	T = 0.15 (X)	3	20	50%	50%	2	1	---
AM Peak Hour of Generator	T = 0.45 (X)	8	48	55%	45%	4	4	---
PM Peak Hour of Generator	T = 0.28 (X)	5	44	45%	55%	2	3	---
Saturday	---	---	---	---	---	---	---	---
Saturday Peak Hour of Generator	---	---	---	---	---	---	---	---

* Percentages rounded to nearest 5%

Fitted Curve Equation

Time Period	ITE Trip Rate	Trip Ends	Sample Size	Directional Split *		Directional Distribution		R^2
				IN	OUT	IN	OUT	
Weekday	---	---	---	---	---	---	---	---
AM Peak Hour of Adj. Street Traffic	---	---	---	---	---	---	---	---
PM Peak Hour of Adj. Street Traffic	---	---	---	---	---	---	---	---
AM Peak Hour of Generator	Ln(T) = 1.14Ln (X) - 1.86	4	48	55%	45%	2	2	0.5
PM Peak Hour of Generator	Ln(T) = 1.09Ln (X) - 1.92	3	37	45%	55%	1	2	0.54
Saturday	---	---	---	---	---	---	---	---
Saturday Peak Hour of Generator	---	---	---	---	---	---	---	---

* Percentages rounded to nearest 5%

East Bayside Properties - Parking Study
Date: 5/4/2014
JN: 2876

9:00 PM

	Location	Total Parked Vehicles	# Parked Vehicles within 300' of Bayside Anchor	# Parked Vehicles within 500' of Bayside Anchor
PARKING LOTS				
	Kennedy Park lots	27	14	27
	Bayside Terrace lots	20	6	20
	Bayside East lots	32	15	20
	Total Parked Vehicles:	**79**	**35**	**67**
	Total Parking Spaces:	**157**	**62**	**135**
	Total Available Spaces:	**78**	**27**	**68**
ON-STREET PARKING				
	Boyd Street	14	9	14
	Mayo Street	26	22	26
	Smith Street	24	0	24
	Anderson Street (E Lancaster to Cumberland)	22	0	0
	E Lancaster Street	2	0	2
	Oxford Street (Anderson to Boyd)	6	4	6
	Cumberland Avenue (Anderson to Franklin)	26	0	8
	Total Parked Vehicles:	**120**	**35**	**80**

East Bayside Properties - Parking Study
Date: 5/4/2014
JN: 2876

10:00 PM

	Location	Total Parked Vehicles	# Parked Vehicles within 300' of Bayside Anchor	# Parked Vehicles within 500' of Bayside Anchor
PARKING LOTS				
	Kennedy Park lots	28	19	28
	Bayside Terrace lots	23	6	23
	Bayside East lots	32	16	21
	Total Parked Vehicles:	**83**	**41**	**72**
	Total Parking Spaces:	**157**	**62**	**135**
	Total Available Spaces:	**74**	**21**	**63**
ON-STREET PARKING				
	Boyd Street	15	10	15
	Mayo Street	29	23	29
	Smith Street	27	0	27
	Anderson Street (E Lancaster to Cumberland)	25	0	0
	E Lancaster Street	3	0	3
	Oxford Street (Anderson to Boyd)	7	5	7
	Cumberland Avenue (Anderson to Franklin)	22	0	10
	Total Parked Vehicles:	**128**	**38**	**91**

East Bayside Properties - Parking Study
Date: 5/4/2014
JN: 2876

11:00 PM

	Location	Total Parked Vehicles	# Parked Vehicles within 300' of Bayside Anchor	# Parked Vehicles within 500' of Bayside Anchor
PARKING LOTS				
	Kennedy Park lots	27	17	27
	Bayside Terrace lots	25	8	25
	Bayside East lots	36	18	23
	Total Parked Vehicles:	**88**	**43**	**75**
	Total Parking Spaces:	**157**	**62**	**135**
	Total Available Spaces:	**69**	**19**	**60**
ON-STREET PARKING				
	Boyd Street	18	12	18
	Mayo Street	33	26	33
	Smith Street	28	0	28
	Anderson Street (E Lancaster to Cumberland)	27	0	0
	E Lancaster Street	4	0	3
	Oxford Street (Anderson to Boyd)	9	6	9
	Cumberland Avenue (Anderson to Franklin)	20	0	9
	Total Parked Vehicles:	**139**	**44**	**100**

East Bayside Properties - Parking Study
Date: 5/4/2014
JN: 2876

12:00 AM

	Location	Total Parked Vehicles	# Parked Vehicles within 300' of Bayside Anchor	# Parked Vehicles within 500' of Bayside Anchor
PARKING LOTS				
	Kennedy Park lots	29	19	29
	Bayside Terrace lots	25	7	25
	Bayside East lots	37	18	23
	Total Parked Vehicles:	**91**	**44**	**77**
	Total Parking Spaces:	**157**	**62**	**135**
	Total Available Spaces:	**66**	**18**	**58**
ON-STREET PARKING				
	Boyd Street	18	12	18
	Mayo Street	34	27	34
	Smith Street	28	0	24
	Anderson Street (E Lancaster to Cumberland)	25	0	0
	E Lancaster Street	5	0	3
	Oxford Street (Anderson to Boyd)	9	6	9
	Cumberland Avenue (Anderson to Franklin)	18	0	9
	Total Parked Vehicles:	**137**	**45**	**97**

East Bayside Properties - Parking Study
Date: 5/4/2014
JN: 2876

Within 300' of Bayside Anchor

	9:00 PM	10:00 PM	11:00 PM	12:00 AM
Parked Cars In Lots	35	41	43	44
Total Lot Spaces	62	62	62	62
Available Lot Spaces	27	21	19	18
Parked Cars On-Street	35	38	44	45

Within 500' of Bayside Anchor

	9:00 PM	10:00 PM	11:00 PM	12:00 AM
Parked Cars In Lots	67	72	75	77
Total Lot Spaces	135	135	135	135
Available Lot Spaces	68	63	60	58
Parked Cars On-Street	80	91	100	97

On-Street Parking

Total On-Street Parking Spaces	Street Name	Street Segment
11	Cumberland Ave	Anderson St to Smith St
13	Cumberland Ave	Smith St to Mayo St
8	Cumberland Ave	Mayo St to Boyd St
0	Cumberland Ave	Boyd St to Franklin St
15	Oxford St	Anderson St to Smith St
12	Oxford St	Smith St to Mayo St
18	Oxford St	Mayo St to Boyd St
15	E Lancaster St	Anderson St to Smith St
31	Boyd St	Cumberland Ave to Oxford St
25	Boyd St	Oxford St to Bayside Terrace
31	Mayo St	Cumberland Ave to Oxford St
22	Mayo St	Oxford St to Kennedy Park lot
27	Smith St	Cumberland Ave to Oxford St
23	Smith St	Oxford St to Kennedy Park lot
28	Anderson St	Cumberland Ave to Oxford St
19	Anderson St	Oxford St to E Lancaster St

2/3 →

Total: **298** **On Street Parking Spaces**

within 300' 118 ~~spaces~~ spaces w/in 300'

within 500' 227 spaces within 500'

Gorrill-Palmer Consulting Engineers, Inc.
Engineering Excellence Since 1998

PO Box 1237
15 Shaker Rd.
Gray, ME 04039

207-657-6910
FAX: 207-657-6912
E-Mail:mailbox@gorrillpalmer.com

June 30, 2014

Mark B. Adelson, Executive Director
Portland Housing Authority
14 Baxter Boulevard
Portland, Maine 04101

Subject: Response to Traffic Review Comments from Tom Errico

Dear Mark:

Gorrill-Palmer Consulting Engineers, Inc. (GPCEI) is pleased to respond to the comments emailed on June 5, 2014 from Tom Errico to Rick Knowland concerning traffic and parking for Bayside Anchor. Each of the comments are repeated below for your convenience followed by our response.

Responses to June 5th Email from Tom Errico:

Comment: "*The project is expected to generate 24 vehicles during the AM peak hour and 29 vehicles during the PM peak hour. This level of traffic does not trigger the requirement for a MaineDOT Traffic Movement Permit.*"

Response: No response required

Comment: "*I continue to review the parking analysis for the project but note the following:*
During a field review of the site during a weekday morning, a significant number of vehicles were parked in the immediate area of the proposed site. Cars were parked on both sides of Boyd Street and there were no on-street parking spaces available. I would further note that the travel lane was very narrow in this area and is a cause for concern and review."

Response: We agree that there are a significant number of vehicles parked on the upper part of Boyd Street between Oxford and Cumberland Streets during the week. While this does narrow the effective width of the street, which is a potential cause for concern for public safety in terms of emergency vehicle access, it does serve to let drivers know they are entering an urban neighborhood and they appear to slow down as a result of this narrowing. This traffic calming benefits the neighborhood as a whole, particularly bicyclists and pedestrians. We offer two potential suggestions to address the public safety issue while retaining the positive traffic calming benefit of parked vehicles. First, based on visual observations, a majority of the parked vehicles in this area appear to be people who work downtown outside of this neighborhood but leave their cars parked all day. We recommend that the City consider implementing a two hour parking restriction on Boyd Street between

Oxford and Cumberland Streets. Second, we recommend that two forty foot no parking zones be implemented, with one on each side of the street midway between Oxford and Cumberland Streets to allow vehicles to pull over for an oncoming vehicle to let them pass. In our opinion, this would represent an appropriate balance on this relatively low volume street.

Comment: "It has been the City's general policy not to include on-street parking spaces in the determination of parking supply adequacy for a proposed project. I would suggest that the project determine parking supply adequacy from using off-street parking lots only (I would note that based upon the applicants data, it appears adequate off-street parking can be provided)."

Response: Using a parking ration of 0.75 per unit for the proposed (45 units) and existing (164 units) results in a parking demand of 157 spaces for the 209 units. The Portland Housing Authority currently has 183 off street spaces in the neighborhood, however 26 spaces, which are underutilized will be lost as a result of the proposed project reducing the number of off street spaces to 157. The parking assessment completed for the project presents parking demand data for 5 projects which showed an average demand of 0.48 spaces per unit. Based on this information it appears that a parking ratio of 0.75 is reasonable and it would assume no on street parking, which as a practical matter does occur to some extent but is helpful as a traffic calming mechanism.

Comment: *The applicant should provide information on how the PHA parking lots will be managed. Specific details should be provided"*

Response: PHA had considered assigning specific spaces to tenants, however, they have elected instead to monitor the parking once the project is construction since assignments may not prove to be necessary. They propose to issue parking guidelines to tenants that describe which lot they should park in if they have a car and monitor this program as part of their ongoing TDM monitoring program. From there, they will see if they would need to take the next step of assigning the spaces. As mentioned in the Transportation Demand Management Plan (TDM), tenants will be encouraged to use alternative forms of transportation such as the Metro, bicycling, walking, etc. and the success of this program will be monitored and reported to City staff. As previously noted, PHA will assign tenant spaces should it prove necessary.

Comment: *"It is my understanding that the proposed crosswalks on Boyd Street and Oxford Street have been reviewed by the City's Crosswalk Committee. I will provide specific comments on the crosswalks in the future."*

Response: The crosswalk committee approved the proposed crosswalk at their June meeting.

Comment: ***"It should be noted that recommendations from the Franklin Street Study may include some type of transportation connection from Oxford Street to Franklin Street. I need to review this possibility and whether it impacts the proposed site plan."***

Response: The proposed project should not interfere with the potential for a future connection.

Comment: "Changes to on-street parking regulations may require an amendment to the City's Traffic Schedule and thus action by the City Council. If required, the applicant will be requested to provide information in support of the Council packet."

Response: We are proposing one space on Boyd Street and three spaces on Oxford Street be signed for 15 minutes spaces. The reason for this request is to provide for visitor traffic to the proposed building. We understand that these proposals, if supported by City staff, may require Council Action.

Comment: "The project appears to use existing handicapped parking spaces across Oxford Street. The applicant should provide information that the parking spaces dimensionally meet ADA standards. During my field review, one of the spaces was occupied, so the applicant should provide information on the use of these spaces for both the existing and proposed sites."

Response: Two additional handicapped parking spaces across Oxford Street will be developed to meet ADA requirements including their connection to the Oxford Street sidewalk and crosswalk connection to the Bayside Anchor entrance. The existing handicap spaces will be relocated within the same lot to maintain their use by two accessible Bayside East apartments on that block.

Comment: "The applicant should provide information on how Head Start Pick-up and Drop-off activities will be managed."

Response: As discussed during our meeting at the site on June 24th, the large majority of the students already live in the neighborhood and will be walking. For those that area dropped off and or picked up, the applicant is proposing to have four spaces designated as 15 minute parking, three on Oxford Street and one directly adjacent to the HeadStart entrance.

Comment: The applicant should provide details on where Police Station vehicles will park (if required)

Response: one space will be reserved in front of the police station for use by a police vehicle only during business hours.

Please let me know if you have any further questions.

Sincerely,

Gorrill-Palmer Consulting Engineers, Inc.

Thomas L Gorrill, P.E., PTOE
Principal

TLG/tlg/2876/comment response 6-30-14.doc

ATT 14

CARROLL ASSOCIATES
LANDSCAPE ARCHITECTS

RECEIVED JULY 18, 2014

~~April 2, 2014~~

Mr. Rick Knowland, Senior Planner
City of Portland
389 Congress Street
Portland, ME 04101

RE: Bayside Anchor Response to Staff Comments

Dear Rick,

We are in receipt of your initial staff comments regarding the Application for Site Plan and Subdivision Approval and offer the following responses:

1. There is apparently no service utility letter from Portland Water District or any other utility in the submitted material.
   Response: Letters of Capacity have been requested from the Portland Water District and the City of Portland Wastewater Division and were included in the application. We expect their official response prior to the Public Hearing. Power is proposed to be routed down from Cumberland Avenue and will be confirmed once the final building design and loads have been calculated.

2. Need most recent neighborhood meeting notes.
   Response. The minutes from the Neighborhood Meeting are attached to this letter.

3. The site plan labels the brick sidewalk as "brick paving" which might be confused with "brick pavers". Please use the term brick sidewalk on the plan.
   Response: We have made the requested change to the Site Plan which clarifies that the sidewalk will be 'brick" meeting City Standards.

4. Sheet L3.0 references "town of Freeport".
   Response: This was an oversight and has been corrected on the Site Plan.

5. The subdivision plat references "45 units". Revise to "45 housing units" or "45 dwelling units".
   Response: We have made the requested change to the Site Plan.

6. Site plan bike parking standard references 2 bike spaces for every 5 housing units. Does the site plan meet that standard?
   Response: The proposed site plan indicates four outside bicycle racks, 2 on Oxford and 2 just off theright of way on Boyd Strreet, providing a total of 8 bicycle spaces that will be used by tenants and guests on an as-needed basis. Additionally, there is an interior bicycle storage area on the first floor of the building with a capacity for up to 34 bicycles.

7. One of the bike racks is within the city right-of-way. Does that rack design meet city standards?
   Response: The exterior bicycle racks are detailed on Sheet L-5.1 and identified as "Dero Bike Hitch" which meets City Standards.

8. Do you have a catalog cut for the exterior light fixtures indicating they have a cut-off feature?
   Response: The proposed lighting is indicated on the Photometric Plan. The fixtures are Sharp cut-off type with LED illumination. A catalog cut sheet is attached to this response letter.

9. Do you have the equivalent of 2 trees per dwelling units? If not we'll need to discuss this further such as additional street trees in the neighborhood.
   Response: We are proposing a total of 15 trees to be located within or adjacent to the public right-of-way as part of this project. We are aware of the requirement for trees per dwelling unit and would be open to discussions with staff on locating the remaining trees within the neighborhood or paying a fee into the City Tree fund as required per ordinance.

10. A transformer is proposed close to Boyd Street. What is the projected size and color of the transformer?
    Response: We do not have a final design of the transformer requirements but are anticipating a standard CMP pad mounted transformer on a 7 ft x 7 ft pad. The standard color for these transformers is green.

11. Could you provide more info on the "special paver" for the rear terrace area? Also I believe this material is shown within a portion of the esplanade along Oxford St. which would be unusual since the sidewalk standard is brick.
    Response: The "Special Paver" indicated for the rear terrace is a concrete paver manufactiured by Hanover Pavers called "Plankstone". We are also proposing to use the same paver in a small portion of the esplanade along Oxford Street associated with the main entrance and gathering area. Use of this same product is intended to provide continuity between the front and rear of the project. Within the Head Start outdoor space we are proposing to utilize a porous, rubberized surfacing that will provide cushioning for the younger children and a differentiation for this space from the rest of the terrace. Details of these surfaces are indicated on Sheet L-5.0

Please review the comments and let me know if there are other issues or comments from other staff resulting from their review. As always, we appreciate the opportunity to work closely with you and the Staff on review of the project and look forward to meeting with the Planning Board on July 22 to discuss the project in greater detail. Please contact me if you have any questions or concerns.

With Regards,
CARROLL ASSOCIATES

Patrick J. Carroll, Principal

CC: Mark Adelson, PHA
Brooks More, Avesta
Rick Knowland, City of Portland

ATT 15

SITE/ROADWAY

BNS
SERIES

Bounce®

Pedestrian Scale Luminaire

70 - 200W H.I.D.

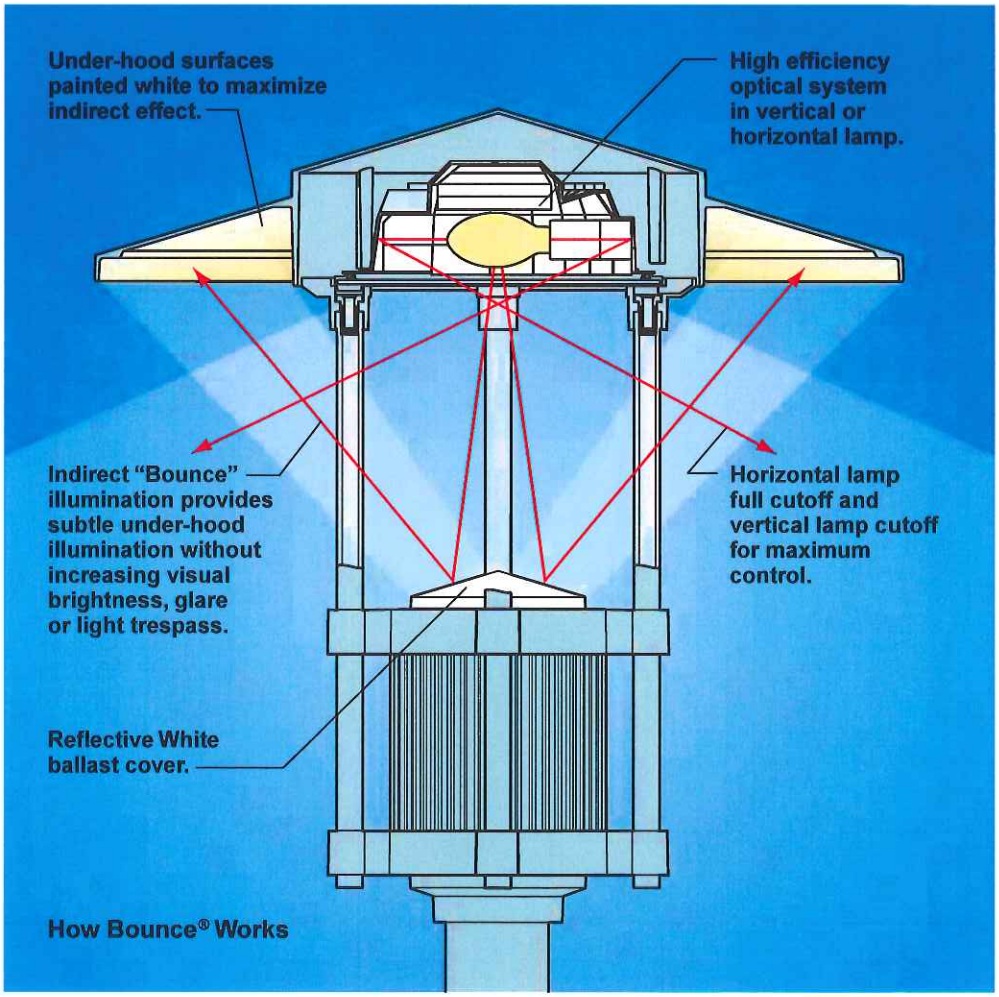
KIM LIGHTING

Bounce®

Table of Contents

Bounce®

The Bounce® luminaire design combines the look of contemporary European lanterns with the cutoff control and optical performance provided in every Kim area lighting product. Rather than waste light by discharging it in lateral planes, the Bounce luminaire utilizes either Vertical or Horizontal lamp optical systems with cutoff lighting control. A subtle indirect component is captured from light bouncing off the reflective white ballast compartment cover, to illuminate the underside of the fixture's hood. Bounce addresses the growing concern for control of glare and light trespass, with a unique visual presence both day and night.



How Bounce® Works

KIM LIGHTING

SITE / AREA
PARKING STRUCTURE
ROADWAY
ARCHITECTURAL FLOOD
ACCENT
LANDSCAPE

MAILING ADDRESS:
P.O. BOX 60080
CITY OF INDUSTRY, CA
91716-0080

BUSINESS ADDRESS:
16555 EAST GALE AVENUE
CITY OF INDUSTRY, CA 91745
U.S.A.
PHONE 626 / 968-5666
FAX 626 / 369-2695

www.kimlighting.com

HUBBELL®

Hubbell Lighting, Inc.

Printed in U.S.A.
5506510288
Version 10/10

Kim Theory of Relativity

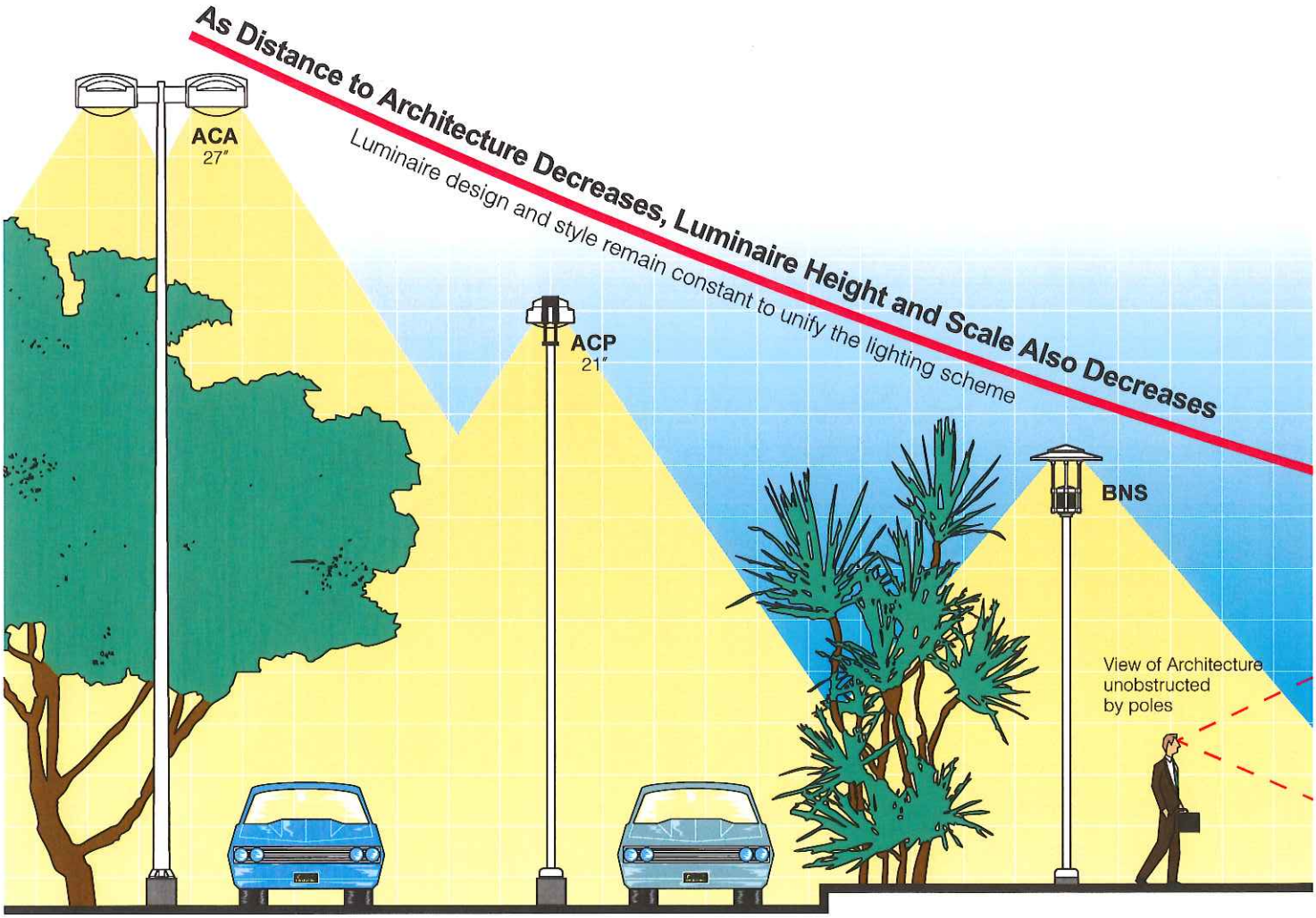
The Relationship of Outdoor Lighting to Site and Architecture

ACA AC Arm Mount

BNS Bounce®

LTV Lightvault®

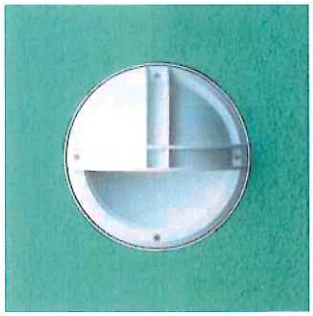
GEM™ Bollard



SITE / ROADWAY ZONE
Parking lots and roadways require luminaires on 20′ - 40′ poles to efficiently light these large areas. Therefore, this lighting becomes dominant, and sets the design and style for all other lighting as you progress towards the building.

PEDESTRIAN ZONE
As you leave the parking lot and transition to pedestrian areas, poles should decrease in height to 10′ - 16′. In addition, luminaires should decrease in scale, and can have more decorative features to be appreciated at the pedestrian level.

AFL Architectural Floodlight



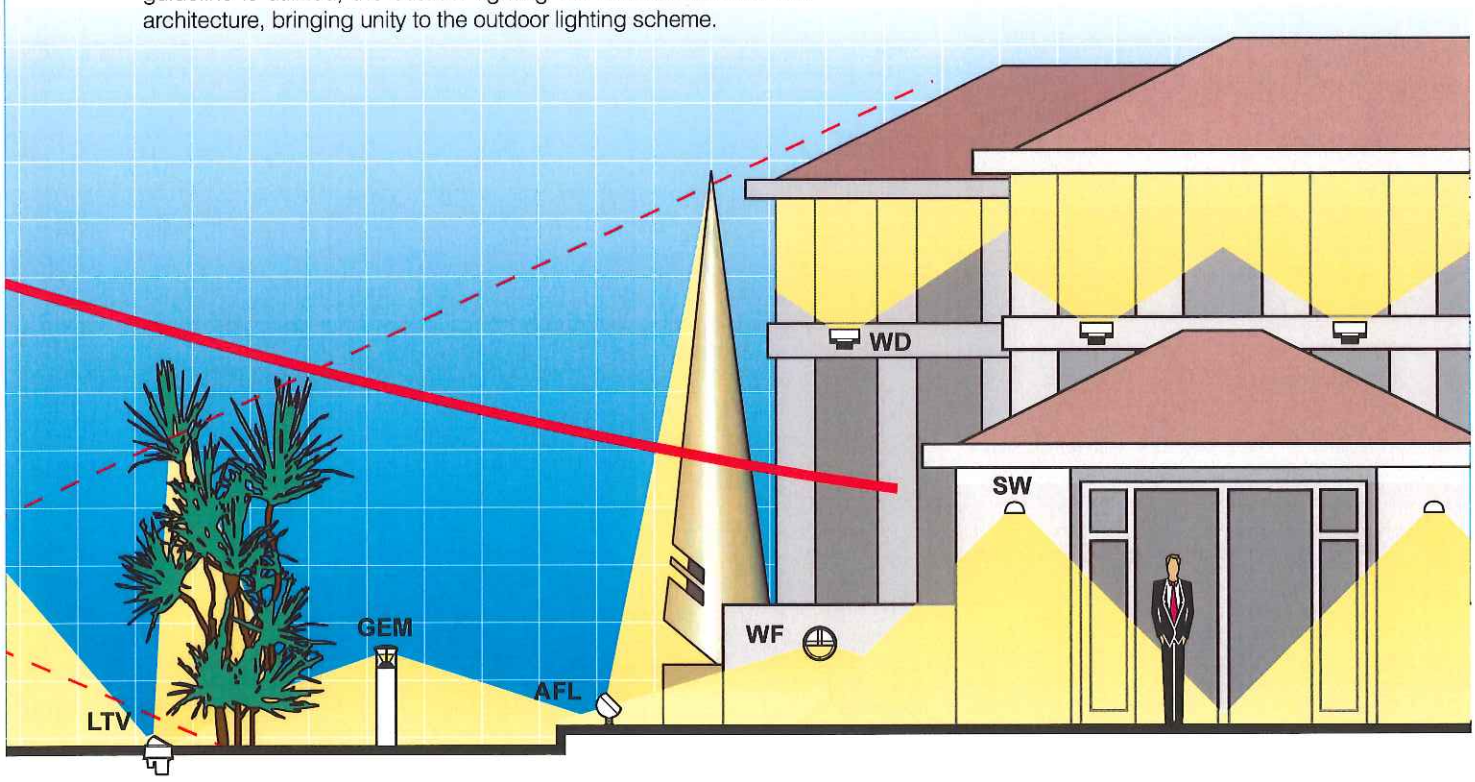
WF Wall Forms®

SW Site Wallforms

WD Wall Director®

KIM THEORY OF RELATIVITY

The purpose of this guideline is to bring a cohesive look to outdoor lighting, maximizing lighting efficiency while preserving the architectural experience. Simply stated, the Kim Theory of Relativity says "Poles belong in parking lots. And, once you leave the parking lot, the outdoor lighting should become less and less conspicuous until it becomes an integral part of the architecture." In addition, the luminaire style and geometry should remain consistent. If this guideline is utilized, the outdoor lighting will enhance the site and architecture, bringing unity to the outdoor lighting scheme.



LANDSCAPE / PATH ZONE

Near the building, luminaires should begin to disappear, blending into the landscape and hardscape elements.

BUILDING / PERIMETER ZONE

No pole mounted luminaires should ever be used near the building, as they will dominate the architecture. The only exception would be the use of decorative luminaires to delineate entrances to the structure. Building mounted, architecturally compatible fixtures should be almost invisible.

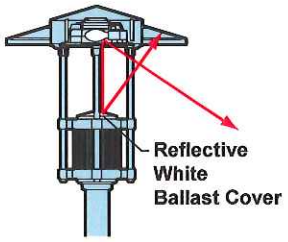
Horizontal or Vertical Lamp

See the **Kim Site / Roadway Optical Systems Catalog** for complete details and explanation of optical system features.

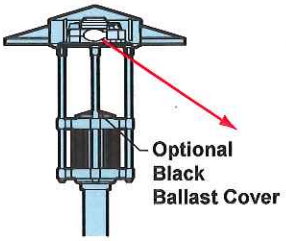
Cutoff and Bounce Optical Design

Unlike lantern style products that emit the majority of their light in the horizontal plane, the Kim Bounce design incorporates a Cutoff optical system for distribution of illumination onto the ground, combined with a controlled up-light feature to provide a subtle and unique night-time presence. For locations where Full Cutoff optical control is required, an optional black ballast cover, combined with either dark bronze or black fixture finish, and the Horizontal Lamp flat lens optical system, meet the stringent standard of no illumination at 90° from the vertical optical plane.

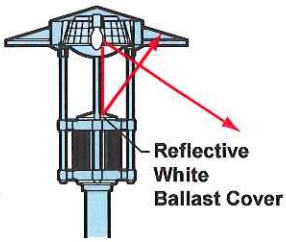
Horizontal Lamp with indirect light



Horizontal Lamp with Full Cutoff option



Vertical Lamp with indirect light



Horizontal Lamp

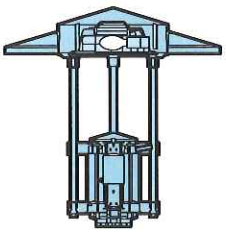
Available in **Type II, Type III, Type IV,** and **Type V** Square distributions, providing **maximum cutoff control** and very good uniformity.

Die-Cast Reflector Construction

Bounce utilizes die-cast aluminum optical chambers to provide a rigid foundation for the high efficiency reflector components. This produces the most durable, accurate, and highly repeatable optical system possible. The optical chamber is painted reflective white to increase efficiency and reduce lamp source apparent brightness.

Convex Lens Option

An optional Convex Lens produces a subtle improvement in uniformity where fixtures are spaced widely apart. This option will also increase fixture presence and improves houseside shielding effectiveness. Maintains Cutoff classification.



Cutoff Control

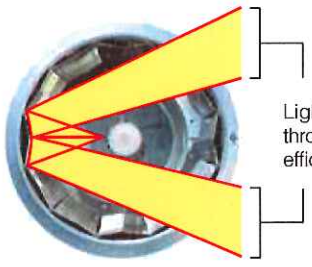
The horizontal lamp optical system, combined with tight control of the subtle up-light into the fixture hood, maintains its classification as "Cutoff", producing low glare and control of light trespass.

Full Cutoff Option

For locations where Full Cutoff optical control is mandated, an optional black ballast cover can be specified. This eliminates all indirect up-light distribution, producing a Full Cutoff luminaire, when used in conjunction with a dark bronze or black luminaire finish, and the standard flat lens.

Vertical Lamp

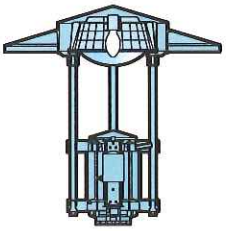
Available in **Asymmetric** and **Symmetric** distributions, providing vertical lamp performance in a compact luminaire profile with excellent uniformity. **Symmetric** downlight distribution (BNS1F3 and BNS1F5) produces a soft glow and maximum fixture presence.



Light is directed around, not through the lamp for maximum efficiency.

Reflected Energy Directed Around the Lamp

Wide-beam vertical lamp reflectors often redirect heat and light back through the lamp, reducing efficiency. The Kim Split Beam optical design re-directs energy around the lamp into the desired useable lighting zones. The result is a cooler running lamp and higher luminaire efficiency.



Cutoff Control

The vertical lamp optical system, combined with tight control of the subtle up-light into the fixture hood, maintains its classification as "Cutoff", producing low glare and control of light trespass.

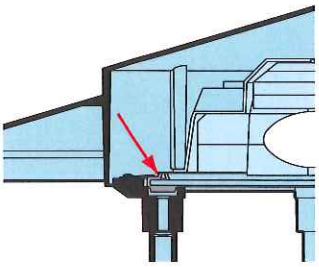
Design Features

Precision Components

The hood and ballast chamber cover are die-cast aluminum for precision and repeatability. The ballast housing and support rods are extruded aluminum. Use of low-copper aluminum alloys (<0.6% Cu) provides trouble-free service and corrosion resistance.

Sealed Optical Chamber

The optical chamber is completely sealed, including wire entries. The lens is sealed with a molded silicone gasket. By eliminating the intrusion of moisture, dust, and insects, efficiency and maximum light output is maintained between maintenance intervals.



No-Tool Relamping

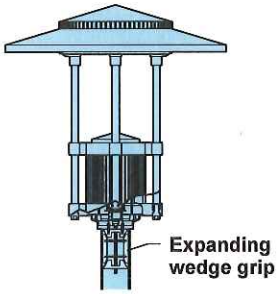
The hood is secured with a latch, and is hinged for relamping. A self-locking stop arm retains the hood/lamp compartment in the open position for easy maintenance.

Easy Installation

The ballast module is factory prewired with a quick-disconnect plug, and mounted to a slide-in tray. Removal for maintenance or access to mounting fasteners is done without disturbing fixture wiring.

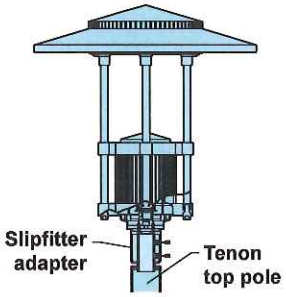
Post Top Mounting

The Bounce® post top mounting can be installed flush to square cut round poles. The **FM** Flush Mount for 4″ round poles, produces the cleanest appearance with fully concealed fasteners, utilizing Kim's patented wedge grip. A single concealed bolt attaches the fixture.



Pole Top Tenon Mount

The Bounce® Pole Tenon Mount, for 2″ pipe-size tenon (2⅜″ O.D. x 4½″ minimum length) provides flexibility for mounting to specialty poles (by others). **PT** Pole Tenon mount is held in place by four set screws. One set screw is drilled into tenon to prevent fixture rotation.



Twin Post Top Mounting

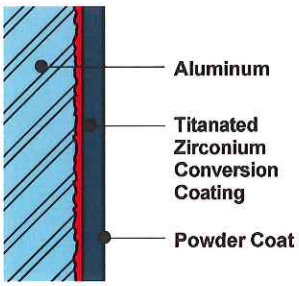
The Bounce® twin post top mount is installed onto 4″ or 5″ poles with extruded arms and risers with cast end caps. All fasteners and trim components are provided.

Wall Mount

The Bounce® wall mount installation includes a cast mounting plate, a cast cover plate, and an extruded arm and riser with cast end caps.

Eight Stage Durable Powder Coat Finish

Kim's state-of-the-art powder coat paint system is engineered to provide the highest quality finish with absolute paint adhesion under weather extremes. The Super TGIC thermoset polyester powder coat finish is applied over a Titanated Zirconium conversion coating. This finish system has exceeded the A.S.T.M. 2500 hour salt spray test.



1. Power wash and degrease.
2. Detergent tank bath.
3. Clear water rinse bath.
4. Premium Titanated Zirconium conversion coating as used in the automobile industry.
5. Clear water rinse bath.
6. Dry off oven.
7. Powder coating, 2.5 mil nominal thickness.
8. Bake for 20 minutes at 410°F.

Standard Super TGIC Colors

BL-P Black
DB-P Dark Bronze
LG-P Light Gray
PS-P Platinum Silver
WH-P White

Ordering Information

BNS1 Bounce

BNS1

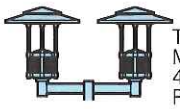
Ordering Example:
For Standard Fixture and Pole

Mounting	Fixture	Electrical Module	Finish	Options	Pole
FM /	**BNS1H2** /	**100MH277** /	**PS-P** /	**A-33** /	**PRA14-4125FM** / **PS-P**
1	**2**	**3**	**4**	**5-10** See p. 9	See Kim Pole Catalog (**PRA**, **KRS** for **NS**) Omit for **1W** Wall Mount

1 Mounting:

Flush Mount 4" O.D. Poles only

Tenon Mount For Poles with 2" Pipe-size Tenon



Twin Mount 4" or 5" O.D. Poles only

Wall Mount

EPA:	1.2	1.2	3.6	n/a
Cat. No.:	**FM**	**PT**	**2SB**	**1W**

2 Fixture:

Cat. No. designates **BNS1** fixture and light distribution.

See the **Kim Site/Roadway Optical Systems Catalog** for detailed information on reflector design and application.

Horizontal Lamp Flat Glass Lens

Light Distribution:	Type II	Type III	Type IV Forward Throw	Type V Square
Cat. No.:	**BNS1H2**	**BNS1H3**	**BNS1H4**	**BNS1H5**

Vertical Lamp Convex Glass Lens

Light Distribution:	Asymmetric	Symmetric Square
Cat. No.:	**BNS1F3**	**BNS1F5**

3 Electrical Module:

HPS = High Pressure Sodium

MH = Metal Halide

PMH = Pulse Start Metal Halide

See lamp and electrical data on page **12** for ballast types and characteristics.

Lamp Watts	Lamp Type	Line Volts
100	**HPS**	**277**

70HPS120	**100HPS120**	**150HPS120**	**175MH120**	[1] Not for use in horizontal lamp reflectors.
70HPS208	**100HPS208**	**150HPS208**	**175MH208**	
70HPS240	**100HPS240**	**150HPS240**	**175MH240**	[2] Check with local codes for use of medium base sockets with the 480 volt.
70HPS277	**100HPS277**	**150HPS277**	**175MH277**	
70HPS347	**100HPS347**	**150HPS347**	**175MH347**	
70HPS480[2]	**100HPS480**[2]	**150HPS480**[2]	**175MH480**[2]	

70PMH120	**100PMH120**	**150PMH120**	**175PMH120**[1]	**200PMH120**[1]
70PMH208	**100PMH208**	**150PMH208**	**175PMH208**[1]	**200PMH208**[1]
70PMH240	**100PMH240**	**150PMH240**	**175PMH240**[1]	**200PMH240**[1]
70PMH277	**100PMH277**	**150PMH277**	**175PMH277**[1]	**200PMH277**[1]
70PMH347	**100PMH347**	**150PMH347**	**175PMH347**[1]	**200PMH347**[1]
70PMH480[2]	**100PMH480**[2]	**150PMH480**[2]	**175PMH480**[1,2]	**200PMH480**[1,2]

4 Finish:

Super TGIC powder coat paint over Titanated Zirconium conversion coating.

Color:	Black	Dark Bronze	Light Gray	Platinum Silver	White	Custom Colors
Cat. No.:	**BL-P**	**DB-P**	**LG-P**	**PS-P**	**WH-P**	**CC-P** Consult representative for custom colors.

5 Optional Photocell:

Line Volts:	120V	208V	240V	277V	347V	480V
Cat. No.:	**A-30**	**A-31**	**A-32**	**A-33**	**A-35**	**A-34**

6 Optional Convex Glass Lens:

For Horizontal Lamp Fixtures.

Cat. No.: **CGL**

Tempered convex glass lens replaces standard flat lens. For horizontal lamp Type II, Type III, Type IV, and Type V distribution.

Convex Glass Lens

7 Optional Convex Polycarbonate Lens:

Cat. No.: **CP**

Clear convex Polycarbonate Lens replaces standard glass lens.

Convex Polycarbonate Lens

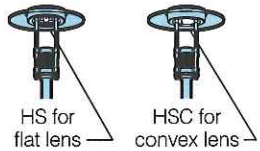
8 Optional Houseside Shield:

Cat. No.: **HS**

Not for use with Type V (horizontal lamp) or symmetric (vertical lamp) light distributions.

Cat. No.: **HSC**

For use with all fixtures with convex glass or polycarbonate lenses. Not for use with Type V or symmetric light distributions.



HS for flat lens

HSC for convex lens

9 Optional Black Ballast Cover:

For Full Cutoff Applications.

Cat. No.: **BBC**

Replaces reflective white ballast cover with black ballast cover. For use in conjunction with black or dark bronze fixture finish and horizontal lamp optics utilizing a flat lens only. Eliminates under-hood illumination.

10 Optional Fusing:

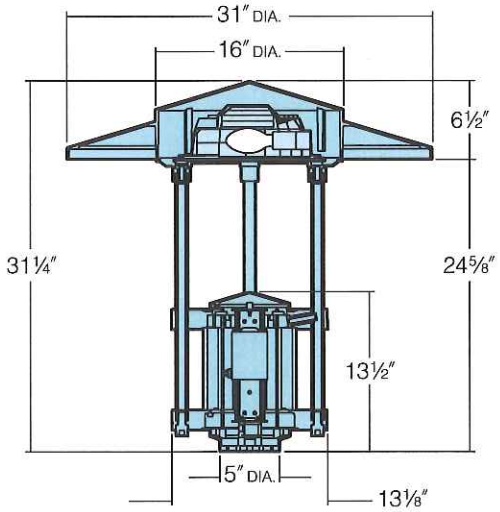
Line Volts:	120V	208V	240V	277V	347V	480V
Cat. No.:	**SF**	**DF**	**DF**	**SF**	**SF**	**DF**

Luminaire Specifications

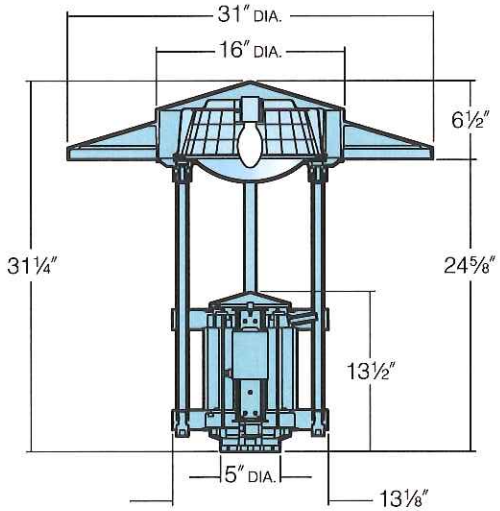
BNS1

Dimensions

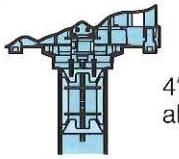
Horizontal Lamp
70 to 175 watt
Medium Base Lamps



Vertical Lamp
70 to 200 watt
Medium Base Lamps

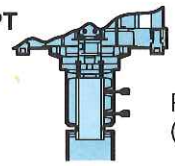


FM



4″ O.D. extruded aluminum pole

PT



Pole with 2″ pipe-size tenon (2⅜″ O.D. x 4½″ min. length)

Hood and Lens Frame: Die-cast, low copper (<0.6% Cu) aluminum hood and lens frame with stainless steel hinge. The hood is opened with a tool-less latch made of die-cast aluminum and stainless steel brackets. The hood is held open for relamping with a stainless steel wire self-locking stop arm. The 3⁄16″ thick clear flat or convex tempered glass lens seals against the reflector flange by a one-piece molded silicone gasket, to produce a fully sealed optical chamber. The underside of the hood is always painted white.

Reflector Module: Specular Alzak® optical segments are rigidly mounted within an aluminum enclosure (die-cast for horizontal, spun for vertical) which attach to the hood as a one-piece module with four captive screws. The 4KV, medium base socket is factory prewired with a high temperature quick-disconnect plug. The wires pass through a silicone gasket to maintain sealed optical chamber integrity.

Ballast Chamber: Die-cast, low copper (<0.6% Cu) aluminum flanges compress a ribbed extruded aluminum chamber. The die-cast aluminum cover is held with two captive stainless steel screws and a retaining wire is provided to secure the cover during installation or servicing. The four heavy wall extruded support rods are mechanically fastened to the lens frame with stainless steel fasteners. The support rods are held in position through die-cast arms and mechanically fastened at the bottom with a custom aluminum bolt. The electrical wiring is channeled through a support rod with an aluminum bushing. The die-cast cover is always painted reflective white. (Optional Black Ballast Cover).

Electrical Module: All electrical components are UL and CSA recognized mounted on a single bracket and factory prewired to a main power disconnect plug. The power quick-disconnect plugs are glass-filled thermoplastic, self aligning, and rated for 10,000 matings. The male portion of the plug is mounted to the ballast bracket and the female portion is mounted to the bottom die-cast flange section. Wires are supplied to reach the pole hand hole. Power to the ballast disconnects when the bracket is pulled out. All ballasts are high power factor with starting temperatures of -40°F for HPS and -20°F for MH lamp modes.

Finish: Super TGIC thermoset polyester powder coat paint, 2.5 mil nominal thickness, applied over a Titanated Zirconium conversion coating; 2500 hour salt spray test endurance rating. Standard colors are Black, Dark Bronze, Light Gray, Platinum Silver, or White. Custom colors are available and subject to additional charges, minimum quantities and longer lead times. Consult representative.

CAUTION: Fixtures must be grounded in accordance with national, state, and/or local codes. Failure to do so may result in serious personal injury.

Listings and Ratings	
UL cUL 1598	25C Ambient
IP66 Rated	ISO 9001:2000

Pole Mounting

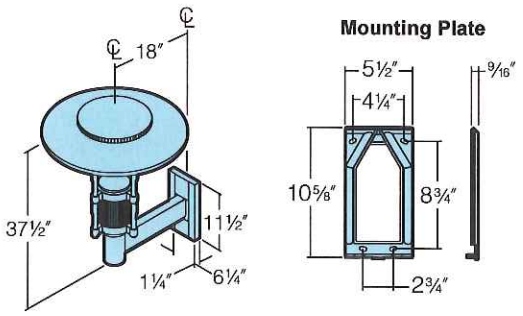
FM - Flush Mounting by means of an expansion device activated by a single bolt within the ballast compartment. Pole must have a plain-cut top. Standard pole size is 4″ O.D. (Other pole adapter sizes available; contact Kim representative).

PT - Pole Tenon mounting by means of a cast aluminum adapter containing four recessed ⅜″ stainless steel allen head set screws. Pole must have a 2″ pipe-size tenon (2⅜″ O.D. x 4½″ minimum length). Pole tenon must be field drilled at one set screw location to secure against fixture rotation.

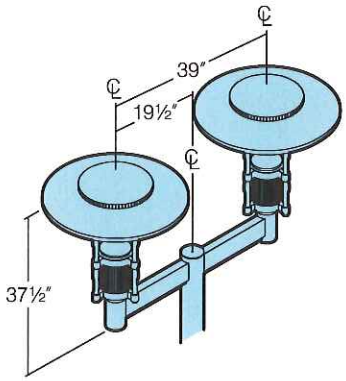
Option Specifications

See page 6 for complete ordering information

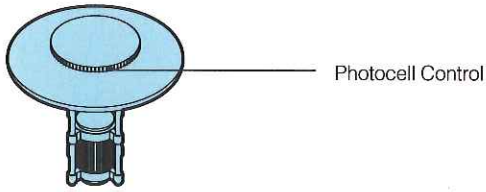
Wall Mounting: Extruded aluminum arm is factory assembled, with internal concealed draw bolts, to an extruded aluminum fixture support riser and a cast aluminum wall cover plate. A cast aluminum wall mounting plate pre-attaches to wall with bolts (by others). Fixture riser has a cast aluminum bottom cap. Wall cover plate has a removable cast aluminum cover for field splice access. Complete arm assembly can be mounted before field splices are made. All components are mechanically attached with no visible welds or fasteners. All wall components are finished to match fixture.



Twin Mounting: Two extruded aluminum arms are supplied with internal concealed draw bolts for attachment to Kim 4″ and 5″ O.D. poles with predrilled mounting holes. Arms are 180° apart, supplied with an internal pole reinforcing plate with wire strain relief and an extruded aluminum riser for mounting FM (Flush Mount) fixtures only. A cast aluminum pole cap and matching riser cap are included, and all components are mechanically fastened to eliminate welds and visible fasteners. All components are finished to match fixture.



Photocell: Factory installed fully gasketed sensor mounted in the hood.

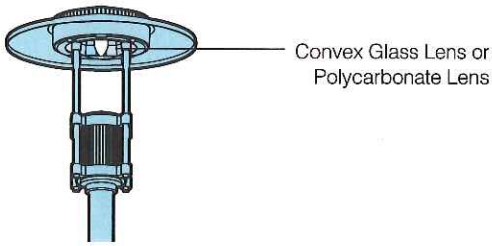


Convex Glass Lens: The 3⁄16″ thick clear convex tempered glass lens replaces the standard flat glass lens in horizontal lamp fixtures. Provides increased lens presence and provides a subtle improvement in uniformity where pole spacing is extreme.

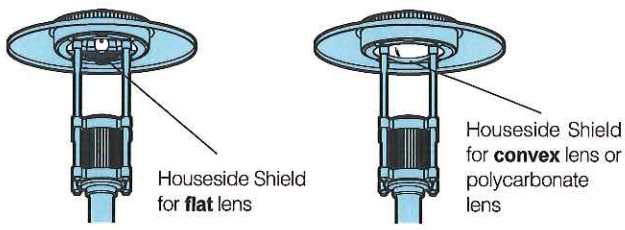
NOTE: Convex lens is standard on all Vertical Lamp Optical Systems.

Polycarbonate Lens: One piece vacuum formed, clear, UV stabilized convex polycarbonate, fully gasketed, replacing the standard tempered flat or convex glass lens.

CAUTION: Use only when vandalism is anticipated to be high. Useful life of lens is limited by UV discoloration from sunlight and metal halide lamps.



Houseside Shield: (Types II, III, IV - Asymmetric distributions only). The cutoff horizontal reflectors are available with stamped aluminum louvers that pass streetside light and block houseside light, and a blackened panel added to the reflector to reduce houseside reflections. The vertical reflectors and horizontal reflectors with the optional convex lens are available with a formed aluminum shield that passes streetside light and blocks houseside light, and a blackened panel added to the reflector to reduce houseside reflections.



Black Ballast Cover: (For Full Cutoff distributions). Replaces reflective white ballast cover with black ballast cover. For use in conjunction with black or dark bronze fixture finish and horizontal lamp optics utilizing a flat lens only. Eliminates indirect under-hood illumination and horizontal light distribution, to produce a full cutoff light distribution. For use with Black or Dark Bronze fixtures only.

Fusing: High temperature fuse holders factory installed. Fuse is included.

Proportion Guide

70 to 200 Watt / 10′ to 20′ Poles

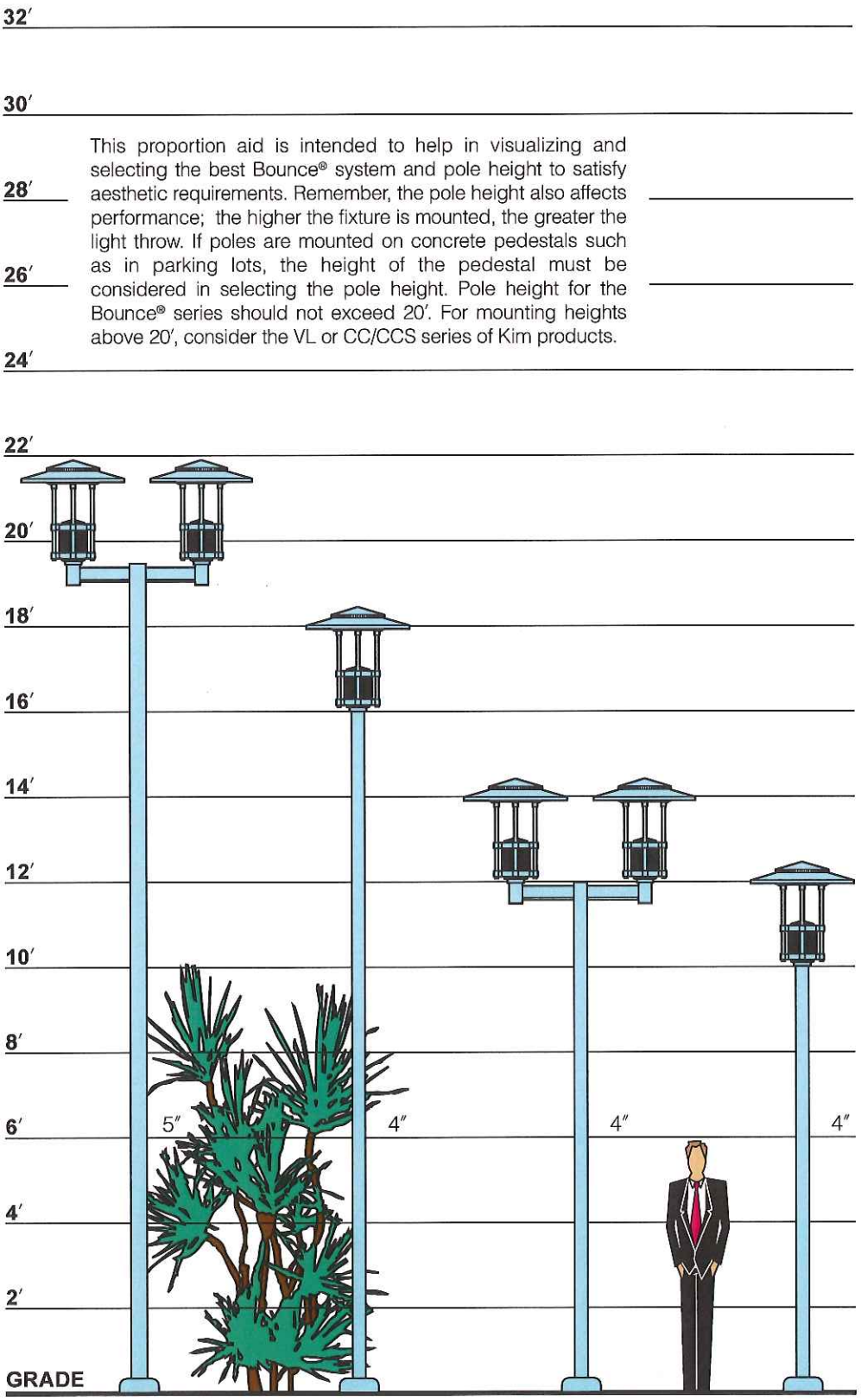
The role of a Pedestrian Scale Luminaire

A true pedestrian scale luminaire like the Bounce® can satisfy many diverse requirements. Where pole mounting heights are restricted by local code and aesthetics, the Bounce® series is ideal. It is specifically designed for broad illumination at low mounting heights, in such locations as parks or along small streets, where mature trees would block the light if taller poles were used. The smaller scale of one or two story structures may dictate the use of a pedestrian scale luminaire so lighting equipment does not overpower the architecture. These are just a few instances where Bounce® provides an exceptional solution.

Mounting Height

As a pedestrian scale luminaire, Bounce® is most commonly mounted on 8′ to 20′ poles. Within this height range, the fixture, coupled with the standard 4″ pole diameter, provides pleasing proportions. Wide throw light distributions also provide outstanding uniformity of illumination. This translates to maximum pole spacing, and the economy this brings in terms of initial cost and long term energy conservation.

This proportion aid is intended to help in visualizing and selecting the best Bounce® system and pole height to satisfy aesthetic requirements. Remember, the pole height also affects performance; the higher the fixture is mounted, the greater the light throw. If poles are mounted on concrete pedestals such as in parking lots, the height of the pedestal must be considered in selecting the pole height. Pole height for the Bounce® series should not exceed 20′. For mounting heights above 20′, consider the VL or CC/CCS series of Kim products.



Lamp and Electrical Guide

Lamp	Lamp Watts	ANSI Ballast Type	Life (Hours)	Initial Lumens[1]	Voltage	Operating Amps.	Open Circuit	Starting Amps.	Max. Amps.
HIGH PRESSURE SODIUM									
70HPS									
ED-17 Coated	70	S-62	24000+	5860	120	0.81	1.45	0.75	1.45
Medium Base					208	0.47	0.85	0.45	0.85
					240	0.40	0.75	0.37	0.75
					277	0.35	0.65	0.35	0.65
					347	0.30	0.55	0.30	0.55
					480[3]	0.21	0.36	0.21	0.36
100HPS					120	1.15	2.20	1.30	2.20
ED-17 Coated	100	S-54	24000+	8800	208	0.67	1.25	0.75	1.25
Medium Base					240	0.58	1.10	0.65	1.10
					277	0.50	0.85	0.60	0.85
					347	0.39	0.70	0.45	0.70
					480[3]	0.29	0.55	0.35	0.55
150HPS					120	1.65	2.80	2.00	2.80
ED-17 Coated	150	S-55	24000+	15000	208	0.95	1.60	1.15	1.60
Medium Base					240	0.83	1.40	1.00	1.40
					277	0.72	1.25	0.85	1.25
					347	0.56	0.92	0.52	0.92
					480[3]	0.42	0.70	0.50	0.70
METAL HALIDE									
175MH					120	1.80	1.80	1.30	1.80
ED-17 Coated	175	M-57	10000+	13300	208	1.04	1.04	0.75	1.04
Medium Base					240	0.90	0.90	0.65	0.90
					277	0.80	0.80	0.55	0.80
					347	0.65	0.70	0.50	0.70
					480[3]	0.45	0.45	0.35	0.45
PULSE START METAL HALIDE									
70PMH					120	0.80	1.90	0.55	1.90
ED-17 Coated	70	M-98	10000+	5700	208	0.46	1.00	0.30	1.00
Medium Base					240	0.40	0.90	0.25	0.90
					277	0.35	0.80	0.25	0.80
					347	0.28	0.65	0.20	0.65
					480[3]	0.23	0.50	0.26	0.50
100PMH					120	1.15	2.30	1.20	2.30
ED-17 Coated	100	M-90	12000+	8500	208	0.66	1.40	0.80	1.40
Medium Base					240	0.58	1.15	0.65	1.15
					277	0.50	1.00	0.60	1.00
					347	0.40	1.00	0.40	1.00
					480[3]	0.30	0.15	0.30	0.55
150PMH					120	1.60	3.65	1.75	3.65
ED-17 Coated	150	M-102	10000+	12000	208	1.00	2.10	1.30	2.10
Medium Base					240	0.80	1.80	0.85	1.80
					277	0.70	1.58	0.77	1.58
					347	0.55	1.25	0.65	1.25
					480[3]	0.42	0.81	0.45	0.81
175PMH[2]					120	1.80	1.80	0.95	1.80
ED-17 Coated	175	M-137	15000+	16600	208	1.05	1.05	0.55	1.05
Medium Base					240	0.90	0.90	0.45	0.90
					277	0.80	0.80	0.40	0.80
					347	0.63	0.60	0.32	0.63
					480[3]	0.46	0.44	0.13	0.46
200PMH[2]					120	2.00	2.00	0.75	2.00
ED-17 Coated	200	M-136	12000+	20000	208	1.20	1.20	0.40	1.20
Medium Base					240	1.00	1.00	0.35	1.00
					277	0.85	0.85	0.30	0.85
					347	0.70	0.65	0.25	0.70
					480[3]	0.50	0.50	0.18	0.50

[1] All initial lumen values and rated life shown may vary, due to operating orientation (vertical/horizontal), and from one manufacturer to another. Consult lamp manufacturer's data for exact lumen and life data.

[2] Indicated lamps are for use in vertical lamp luminaires only. Data provided is extracted from Venture Uni-Form product information.

[3] 480 volt with medium base lamp sockets may require approval by the local building code authority.

NOTE: For lamp/ballast information outside of the U.S.A. and Canada, please consult your local Kim representative.

WARNING: All fixtures must be grounded in accordance with local codes or the National Electrical Code. Failure to do so may result in serious personal injury.

Lamps by others.

Application Engineering Services

Applications Assistance

Kim Lighting utilizes the latest computer technology and software to provide specifiers with reliable evaluations of lighting system performance.

Kim can analyze a proposed luminaire layout or provide recommendations based on performance criteria.

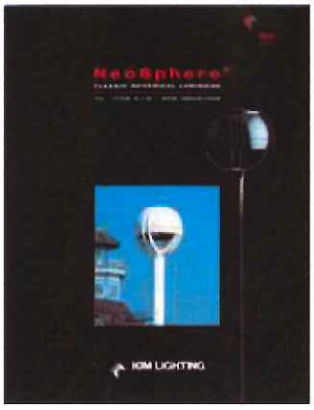
Hard copies of plans can be sent directly to the Kim Applications Department via fax, express or regular mail. Any .dwg or .dxf file can be transmitted via modem or email **(kim.apps@kimlighting.com)**, or placed on diskette, CD ROM or Zip disk, and forwarded to Kim Lighting c/o Kim Apps.

Photometric Files

Kim photometric files are available free in both electronic and hard copy format.

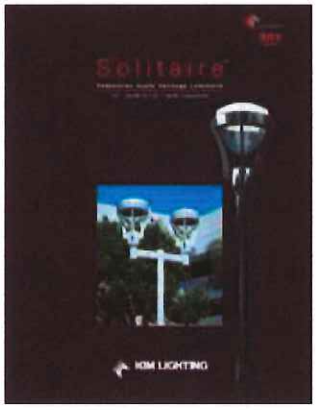
Electronic photometric files include .pdf file format pages for printing and .ies files for use in lighting calculation software. The complete .ies / .pdf library is available on CD ROM and on the internet at **www.kimlighting.com**.

Other Kim Pedestrian Zone Luminaires



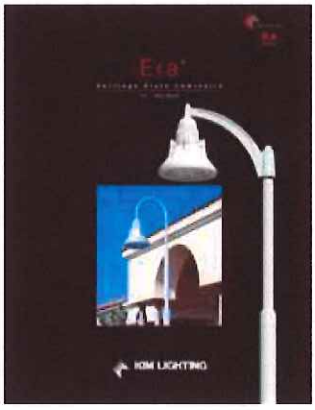
NeoSphere®

Spherical style with a full compliment of optical choices from cutoff to induction fluorescent.



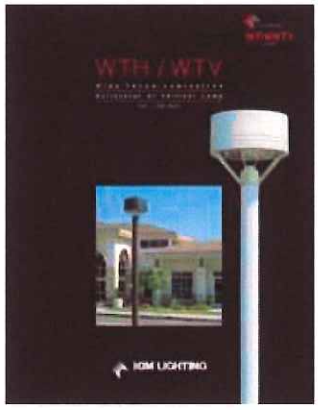
Solitaire™

Classic lantern style with modern optical design, from cutoff to induction fluorescent.



Era®

Heritage style with a wide range of mounting and optical choices.



WTH / WTV

Curvilinear style with reveal banding, provides simple and clean contemporary accent.

Bounce®

Pedestrian Scale Luminaire

Because of a continuing product improvement program, Kim Lighting reserves the right to change specifications without notice.

How may we serve you better?
Let us know by visiting our web site at:
www.kimlighting.com

Your input is valuable to us.

KIM LIGHTING

HUBBELL
Lighting, Inc.

ATT 17

NEW Hanover® PlankStone™

shown in #B92966 with Tudor® finish

Hanover® PlankStone™

Hanover's NEW PlankStone™ introduces a completely new look for modular paving. Sized at 2 7/8" x 23 1/2" with a 4" thickness, Hanover® PlankStone™ creates the look of traditional wood board decking. Pieces can be laid horizontally, vertically or in alternating directions. Installation designs are endless.

Hidden spacers allow for sand joint interlock. PlankStone™ is suggested for pedestrian use only. Hanover® PlankStone™ is stocked in Chocolate/Tan and Natural/Charcoal color blends with a Natural finish. Tudor® finish, as well as custom aggregates and color blending are available when quantities permit.

NEW PlankStone™ with Tudor® Finish
2 7/8" x 23 1/2" x 4"

shown in #B91841

NEW PlankStone™ with Natural Finish
2 7/8" x 23 1/2" x 4"

shown in Chocolate/Tan Blend

	thickness	pcs. per s.f.	s.f. per strap	pcs. per cube	s.f. per cube	s.f. per truck	lbs. per cube
2 7/8" x 23 1/2"	4"	2	-	100	50	1050	2145

Sizes shown are nominal. Products are made to fit metric modules.

ATT 16

Bayside Anchor Site Plan Application

Neighborhood Meeting June 4, 2014

Meeting Minutes

Development Team Attendees: Mark Adelson, Portland Housing Development Corp; Brooks More, Avesta Housing; Pat Carroll, Carroll Associates; Erin _____, Carroll Associates; Jesse Thompson, Kaplan Thompson Architects; Morgan Law, Kaplan Thompson Architects.

Five members of the public were in attendance.

Mark Adelson briefly introduced the project concept, location and the development team.

Pat Carroll described the project, location, current use of the land, general building dimensions, exterior improvements to sidewalks and walkways, handicapped parking, landscaping and exterior terrace. He also explained that parking is to being built for the project except of the handicapped spaces. Parking would be available on the current lots PHA throughout the Bayside campus.

Jesse Thompson described the building and units in more detail, including the mix of affordable and market rate units, the units sizes, and the location of entrances and common areas. He also explained the environmental and energy efficiency goals for the building.

Question from a PHA resident at Bayside Terrace: What will the rents be and is it similar to Public Housing. It was explained that the rents are affordable but not subsidized like Public Housing.

Comment from a PHA resident at Bayside Terrace: The development should include apartments with three bedrooms too.

Question from Smith Street resident: Will there be more opportunities for public comment? The response was yes, at the Planning Board Workshop and Public Hearing.

Comment from Smith Street resident: She doesn't love the color shown on the elevation, but she likes the features surrounding windows. Her tastes are more conservative.

Meeting Ended at 7:00 P.M.

ATT 18

CARROLL ASSOCIATES
LANDSCAPE ARCHITECTS

June 5, 2014

Mr. Rick Knowland
City of Portland Planning Authority
4th Floor, City Hall
389 Congress Street
Portland, ME 04101

RE: Bayside Anchor, 81 East Oxford Street

Dear Rick,

On behalf of the Portland Housing Authority and Portland Housing Development Corporation, we are pleased to submit this response to Staff comments relating to the Preliminary Level III Site Plan Application for Bayside Anchor. We appreciate the thorough review that staff has taken to date and look forward to working closely with the City as this project develops. We offer the following responses to comments submitted through today in email, letter, and voice conversations:

Comments by Rick Knowland in email received 05.30.2014

1. *Need a subdivision plan.*
   Response. A subdivision plan will be submitted by Owen Haskell as part of the final submission.

2. *The assumption is that the Head Start use is a conditional use like other kindergarten uses unless clarifying information is submitted to support applicant's position. This material will be reviewed by Marge Schmuckal, Zoning Administrator.*
   Response. As the name Bayside Anchor describes, this proposed building is envisioned to function as the community hub for the PHA Campus and East Bayside neighborhood. We believe Head Start is an important accessory use to the existing PHA campus development and as such is allowed under the current R-7 zoning.

   Head Start is a federally funded half-day morning early childhood education program that operates only during the school year. The programs serve 4 and 5 years olds from low income families in the neighborhood. The Head Start and Childcare programs have been serving PHA residents in its current location on PHA property, 58 Boyd Street, since the early 1990's. It fills a tremendous need and has become an integral part of PHA's effort to promote and assist families to succeed and achieve self-sufficiency. PHA families are the priority for the program's annual recruitment and registration. The large majority of participants are Portland Housing Authority residents, and it is anticipated this will remain the case upon completion of Bayside Anchor. Currently there are a total of 36 students enrolled in the program, split between morning and afternoon sessions.

   The current location for Head Start will be closed when the Bayside Anchor project is completed, and we are proposing to simply move this program from its existing location to the new Bayside Anchor building. The Opportunity Alliance (TOA) will lease approximately 1,244 square feet of space from the Bayside Anchor Apartments LP to house their Head Start and Childcare programs for this area.

Head Start eligibility is based on household income. 90% of enrollees must come from households with incomes at or below the federal poverty line. Currently, 100% of the children in the East Bayside Head Start location are from households with incomes below the federal poverty line. No fees are charged to families with children in the Head Start program.

During the summer, when the Head Start and Childcare programs are inactive, the space will be used for a variety of neighborhood services including the Summer Lunch Program operated by the Portland Housing Authority with funding from USDA and the Maine DHHS Summer Food Service Program, which provides free meals that meet Federal nutrition guidelines to all children 18 years old and under in areas with significant concentrations of low-income children.

In addition to the Head Start, Childcare, and Summer Lunch Program and activities, we anticipate this space will also be used for large community meetings and workshops, similar to how the existing facility is being utilized.

3. *Please provide a response to the railing/ramp being within the city right-of-way. Generally we try to avoid this situation within a right of way. Could the ramp be located on the side of the building? Of course making that change may result in removing the door along Boyd St. which may not be ideal in terms of having doorways on streets. Could someone discuss this issue?*
Response. We have proposed this solution in an effort to provide accessible route into the Head Start facility. The elevation of this part of the building is approximately 18" higher than the sidewalk grade along Boyd Street, and the grade drops moving west along the street. We are proposing widening the sidewalk in this location to maintain a 7 foot minimum circulation path around the stair/ ramp area. We think this solution creates a strong presence on the street, provides a safe pedestrian zone for residents and Head Start students/ parents, and adds life and character to this important side of the building. Please note that an accessible ramp/ sloped walk access to the Head Start is proposed along the west side of the building, but we feel the Boyd Street entrance needs to also be accessible.

4. *TDM stops at page 7. Is that it?*
Response. An oversight on the scanned copy. The corrected report was submitted to your attention earlier today.

5. *Fiber cement paneling. Please submit a spec on this material as well as a sample.*
Response. The use of fiber cement siding is prevalent throughout the construction industry, it provides a strong, long wearing surface that can hold paint for 15-25 years. All siding materials will be installed over a ventilated rain screen to allow proper drying of materials and increased durability of the building enclosure . A cut sheet on the proposed product is attached to this letter, and we intend to submit samples of the proposed material for review at the Workshop.

6. *I'm not sure if you need a waiver for parking. Have you identified specific off-site spaces for Bayside Anchor residents?*
Response. We have identified specific off-site spaces for the two handicap spaces for the project on the lot directly across Oxford Street from the building entrance. Other tenant parking spaces are proposed to be offered within the existing pool of parking associated with the adjacent PHA neighborhoods of Kennedy Park, Bayside Terrace, and Bayside East. We have submitted a Transportation Demand Management Plan for the project that identifies methods

and goals of reducing demand for parking by residents, and will be actively monitoring and reporting parking activities for the PHA campus back to the City. We feel this approach utilizes the existing inventory of off-street parking, reduces the need to construct new impervious areas, and through active management will be able to adjust the TDM plan over time if necessary.

In addition to the off street parking management, the Applicant would also consider management of on-street parking on Oxford and Boyd Streets to provide short term drop-off, loading/ unloading, and dedicated space for the neighborhood police vehicle.

7. *Is the Parking Management Plan and Campus Transportation Plan the same thing?*
Response. Yes, this will be corrected in the final submission.

8. *Dimensions of sidewalk and esplanade should be shown.*
Response. These dimensions are shown on Sheet L-1. The sidewalk along Oxford Street varies from 6'-4" to 8'-4, the sidewalk along Boyd Street is 6'-0", flaring out to 12'-0" at the building and intersection with Oxford Street. The esplanade is 5'-0" wide typical.

We are also in receipt of a memo from David Senus dated May 30, 2014 regarding site drainage, utilities, and other items. We offer the following comments:

1) *The application is preliminary. As such, we anticipate that additional documents will be submitted with the final application, including details, confirmation of capacity to serve the development from utilities, stormwater design calculations, and a Construction Management Plan. The Applicant should note that all work proposed within the City Right-of-Way should comply with the City of Portland Technical Manual. Woodard & Curran will perform a review of the Final Application upon receipt of those documents.***Response**. We agree with this observation and will insure the final plan submittal shall include this information as required.
2) *In accordance with Section 5 of the City of Portland Technical Manual, a Level III Site Plan project is required to submit a stormwater management plan pursuant to the regulations of Maine DEP Chapter 500 Stormwater Management Rules, including conformance with the Basic, General, and Flooding Standards. We offer the following comments:*
   a) *Basic Standards: The Applicant should provide a plan, notes, and details to address erosion and sediment control requirements, inspection and maintenance requirements, and good housekeeping practices in general accordance with Appendix A, B, & C of Maine DEP Chapter 500.* **Response**. We agree with this observation and will insure the final plan submittal shall include this information as required.

   b) *General Standards: The project will result in a net increase in impervious area of approximately 6,235 square feet. As such, the project is required to include stormwater management features for stormwater quality control. The Applicant is proposing to treat one inch of rainfall from the site's new impervious area utilizing the Focal Point bio-filtration system. The Applicant has noted that the proposed system will be sized and designed in accordance with Chapter 7.5 of Volume III of the Maine DEP Stormwater BMP Manual. As part of the final submission package, the Applicant should provide additional information and calculations demonstrating that the proposed treatment unit will be adequately sized and will provide sufficient treatment, in accordance with the General Standards.* **Response**. We agree with this observation and will insure the final plan submittal shall include this information as required.

c) *Flooding Standard: The project will result in a net increase in impervious area of approximately 6,235 square feet. As such, the project is required to include specific stormwater management features to control the rate of stormwater runoff from the site. The Applicant is proposing to provide detention via an R-Tank system. The Applicant has noted that, although flow rates will be decreased, the volume of water discharged to the downstream basin area may increase, and additional information on the results of this scenario will be provided in the final site plan application. The Applicant is also proposing to disconnect the existing stormdrain that currently discharges to the combined sewer, but requests the ability to reconnect should unanticipated future conditions require the use of this drain. As part of the final submission package, the Applicant should provide adequate documentation, such as a HydroCAD model, demonstrating that stormwater runoff from the proposed site will not exceed the peak runoff rates from the existing site and that the infiltration area will have adequate capacity to infiltrate the design storm events without impacting adjacent infrastructure. If in the future the Applicant determines that the system must be reconnected to the City's combined sewer system, the Applicant will be required to receive approval by Planning and the Department of Public Services for the change. General Standards: The project will result in a net increase in impervious area of approximately 6,235 square feet. As such, the project is required to include stormwater management features for stormwater quality control. The Applicant is proposing to treat one inch of rainfall from the site's new impervious area utilizing the Focal Point bio-filtration system. The Applicant has noted that the proposed system will be sized and designed in accordance with Chapter 7.5 of Volume III of the Maine DEP Stormwater BMP Manual. As part of the final submission package, the Applicant should provide additional information and calculations demonstrating that the proposed treatment unit will be adequately sized and will provide sufficient treatment, in accordance with the General Standards.* **Response**. We agree with this observation and will insure the final plan submittal shall include this information as required.

3) *The Applicant "propose(s) to disconnect the existing storm drain that discharges to the combined sewer and outlet stormwater runoff to the surface only", relying on infiltration of stormwater on an area of adjacent property under common ownership. The Applicant states "It should be noted that, although flow rates will be decreased, the volume of water discharged to the downstream basin area may increase. We will provide an opinion on this in the final site plan application". The Applicant's approach to stormwater management is keeping with the City's interests and design standards for the management of stormwater on sites; however, as indicated by the Applicant, additional engineering data, calculations and information will need to be presented to ensure that the approach will provide for a functional system. As part of the additional information, the Applicant should perform a test pit and document soil type, presence of groundwater, and soil infiltration rates in the infiltration area. General Standards: The project will result in a net increase in impervious area of approximately 6,235 square feet. As such, the project is required to include stormwater management features for stormwater quality control. The Applicant is proposing to treat one inch of rainfall from the site's new impervious area utilizing the Focal Point bio-filtration system. The Applicant has noted that the proposed system will be sized and designed in accordance with Chapter 7.5 of Volume III of the Maine DEP Stormwater BMP Manual. As part of the final submission package, the Applicant should provide additional information and calculations demonstrating that the proposed treatment unit will be adequately sized and will provide sufficient treatment, in accordance with the General Standards.* **Response**. We agree with this observation and will insure the final plan submittal shall include this information as required.

4) *The Applicant requests guidance on how their proposed stormwater management approach may affect a future (possible) stormwater service charge that is being considered by the City. The City is considering a service charge program that includes credit reductions to the service charge for treatment and/or detention of stormwater on a site. The program has not been finalized; however, compliance with City's stormwater management standards is anticipated to result in certain credit reductions in the service fee.* **Response:** We anticipate working closely with Public Services on this issue as we move through the review and approval phase of the project.

5) *The Applicant should provide additional design information and details for the stormwater features as part of the final application.* **Response**. We agree with this observation and will insure the final plan submittal shall include this information as required.

6) *The Plans should depict the routing of the existing drainage system on the site and should show how the existing storm drain pipe will be demolished and plugged or capped at the main.* **Response**. We agree with this observation and will insure the final plan submittal shall include this information as required.

7) *The Applicant should provide a Stormwater Management Plan, which should include a stormwater inspection and maintenance plan developed in accordance with and in reference to MaineDEP Chapter 500 guidelines and Chapter 32 of the City of Portland Code of Ordinances.* **Response**. We agree with this observation and will insure the final plan submittal shall include this information as required.

8) *Final plans must be stamped by a professional engineer (Section 14-527, sub-section (e) of the City of Portland Land Use Ordinance).* **Response**. We agree with this observation and will insure the final plan submittal shall include this information as required.

We look forward to working with you, Planning Department staff, and the Planning Board in the review of this project. Please feel free to contact me to discuss any questions or concerns you may have regarding the attached application materials.

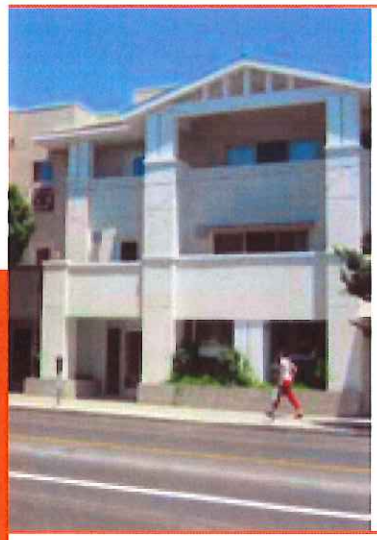
Sincerely,
CARROLL ASSOCIATES

Patrick J. Carroll
Principal

Enc.

Cc: Mark Adelson, PHA
Brooks More, Avesta Housing
Jesse Thompson, KTA
John Mahoney, Ransom Consulting

ATT 19



JamesHardie Commercial

HardiePanel®

Version 1.1
Effective September 2013

Visit JamesHardieCommercial.com for most recent version

HardiePanel® Vertical Siding Technical Guide

Technical Services:
1-800-942-7343

IMPORTANT: This Guide is subject to updates, check for latest version. Failure to install and finish this product in accordance with applicable building codes and James Hardie's written application instructions may lead to personal injury, affect system performance, violate local building codes, and void the product only warranty. Before installation, confirm that you are using the correct HardieZone® product. To determine which HardieZone® applies to your location, visit www.hardiezone.com or call 1-866-942-7343 (866 9-HARDIE). For warranty services call 866-375-8603.

Traditional Applications
For Multifamily and Light Commercial Construction

Contents

1 | INTRODUCTION

The extensive range of products offered by James Hardie provides the freedom, aesthetics and affordability you need to create a distinct look for apartments, condos, senior living and commercial real estate.

This document is a guide only. It is intended for use by architects, and general contractors who may be involved with the design and installation of HardiePanel vertical siding to create traditional looks in Multifamily and Light Commercial Construction. This document must be read in conjunction with the current multi-family / commercial installation requirements.

1.1 SCOPE

The material contained herein is aimed to provide guidance and technical specification for the use of HardiePanel® vertical siding in traditional solutions/applications for light commercial and multifamily construction. The most important change involves the requirement of HardiePanel® to be installed in a rainscreen application.

1.2 APPLICATION

HardiePanel vertical siding is a panel product that accommodates for traditional design styles. HardiePanel vertical siding offers versatile and durable design options for architects and builders. This product is ideal for achieving a board and batten look or other traditional styles. When used in multifamily or light commercial applications, HardiePanel vertical siding must be installed over 3/8" furring in a rainscreen application. This application is limited to six stories maximum.

James Hardie recognizes that style and applications are complementary and does not recommend ColorPlus® panel for every application. Applications with ColorPlus® panels that require touch-up to cover fasteners are not recommended. Primed panels should be used in such applications (refer to section 4.1). HardiePanel siding may not be used as trim. Contact technical support if your design involves curved or pitched wall designs. Refer to product installation instructions for further details at www.jameshardiecommercial.com.

1.3 RESPONSIBILITY

While care has been taken to provide the contained specifications, details, and other material content, we cannot incorporate every design iteration for intended application. It is the responsibility of the licensed architect, designer, specifier or builder to ensure that the construction details are suitable for the project's intended application. The responsible party shall also identify moisture related risks associated with any particular building design. The wall design and construction must effectively manage moisture. Properly designed rainscreens should incorporate wall system features to manage water, as regional climatic needs dictate.

The responsible parties shall ensure that the product meets aesthetic requirements before installation; and that the application suits the product intent for assemblies and in accordance with local building codes. Mockup walls / constructions are recommended. James Hardie assumes no responsibility for rectifying obvious aesthetic surface variations subsequent to installation.

1.4 WORK SAFETY

James Hardie embraces safe working practices and believes that safety should be of paramount importance. We remain committed to jobsite safety and recommend safe use of our products.

James Hardie products contain sand, a source of respirable crystalline silica, which is considered by some international authorities to be an occupational source leading to health impairment, namely fibrosis. Some studies suggest smoking may increase the risks. We promote and encourage the use of protective equipment proven to limit the amount of silica dust exposure.

Additionally, work in areas with ample ventilation. Minimize dust when cutting, position cutting station so that wind will blow dust away from users and others in the area. When cutting, sanding, rebating or drilling avoid breathing dust. Wear properly fitted dust mask or respirator. Make others in the immediate area aware of the risks and encourage use of dust masks or respirators. Use HardieBlade® Saw Blade and dust reducing circular saws attached to a HEPA vacuum.

1 | INTRODUCTION

1.5 SUSTAINABILITY

James Hardie believes sustainable building and construction practices are important and can be addressed in the following ways: raw materials, manufacturing, products design interface, and communities.

James Hardie is a longstanding industry innovator and prides itself on product development, building science, and innovative manufacturing. James Hardie products are made from natural and sustainable raw materials of portland cement, ground sand, cellulose fibers, and small amounts of additives as required for product properties. We have a high selection standard for our raw materials, and 75% of raw materials are locally sourced. We also embrace practices of fuel conservation and efficiency in manufacturing and shipping.

James Hardie factories worldwide continue to implement the principles in compliance with our sustainability policy. Our Illinois and Virginia manufacturing facilities are ISO 14001 certified for Environmental Management Systems.

Our technology advancements include products that are Engineered for Climate®. Our ColorPlus® Technology offers a durable finish that minimizes Volatile Organic Compounds (VOC) on the job sites.

We recognize that informed product decisions have to be made in order to create high performance structures that deliver on their sustainability obligation. James Hardie products are easy to incorporate into practical building systems – they are durable and low maintenance. While products alone do not provide LEED points, under USGBC LEED program, James Hardie projects may contribute to LEED NC points MR 5, MR 2.2c for homes, (regional materials) and MR 4, MR 2.2b for homes, (recycled content).

2 | PRODUCT INFORMATION

2.1 PRODUCT SELECTION

James Hardie offers a full range of products that meet a wide variety of design needs. All of our products are engineered for climate. HZ5® products are engineered for freezing wet climates, and HZ10® products are engineered for humid and hot climates. James Hardie gives you the ability to get the right siding for your climate. To find which product zone your project is located in visit: www.hardiezone.com

All James Hardie products are primed and ready to paint. For the ultimate in performance, our products are also available with ColorPlus® Technology. ColorPlus technology is a proprietary process for applying baked-on finish to maximize durability and resistance to the elements. Our color palette has been selected to meet regional demands with more than 20 color offerings.

2.2 PRODUCT INFORMATION

HardiePanel vertical siding is a great option for a smooth and traditional panelized look.

HardiePanel vertical siding

Surface textures include:

• Smooth • Select Sierra 8 • Cedarmill© • Stucco

Thickness: 5/16" (7.9mm)
Widths: 48" (1.22 m)
Length: 96" (2.44 m), 108" (2.74m), 120" (3.0 m)
Weight: 2.3 lbs./sq.ft.
Available in primed or with ColorPlus Technology

In addition to HardiePanel vertical siding, James Hardie offers a full range of products to suit most styles:

- HardieWrap® Weather Barrier
- Artisan® Lap Siding
- Artisan® Accent Trim
- HardiePlank® Lap Siding
- HardieShingle® Siding
- HardieTrim® Boards

For a modern panel look, please refer to www.JamesHardieCommerical.com.

2.3 HARDIEPANEL TECHNICAL DATA

James Hardie exterior cladding complies with physical properties and supplementary requirements described in ASTM C1186. A partial property list follows.

- Dimensional Tolerance: length, width.....0.5%
- Dimensional Tolerance: thickness.....±1.6 mm
- Flexural Strength: wet condition.....7 MPa
- Flexural Strength: equilibrium condition.....10 MPa
- Flexural Strength: freeze/thaw, wet retention.....>80%
- Flexural Strength: warm water, wet retention.....>85%
- Moisture Movement*:....0.05% (A direction), 0.06% (B direction)
- Average Density.....1.3 g/cm³
- Water Tightness.....Pass
- Warm Water Resistance.....Pass
- Heat/Rain Resistance.....Pass
- Surface Burning Characteristics *(ASTM E84)*.....FSI=0, SDI<5
- Thermal Conductivity (ASTM C177).....2.07 BTU/hr-ft2-°F
- Coefficient of Thermal Expansion (Longitudinal, ASTM E228).....6.70x10-6 in/in°F
- Coefficient of Thermal Expansion (Transverse, ASTM E228).....6.65x10-6 in/in°F

2.4 ACCESSORIES

There are a number of manufacturers for fasteners, furring, caulking, and paint. James Hardie does not specify any one brand of product for use in conjunction with HardiePanel vertical siding. It is the architect's responsibility to select components based on technical information and warranties as supplied by third party manufacturers.

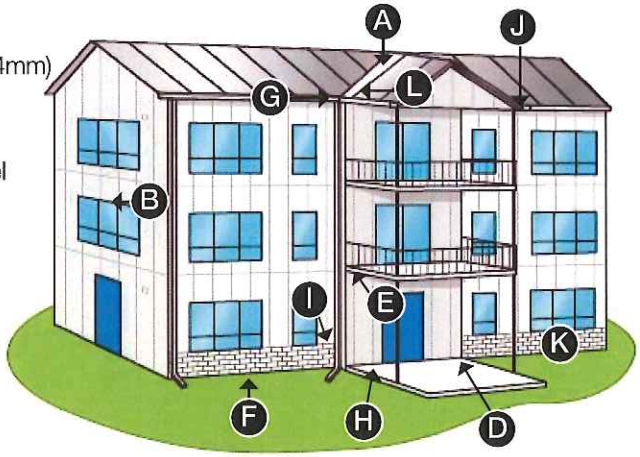
** RH 30%-90%*

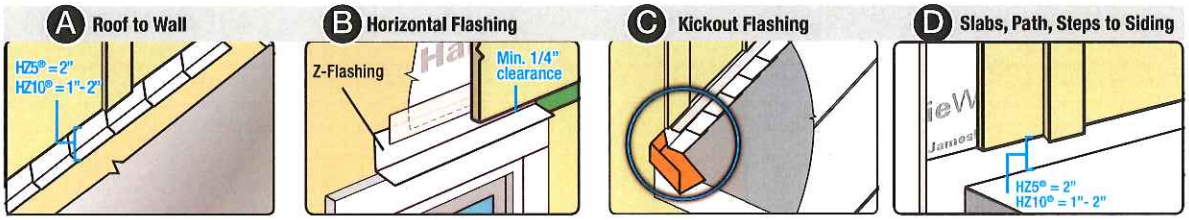
3 | GENERAL REQUIREMENTS

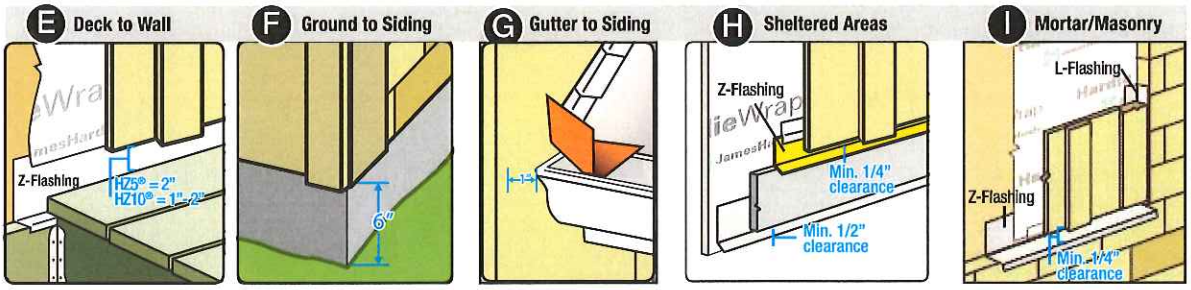
3.1 CLEARANCES

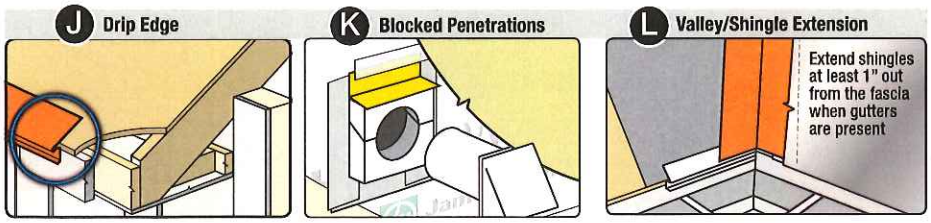
Siding and trim must be installed in compliance with local building code requirements for clearances between the bottom edge of the siding and the adjacent finished grade. All clearance requirements must be followed when installing James Hardie siding products.

- James Hardie requires a minimum 6" (152mm) clearance to finished grade on the exterior of the building (8" or 203mm in Canada).
- Install kick out flashing at roof-wall junctions.
- Ensure gutters have end caps and must have a minimum 1" (25.4mm) clearance between end cap and siding or trim.
- Every horizontal break surface must be flashed.
- A minimum ¼" (6.4mm) clearance is required between the panel factory edge and the horizontal flashing.
- Do not caulk the gap between flashing and product.
- James Hardie requires maintaining a 2" (50 mm) clearance between product and horizontal surfaces other than at grade.









3 | GENERAL REQUIREMENTS

3.2 FRAMING REQUIREMENTS

James Hardie siding products can be installed onto wood or steel framing. Stud spacing is to be a maximum of 24" (600m) on center. Additional framing may be required at key locations such as joints or abutments. Irregularities in framing and sheathing can transfer through to the finished application.

James Hardie has solutions for the following frame types:

- Wood
- Structural steel construction must be min 20 ga.
- Over concrete masonry wall (ASTM C90)

3.3 RAINSCREEN REQUIREMENTS

When used in multifamily or light commercial applications, HardiePanel vertical siding must be installed over furring in a rainscreen application. Furring shall be installed between the cladding and a code-approved water-resistive barrier. Furring shall be a minimum 3/8" thick and a minimum 1-1/2" wide.

It is the responsibility of the designer, engineer, or builder to:

- Adhere to all the installation requirements listed in the relevant product installation instructions.
- Provide adequate details for water management.
- Understand both the limitations of each system component and the interaction between system components.
- Account for both interior and exterior moisture control.
- Identify all moisture-related risks associated with the building design.

20-16 gauge must be used when using light gauge steel z-girts as rainscreen furring. Rainscreen furring must be designed to be structurally fit for purpose. At thicker gauge steel, 16 ga., self-drilling wing tipped screws work best.

Alkaline Copper Quaternary (ACQ) treated lumber may pose a corrosive risk affecting aluminum trim components and metal trim or accessories, such as screws. Wood preservative manufacturers generally advise that aluminum, galvalume, or uncoated galvanized metals should not be used in direct contact with wood containing ACQ or similar water based preservatives. Metals should be separated from treated wood with a barrier or industrial coating. Check with treatment manufacturers for specific recommendations.

When using Treated Plywood or Treated Dimensional wood:
-BEST: MCS or MCQ treated wood
-BETTER: CA or ACQ treated wood
-GOOD: CA or ACQ treated wood, not to be used when 1 mile from coastal saltwater.

James Hardie does not recommend the use of drainage mats or drainage boards. These products can compress during the installation process, impairing drainage channels and causing a wavy appearance in the panel.

Bug (vermin) screens or cavity vent strips may be installed at rainscreen openings to deter insect infestations. Note, this may reduce ventilation capacity.

3 | GENERAL REQUIREMENTS

3.4 FASTENING REQUIREMENTS

Wood furring:
The wood furring thickness will be dependent on the details of the wall assembly, with a minimum thickness of 3/8". The fastener should be selected using ESR-1844 Table 4, "Maximum Wind Speeds for Exposure Category (mph)," according to the wind speed desired for the given stud spacing, building height, and exposure category. The fastener must be fully encompassed in wood with specific gravity equivalent to the reference wood stud specific gravity, as found in ESR-1844 Table 4.

The furring may count as all of the necessary penetration if:
- It is attached with its own fastener schedule to resist the wind load desired while holding the weight of the product, and
- It encompasses the full length of the fastener, and
- The furring specific gravity is equivalent to the reference wood stud specific gravity, as found in ESR-1844 Table 4.

The furring may count as part of the necessary penetration if:
- It is attached directly to other wood structural members, which encompasses the rest of the fastener, and
- The furring specific gravity is equivalent to the reference wood stud specific gravity, as found in ESR-1844 Table 4.

Steel furring:
The steel furring must be a minimum 20 gauge steel and must maintain a minimum 3/8" gap. The fastener should be selected using ESR-1844 Table 4, "Maximum Wind Speeds for Exposure Category (mph)," according to the wind speed desired for the given stud spacing, building height, and exposure category. If a nail or pin is used, it must penetrate the furring to a depth of 1/4". If a screw is used, it must penetrate the furring for three full threads.

Concrete Masonry Units (CMU):
Wood or steel furring must be used over CMU such that the furring transfers the wind loads and other necessary forces back to the structure.

Note: For description of attachment of furring over foam to structure consult with Foam Sheathing Coalition (FSC) in reference to fastener selection. See Tech Matters: Guide To Attaching Exterior Wall Coverings Through Foam Sheathing To Wood or Steel Wall Framing, 2011. (Table 1a: Siding minimum fastening requirements for direct cladding attachment over foam plastic sheathing to support cladding weight.)

General Fastening:
HardiePanel siding can be fastened by hand or pneumatically. All fasteners should be driven such that they are snug or flush with the panel surface. No fasteners should be countersunk or recessed with the intent of concealing the fasteners. James Hardie ColorPlus Touch-up is not intended to conceal fastener heads.

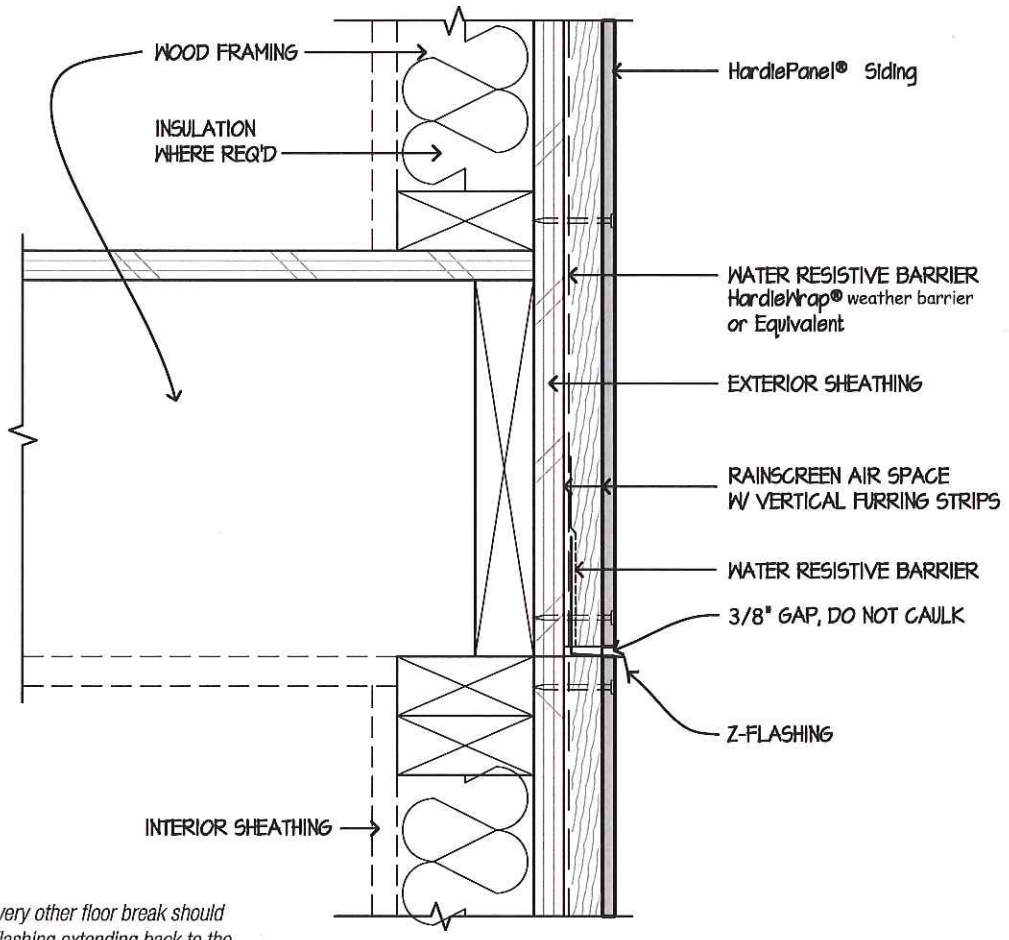
Corrosion-resistant fasteners must be used. The following are recommended:
- Galvanized, preferably hot-dipped in the case of nails
- Stainless steel, especially for installation near the ocean or other large bodies of water or in very humid climates

The following are not recommended:
- Electro-galvanized, since premature corrosion may occur

DO NOT USE:
- Clipped-head nails
- Staples
- Aluminum fasteners of any kind

James Hardie is not responsible for the corrosion resistance of fasteners.

Fastener type, size and spacing are determined in accordance with IBC/IRC requirements. Fastener specification for your project is dependent on the project design wind loads. Consult applicable product evaluation report or product listing for correct fastener spacing and fastener dimensions. The following are recommened: ESR-1844, TDI EC-23, Miami Dade County NOA 12-0218.11, State of Florida PA FL13223.



Note: every other floor break should have z-flashing extending back to the weather barrier.

0 2" 4"
SCALE: 3" = 1'-0"

HORIZONTAL VIEW - RAINSCREEN

DETAIL:		
PANEL 3.05	**HardiePanel® Siding Details** • Wood Framing with Wood Furring Strips • OSB or Plywood Sheathing • Shown with Siding Nails into Framing	JamesHardie

4 | PRINCIPLES FOR DESIGN

4.1 DESIGN OPTIONS

HardiePanel siding can be used to create a wide variety of traditional styles, especially when combined with HardieTrim board and battens.

Four textures are available, as outlined in section 2, and most products are available both primed and with ColorPlus technology. Applications that either cover fasteners or accentuate exposed fasteners as a design feature are recommended when installing HardiePanel with ColorPlus technology.

The following tables outline the recommended applications for both primed and ColorPlus panels. Not all designs will be suitable for every application.

Traditional styles that are ideally suited for HardiePanel vertical siding.

ColorPlus Products	Vertical Joints	Horizontal Joints	Fasteners
Stucco, Cedarmill, Smooth	Batten at joints and at stud centers to cover fasteners	Z-flashing with or without trim	As per ESR 1844
	Moderate contact	Z-Flashing	As per ESR 1844 exposed fastener only
	Batten or Trim	Z-Flashing with Trim	As per ESR 1844 exposed fastener only

Do not caulk joints between ColorPlus panels. Do not use Touch-up on fastener heads on ColorPlus panels.

Battened Panel

Primed Products (Field Painted)	Vertical Joints	Horizontal Joints	Fasteners
Stucco, Cedarmill, Smooth	Vertical batten typically 12-16" on center*	Z-flashing with or without trim	As per ESR 1844
	Moderate contact	Z-Flashing	As per ESR 1844
	Batten or Trim	Z-Flashing with Trim	As per ESR 1844
Sierra 8	Moderate contact	Z-Flashing	As per ESR 1844

Provide additional support for battens when not installed on stud locations.

Trimmed Joints

4.2 MOISTURE MANAGEMENT

Wall construction and design must effectively manage moisture, considering both the interior and exterior environments of the building. This is particularly important for buildings that have a high risk of wind-driven rain penetration or those that are artificially heated or cooled.

The EEBA states, "The fundamental principle of water management is to shed water by layering materials in such a way that water is directed downwards and outwards of the building or away from the building. The key to this fundamental principle is drainage." [1]

Furthermore, "all water that is intercepted by the second line of defense [described as the system behind the cladding] must be dissipated to the exterior by means of drainage or evaporation, or both. Drainage is the only transport process with sufficient capacity to dissipate free water quickly enough to prevent deterioration from starting. [...] In most other [not including masonry veneer] circumstances, a 10-mm-deep cavity will provide sufficient drainage while allowing for typical construction practices."[2]

Wall openings, penetrations, junctions, connections, window sills, heads, and jambs must incorporate appropriate flashing for water management. A weather resistant barrier shall be continuous, with all junctions and penetrations properly detailed to prevent water entry. The cladding layer, where attached over furring, must also be detailed to minimize water entry.

[1] *EEBA (Energy & Environmental Building Assocation™) Water Management Guide by Joseph W. Lstriburek, Ph.D., P.eng. June 2004.*
[2] *http://archive.nrc-cnrc.gc.ca/obj/irc/doc/ctu-n34_eng.pdf*

4 | PRINCIPLES FOR DESIGN

4.3 PENETRATIONS

All penetrations shall be treated to manage moisture. Backer rod and sealant or gasketed cover plates should be used where applicable. Electrical outlets are properly installed when flush with the surface of the cladding.

Blocking is required around penetrations in the building envelope, such as hose bibs or holes with a diameter of 1-1/2" (38mm) or greater. Cap flashing must be installed over the top of the trim block.

The point of contact between the substructure and structural or mechanical stand-offs, such as awnings or access ladders, must be treated as a penetration of the siding or trim. Where blocking requires structural support, such as stair railings, wood blocking is required.

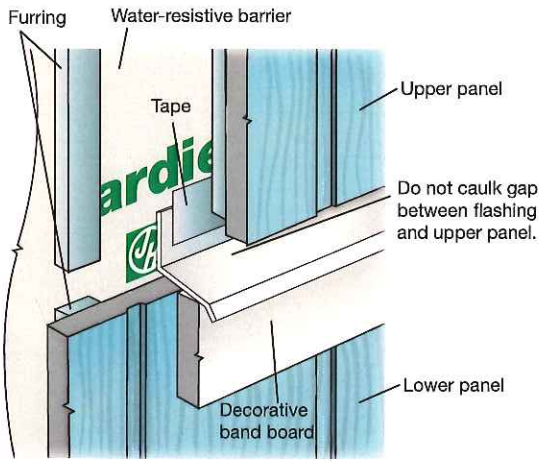
4.4 JOINT TREATMENT

Vertical joint treatment for panels shall be installed as follows:

- Moderate contact of the panels abutted together or
- Leave a 1/8" gap between panels and fill with caulk (for primed products only) or
- Cover joint with batten or trim board.

All horizontal joints must be flashed. If decorative band board is used, flashing shall extend over it.

Adding horizontal blocking between vertical furring members is not needed. If used, kerfed blocks are the accepted best practice for water management.



4.5 TRIM APPLICATIONS

All horizontal trim must have cap flashing. Trim is not intended for use as wall capping or rail caps. Refer to the HardieTrim® board installation instructions for details and trim requirements.

Horizontal joints for panels must be properly flashed to minimize water penetration. Treat joints using Z-flashing or flashed belly bands.

4.6 FLOOR TRANSITIONS & CONTROL JOINTS

Control joints should be considered in the building design such that the integrity of the cladding is maintained over time.

Panel may terminate anywhere between the top plate and bottom plate at a floor joist. All floor transitions must be flashed. A Z-flashing that extends back to the weather barrier must be provided at least at every other floor.

Do not bridge floors with siding or furring. Panels may terminate at top or bottom of a floor-break. Leave a minimum 3/8" (9.5mm) gap to accommodate anticipated structural movement. All floor transitions must be flashed with drainage flashing.

Vertical movement must be considered in the horizontal joint design.

Where the wall span is significant in length, the design professional should take into consideration the siding's coefficient of thermal expansion and moisture movement in their design.

Refer to technical data for computation.