

Alameda Aquatic Center

Planning Resubmittal 5

EXHIBITS



June 9, 2025

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EXHIBIT B
Alameda Aquatic Center Project Description

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ALAMEDA AQUATIC CENTER PROJECT DESCRIPTION

Background

The City of Alameda plans to build the Alameda Aquatic Center on the west side of Jean Sweeney Open Space Park located at the intersection of Wilma Chan and Atlantic Avenue. The aquatic center is expected to serve as the primary swim center for Alameda.

Proposed Project

The proposed aquatic center would occupy approximately 2.35 acres of undeveloped park land at Jean Sweeney Open Space Park.

The building to support the pool operations has a gross area of 5,740 SF.

The pool environment inside the enclosure fence totals approximately 25,000 SF. It will include two pools, (1) 7,448 SF 30m x 25yd Competition Pool and (1) 3,015 SF Activity Pool.

The project plans will include parking for 200 vehicles, including a surface lot for 71 parking spaces onsite and an arrangement with the adjacent Marina Village Business Park to provide 129 spaces for overflow parking.

The proposed project also includes the following components:

- 7 Electric vehicles charging stations
- Bike parking/storage for 112 bikes at the entrance plaza
- Windscreen fencing
- Perimeter security fence
- Enclosed mechanical room
- Locker rooms for both genders plus 2 gender neutral restrooms with showers
- Manager's office
- Multi-purpose room
- Snack bar
- Spectator seating
- Soil and ground water engineering solutions
- Breezeway entrance
- Fenced storage

Operation

The proposed facility would be open seven days a week, except on City holidays, the center is anticipated to have approximately 100,000 to 150,000 visitors a year. The aquatic center would be primarily used for practices, swim meets, and public swimming. For aquatic competitions, the center would be able to seat approximately 194 spectators. Proposed hours of operation are below.

Hours	Aquatic Center
Monday-Friday	5:30AM – 9:30PM
Saturday	7:00AM – 9:30PM
Sunday	7:00AM – 8:00PM

Visitation Rates

The proposed project would include regular programming of swim and recreation activities at the aquatic center.

General Plan and Zoning Designations

GP Designation: Public Park + Open Space www.alameda2040.org

Zoning: O, Open Space District [AMC 30-4.19](#)

The project is in the approved City of Alameda Strategic Plan.

Green Building Measures

The project proposes to incorporate the following green building measures:

- All electric domestic hot water and pool heating.
- Water efficient fixtures to reduce potable water use.
- Water efficient landscaping to reduce irrigation.
- Energy efficient building performance.
- Low Volatile Organic Compound (VOC) emitting building materials (i.e., adhesives, sealants, paints, coatings, carpet, and composite wood).
- Computer system to control lighting and temperature.

EXHIBIT C
Window Cut Sheets

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DESIGN AND PERFORMANCE VERSATILITY WITH UNMATCHED FABRICATION FLEXIBILITY

Photography: © Bob Perzel



TRIFAB® VERSAGLAZE® 450, 451 & 451T (THERMAL) FRAMING SYSTEMS & TRIFAB® 451UT (ULTRA THERMAL) FRAMING SYSTEM

Trifab® VersaGlaze® is built on the proven and successful Trifab® platform – with all the versatility its name implies. There are enough framing system choices, fabrication methods, design options and performance levels to please the most discerning building owner, architect and installer. The 4.5" depth Trifab® VersaGlaze® Framing System family is available with non-thermal, thermal and ultra-thermal performance levels. The ultra-thermal Trifab® 451UT Framing System, is designed for the most demanding thermal performance and employs actual Isolock® thermal break.

AESTHETICS

Trifab® VersaGlaze® Framing Systems offer designers a choice of front-, center-, back- or multi-plane glass applications. Structural silicone glazing (SSG) and weatherseal glazing options further expand designers' choice, allowing for a greater range of possibilities for specific project requirements and architectural styles. All systems have a 4-1/2" frame depth; Trifab® VersaGlaze® 450 has 1-3/4" sightlines, while Trifab® VersaGlaze® 451/451T and Trifab® 451UT have 2" sightlines.

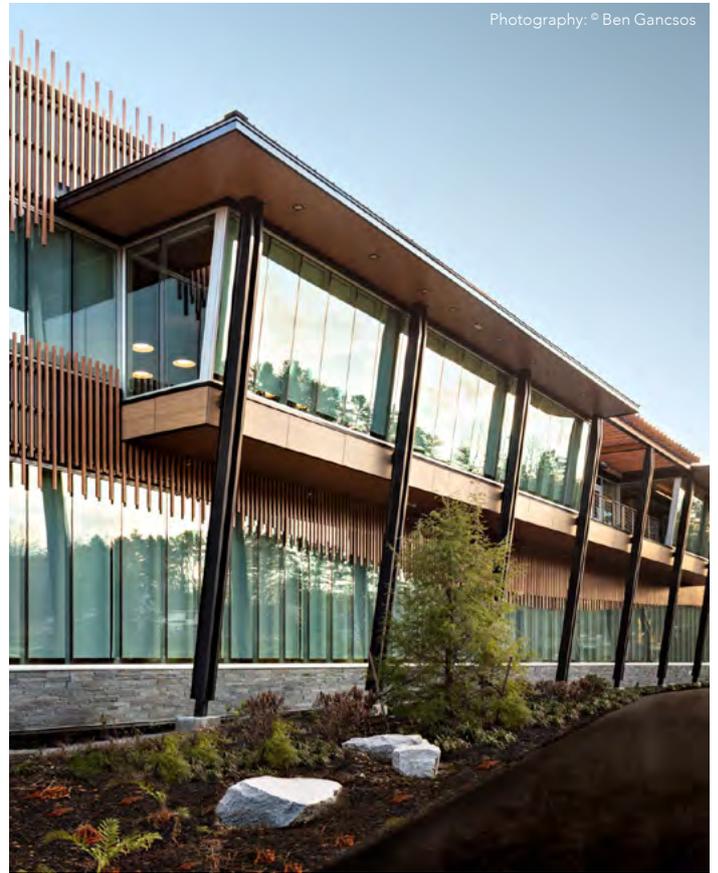
With seamless incorporation of Kawneer entrances or windows, including GLASSvent® visually frameless ventilators, Trifab® framing can be used on almost any project. These framing systems can also be packaged with Kawneer curtain walls and overhead glazing, thereby providing a full range of proven, and tested, quality products for the owner, architect and installer from a single-source supplier.

ECONOMY

Trifab® VersaGlaze® 450/451/451T/451UT Framing Systems offer a variety of fabrication choices to suit your project:

- **Screw Spline** – for economical continuous runs utilizing two-piece vertical members that provide the option to pre-assemble units for efficient handling and installation. (available for all Trifab systems)
- **Shear Block** – for punched openings or continuous runs using tubular verticals with shear blocks to connect horizontal members. (available for 450/451/451T systems)
- **Stick** – for fast, easy field fabrication. Continuous sill and head receptors are installed with horizontals connected to tubular verticals with shear blocks. (available for 450/451/451T systems)
- **Pre-glazed** – The combination of screw spline construction with pre-glazing in the shop accelerates installation and reduces field labor time while minimizing disruption to the surrounding area or existing tenants. Making it an exceptional choice for new or retrofit applications, particularly in urban areas or where space is limited. (available for 451/451T/451UT framing)

Photography: © Ben Gancsos



All systems can be flush glazed from either the inside or outside. The weatherseal option provides an alternative to SSG vertical mullions for Trifab® VersaGlaze® 450/451/451T. This ABS/ASA rigid polymer extrusion allows complete inside glazing and creates a flush glass appearance on the building exterior without the added labor of scaffolding or swing stages. Additionally, high-performance flashing options are engineered to eliminate perimeter sill fasteners and associated blind seals.

FOR THE FINISHING TOUCH

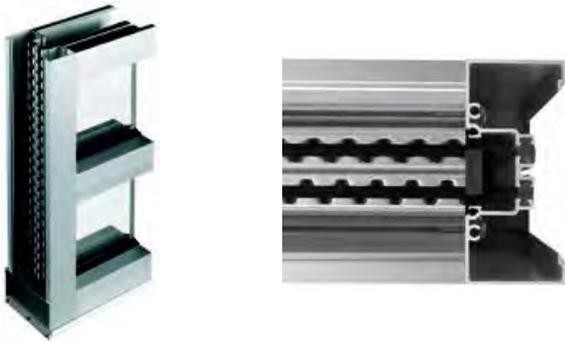
Architectural Class I anodized aluminum and painted finishes in fluoropolymer (AAMA 2605) and solvent-free powder coatings (AAMA 2604) offer a variety of color choices.

PERFORMANCE

Kawneer's Isolock® thermal break technology creates a composite section, prevents dry shrinkage and is available on Trifab® VersaGlaze® 451T. For even greater thermal performance, a dual Isolock® thermal break is used on Trifab® 451UT.

U-factor, CRF values and STC ratings for Trifab® framing systems vary depending upon the glass plane application. Project-specific U-factors can be determined for each individual project.

(See the Kawneer Architectural Manual or Kawneer.com for additional information.)



Trifab® 451UT uses a dual Isolock® thermal break (right) and features a new high performance sill design, which incorporates a screw-applied end dam (left), ensuring positive engagement and tight joints between the sill flashing and end dam.

PERFORMANCE TEST STANDARDS

Air Infiltration	ASTM E283
Water	AAMA 501, ASTM E331
Structural	ASTM E330
Thermal	AAMA 1503
Thermal Break	AAMA 505, AAMA TIR-A8
Acoustical	AAMA 1801, ASTM E1425

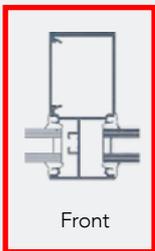
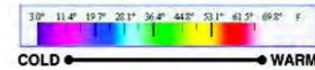
Thermal simulations showing temperature variations from exterior/cold side to interior/warm side.



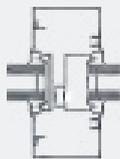
Trifab®
VersaGlaze® 451

Trifab® VersaGlaze®
451T

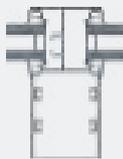
Trifab® 451UT



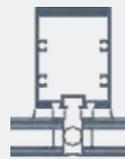
Front



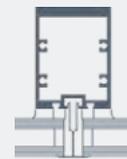
Center



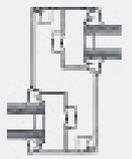
Back



SSG



Weatherseal



Multi-Plane

KAWNEER ANODIZED FINISHES

Kawneer gives you a wide variety of anodized finishes with attractive alternatives. The benefit of a durable, anodized finish is married to the beauty of some very dynamic and exciting colors.

At the start of every design, there's a choice of how you want to finish. Contact your Kawneer sales rep for the information on these and other finishes available from Kawneer.

	KAWNEER FINISH NO.	COLOR	ALUMINUM ASSOCIATION SPECIFICATION	OTHER COMMENTS
	#14	CLEAR	AA-M10C21A41	Architectural Class I (0.7 mils minimum)
	#17	CLEAR	AA-M10C21A31	Architectural Class II (0.4 mils minimum)
	#40	DARK BRONZE	AA-M10C21A44	Architectural Class I (0.7 mils minimum)
	#29	BLACK	AA-M10C21A44	Architectural Class I (0.7 mils minimum)

EXHIBIT D
Stormwater Requirements Checklist

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Stormwater Requirements Checklist

Municipal Regional Stormwater Permit (MRP 3.0)
Stormwater Controls for Development Projects

CITY OF ALAMEDA
PUBLIC WORKS DEPARTMENT
950 WEST MALL SQUARE, ROOM 110
ALAMEDA, CA 94501
510 747-7930

I. Applicability of C.3 and C.6 Stormwater Requirements

I.A. Enter Project Data (For "C.3 Regulated Projects," data will be reported in the municipality's stormwater Annual Report.)

I.A.1 Project Name: _____

I.A.2 Project Address (include cross street): _____

I.A.3 Project APN: _____ I.A.4 Project Watershed¹: _____

I.A.5 Applicant Name: _____ I.A.6 Date Submitted: _____

I.A.7 Applicant Address: _____

I.A.8 Applicant Phone: _____ I.A.9 Applicant Email Address: _____

I.A.10 Development type: (check all that apply)
 Residential Commercial Industrial Mixed-Use Streets, Roads, etc.
 'Redevelopment' as defined by MRP: creating, adding and/or replacing exterior existing impervious surface on a site where past development has occurred

I.A.11 Project Description²: (Also note any past or future phases of the project.)

I.A.12 Total Area of Site: _____ acres I.A.13 Slope on Site: _____ %

I.A.14 Total Area of land disturbed during construction (include clearing, grading, excavating and stockpile area: _____ acres.

I.B. Is the project a "C.3 Regulated Project" per MRP Provision C.3.b?

I.B.1 Enter the amount of impervious surface³ created and/or replaced by the project (if the total amount is 5,000 sq.ft. or more):

Table of Impervious and Pervious Surfaces

	a	b	c	d
Type of Impervious Surface	Pre-Project Impervious Surface (sq.ft.)	Existing Impervious Surface to be Replaced ⁵ (sq.ft.)	New Impervious Surface to be Created ⁵ (sq.ft.)	Post-project pervious surface (sq.ft.)
Roof area(s) – excluding any portion of the roof that is vegetated ("green roof")				N/A
Impervious ³ sidewalks, patios, paths, driveways				
Impervious ³ uncovered parking ⁴				
Streets (public)				
Streets (private)				
Totals:				
Area of Existing Impervious Surface to remain in place	N/A			
Total New Impervious Surface (sum of totals for columns b and c):				

¹ Watershed is defined by the maps from the Alameda County Flood Control District at <http://acffloodcontrol.org/resources/explore-watersheds>

² Project description examples: 5-story office building, industrial warehouse, residential with five 4-story buildings for 200 condominiums, etc.

³ Per the MRP, pavement that meets the following definition of pervious pavement is NOT an impervious surface. Pervious pavement is defined as pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in Provision C.3.d.

⁴ Uncovered parking includes top level of a parking structure.

⁵ "Replace" means to install new impervious surface where existing impervious surface is removed. "Create" means to install new impervious surface where there is currently no impervious surface.

I.B. Is the project a “C.3 Regulated Project” per MRP 3.0 Provision C.3.b? (continued)

	Yes	No	NA
I.B.2 In Item I.B.1, does the Total New Impervious Surface equal 5,000 sq.ft. or more? <i>If YES, GO to Item I.B.3 and check “Yes.” If NO, continue to Item I.C.</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I.B.3 Is the project a C.3 Regulated Project? <i>If YES, go to Item I.B.4; if NO, continue to Item I.C.</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I.B.4 Does the total amount of Replaced impervious surface equal 50 percent or more of the Pre-Project Impervious Surface? <i>If YES, stormwater treatment requirements apply to the whole site; if NO, these requirements apply only to the impervious surface created and/or replaced.</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I.B.5 Is the project installing a total of 3,000 sq.ft. or more (excluding private-use patios in single family homes, townhomes, or condominiums) of new pervious pavement systems? (Pervious pavement systems include pervious concrete, pervious asphalt, pervious pavers and grid pavers etc. and are described in the C3 Technical Guidance at www.cleanwaterprogram.org) If YES, stormwater treatment system inspection requirements (C.3.h) apply; (Municipal staff – add this site to your list of sites needing a final inspection at the end of construction and on-going O&M inspections.) If NO, inspection requirements only apply if there are other treatment systems installed on the project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I.C. Projects that are NOT C.3 Regulated Projects

If you answered NO to Item I.B.3, or the project creates/replaces less than 5,000 sq. ft. of impervious surface, then the project is NOT a C.3 Regulated Project, and stormwater treatment is not required, BUT the City does require that appropriate source controls and site design measures are integrated with the project design. Skip to Section II.

I.D. Projects that ARE C.3 Regulated Projects

If you answered YES to Item I.B.3, then the project is a C.3 Regulated Project. The project must include appropriate site design measures and source controls AND hydraulically-sized stormwater treatment measures. If final discretionary approval was granted on or after **DECEMBER 1, 2011**, Low Impact Development (LID) requirements apply, except for “Special Projects.” See Section II.

I.E. Identify C.6 Construction-Phase Stormwater Requirements

	Yes	No
I.E.1 Does the project disturb 1.0 acre (43,560 sq.ft.) or more of land? (See Item I.A.14). <i>If Yes, obtain coverage under the state’s Construction General Permit at https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp. Submit to the municipality a copy of your Notice of Intent, the Storm Water Pollution Prevention Plan (SWPPP), and the WDID# issued by the State before a grading or building permit is issued. And, see below prior to continuing on to Section II. If No, see below prior to continuing on to Section II.</i>	<input type="checkbox"/>	<input type="checkbox"/>

➤ **NOTE TO APPLICANT:** All projects require appropriate stormwater best management practices (BMPs) during construction to comply with the Alameda Municipal Code. Refer to the Section II.D to identify appropriate construction BMPs.

II. Implementation of Stormwater Requirements

II.A. Complete the appropriate sections for the project. For non-C.3 Regulated Projects, Sections II.B, II.C, and II.D apply. For C.3 Regulated Projects, all sections of Section II apply.

II.B. Select Appropriate Site Design Measures

- *Required for C.3 Regulated Projects.*
- *Projects that create and/or replace 2,500 to <5,000 sq.ft. of impervious surface, and stand-alone single family homes that create/replace 2,500 to <10,000 sq.ft. of impervious surface, must include one of Site Design Measures a through f.*
- *All other projects are encouraged to implement site design measures, which may be required at municipality discretion.*
- *Consult with municipal staff about requirements for your project.*

II.B.1 Are the following site design measures included, as relevant, in the project plans to the maximum extent practicable?

Yes	No	Plan Sheet No.
<input type="checkbox"/>	<input type="checkbox"/>	a. Direct roof runoff into cisterns or rain barrels for reuse.
<input type="checkbox"/>	<input type="checkbox"/>	b. Direct roof runoff onto vegetated areas.
<input type="checkbox"/>	<input type="checkbox"/>	c. Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
<input type="checkbox"/>	<input type="checkbox"/>	d. Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
<input type="checkbox"/>	<input type="checkbox"/>	e. Construct sidewalks, walkways, and/or patios with pervious surfaces. Use the specifications in the C3 Technical Guidance (current version) or for small projects see the BASMAA Pervious Paving Factsheet. For these documents and others go to www.cleanwaterprogram.org and click on "Resources."
<input type="checkbox"/>	<input type="checkbox"/>	f. Construct bike lanes, driveways, and/or uncovered parking lots with pervious surfaces. Use the specifications in the C3 Technical Guidance (current version) or for small projects see the BASMAA Pervious Paving Factsheet. For these documents and others go to the program website at: www.cleanwaterprogram.org and click on "Resources."
<input type="checkbox"/>	<input type="checkbox"/>	g. Minimize land disturbance and impervious surface (especially parking lots).
<input type="checkbox"/>	<input type="checkbox"/>	h. Maximize permeability by clustering development and preserving open space.
<input type="checkbox"/>	<input type="checkbox"/>	i. Use micro-detention, including distributed landscape-based detention.
<input type="checkbox"/>	<input type="checkbox"/>	j. Protect sensitive areas, including wetland and riparian areas, and minimize changes to the natural topography.
<input type="checkbox"/>	<input type="checkbox"/>	k. Self-treating area (see Section 5.1 of the C.3 Technical Guidance)
<input type="checkbox"/>	<input type="checkbox"/>	l. Self-retaining area (see Section 5.2 of the C.3 Technical Guidance)
<input type="checkbox"/>	<input type="checkbox"/>	m. Plant and preserve appropriate trees for the site

II.C. Select appropriate source controls (Applies to C.3 Regulated Projects and all other projects subject to municipal review.⁶)

Are these features in project?		Features that require source control measures	Source control measures (Refer to Local Source Control List for detailed requirements)	Is source control measure included in project plans?		
Yes	No			Yes	No	Plan Sheet No.
<input type="checkbox"/>	<input type="checkbox"/>	Storm Drain	Mark on-site inlets with the words "No Dumping! Flows to Bay" or equivalent.	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Floor Drains	Plumb interior floor drains to sanitary sewer ⁷ [or prohibit].	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Parking garage	Plumb interior parking garage floor drains to sanitary sewer. ⁷	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Landscaping	<ul style="list-style-type: none"> ▪ Retain existing vegetation as practicable. ▪ Select diverse species appropriate to the site. Include plants that are pest- and/or disease-resistant, drought-tolerant, and/or attract beneficial insects. ▪ Minimize use of pesticides and quick-release fertilizers. ▪ Use efficient irrigation system; design to minimize runoff. 	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Pool/Spa/Fountain	Provide connection to the sanitary sewer to facilitate draining. ⁷	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Food Service Equipment (non-residential)	Provide sink or other area for equipment cleaning, which is: <ul style="list-style-type: none"> ▪ Connected to a grease interceptor prior to sanitary sewer discharge. ⁷ ▪ Large enough for the largest mat or piece of equipment to be cleaned. ▪ Indoors or in an outdoor roofed area designed to prevent stormwater run-on and run-off, and signed to require equipment washing in this area. 	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Refuse Areas	<ul style="list-style-type: none"> ▪ Provide a roofed and enclosed area for dumpsters, recycling containers, etc., designed to prevent stormwater run-on and runoff. ▪ Connect any drains in or beneath dumpsters, compactors, and tallow bin areas serving food service facilities to the sanitary sewer.⁷ 	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Outdoor Process Activities ⁸	Perform process activities either indoors or in roofed outdoor area, designed to prevent stormwater run-on and runoff, and to drain to the sanitary sewer. ⁷	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Outdoor Equipment/ Materials Storage	<ul style="list-style-type: none"> ▪ Cover the area or design to avoid pollutant contact with stormwater runoff. ▪ Locate area only on paved and contained areas. ▪ Roof storage areas that will contain non-hazardous liquids, drain to sanitary sewer⁷, and contain by berms or similar. 	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Vehicle/ Equipment Cleaning	<ul style="list-style-type: none"> ▪ Roofed, pave and berm wash area to prevent stormwater run-on and runoff, plumb to the sanitary sewer⁷, and sign as a designated wash area. ▪ Commercial car wash facilities shall discharge to the sanitary sewer.⁷ 	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Vehicle/ Equipment Repair and Maintenance	<ul style="list-style-type: none"> ▪ Designate repair/maintenance area indoors, or an outdoors area designed to prevent stormwater run-on and runoff and provide secondary containment. Do not install drains in the secondary containment areas. ▪ No floor drains unless pretreated prior to discharge to the sanitary sewer. ⁷ ▪ Connect containers or sinks used for parts cleaning to the sanitary sewer. ⁷ 	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Fuel Dispensing Areas	<ul style="list-style-type: none"> ▪ Fueling areas shall have impermeable surface that is a) minimally graded to prevent ponding and b) separated from the rest of the site by a grade break. ▪ Canopy shall extend at least 10 ft in each direction from each pump and drain away from fueling area. 	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Loading Docks	<ul style="list-style-type: none"> ▪ Cover and/or grade to minimize run-on to and runoff from the loading area. ▪ Position downspouts to direct stormwater away from the loading area. ▪ Drain water from loading dock areas to the sanitary sewer.⁷ ▪ Install door skirts between the trailers and the building. 	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Fire Sprinklers	Design for discharge of fire sprinkler test water to landscape or sanitary sewer. ⁷	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Miscellaneous Drain or Wash Water	<ul style="list-style-type: none"> ▪ Drain condensate of air conditioning units to landscaping. Large air conditioning units may connect to the sanitary sewer.⁷ ▪ Roof drains shall drain to unpaved area where practicable. ▪ Drain boiler drain lines, roof top equipment, all washwater to sanitary sewer⁷. 	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Architectural Copper	Discharge rinse water to sanitary sewer ⁷ , or collect and dispose properly offsite. See flyer "Requirements for Architectural Copper."	<input type="checkbox"/>	<input type="checkbox"/>	

⁶ See MRP Provision C.3.a.i (7) for non-C.3 Regulated Projects and Provision C.3.c.i (1) for C.3 Regulated Projects.

⁷ Any connection to the sanitary sewer system is subject to sanitary district approval.

⁸ Businesses that may have outdoor process activities/equipment include machine shops, auto repair, industries with pretreatment facilities.

II.D. Implement Construction Best Management Practices (BMPs) (Applies to all projects – see Provision C.6 for more details.)

Yes	No	Best Management Practice (BMP)
<input type="checkbox"/>	<input type="checkbox"/>	Attach the municipality’s construction BMP plan sheet to project plans and require contractor to implement the applicable BMPs on the plan sheet.
<input type="checkbox"/>	<input type="checkbox"/>	Temporary erosion controls to stabilize all denuded areas until permanent erosion controls are established.
<input type="checkbox"/>	<input type="checkbox"/>	Delineate with field markers clearing limits, easements, setbacks, sensitive or critical areas, buffer zones, trees, and drainage courses.
<input type="checkbox"/>	<input type="checkbox"/>	Provide notes, specifications, or attachments describing the following: <ul style="list-style-type: none"> ▪ Construction, operation and maintenance of erosion and sediment controls, include inspection frequency; ▪ Methods and schedule for grading, excavation, filling, clearing of vegetation, and storage and disposal of excavated or cleared material; ▪ Specifications for vegetative cover & mulch, include methods and schedules for planting and fertilization; ▪ Provisions for temporary and/or permanent irrigation.
<input type="checkbox"/>	<input type="checkbox"/>	Perform clearing and earth moving activities only during dry weather.
<input type="checkbox"/>	<input type="checkbox"/>	Use sediment controls or filtration to remove sediment when dewatering and obtain all necessary permits.
<input type="checkbox"/>	<input type="checkbox"/>	Protect all storm drain inlets in vicinity of site using sediment controls such as berms, fiber rolls, or filters.
<input type="checkbox"/>	<input type="checkbox"/>	Trap sediment on-site, using BMPs such as sediment basins or traps, earthen dikes or berms, silt fences, check dams, soil blankets or mats, covers for soil stock piles, etc.
<input type="checkbox"/>	<input type="checkbox"/>	Divert on-site runoff around exposed areas; divert off-site runoff around the site (e.g., swales and dikes).
<input type="checkbox"/>	<input type="checkbox"/>	Protect adjacent properties and undisturbed areas from construction impacts using vegetative buffer strips, sediment barriers or filters, dikes, mulching, or other measures as appropriate.
<input type="checkbox"/>	<input type="checkbox"/>	Limit construction access routes and stabilize designated access points.
<input type="checkbox"/>	<input type="checkbox"/>	No cleaning, fueling, or maintaining vehicles on-site, except in a designated area where washwater is contained and treated.
<input type="checkbox"/>	<input type="checkbox"/>	Store, handle, and dispose of construction materials/wastes properly to prevent contact with stormwater.
<input type="checkbox"/>	<input type="checkbox"/>	Contractor shall train and provide instruction to all employees/subcontractors re: construction BMPs.
<input type="checkbox"/>	<input type="checkbox"/>	Control and prevent the discharge of all potential pollutants, including pavement cutting wastes, paints, concrete, petroleum products, chemicals, washwater or sediments, rinse water from architectural copper, and non-stormwater discharges to storm drains and watercourses.

PROJECTS THAT ARE NOT C.3 REGULATED PROJECTS, SKIP TO SECTION II.H TO COMPLETE.

II.E. Biotreatment, Infiltration and Rain Water Harvesting and Use.

Applicants are encouraged to maximize infiltration of stormwater if site conditions allow.

If feasible and desired, infiltration and rainwater harvesting may be cost effective solutions depending on the project.

II.F. Stormwater Treatment Measures (Applies to C.3 Regulated Projects)

II.F.1 Check the applicable box and indicate the treatment measures to be included in the project.

Yes	No											
<input type="checkbox"/>	<input type="checkbox"/>	<p>Is the project a Special Project? (See Appendix J of the C.3 Technical Guidance for criteria.)</p> <p>If Yes, complete the Special Projects Worksheet (go to the program website at: www.cleanwaterprogram.org and click on "Resources") and consult with municipal staff about the need to prepare a discussion of the feasibility and infeasibility of 100% LID treatment. Indicate the type of non-LID treatment to be used, the hydraulic sizing method*, and percentage of the amount of runoff specified in Provision C.3.d that is treated:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Non-LID Treatment</u></th> <th style="text-align: left;"><u>Hydraulic sizing method*</u></th> <th style="text-align: left;"><u>% of C.3.d amount of runoff treated</u></th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> Media filter</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Tree well filter</td> <td></td> <td></td> </tr> </tbody> </table>	<u>Non-LID Treatment</u>	<u>Hydraulic sizing method*</u>	<u>% of C.3.d amount of runoff treated</u>	<input type="checkbox"/> Media filter			<input type="checkbox"/> Tree well filter			
<u>Non-LID Treatment</u>	<u>Hydraulic sizing method*</u>	<u>% of C.3.d amount of runoff treated</u>										
<input type="checkbox"/> Media filter												
<input type="checkbox"/> Tree well filter												
<input type="checkbox"/>	<input type="checkbox"/>	<p>Is the project using biotreatment to treat the C.3.d amount of runoff?</p> <p>For more information on infiltration and rainwater harvesting and use of stormwater, refer to the C3 Technical Guidance downloadable at the program website: www.cleanwaterprogram.org</p> <p>If Yes, indicate the biotreatment measures to be used, and the hydraulic sizing method:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Biotreatment Measures</u></th> <th style="text-align: left;"><u>Hydraulic sizing method*</u></th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> Bioretention area</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Flow-through planter</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other (specify): _____</td> <td></td> </tr> </tbody> </table>	<u>Biotreatment Measures</u>	<u>Hydraulic sizing method*</u>	<input type="checkbox"/> Bioretention area		<input type="checkbox"/> Flow-through planter		<input type="checkbox"/> Other (specify): _____			
<u>Biotreatment Measures</u>	<u>Hydraulic sizing method*</u>											
<input type="checkbox"/> Bioretention area												
<input type="checkbox"/> Flow-through planter												
<input type="checkbox"/> Other (specify): _____												
<input type="checkbox"/>	<input type="checkbox"/>	<p>Is the project using infiltration or rainwater harvesting/use?</p> <p>For more information on infiltration and rainwater harvesting and use of stormwater, refer to the C3 Technical Guidance downloadable at the program website: www.cleanwaterprogram.org</p> <p>If Yes, indicate the measures to be used, and hydraulic sizing method:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>LID Treatment Measure (non-biotreatment)</u></th> <th style="text-align: left;"><u>Hydraulic sizing method*</u></th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> Rainwater harvesting and use</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Bioinfiltration⁹</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Infiltration trench</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other (specify): _____</td> <td></td> </tr> </tbody> </table>	<u>LID Treatment Measure (non-biotreatment)</u>	<u>Hydraulic sizing method*</u>	<input type="checkbox"/> Rainwater harvesting and use		<input type="checkbox"/> Bioinfiltration ⁹		<input type="checkbox"/> Infiltration trench		<input type="checkbox"/> Other (specify): _____	
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<input type="checkbox"/> Rainwater harvesting and use												
<input type="checkbox"/> Bioinfiltration ⁹												
<input type="checkbox"/> Infiltration trench												
<input type="checkbox"/> Other (specify): _____												

***Hydraulic Sizing Method:** Indicate which of the following Provision C.3.d.i hydraulic sizing methods were used:

1. Volume based approaches – Refer to Provision C.3.d.i.(1):
 - 1(a) Urban Runoff Quality Management approach, or
 - 1(b) 80% capture approach (recommended volume-based approach).
2. Flow-based approaches – Refer to Provision C.3.d.i.(2):
 - 2(a) 10% of 50-year peak flow approach,
 - 2(b) Percentile rainfall intensity approach, or
 - 2(c) 0.2-Inch-per-hour intensity approach (this is recommended flow-based approach AND the basis for the 4% rule of thumb described in Section 5.1 of the C.3 Technical Guidance).
3. Combination hydraulic sizing approach -- Refer to Provision C.3.d.i.(3):

If a combination flow and volume design basis was used, indicate which flow-based and volume-based criteria were used.

⁹ See Section 8.1 of the C.3 Technical Guidance for conditions in which bioretention areas provide bioinfiltration.

II.G. Project Submittals for Site Stormwater Quality Management

The project applicant/proponent shall provide the City the following submittals for approval by the Public Works Department (PW) according to the deadlines indicated. Item II.G.1 shall be completed prior to the project planning application being deemed complete and the review for Development Plan approval (final discretionary approval). Items II.G.2 through G.4 are advisory at the planning application stage and shall be completed prior to the issuance of the first grading or building permit and prior to the issuance of any occupancy permit, respectively. (Complete this section for C.3 Regulated Projects)

II.G.1 Prepare and submit a stormwater drainage management area (DMA) plan that details the low impact development (LID) techniques, if applicable, and/or the stormwater treatment measure(s) to be used for 100% of the project's impervious surface area subject to C.3. As part of the submittal, the applicant/developer shall submit a stamped, signed Certification Form from a qualified independent civil engineer with stormwater treatment facility design experience, licensed in the State of California, and acceptable to PW that indicates the LID techniques and treatment measure(s) design meets the established hydraulic sizing design criteria for stormwater treatment measures. Obtain a copy of the City of Alameda's Design Criteria Certification Form from the PW Clean Water Program office.

Have a completed DMA Plan and Design Criteria Certification Form been submitted for review and approval by PW?

- Yes. *Continue to Item II.G.2.*
- No. Complete and submit the DMA plan and Design Criteria Certification Form.

II.G.2 Project applicant shall acknowledge the need to prepare and submit to the City Public Works Department for review and approval, prior to issuance of the first grading or building permit, a stormwater treatment measures site plan, a stormwater treatment measures operations and maintenance (O&M) plan, and a template annual maintenance reporting form for the approved and certified LID techniques and/or stormwater treatment measures. These submittals shall be either used as the necessary Exhibits to a stormwater treatment measures Maintenance Agreement or incorporated into the maintenance responsibilities of the property/homeowner association.

- Yes, acknowledged. *Continue to Item II.G.3.*

II.G.3 Project applicant shall acknowledge the need to either execute a stormwater treatment measures maintenance agreement with the City or incorporate the maintenance responsibilities with the property/homeowners association for all approved LID techniques and stormwater treatment measures.

- Yes, acknowledged. *Continue to II.G.4.*

II.G.4 Project applicant shall acknowledge the need to submit a construction certification report (Report) affirming that all project site stormwater treatment measures have been constructed per the City approved plans and specifications, prior to the issuance of any occupancy permit. The Report shall be submitted in a form acceptable to the Public Works and prepared by a registered civil engineer, licensed in the State of California.

- Yes, acknowledged.

II.H Project Owner and Applicant Information:

Project Owner/Agent: _____

Address: _____

Phone: _____ Email: _____

➤ *Applicant must call for inspection and receive inspection within 45 days of installation of treatment measures and/or hydromodification management controls.*

Name of applicant completing the form: _____

Signature: _____ Date: _____

III. For Completion By Municipal Staff

III.1 Alternative Certification: Was the treatment system sizing and design reviewed by a qualified third-party professional that is not a member of the project team or agency staff?

Yes No Name of Reviewer _____

III.2. Confirm Operations and Maintenance (O&M) Submittal:

The following questions apply to C.3 Regulated Projects and Hydromodification Management Projects.

	Yes	No	N/A
III.2.a Was maintenance plan submitted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
III.2.b Was maintenance plan approved?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
III.2.c Was maintenance agreement submitted? (Date executed: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

➤ Attach the executed maintenance agreement as an appendix to this checklist.

III.3 Annual Operations and Maintenance (O&M) Submittals:

For C.3 Regulated Projects and Hydromodification Management Projects, indicate the dates on which the Applicant submitted annual reports for project O&M: _____

III.4 Comments:

III.5 Notes:

Section I Notes: _____
 Section II Notes: _____
 Section III Notes: _____

III.6 Project Close-Out:

	Yes	No	N/A
III.7.a Were final Conditions of Approval met?	<input type="checkbox"/>	<input type="checkbox"/>	
III.7.b Was initial inspection of the completed treatment measure(s) conducted? (Date of inspection: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
III.7.c Was maintenance plan submitted? (Date executed: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
III.7.d Was project information provided to staff responsible for O&M verification inspections? (Date provided to inspection staff: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Name of staff confirming project is closed out: _____

Signature: _____ Date: _____

Name of O&M staff receiving information: _____

Signature: _____ Date: _____

Appendices

- Appendix A: O&M Agreement
- Appendix B: O&M Annual Report Form

EXHIBIT E
WELO Responsive Approach to Landscape Design

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SWA Sausalito

2200 Bridgeway
Sausalito, California
94965
+1.415.332.5100
www.swagroup.com

John L Wong
R Joseph Runco
Shuntaro Yahiro
Marco Esposito
Chih-Wei Lin
Hui-Li Lee
William Hynes
Yang Zhang

13 November 2024

William Gordon
Principal
ELS ARCHITECTURE + URBAN DESIGN
2040 Addison St
Berkeley, California 94704

Re: Alameda Aquatic Center - WELO Responsive Approach to Landscape Design

Dear William:

Below please find our Schematic Design narrative outlining our WELO responsive approach to the landscape design for the Alameda Aquatic Center:

The Alameda Aquatic Center project will include new planting irrigated by an automatically-controlled landscape irrigation system that utilizes evapotranspiration data. The landscape irrigation will be supplied by potable water from a new dedicated water service and meter. The project's three acre site is located within the Jean Sweeney Open Space Park, and the project will include about an acre of planting consisting of low water use native species trees and shrubs, plus a modest grass lawn "Special Landscape Area" around the pools. The planting and irrigation design will be designed to comply with the Maximum Applied Water Allowance.



Marco Esposito
Principal
SWA GROUP
Landscape Architect CA 2908

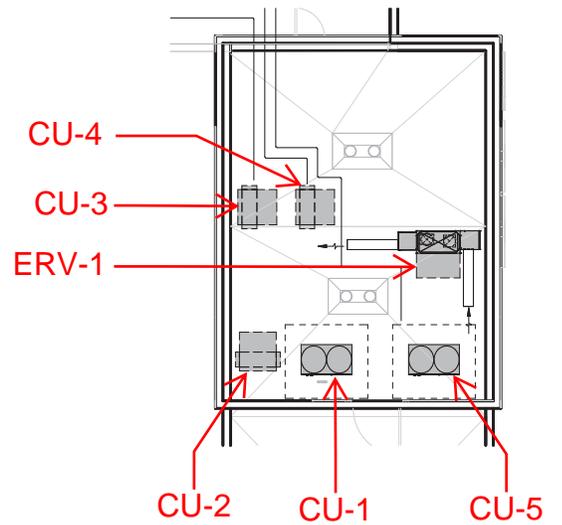
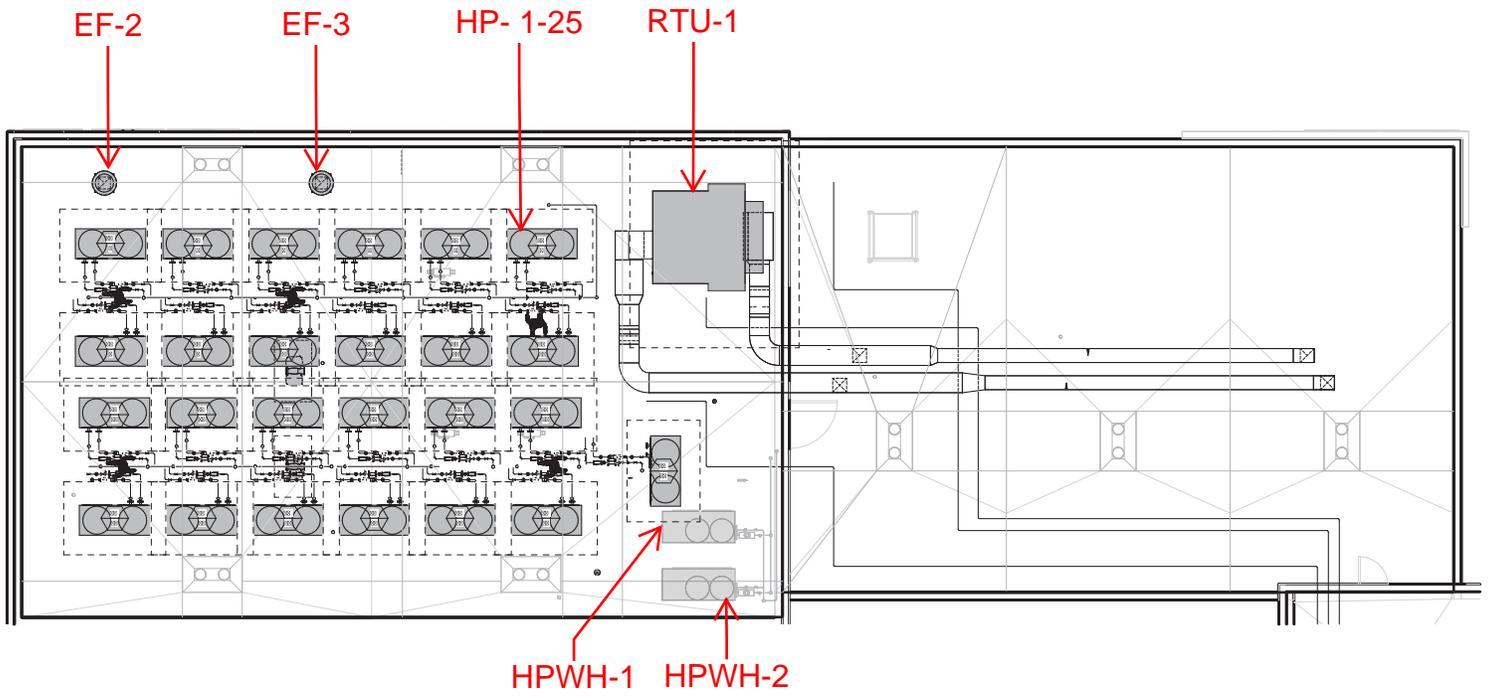
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EXHIBIT H
Exterior Mechanical Equipment Cut Sheets and
Noise Data

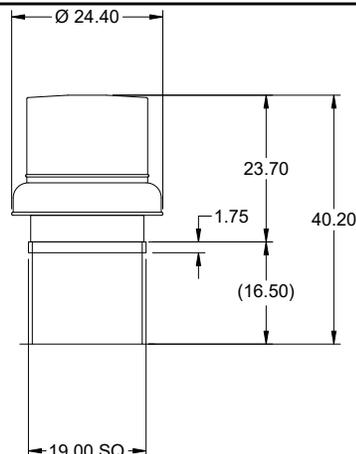
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ALAMEDA AQUATIC CENTER

EXTERIOR ROOF TOP MECHANICAL EQUIPMENT



Model: GB-098-4
Belt Drive Centrifugal Roof Exhaust Fan



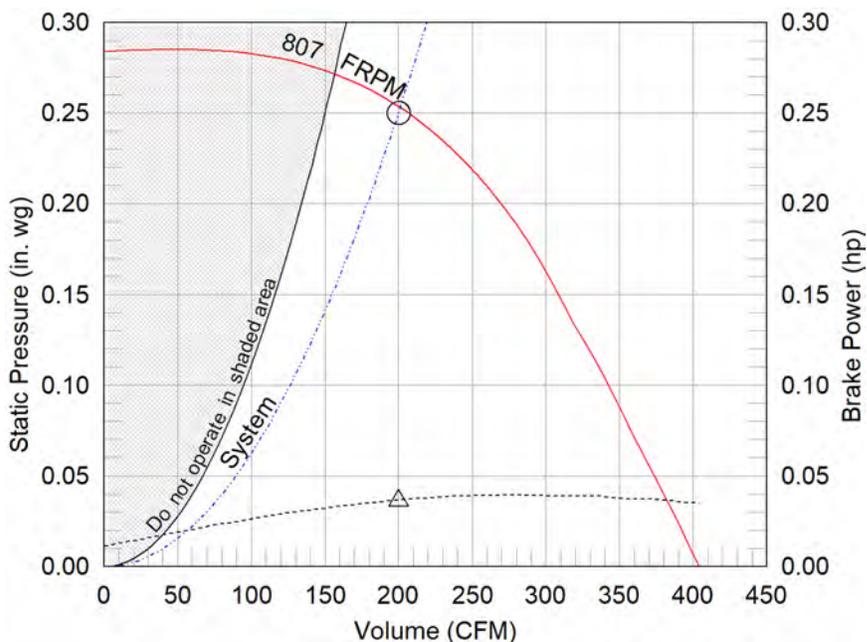
Dimensional	
Quantity	1
Weight w/o Acc's (lb)	61
Weight w/ Acc's (lb)	69
Weight w/ Acc's and Curb (lb)	101
Max T Motor Frame Size	56
Standard Curb Cap Size (in.)	19 x 19
Roof Opening (in.)	15.5 x 15.5

Performance	
Requested Volume (CFM)	200
Actual Volume (CFM)	200
Total External SP (in. wg)	0.25
Fan RPM	807
Operating Power (hp)	0.04
Elevation (ft)	33
Airstream Temp.(F)	70
Air Density (lb/ft3)	0.075
Drive Loss (%)	50.0
Tip Speed (ft/min)	2,363
Static Eff. (%)	43

Misc Fan Data	
Fan Energy Index (FEI)	-
Outlet Velocity (ft/min)	208

Motor	
Motor Included	Yes
Size (hp)	1/4
Voltage/Cycle/Phase	115/60/1
Enclosure	EXP
Motor RPM	1725
Efficiency Rating	Standard
Windings	1
NEC FLA* (Amps)	5.8
Min. Circuit Ampacity (MCA)	7.25
Max. Overcurrent Protection (MOP)	15
Short Circuit Current Rtg (SCCR)	5 kA

OVERALL HEIGHT MAY BE GREATER DEPENDING ON MOTOR, ADAPTER, AND/OR HINGE BASE.



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- - - System curve
- - - Brake horsepower curve

Notes:

All dimensions shown are in units of in.
 *NEC FLA, MCA and MOP are for reference only – based on tables 430.248 or 430.25 of National Electric Code 2020. Actual motor FLA may vary, for sizing thermal overload, consult factory.
 MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc).
 LwA - A weighted sound power level, based on ANSI S1.4
 dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
 Sones - calculated using ANSI/AMCA 301 at 5 ft

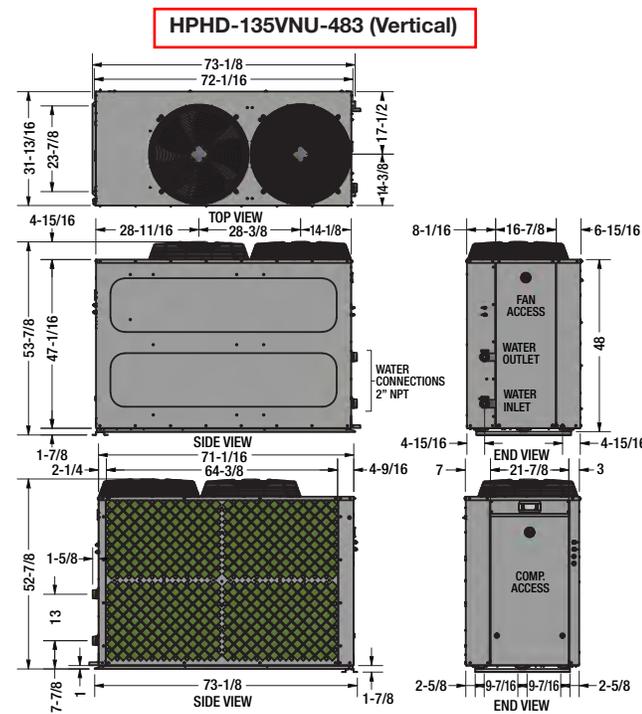
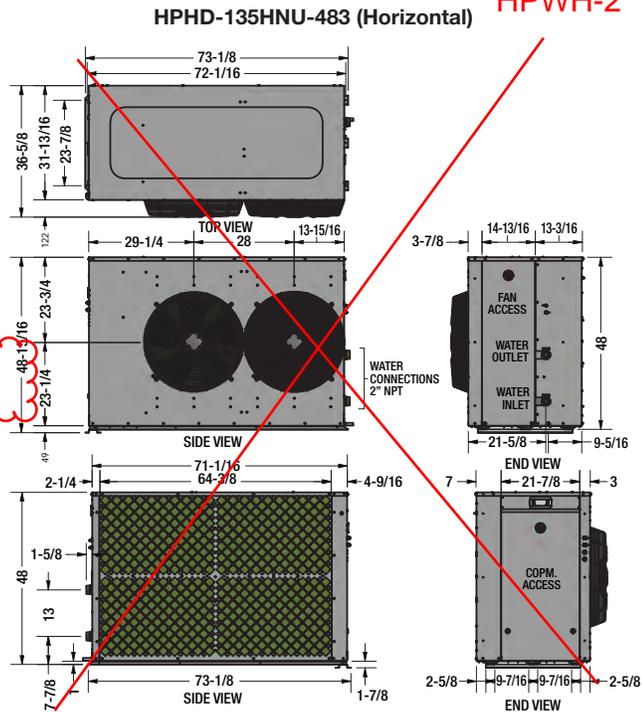
Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	62	62	57	51	47	41	35	33	54	42	3.1



Air to Water 135k BTU/h Heat Pump Specifications

Rheem Model Number	HPHD-135HNU-483 (Horizontal)	HPHD-135VNU-483 (Vertical)		
ELECTRICAL INPUT				
Voltage/Phase	480 Volts / 3 Phase / 60 Hz			
Full Load / Locked Rotor (Amps Per Phase)	26.9 FLA / 150 LRA			
Min. Circuit Amperage	35 Amps			
Refrigerant	R134a			
Heating Capacity, BTU/hr*	Up to 198,305			
Power Input, kW	12.3			
COP*	Up to 5.94			
Noise Level, dBA @ 10ft	62			
Rated Load Amps @ 54°F SST / 113°F SCT	21.3			
TECHNICAL DATA				
	Compressor	Fan	Compressor	Fan
Make	Copeland	EBM-Papst	Copeland	EBM-Papst
Type	Scroll 20133	Axial	Scroll 20133	Axial
Number Per Unit	1	2	1	2
FLA (Full Load Amps, each)	23.7	1.6	23.7	1.6
Voltage / Phase	480 / 3	480 / 3	480 / 3	480 / 3
Pole/RPM	2/3500	6/1065	2/3500	6/1065
Air Flow, CFM	N/A	6316	N/A	6316
HEAT EXCHANGER (Water Side)				
Type of Water Tube	Double Wall			
Design	Vented Brazed Plate			
Flow Rate Excl. By Pass, gpm	34.9			
Max. Outlet Water Temp, °F	150**			
Design Pressure Drop, PSI	5.8			
Max. Operating Pressure, PSI	225			
GENERAL INFORMATION				
Water Connections	2" Copper			
Drain	3/4" Aluminium			
Defrost	Hot Gas Injection			
Cabinet Construction	18 Gauge Stucco Aluminium			
Approx. Shipping Weight, lbs	800			
Size L x W x H	73.1" x 36.6" x 48.0"		73.1" x 31.8" x 53.8"	



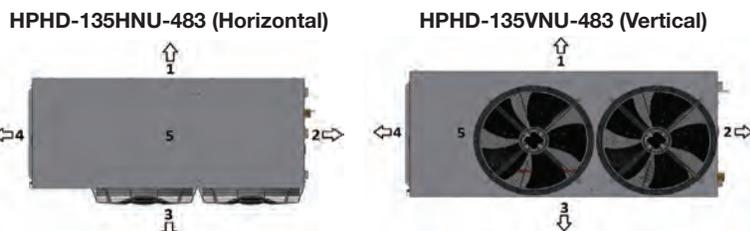
COP Table*

WATER OUT °F	AMBIENT TEMPERATURE								UNITS
	40°F	50°F	60°F	70°F	80°F	90°	100°F	110°F	
100°F	98,390	110,190	121,989	133,331	143,606	175,783	187,044	198,305	BTU/hr
	3.34	3.54	3.74	3.97	4.27	5.09	5.52	5.94	COP
110°F	96,531	107,241	117,950	129,301	142,153	174,041	183,026	192,011	BTU/hr
	2.75	3.03	3.30	3.59	3.92	4.58	4.65	4.73	COP
120°F	96,182	106,934	117,687	128,788	140,701	161,915	176,746	191,576	BTU/hr
	2.77	2.92	3.07	3.26	3.57	4.07	4.37	4.66	COP
130°F	91,783	102,907	114,030	125,795	139,054	149,793	165,278	180,763	BTU/hr
	2.04	2.32	2.61	2.90	3.22	3.27	3.50	3.74	COP
140°F	93,632	104,038	114,445	124,999	135,894	153,433	166,836	180,239	BTU/hr
	2.24	2.36	2.49	2.65	2.89	3.18	3.24	3.30	COP
150°F	N/A	102,682	111,211	120,373	131,015	145,039	162,508	179,977	BTU/hr
		1.91	2.11	2.31	2.52	2.73	2.87	3.01	COP

Unit Clearances

Direction	Description	Minimum Clearance Required	
		Horizontal	Vertical
1	Evaporator Coil		20"
2	Water Connections		20"
3	Plain Back	79"	Nil
4	Compressor Access		35"
5	Top - Fan Discharge	20"	79"

When units are placed side by side, allow at least 40" between evaporator coils.
 Rating Conditions: 80°F ambient, 60% RH, 100°F Water in, 110°F Water out.
 * At 60% RH
 **Max outlet temperature when ambient is above 70°F.



Samsung DVM Heat Pump Chiller

Job Name _____
 Purchaser _____
 Submitted to _____
 Unit Designation _____

Location _____
 Engineer _____
 Reference Approval Construction
 Schedule # _____

System Specifications

Performance	US Ton (nominal)		15
	Rated Capacity (Btu/h)	Cooling	95°F Ambient, Entering Temperature: 55°F, Leaving Temperature: 44°F 168,000
		Heating (Dry/Wet Bulb: 47/43°F)	Leaving Temperature: 105°F 182,000 Leaving Temperature: 120°F 171,000
		Heating (Dry/Wet Bulb: 17/15°F)	Leaving Temperature: 105°F 90,000 Leaving Temperature: 120°F 85,000
	Power Input (A)	Cooling	95°F Ambient, Entering Temperature: 55°F, Leaving Temperature: 44°F 22.0
		Heating (Dry/Wet Bulb: 47/43°F)	Leaving Temperature: 105°F 20.8 Leaving Temperature: 120°F 23.9
		Heating (Dry/Wet Bulb: 17/15°F)	Leaving Temperature: 105°F 16.1 Leaving Temperature: 120°F 17.4
	Cooling EER		10.42
	Heating COP	Heating (Dry/Wet Bulb: 47/43°F)	Leaving Temperature: 105°F 3.52 Leaving Temperature: 120°F 2.87
		Heating (Dry/Wet Bulb: 17/15°F)	Leaving Temperature: 105°F 2.24 Leaving Temperature: 120°F 1.96
IPLV		19.75	
Power	Voltage	(ø)V/Hz	3 / 460 / 60
	Maximum Circuit Breaker (MCCB/ELB/ELCB)		50
	Minimum Circuit Ampacity (MCA)		40
	SCCR	kA	5
Compressor	Type		Inverter Driven Scroll X 2
	RLA	A	15.7
Refrigerant	R32 Factory Charge	Lbs.	30.4
Water Side Heat Exchanger	Connection Type		50A Cut Groove
	Quantity		2
	Water Flow (GPM)	Minimum	16.8
		Nominal	33.6
Maximum		67.2	
Minimum Water System Volume		Gallons	100.8
Condenser Fan	Fan	Type	Propeller X 2
		Output (max.)	CFM 12,855
	Motor	Type	BLDC
		Output	W 630 X 2
		FLA	A 2.3
Max. External Static Pressure		"WC	0.315
Dimensions	W X H X D		Inches 70 11/16 X 66 3/4 X 30 1/8
	Weight	Net	Lbs. 959
		Shipping	Lbs. 1,006
Sound Level	Sound Pressure	dB (A)	61
Operating Water Temperature Range	Cooling	Standard	°F (°C) 41 ~ 77°F (5 ~ 25°C)
		When Using Brine	°F (°C) 14 ~ 77°F (-10 ~ 25°C)
		Heating ¹	°F (°C) 77 ~ 140°F (25 ~ 60°C) ¹
Operating Ambient Temperature Range	Cooling	°F (°C)	5 ~ 118°F (-15 ~ 48°C)
	Heating	°F (°C)	-13 ~ 109°F (-25 ~ 43°C)
Safety Certifications			ETL & ETLc
Protection Devices	Intelligent logic to ensure proper operation within unit design limitations and operational parameters		
	High pressure sensor, low pressure sensor, over-voltage protection, compressor over-current protection, current transformer, fan motor voltage protection, fan motor thermal protection, overheat protection, phase detection protection, high voltage fuses, water pressure sensors		
	Inverter PCB cooling done with liquid refrigerant to maintain optimal and safe operating temperatures		



Construction

The unit shall be EGI (electronic galvanized steel) with a baked on powder coated finish. Some brackets shall be GI (hot-dipped galvanized steel)

Air Side Heat Exchanger

The heat exchanger shall be mechanically bonded fin to copper tube.

The aluminum fins of the heat exchanger shall have a protective coating.

Salt spray test method: ASTM B117-18 - the heat exchanger showed no unusual rust or corrosion development to 2,280 hours.

Water Side Heat Exchanger

The heat exchanger shall be brazed plate type (2)

A field provided gas separator is required on the water outlet pipe to vent high pressure gas in the event of water side heat exchanger leakage.

Controls

The unit shall be operated via NASA Protocol with controls provided by Samsung

Can connect up to 16 X AG0**DSVA**G/AA DVM Chillers to a single DVM Chiller module controller (MCM-A00UN) to provide various system operation configuration, setup, monitoring, status, and error notification (MCM-A00UN is required for operation.)

The outdoor unit shall have a removable EEPROM that stores unit serial number, startup information, system settings, system tag/name, and other information.

Optional FCU Kit (fan coil unit) available to control and integrate fan coil units to Samsung central and local controls (FCU Kit: MIM-F00N; FCU Kit Central Control Interface Module: MIM-F10N).

Control wiring shall be 16 AWG X 2 shielded wire (for communicating controls connections).

Refrigerant System

The compressors shall be Samsung hermetically sealed, inverter driven, direct flash injected, DC scroll type with soft-start capability.

The refrigerant system capacity shall modulate based on demand.

Flash injected compressors provide advanced low ambient heating performance.

Refrigerant flow shall be controlled by EEV (electronic expansion valve).

Other Features

Asymmetrical scroll design with rotating compressor operation/priority.

Optional night quiet modes to reduce outdoor unit sound (default mode and levels 1-3) with automatic or manual activation.

Advanced intelligent defrost logic to significantly reduce defrost cycle frequency by monitoring air resistance across the condenser coil during heating operation to determine defrost operation initiation to prevent unnecessary defrost cycles. In applications where 2-16 modules are configured and controlled as one system, only 30% or less of the total nominal capacity will enter defrost operation at a time (ex: 6 module system - only one module will defrost at a time; 8 module system - two modules may enter defrost at a time).

Optional snow blowing logic to prevent snow accumulation on idle units (enabled by default, can be disabled at any time)

Error reset with dry input at outdoor unit (refer to pages 4-5 for input/output details)

Three operation patterns can be selected: Standard, Rotation, and Efficiency (refer to page 6 for details)

Operation patterns can be adjusted at DVM Chiller unit or at controllers (refer to page 7 for details)

Energy savings options to reduce system energy consumption by configuring Water Law (outdoor reset) control to automatically adjust leaving water set temperature based on ambient temperature or room temperature. Room temperature (heating and cooling, two points each), outdoor temperature (heating and cooling, two points each), and water temperature (heating and cooling, two points each) settings can be configured when using Water Law control. Water Law can be based on outdoor temperature or indoor temperature. Water Law based on room temperature requires installation of PT1000 temperature sensor (field provided) in the space to monitor room temperature (refer to page 6 for details).

¹ When outside temperature is below 50°F (10°C), the maximum outlet temperature is 131°F (55°C).

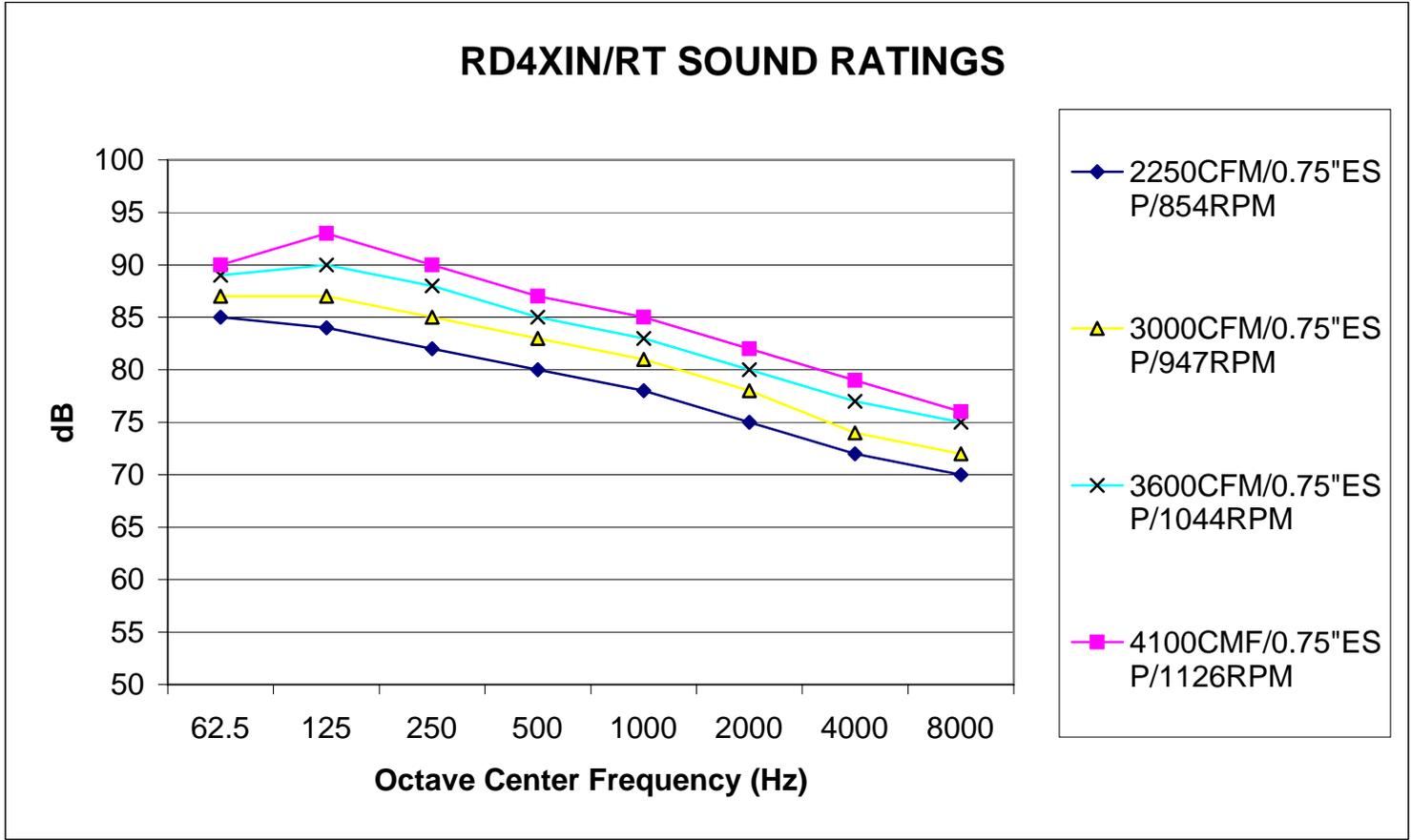
Performance is certified in accordance with the AHRI Air-Cooled Water-Chilling Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Heat Pump Water-Heating unit is certified when operating in cooling. Certified units may be found in the AHRI Directory at www.ahridirectory.org. Combined performance of multiple chillers are not AHRI Certified.

Samsung HVAC maintains a policy of ongoing development, specifications are subject to change without notice.



ERV-1 will have similar or lower frequency data.

RD4XRT	1	2	3	4	5	6	7	8
OUTLET SOUND POWER LEVELS IN dB	Octave Center Frequencies (Hz)							
	62.5	125	250	500	1000	2000	4000	8000
2250CFM/0.75"ESP/854RPM	85	84	82	80	78	75	72	70
3000CFM/0.75"ESP/947RPM	87	87	85	83	81	78	74	72
3600CFM/0.75"ESP/1044RPM	89	90	88	85	83	80	77	75
4100CMF/0.75"ESP/1126RPM	90	93	90	87	85	82	79	76



Job Name _____
 Purchaser _____
 Submitted to _____
 Unit Designation _____

Location _____
 Engineer _____
 Reference Approval Construction
 Schedule # _____

System Specifications

Performance	US Ton (nominal)	8		
	Capacity (Btu/h) ¹	Nominal / Rated Cooling	96,000 / 92,000	
		Nominal / Rated Heating	108,000 / 103,000	
	EER	Ducted / Mixed / Non-Ducted	12.4 / 12.75 / 13.1	
	IEER	Ducted / Mixed / Non-Ducted	24.1 / 26 / 27.9	
	SCHE	Ducted / Mixed / Non-Ducted	25.84 / 28.17 / 30.50	
High Heat COP	Ducted / Mixed / Non-Ducted	3.83 / 3.98 / 4.13		
Power	Voltage	(ø/V/Hz)	3 / 460 / 60	
	Maximum Circuit Breaker (MCCB/ELB/ELCB)	20		
	Minimum Circuit Ampacity (MCA)	18		
	SCCR	kA	5	
Indoor Units	Total Capacity (%)	50 - 184% Of outdoor unit capacity ²		
	Maximum Indoor Unit Quantity	16		
Compressor	Type X Qty.	Inverter Scroll X 2		
	RLA (A)	6.0		
	Compressor Modulation Range	5 - 100%		
Refrigerant	R410A Factory Charge (lbs.)	17.6		
Pipe Connections	Liquid X Suction X HP Gas (inches)	3/8 X 7/8 X 3/4		
Refrigerant Pipe Limitations ³	Max. Length - ODU to Farthest IDU (feet)	656 (722 equivalent)		
	Max. Vertical Separation	ODU to IDU (feet) ⁴	361	
		Highest/Lowest IDU (feet)	131	
	Max. Total Refrigerant Pipe Length (feet)	3,280		
Condenser Fan	Fan	Type X Qty.	Propeller X 2	
		Output (CFM)	9,924	
	Motor	Type	DC	
		Output (W)	620 X 2	
		FLA (A)	2.1 (each)	
Max. External Static Pressure (in. WC)	0.43			
Dimensions	W X H X D	Inches	51 X 66 3/4 X 30 1/8	
	Weight	lbs.	584.2	
	Shipping Weight	lbs.	621.7	
Sound Level	dB (A)	Max.	57	
Operating Temperatures	Cooling ⁵	°F (°C)	5 -122 (-15 - 50)	
	Heating	°F (°C)	-22 - 75 (-30 - 24)	
Safety Certifications	ETL & ETLc			
Protection Devices	Intelligent logic to ensure proper operation within unit design limitations and operational parameters.			
	High pressure sensor, low pressure sensor, over-voltage protection, compressor over-current protection, current transformer, fan motor voltage protection, fan motor thermal protection, overheat protection, phase detection protection, high voltage fuses			



Compatibility

DVM S indoor units (AM****N****/AA, ACL-***NN), AHU Kits (MXD-K****AN), Universal Communication Kits (MCM-D211UN), and Hydro Units (AM****NB****/AA).

Construction

The outdoor unit shall be galvanized steel with a baked on powder coated finish.

Refrigerant System

The Heat Recovery system shall allow simultaneous heating and cooling (conditions apply, refer to technical data book for more information).

Mode Control Units (MCU) are required for proper operation. Indoor units that will only operate in cooling mode year-round (cooling-only) may be piped directly to the liquid and suction pipes bypassing MCU connection. Please consult Technical Data Books and supporting technical documents for compatible MCU models and details.

The compressor shall be hermetically sealed, inverter driven, direct flash injected, DC scroll type with soft-start capability manufactured by Samsung. Flash injected compressors provide advanced low ambient heating performance. The compressor shall feature an asymmetrical scroll design.

The system shall have subcooling devices to maintain capacity at extreme system refrigerant pipe lengths and to minimize refrigerant noise.

Heat Exchanger

The heat exchanger shall be mechanically bonded fin to copper tube. The aluminum fins of the heat exchanger shall have a protective coating.

Salt spray test method: ASTM-B117-18 - The heat exchanger showed no unusual rust or corrosion development to 3,000 hours.

The heat exchanger shall consist of two separate circuits to enhance the heat pump defrost cycle. The unit shall use the entire coil initially for the defrost cycle. To resume heating faster in extreme conditions, the upper section shall return to heating operation while the lower section continues to defrost.

Active Artificial Intelligence

The outdoor unit shall feature Active Artificial Intelligence (AI) shall monitor environmental and system operational data and use Deep Neural Network algorithms to provide optimal system performance and reliability.

Active Artificial Intelligence (AI) shall be used to optimize high pressure control, low pressure control, defrost cycle activation and operation, and low refrigerant detection.

The outdoor unit shall use Active Artificial Intelligence (AI) to monitor system refrigerant volume in real-time while in cooling mode to detect possible leaks or low refrigerant charge and provide an error code before system shutdown (conditions apply).

Controls

The outdoor unit shall have a removable EEPROM that stores unit serial number, startup information, system settings, system tag/name, and other information.

Control wiring shall be 16 AWG X 2 shielded wire.

Other Features

Inverter PCB cooling shall be done with liquid refrigerant and air to maintain optimal and safe operating temperatures.

The system shall feature advanced oil recovery cycle logic (maximum duration in cool mode: 3 minutes, maximum duration in heat mode: 6 minutes, defrost cycles lasting over 3 minutes are considered oil recovery cycles). Oil recovery operation shall not interrupt heating or cooling operation.

The outdoor unit shall feature optional night quiet modes to reduce outdoor unit sound (4 levels) with automatic activation or manual activation (with MIM-B14 accessory).

The outdoor unit shall feature advanced intelligent defrost logic to significantly reduce defrost cycle frequency by monitoring air resistance across the condenser coil during heating operation to determine defrost operation initiation to prevent unnecessary defrost cycles.

The outdoor unit shall feature optional snow blowing logic to prevent snow accumulation on idle outdoor units

The outdoor unit shall feature maximum current control settings to limit current (50% - 100% of design current) adjustable at outdoor unit, supported central controls, and supported indoor unit wired controllers.

The outdoor unit shall feature energy savings options to reduce system energy consumption when average indoor room temperatures are greater than average indoor set temperatures in heating mode or when average indoor room temperatures are lower than average indoor set temperatures in cooling mode.

Accessories

Qty.	Model Number	Description
	WHG-T2-B	Top wind/hail guard (8 - 14 ton outdoor units)
	WHG-SL-B	Left side wind/hail guard
	WHG-SR-B	Right side wind/hail guard
	WHG-R2-B	Rear wind/hail guard for 8 - 14 ton units
	WHG-F1-B	Front wind/hail guard for 8 - 14 ton outdoor units
	LACH-2-KIT-B	Low ambient cooling hood and side guards (medium chassis, 1 required)
	BPHK-460V-2	Base pan heater kit (base pan pan heater and control box, 1 required)
	MIM-B14U	External contact control interface module for operation and error output and night silent mode manual activation (1 required)

¹ Certified in accordance with the AHRI Variable Refrigerant Flow Multi-Split Air-Conditioners and Heat Pump (VRF) Certification Program which is based on the latest edition of AHRI Standard 1230-2021.

² Restrictions apply. Refer to DVM S2 technical data books for full details.

³ Other pipe restrictions and requirements exist. Please consult technical data book or installation manuals for full details regarding limitations and other requirements.

⁴ When the outdoor unit is lower than indoor units, and vertical separation is greater than 131 feet, additional conditions apply. When the outdoor unit is higher than the indoor units, and vertical separation is greater than 163 feet, additional conditions apply. Please refer to supporting documents at www.SamsungHVAC.com.

⁵ Cooling operation range is 23-122°F (-5 - 50°C) as standard. When in Main Heating, cooling operation down to 5°F (-15°C) outdoor temperature is possible with modified pipe design for indoor units that require cooling. Cooling or Main cooling is possible down to -13°F (-25°C) when using a low ambient cooling kit (LACH-2-KIT-B). Consult technical documents or Samsung HVAC for details.

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Job Name _____
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 Submitted to _____
 Unit Designation _____

Location _____
 Engineer _____
 Reference _____ Approval _____ Construction _____
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Specifications

Model	Indoor Unit Model Number (US Code)		AC024BNADCH/AA (CNH24ADB)	
	Outdoor Unit Model Number (US Code)		AC024BXADCH/AA (CXH24ADB)	
Performance	Nominal Capacity	Cooling / Heating (Btu/h)	24,000 / 27,000	
	Capacity Range	Cooling (Btu/h)	8,000 - 27,000	
		Heating (Btu/h)	7,000 - 40,000	
	AHRI 210-240 2017 ¹	SEER		18.9
		EER		10.3
		HSPF		10.80
	AHRI 210-240 2023 ²	SEER2		19.5
EER2			10.3	
HSPF2			8.5	
Power	Voltage	ø / V / Hz	1 / 208-230 / 60	
	Working Voltage Range (VAC)		187 - 253	
	Operating Current (min. / std. / max.)	Cooling (A)	2.5 / 10.6 / 12.9	
		Heating (A)	2.0 / 12.4 / 23.5	
	Max. Breaker	Amps	30	
Min. Circuit Ampacity (A)		24.1		
Dimensions	W X H X D (in.)	Indoor Unit	41 9/16 X 8 7/16 X 11 3/4	
		Outdoor Unit	37 X 39 5/16 X 13	
	Weight (lbs.)	Indoor Unit	28	
		Outdoor Unit	158.7	
Sound Pressure Level	Indoor Unit dB(A)	L / M / H	35 / 39 / 44	
	Outdoor Unit dB(A)	Cooling / Heating (high)	50 / 52	
Operating Temperatures	Outdoor	Cooling	23 ~ 122°F (-5 ~ 50°C) 0 ~ 122°F (-18 ~ 50°C) W/Baffle	
		Heating	-13 - 75°F (-25 - 24°C)	
	Indoor	Cooling	64 ~ 90°F (16 ~ 32°C)	
		Heating	T ≤ 86°F (30°C)	
Pipe Connections	Indoor & Outdoor	High side	1/4"	
		Low side	5/8"	
	Maximum (ft.)		164	
	Maximum Vertical Separation (ft.)		98.4	
Condensate Connection			11/16 in. OD	
Refrigerant	Type		R410A	
	Factory Charge	lbs.	5.73	
	Charged for		24.6 ft.	
Compressor	Manufacturer		Samsung	
	Type		Inverter Driven, Twin BLDC Rotary	
	RLA	Amps	15.9	
Evaporator Fan	Type		BLDC With Crossflow Fan (1)	
	Air Volume	CFM (L/M/H)	466 / 537 / 629	
	Output	Watts	27	
Condenser Fan	Motor		BLDC With Axial Type Fan (1)	
	FLA / Watts / CFM (max.)		1.25A X 1 / 125W X 1 / 2,684 CFM	
Safety	Certifications		UL 60335-2-40	
	Devices		PCB fuses, indoor unit terminal block thermal fuse, current transformer, over-voltage protection, crankcase heating, temperature limit protection logic, compressor overload sensing	



General Information

- The indoor unit shall feature "WindFree™" mode*. In cooling mode, as room temperature nears set temperature, the unit will close its louver and will disperse air into the space through thousands of micro-holes on the front of the indoor unit preventing cold air drafts on occupants
- The outdoor unit shall supply power to indoor unit via 14 AWG X 3 power wire
- High-voltage terminal block temperature sensor to disable unit in the event of power connection overheating
- Auto-restart after power loss
- Soft-start compressor minimizing current inrush
- Base pan heater equipped as standard
- All heat exchangers shall be mechanically bonded aluminum fin to copper tube
- The condensing unit heat exchanger salt spray test method: ISO-9227 - the heat exchanger showed no unusual rust or corrosion development to 3,000 hours.
- The system shall provide 100% heating capacity at -4°F (-20°C).

Option settings

- The outdoor unit shall have snow accumulation prevention option setting to prevent snow drifting against an idle outdoor unit.
- Night-time Quiet Mode: reduction of operational sound during evening hours (automatic or manual activation)
- Emergency Temperature Output (ETO) function: when indoor unit is in error status or when room temperature exceeds configurable temperature level, the system outputs a signal to an external source, e.g., backup system, building management system, alert device (ex: status light, warning lamp, buzzer)
- System can be configured as heating/cooling, cooling only, or heating only via outdoor unit option setting
- Maximum Current Control configurable from 50% - 100% via outdoor unit, wired controller, or central controls

Indoor Fan

- Indoor fan is a single crossflow type
- Three fan speed settings and auto setting
- Washable filter as standard
- The WindFree™ function will close the supply air outlet louver while in cooling mode to gently disperse cool air into the space without blowing directly onto occupants. The WindFree™ feature is optional and can be enabled using central or local control options
- The WindFree™ indoor unit has an integral humidity sensor that will open the louver for standard cool mode when space conditions could potentially cause condensation formation on the chassis surface

Construction

- Outdoor unit: Galvanized steel with a baked-on powder coated finish for durability
- Indoor unit: UL94 V0 with a galvanized steel mounting plate
- The indoor unit shall have easy access to wire, pipe, and drain connections via access panel on the front of the unit for easier installation and service

Controls

- Control wiring shall be 2 X 16 AWG
- Wireless controller included as standard
- Wired controllers must be purchased separately
- Dual set temperature support when connected to MWR-WG00UN Advanced Wired Controller or central control options
- No additional interface modules/adapters are required when connecting to Samsung central control options
- The unit shall be operated via a wireless or wired remote control with DDC type signal

Refrigerant System

- The compressor shall be hermetically sealed, inverter-controlled Twin BLDC rotary type
- Refrigerant flow shall be controlled by an electronic expansion valve at outdoor unit

Warranty

10 years compressor, 10 years parts, 1-year limited labor (conditions apply)

This publication reflects both the 1987 Appendix M metric (SEER) and the 2023 Appendix M1 metric (SEER2). Efficiency requirements are published at 10 C.F.R. 430.32(c). Please refer to www.AHRI.net for more information about updated energy metrics.

¹Performance data certified by AHRI to AHRI 210-240 (2017) with Addendum 1.

²Performance data certified by AHRI to AHRI 210-240 (2023). Effective January 1st, 2023.

Samsung HVAC maintains a policy of ongoing development; specifications are subject to change without notice. Refer to www.AHRI.directory.org for current reference numbers.

* The WindFree™ unit delivers an air current that is under 0.15 m/s while in WindFree™ mode. Air velocity that is below 0.15 m/s is considered "still air" as defined by ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers)

Select models are ENERGY STAR Labeled. Proper sizing and installation of equipment is critical to achieve performance. Split system air conditioners and heat pumps (excluding ductless systems) must be matched with appropriate coil components to meet ENERGY STAR criteria. Ask your contractor for details or visit www.energystar.gov.



Job Name _____
 Purchaser _____
 Submitted to _____
 Unit Designation _____

Location _____
 Engineer _____
 Reference _____ Approval _____ Construction _____
 Schedule # _____

System Specifications

Performance ¹	US Ton (nominal)		5
	Capacity (Btu/h)	Nominal Cooling	60,000
		Nominal Heating	66,000
	System Modulation down to (Btu/h)		7,500
	SEER2	Ducted / Non-Ducted	16.5 / 19.0
	EER2	Ducted / Non-Ducted	9.9 / 11.2
HSPF2	Ducted / Non-Ducted	9.5 / 9.8	
Power	Voltage	(ø/V/Hz)	1 / 208-230 / 60
	Maximum Circuit Breaker (MCCB/ELB/ELCB)		50
	Minimum Circuit Ampacity (MCA)		32
Indoor Units	Total Capacity (%)		50 - 130% Of Outdoor Capacity
	Maximum Indoor Unit Quantity		10
Compressor	Type	Flash Injected Scroll X 1	
	RLA	A	24.5
Refrigerant	Type	R410A	
	Factory Charge	lbs.	8.2
Pipe Connections	Liquid X Suction (braze)		3/8 X 3/4
Installation Limitation ²	Max. Distance - ODU to IDU (feet)		492 (574 equivalent)
	Vertical Separation (feet)	ODU to IDU ³	164 / 131
		Highest/Lowest IDU	49
	Total Refrigerant Pipe (feet)		984
Condenser Fan	Fan	Type	Propeller X 2
		Output (CFM)	4,767
	Motor	Type	BLDC
Output (W) / FLA (A)		139 X 2 / 0.6	
Dimensions	W X H X D	Inches	37 X 55 15/16 X 13
	Weight	lbs.	275.6
Sound Level	dB (A)	Max. (cooling / heating)	58 / 60
Operating Temperature Range	Cooling ⁴	°F(°C)	0 ~ 118°F (-18 ~ 48°C)
	Heating	°F(°C)	-13 ~ 75°F (-25 ~ 24°C)
Accessories	Wind Baffles	Front	WBF-6M
		Back	WBB-8M
	Wi-Fi Adapter		MIM-H04UN
	Mode Selector Switch For HP Systems		MCM-C200U
External contact control interface module (operation and error output, night silent mode manual activation)		MIM-B14	
Safety Certifications			ETL (UL 1995)
Protection Devices	Intelligent logic to ensure proper operation within unit design limitations and operational parameters High pressure sensor, low pressure sensor, over-voltage protection, compressor over-current protection, current transformer, fan motor voltage protection, fan motor thermal protection, high voltage fuses		



Compatibility

Only compatible with Samsung DVM S indoor units (AM****N***H**).

Construction

The unit shall be galvanized steel with a baked on powder coated finish.

Heat Exchanger

The heat exchanger shall be mechanically bonded fin to copper tube.

The aluminum fins of the heat exchanger shall have a protective coating.

Salt spray test method: ASTM-B117-18 - the heat exchanger showed no unusual rust or corrosion development to 2,280 hours.

Controls

The unit shall be operated via NASA Protocol with controls provided by Samsung

The outdoor unit shall have a removable EEPROM that stores unit serial number, startup information, system settings, system tag/name, and other information.

Controls shall integrate with Samsung central controls without additional interface modules

Control wiring shall be 16 AWG X 2 shielded wire.

Refrigerant System

The compressors shall be Samsung hermetically sealed, inverter driven, direct flash injected, DC scroll type with soft-start capability.

Flash injected compressors provide advanced low ambient heating performance.

Refrigerant flow shall be controlled by EEV (electronic expansion valve) throughout the system.

A flat plate subcooler device will improve capacity at extreme system refrigerant pipe lengths and reduce refrigerant noise.

Other Features

Advanced oil recovery cycle logic (maximum duration in cool mode: 3 minutes, maximum duration in heat mode: 6 minutes, defrost cycles lasting over 3 minutes are considered oil recovery cycles). Oil recovery operation shall not interrupt heating or cooling operation.

Optional night quiet modes to reduce outdoor unit sound (4 levels) with automatic activation or manual activation (with MIM-B14).

Advanced intelligent defrost logic to significantly reduce defrost cycle frequency by monitoring air resistance across the condenser coil during heating operation to determine defrost operation initiation to prevent unnecessary defrost cycles.

Optional snow blowing logic to prevent snow accumulation on idle outdoor units

Continuous operation while outdoor unit(s) change between heating and cooling modes (conditions apply).

Maximum current control of outdoor unit(s) to limit current (50% - 100% of design current) adjustable at outdoor unit or central control devices: DMS 2 (MIM-D00AN), DMS 2.5 (MIM-D01AUN), BACnet Gateway (MIM-B17N, MIM-B17BUN), LON Gateway (MIM-B18N, MIM-B18BUN).

Energy savings options to reduce system energy consumption in heating mode when average indoor room temperatures are greater than average indoor set temperatures.

¹ Certified in accordance with AHRI 210/240 (2023). Effective January 1st, 2023.

² Other pipe restrictions and requirements exist. Please consult installation manuals or technical data book for full details.

³ Vertical separation: 131' when outdoor unit is lower than the indoor units, 164' when the outdoor unit is higher than the indoor units.

⁴ When cooling in outside temperatures between 0°F ~ 23°F, wind baffles are required. When outside temperature is between 0°F ~ 23°F, minimum 50% operating capacity should be maintained to ensure reliability while in cooling mode.

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Proper sizing and installation of equipment is critical to achieve optimal performance. Split system air conditioners and heat pumps (excluding ductless systems) must be matched with appropriate coil components to meet ENERGY STAR criteria. Ask your contractor for details or visit www.energystar.gov.



Job Name _____
 Purchaser _____
 Submitted to _____
 Unit Designation _____

Location _____
 Engineer _____
 Reference _____ Approval _____ Construction _____
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Specifications

Model	Indoor Unit Model Number (US Code)		AC018BNADCH/AA (CNH18ADB)	
	Outdoor Unit Model Number (US Code)		AC018BXSCCC/AA (CXC18SCB)	
Performance	Nominal Capacity	Cooling (Btu/h)	18,000	
	Capacity Range	Cooling (Btu/h)	4,000 - 20,000	
	AHRI 210-240 2017 ¹	SEER		20.0
		EER		12.0
	AHRI 210-240 2023 ²	SEER2		20.5
EER2			12	
Power	Voltage	ø / V / Hz	1 / 208-230 / 60	
	Working Voltage Range (VAC)		187 - 253	
	Operating Current	(min. / std. / max.)	1.4 / 6.8 / 10.6	
	Max. Breaker	Amps	15	
	Min. Circuit Ampacity (A)		13.5	
Dimensions	W X H X D (in.)	Indoor Unit	41 9/16 X 8 7/16 X 11 3/4	
		Outdoor Unit	34 9/16 X 25 1/8 X 12 3/16	
	Weight (lbs.)	Indoor Unit	25.8	
		Outdoor Unit	89.3	
Sound Pressure Level	Indoor Unit dB(A)	L / M / H	32 / 37 / 42	
	Outdoor Unit dB(A)	High	48	
Operating Temperatures	Outdoor	°F (°C)	23 ~ 122°F (-5 ~ 50°C)	
			-40 ~ 122°F (-40 ~ 50°C) W/Baffle	
	Indoor	°F (°C)	64 ~ 90°F (16 ~ 32°C)	
Pipe Connections	Indoor & Outdoor	High side (flare)	1/4"	
		Low side (flare)	1/2"	
	Maximum (ft.)		98	
	Maximum Vertical Separation (ft.)		66	
Condensate Connection			1 1/16 in. OD	
Refrigerant	Type		R410A	
	Factory Charge	lbs.	2.87	
	Charged for		24.6 ft.	
Compressor	Manufacturer		Samsung	
	Type		Inverter Driven, Twin BLDC Rotary	
	RLA	Amps	8.2	
Evaporator Fan	Type		BLDC With Crossflow Fan (1)	
	Air Volume	CFM (L/M/H)	441 / 540 / 615	
	Output	Watts	27	
Condenser Fan	Motor		BLDC With Axial Type Fan (1)	
	FLA / Watts / CFM (max.)		0.97A X 1 / 125W X 1 / 1,413 CFM	
Safety	Certifications	UL 60335-2-40		
	Devices	PCB fuses, indoor unit terminal block thermal fuse, current transformer, over-voltage protection, crankcase heating, temperature limit protection logic, compressor overload sensing		



General Information

- The outdoor unit shall supply power to indoor unit via 14 AWG X 3 power wire
- High-voltage terminal block temperature sensor to disable unit in the event of power connection overheating
- Auto-restart after power loss
- Soft-start compressor minimizing current inrush
- All heat exchangers shall be mechanically bonded aluminum fin to copper tube
- The condensing unit heat exchanger salt spray test method: ASTM-B117-18 - the heat exchanger showed no unusual rust or corrosion development to 3,000 hours.
- Low ambient cooling to -40°F

Option settings

- The outdoor unit shall have snow accumulation prevention option setting to prevent snow drifting against an idle outdoor unit.
- Night-time Quiet Mode: reduction of operational sound during evening hours (*automatic or manual activation*)
- Emergency Temperature Output (ETO) function: when indoor unit is in error status or when room temperature exceeds configurable temperature level, the system outputs a signal to an external source, e.g., backup system, building management system, alert device (ex: status light, warning lamp, buzzer)
- Maximum Current Control configurable from 50% - 100% via outdoor unit, wired controller, or central controls.

Indoor Fan

- Indoor fan is a single crossflow type
- Three fan speed settings and auto setting
- Washable filter as standard
- The WindFree™* function will close the supply air outlet louver while in cooling mode to gently disperse cool air into the space without blowing directly onto occupants. The WindFree™* feature is optional and can be enabled using central or local control options
- The WindFree™* indoor unit has an integral humidity sensor that will open the louver for standard cool mode when space conditions could potentially cause condensation formation on the chassis surface

Construction

- Outdoor unit: Galvanized steel with a baked-on powder coated finish for durability
- Indoor unit: UL94 V0 with a galvanized steel mounting plate
- The indoor unit shall have easy access to wire, pipe, and drain connections via access panel on the front of the unit for easier installation and service

Controls

- Control wiring shall be 2 X 16 AWG
- Wireless controller included as standard
- Wired controllers must be purchased separately
- No additional interface modules/adapters are required when connecting to Samsung central control options
- The unit shall be operated via a wireless or wired remote control with DDC type signal

Refrigerant System

- The compressor shall be hermetically sealed, inverter-controlled Twin BLDC rotary type
- Refrigerant flow shall be controlled by an electronic expansion valve at outdoor unit

Warranty

7 years compressor, 5 years parts

This publication reflects both the 1987 Appendix M metric (SEER) and the 2023 Appendix M1 metric (SEER2). Efficiency requirements are published at 10 C.F.R. 430.32(c). Please refer to www.AHRInet.org for more information about updated energy metrics.

¹Performance data certified by AHRI to AHRI 210-240 (2017) with Addendum 1.

²Performance data certified by AHRI to AHRI 210-240 (2023). Effective January 1st, 2023.

Samsung HVAC maintains a policy of ongoing development, specifications are subject to change without notice. Refer to www.AHRIdirectory.org for current reference numbers.

*The WindFree™ unit delivers an air current that is under 0.15 m/s while in WindFree™ mode. Air velocity that is below 0.15 m/s is considered "still air" as defined by ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers)

Notice: US Federal law requires that the above model to be installed in all U.S. states and territories except in AZ, CA, NM, and NV. Federal law prohibits installation of this unit in these states.

Job Name _____
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Location _____
 Engineer _____
 Reference _____ Approval _____ Construction _____
 Schedule # _____

System Specifications

Performance	US Ton (nominal)	8		
	Capacity (Btu/h) ¹	Nominal / Rated Cooling	96,000 / 92,000	
		Nominal / Rated Heating	108,000 / 103,000	
	EER	Ducted / Mixed / Non-Ducted	12.4 / 12.75 / 13.1	
	IEER	Ducted / Mixed / Non-Ducted	24.1 / 26 / 27.9	
	High Heat COP	Ducted / Mixed / Non-Ducted	3.83 / 3.98 / 4.13	
Power	Voltage	(øV/Hz)	3 / 460 / 60	
	Maximum Circuit Breaker (MCCB/ELB/ELCB)	20		
	Minimum Circuit Ampacity (MCA)	18.0		
	SCCR	kA	5	
Indoor Units	Total Capacity (%)	50 - 184% Of outdoor unit capacity ²		
	Maximum Indoor Unit Quantity	16		
Compressor	Type X Qty.	Inverter Scroll X 2		
	RLA (A)	6.0		
	Compressor Modulation Range	5 - 100%		
Refrigerant	R410A Factory Charge (lbs.)	17.6		
Pipe Connections	Liquid X Suction (inches)	3/8 X 7/8		
Refrigerant Pipe Limitations ³	Max. Length - ODU to Farthest IDU (feet)	656 (722 equivalent)		
	Max. Vertical Separation	ODU to IDU (feet) ⁴	361	
		Highest/Lowest IDU (feet)	164	
	Max. Total Refrigerant Pipe Length (feet)	3,280		
Condenser Fan	Fan	Type X Qty.	Propeller X 2	
		Output (CFM)	9,924	
	Motor	Type	DC	
		Output (W)	620 X 2	
		FLA (A)	2.1 (each)	
Max. External Static Pressure (in. WC)	0.43			
Dimensions	W X H X D	Inches	51 X 66 3/4 X 30 1/8	
	Weight	lbs.	571.0	
	Shipping Weight	lbs.	608.5	
Sound Level	dB (A)	Max.	57	
Operating Temperatures	Cooling ⁵	°F (°C)	5 -122 (-15 - 50)	
	Heating	°F (°C)	-22 - 75 (-30 - 24)	
Safety Certifications	ETL & ETLc			
Protection Devices	Intelligent logic to ensure proper operation within unit design limitations and operational parameters.			
	High pressure sensor, low pressure sensor, over-voltage protection, compressor over-current protection, current transformer, fan motor voltage protection, fan motor thermal protection, overheat protection, phase detection protection, high voltage fuses			



Compatibility

DVM S indoor units (AM****N****/AA, ACL-***NN), AHU Kits (MXD-K***AN), Universal Communication Kits (MCM-D211UN), and Hydro Units (AM****NB****/AA).

Construction

The unit shall be galvanized steel with a baked on powder coated finish.

Refrigerant System

The compressor shall be hermetically sealed, inverter driven, direct flash injected, DC scroll type with soft-start capability manufactured by Samsung. Flash injected compressors provide advanced low ambient heating performance. The compressor shall feature an asymmetrical scroll design.

The system shall have subcooling devices to maintain capacity at extreme system refrigerant pipe lengths and to minimize refrigerant noise.

Heat Exchanger

The heat exchanger shall be mechanically bonded fin to copper tube. The aluminum fins of the heat exchanger shall have a protective coating.

Salt spray test method: ASTM-B117-18 - The heat exchanger showed no unusual rust or corrosion development to 3,000 hours.

The heat exchanger shall consist of two separate circuits to enhance the heat pump defrost cycle. The unit shall use the entire coil initially for the defrost cycle. To resume heating faster in extreme conditions, the upper section shall return to heating operation while the lower section continues to defrost.

Active Artificial Intelligence

The outdoor unit shall feature Active Artificial Intelligence (AI) shall monitor environmental and system operational data and use Deep Neural Network algorithms to provide optimal system performance and reliability.

Active Artificial Intelligence (AI) shall be used to optimize high pressure control, low pressure control, defrost cycle activation and operation, and low refrigerant detection.

The outdoor unit shall use Active Artificial Intelligence (AI) to monitor system refrigerant volume in real-time while in cooling mode to detect possible leaks or low refrigerant charge and provide an error code before system shutdown (conditions apply).

Controls

The outdoor unit shall have a removable EEPROM that stores unit serial number, startup information, system settings, system tag/name, and other information.

Control wiring shall be 16 AWG X 2 shielded wire.

Other Features

Inverter PCB cooling shall be done with liquid refrigerant and air to maintain optimal and safe operating temperatures.

The system shall feature advanced oil recovery cycle logic (maximum duration in cool mode: 3 minutes, maximum duration in heat mode: 6 minutes, defrost cycles lasting over 3 minutes are considered oil recovery cycles). Oil recovery operation shall not interrupt heating or cooling operation.

The outdoor unit shall feature optional night quiet modes to reduce outdoor unit sound (4 levels) with automatic activation or manual activation (with MIM-B14 accessory).

The outdoor unit shall feature advanced intelligent defrost logic to significantly reduce defrost cycle frequency by monitoring air resistance across the condenser coil during heating operation to determine defrost operation initiation to prevent unnecessary defrost cycles.

The outdoor unit shall feature optional snow blowing logic to prevent snow accumulation on idle outdoor units

The outdoor unit shall feature maximum current control settings to limit current (50% - 100% of design current) adjustable at outdoor unit, supported central controls, and supported indoor unit wired controllers.

The outdoor unit shall feature energy savings options to reduce system energy consumption when average indoor room temperatures are greater than average indoor set temperatures in heating mode or when average indoor room temperatures are lower than average indoor set temperatures in cooling mode.

Accessories

Qty.	Model Number	Description
	WHG-T2-B	Top wind/hail guard (8 - 14 ton outdoor units)
	WHG-SL-B	Left side wind/hail guard
	WHG-SR-B	Right side wind/hail guard
	WHG-R2-B	Rear wind/hail guard for 8 - 14 ton units
	WHG-F1-B	Front wind/hail guard for 8 - 14 ton outdoor units
	LACH-2-KIT-B	Low ambient cooling hood and side guards (medium chassis, 1 required)
	LACH-2-SIDE KIT-B	Low ambient cooling side guards (medium chassis, 1 required)
	MCM-C200	Heat pump mode selector switch
	BPHK-460V-2	Base pan heater kit (base pan pan heater and control box, 1 required)
	MIM-B14U	External contact control interface module for operation and error output and night silent mode manual activation (1 required)

¹ Certified in accordance with the AHRI Variable Refrigerant Flow Multi-Split Air-Conditioners and Heat Pump (VRF) Certification Program which is based on the latest edition of AHRI Standard 1230-2021.

² Restrictions apply. Refer to DVM S2 technical data books for full details.

³ Other pipe restrictions and requirements exist. Please consult technical data book or installation manuals for full details regarding limitations and other requirements.

⁴ When the outdoor unit is lower than indoor units, and vertical separation is greater than 131 feet, additional conditions apply. When the outdoor unit is higher than the indoor units, and vertical separation is greater than 163 feet, additional conditions apply. Please refer to supporting documents at www.SamsungHVAC.com.

⁵ When operating in cooling mode between -13°F (-25°C) and 5°F (-15°C) OA, a low ambient cooling kit (LACH-2-KIT-B) is required. When operating in cooling mode between 5°F (-15°C) and 23°F (-5°C) OA, a low ambient cooling side kit (LACH-2-SIDE KIT-B) is required. Refer to technical bulletin at www.samsunghvac.com for full details and requirements.

Samsung HVAC maintains a policy of ongoing development, specifications are subject to change without notice.

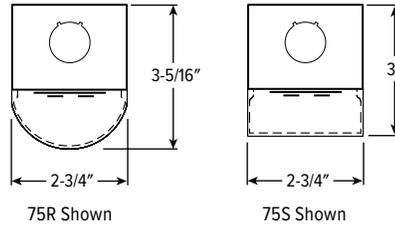


EXHIBIT I
Lighting Cut Sheets

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75R | 75S LED Narrow Strip



CATALOG #: _____

TYPE: _____

PROJECT: _____



FEATURES

- Small fixture profile allows inconspicuous placement in coves or confined spaces
- Round and square lenses provide a clean look for architectural environments
- Row applications produce continuous light with minimal interruption
- Diffuse acrylic lens enhances uniformity and minimizes glare
- Variety of mounting accessories for surface and suspended applications
- Special reflectors are available to provide precise light distribution
- HE option delivers superior efficacies up to 182 lm/W
- Optional wireguard provides added protection
- Six standard finish options and a wide selection of custom colors complement the architectural elements of any space
- 2', 3', 4', and 8' lengths available
- Available on QuickShip
- Wireless in-fixture control solutions available
- Made Right Here® in the USA

ORDERING EXAMPLE: 75R - 4 - L85/835 - OPTIONS - CONTROL/DIM - UNV

SERIES	LENGTH	LUMENS ⁽¹⁾				CRI	CCT
75R Round lens	2 22-1/2"	2'	3'	4'	8'	8 80	27 2700K
	3 33-9/16"	L15 1,500lm	L40 4,000lm	L30 3,000lm	L60 6,000lm	9 90	30 3000K
75S Square lens	4 44-5/8"	L25 2,500lm	L64 6,400lm	L50 5,000lm	L100 10,000lm		35 3500K
	8 89-1/4" ⁽²⁾	L32 3,200lm		L65 6,500lm	L130 13,000lm		40 4000K
		L42 4,200lm		L85 8,500lm	L170 17,000lm		50 5000K
				L100 10,000lm	L200 20,000lm		

OPTIONS ⁽³⁾

See page 3 for FINISH OPTIONS. See page 3 for SPECIAL REFLECTOR OPTIONS. See page 3 for QUICK-CONNECT OPTIONS.

- EM/10WLP Low-profile 10-watt emergency battery ⁽⁴⁾
- EM/10WRM Remote mount 10-watt emergency battery
- EM/10WRM/RTS Remote mount 10-watt emergency battery with regressed test switch
- HE High efficacy lumen package ⁽⁵⁾
- HA High ambient operating temperature, 40°C ⁽⁶⁾
- WG-75 11-gauge white powder coat wireguard ⁽⁷⁾
- 315 1-1/2" ceiling spacer
- VBV (2) Y-hangers
- VBV-2 (2) Y-hangers with 2' chains
- RA-75 Row aligner ⁽⁸⁾
- 45AMB (2) 45° adjustable mounting brackets ⁽⁹⁾

- FP Frosted polycarbonate lens for 75R
- (L___) Additional lower lumen packages available ⁽¹⁰⁾
Example: 7,000 nominal lumens = 75R-4-L85/835-(L70)
- QC Quick-connect wiring harness
- GEN Approved for UL 924 emergency generator circuit through-feed wiring ⁽¹¹⁾
- SP1 10kV surge protection, 120 or 277V
- SP2 10kV surge protection, 208 or 240V
- SP3 10kV surge protection, 347V

AIRCRAFT CABLES (EXAMPLE: ACF/D48) ⁽¹²⁾

Prefix	Type	Length
ACF/ Feeder	D 1" grid & hardpan	24 24"
ACJ/ Joiner	N 9/16" grid	48 48"
	S Slot grid	96 96"

SPECIFICATIONS

- HOUSING – 22-gauge die-formed C.R.S.
- SHIELDING – Diffuse acrylic lens. Frosted polycarbonate available for 75R, specify FP Option.
- FINISH – 92% minimum average reflective white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- ELECTRICAL – High-quality mid-power LED board. L70 > 72,000 hours per IES TM-21. L80 > 102,000 hours with HE option. 25°C maximum ambient operating temperature. 40°C maximum ambient operating temperature with HA Option, lumen restrictions apply, see fixture performance data. 50/60 Hz constant current driver.
- MOUNTING – Surface (ceiling or wall) or suspended (hanging hardware required).
- LISTINGS –
 - cETLus conforms to UL STD 1598. Certified to CAN/CSA STD C22.2 No. 250.0. Suitable for damp locations
 - UL 924 available, see Options.
 - DesignLights Consortium qualified product. Not all versions of this product may be DLC qualified, see the DLC Qualified Products List at designlights.org/GPL
 - Build America, Buy America (BABA) and Buy American Act (BAA) compliant. Request certification at hew.com/buy-american
- WARRANTY – 5-year limited warranty, see hew.com/warranty

CONTROL ⁽¹³⁾

See page 6 for ADDITIONAL CONTROL OPTIONS.

- None
- AVI-LVFA Avi-on wireless fixture control ⁽¹⁴⁾
- AVI-LVFA-PIR Avi-on wireless fixture control with high bay PIR motion and daylight sensor, bottom mount ⁽¹⁵⁾
- AVI-LVFA-CS2-PIR Avi-on wireless fixture control with PIR motion and daylight sensor, bottom mount ⁽¹⁶⁾
- AWN R Lutron Athena wireless node integral fixture control, RF only ⁽¹⁷⁾
- AWNS Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing ⁽¹⁸⁾

DRIVER

See page 8 for ADDITIONAL DRIVER OPTIONS.

- DIM Driver with external 0-10V dimming wires
- DRV Driver without external dimming wires
- DA Driver with 12V auxiliary power, without external dimming wires ⁽¹⁹⁾
- DSR Sensor-ready driver without external dimming wires (D4i DALI-2) ⁽²⁰⁾

VOLTAGE

- 120 120V
- 208 208V
- 240 240V
- 277 277V
- UNV 120-277V
- 347 347V ⁽²¹⁾

QUICKSHIP

75R-4-L50/835-QS-DIM-UNV	75R-8-L100/835-QS-DIM-UNV	75S-4-L50/835-QS-DIM-UNV	75S-8-L100/835-QS-DIM-UNV
75R-4-L50/840-QS-DIM-UNV	75R-8-L100/840-QS-DIM-UNV	75S-4-L50/840-QS-DIM-UNV	75S-8-L100/840-QS-DIM-UNV

NOTES

- Lumen output based on 80 CRI/3500K CCT. Actual performance may vary +/-5%, see page 2 for FIXTURE PERFORMANCE DATA. Additional lumen packages available, see options.
- Ships with (2) 4' lenses.
- Remote EM batteries: max remote distance 50', including suspension length. Large remote box provided. Specify CEC in the option code when California Energy Commission regulations are required. See page 4 for REMOTE MOUNT BATTERY DETAILS.
- Not available with 2' fixtures.
- Not available with 3' Length, 2' L15, 4' L30, or 8' L60 lumen packages. See page 2 for FIXTURE PERFORMANCE DATA.
- Lumen restrictions apply. See page 2 for FIXTURE PERFORMANCE DATA.
- Shipped separately, field-installed.
- Required when row mounting with aircraft cables.
- Cord recommended, ships separately. See page 4 for MOUNTING ACCESSORY DETAILS. Field-adjustable up and down in 7-1/2" increments.
- Specify in increments of 100 nominal lumens. Option must be specified with next higher lumen package.
- Maximum mounting height is 15.4' (4.7 m). Minimum lumen output is 400 lm/ft. See hew.com/UL924 for details.
- Units specified with aircraft cable require cord and RA-75 row aligner. See page 4 for MOUNTING ACCESSORY DETAILS.
- See page 4 for SENSOR & NODE PLACEMENT DETAILS. See page 5 for AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS.
- DA Driver only.
- DA Driver only.
- DA driver only.
- DA and DSR Drivers only.
- DA and DSR Drivers only.
- Avi-on, Lutron Athena, and LV-ZLS05 Controls only.
- Lutron Vive and Athena Controls only.
- Not available with EM batteries, DA, or DSR drivers.



75R | 75S LED Narrow Strip

FIXTURE PERFORMANCE DATA

	LED PACKAGE	DELIVERED LUMENS	STANDARD		HE OPTION		AMBIENT TEMPERATURE ⁽²⁾	
			WATTAGE	EFFICACY (lm/W)	WATTAGE	EFFICACY (lm/W)	EM	NO EM
2'	L15	1511	10.8	140	-	-	40	40
	L25	2470	18.2	136	14.8	167	40	40
	L32	2936	21.3	138	17.2	170	40	40
	L42	4124	31.4	132	23.0	180	35	40
3'	L40	3885	28.2	138	-	-	35	40
	L64	6259	48.2	130	-	-	30	35
	L30	2916	19.7	148	-	-	40	40
4'	L50	4867	33.0	148	26.7	182	40	40
	L65	5994	42.3	142	35.8	168	40	40
	L85	8098	56.2	144	47.6	170	35	40
	L100	9640	68.3	141	56.9	169	30	30
	L60	5520	35.3	157	-	-	40	40
8'	L100	9568	65.9	145	54.1	177	35	35
	L130	12353	87.9	141	70.8	175	35	35
	L170	16197	112.4	144	94.8	171	35	35
	L200	19281	136.5	141	113.9	169	30	30

MULTIPLIER TABLES

COLOR TEMPERATURE	
CCT	CONVERSION FACTOR
2700K	0.97
3000K	0.99
3500K	1.00
4000K	1.03
5000K	1.06

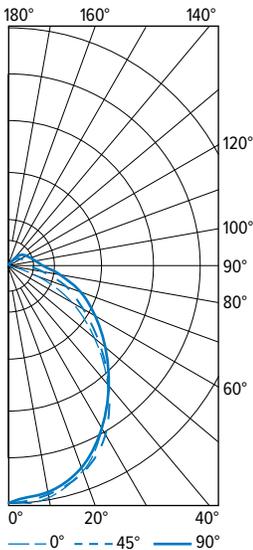
COLOR TEMPERATURE	
CCT	CONVERSION FACTOR
2700K	0.80
3000K	0.82
3500K	0.83
4000K	0.86
5000K	0.89

LENS	CONVERSION FACTOR
Standard	1.00
FP Option	0.95

- Photometrics tested in accordance with IESNA LM-79. Results based on 80 CRI/3500K CCT, average wattage for 120V through 277V input, and 25°C ambient temperature. Actual performance may vary +/-5%.
 - To calculate lumen output in emergency mode, multiply the battery wattage by the efficacy.
 - Use multiplier tables to calculate additional options.
- ¹ Maximum ambient operating temperature (°C) when specified with HA option.

PHOTOMETRY

75R-4-L85/835 Total Luminaire Output: 8098 lumens; 56.2 Watts | Efficacy: 144 lm/W | 80 CRI; 3500K CCT



VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
	0°	45°	90°	
0	2594	2594	2594	
5	2622	2585	2553	246
15	2503	2497	2480	703
25	2256	2306	2324	1059
35	1915	2042	2111	1264
45	1481	1673	1824	1281
55	1003	1296	1488	1135
65	620	942	1117	891
75	267	630	775	613
85	63	401	501	378
90	9	311	407	
95	1	249	329	225
105	0	150	219	136
115	0	94	149	83
125	0	53	102	47
135	0	28	63	24
145	0	12	35	10
155	0	6	16	3
165	0	0	4	0
175	0	0	0	0
180	0	0	0	0

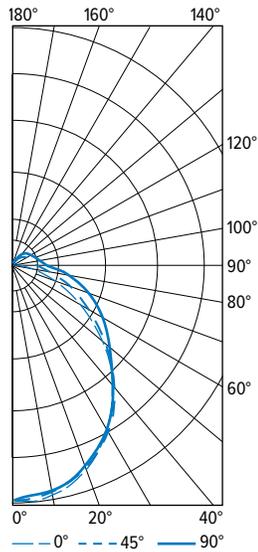
ZONE	LUMENS	% FIXTURE
0 - 30	2008	25
0 - 40	3272	40
0 - 60	5688	70
0 - 90	7570	94
90 - 120	443	6
90 - 150	524	7
90 - 180	527	7
0 - 180	8098	100

PHOTOMETRY CONTINUED ON NEXT PAGE.



75R | 75S LED Narrow Strip

75S-4-L85/835 Total Luminaire Output: 8098 lumens; 56.2 Watts | Efficacy: 144 lm/ W | 80 CRI; 3500K CCT

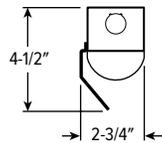


VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
	0°	45°	90°	
0	2732	2732	2732	
5	2756	2720	2682	258
15	2633	2611	2579	734
25	2351	2362	2323	1083
35	1969	2010	1965	1247
45	1516	1554	1583	1209
55	1053	1160	1291	1051
65	618	840	1022	826
75	270	542	745	563
85	47	323	491	332
90	0	246	390	
95	0	230	344	223
105	0	200	291	185
115	0	171	256	149
125	0	139	216	110
135	0	96	166	71
145	0	58	113	38
155	0	36	63	16
165	0	17	31	4
175	0	0	0	0
180	0	0	0	

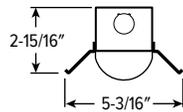
LUMEN SUMMARY	ZONE	LUMENS	% FIXTURE
	0 - 30	2075	26
	0 - 40	3321	41
	0 - 60	5581	69
	0 - 90	7301	90
	90 - 120	557	7
	90 - 150	777	10
	90 - 180	797	10
	0 - 180	8098	100

SPECIAL REFLECTOR OPTIONS

R1015



R1172



Reflectors ordered and shipped separately. Cannot be used with wireguard accessories. To remove reflector, first remove the lens.

Example: R1172-4-75LED REFL

QUICK-CONNECT OPTIONS

Note: Quick-connect wiring required for row mounting. All QC harnesses contain (5) 16ga conductors plus ground.

DESIGNATION	NUMBER OF 16GA WIRES FACTORY CONNECTED (EXCLUDING GROUND)	WIRE COLOR/POWER SUPPLY FACTORY CONNECTIONS	TYPICAL USE
QCBW	2	Black, White	On/off switching (DRV) or line voltage dimming (DIM LINE)
QCRW	2	Red, White	Alternating circuits on/off switching (DRV) or line voltage dimming (DIM LINE)
QCBRW	3	Black, Red, White	On/off switching (DRV) or line voltage dimming when equipped with EM battery packs
QCBW/PK	4	Black, White, Purple, Pink	Single circuit with 0-10V low voltage dimming (DIM)
QCRW/PK	4	Red, White, Purple, Pink	Alternating circuits on/off switching with 0-10V low voltage dimming (DIM)
QCBRW/PK	5	Black, Red, White, Purple, Pink	On/off switching when equipped with EM battery packs and 0-10V dimming (DIM)
QCBW/RPK	5	Black, White, Red, Purple, Pink	On/off switching with 0-10v dimming and 0-10v tunable using shared common
QCUU	N/A	N/A	QC harness passes through fixture, but is not connected to it

FINISH OPTIONS

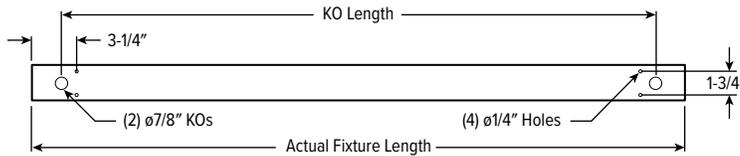


For custom color, please specify RAL code or a manufacturer code with description. All custom colors other than RAL require two sample swatches, minimum 1" square.

75R | 75S LED Narrow Strip

FIXTURE DETAILS

BACKVIEW

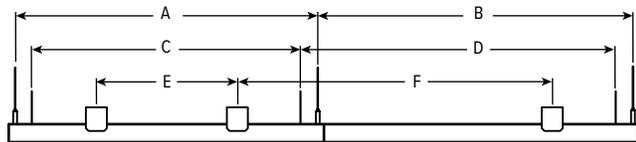


	7/8" KOs	ACTUAL FIXTURE LENGTH
2'	18-3/8"	22-1/2"
3'	29-1/2"	33-9/16"
4'	40-1/2"	44-5/8"
8'	85-1/8"	89-1/4"

MOUNTING ACCESSORY DETAILS

STAND ALONE

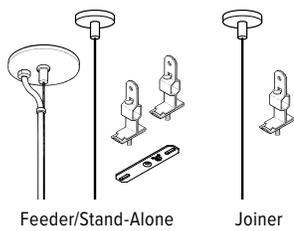
SUBSEQUENT



MOUNTING LENGTH

	AIRCRAFT CABLE		VBY HANGER		315 SPACER	
	A	B	C	D	E	F
2'	21-1/2"	22-1/2"	19"	22-1/2"	10"	22-1/2"
3'	32-1/2"	33-9/16"	30-1/16"	33-9/16"	21"	33-9/16"
4'	43-5/8"	44-5/8"	41-1/4"	44-5/8"	32"	44-5/8"
8'	88-3/16"	89-1/4"	85"	89-1/4"	77"	89-1/4"

STANDARD HARDWARE FOR SUSPENDED PRODUCT (Grid and Hardpan)



Notes:

- Fixtures are provided with adjustable length aircraft cables and mounting hardware, must specify.
- Electrical supply is brought into the feeder fixture, either as part of a row or as a stand-alone unit. Joiner fixtures complete the row.
- The feeder kits are standard with a 5" canopy to cover the junction box and a 2" canopy at the non-feed point. No J-box is required at non-feed points.
- Cable kit provides 10/32 male thread for connection to fixture.

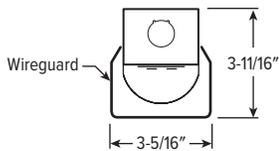
CORD FOR SUSPENDED PRODUCT

Units specified with aircraft cable require cord. Please specify cord type using ordering information below. Long fixture rows may require multiple feed points based on 18ga conductor size.

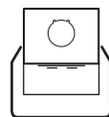
EXAMPLE: S2438D/W				
CORD TYPE	LENGTH	# OF COND. ^[1]	WIRE SIZE	COLOR
S	24 24"	3	8D 18ga	/W White /B Black
	48 48"	4		
	96 96"	5 6		

¹ Includes (2) 22ga purple & pink dimming conductors

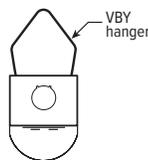
WG-75 75R



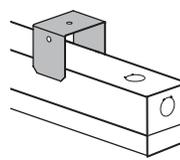
75S



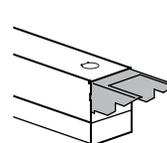
VBY



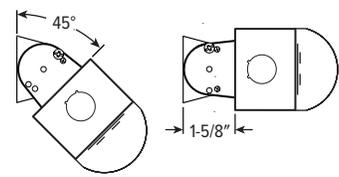
315



RA-75



45AMB



REMOTE MOUNT BATTERY DETAILS

EM/10WRM/RTS



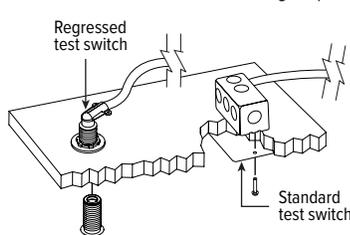
Regressed test switch
ø1-3/4"

EM/10WRM

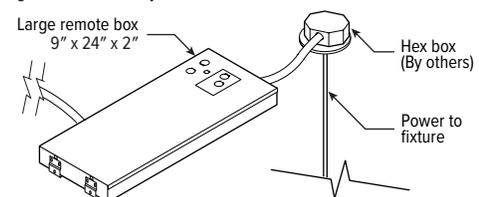


Standard test switch
2-3/4" x 4-1/2"

Max remote distance is 50' including suspension length, connection by others.

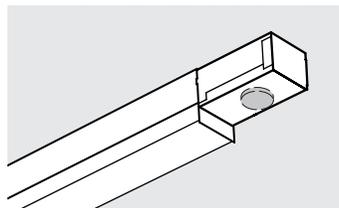


Large remote box
9" x 24" x 2"

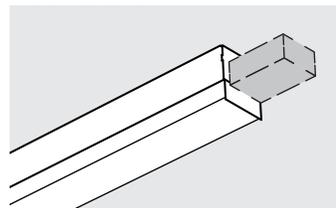


SENSOR & NODE PLACEMENT DETAILS

AVI-LVFA | AWNS | VDO | WS-FSP | LV-ZLS05



LV-OSFHU | SS-LSXR



75R | 75S LED Narrow Strip

AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS

FEATURES

Simple

- Gateway-free distributed control
- Contractor friendly installation
- Occupancy/vacancy/daylight sensing

Scalable

- Virtually unlimited network size
- Spans small areas to large garages
- Flexible control strategies

Secure

- Optional cloud connectivity
- UL IoT platinum security rating
- DLC 5.0 compliant

COMMISSIONING & INSTALLATION TOOLS

Avi-on mobile apps provide intuitive, quick installation and commissioning. Pro tools are available to qualified installers. Live commissioning training and on-site or remote support by Avi-on must be ordered separately through Avi-on.



Commissioning Mobile App



Zone Scanner Web App



Commissioning Pro App

SYSTEM COMPONENTS



The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Avi-on is under license. Other trademarks and trade names are those of their respective owners.

ACCESSORIES

WALL STATIONS

- AVI-B-2401AC-1** Scene controller - buttons numbered 1-4 and up/down/off, 120-277VAC
- AVI-B-2402BAT-1** Scene controller - buttons numbered 1-4 and up/down/off, battery powered
- AVI-B-2401AC-2** Dimmer with presets - buttons with percentages and up/down/off, 120-277VAC
- AVI-B-2402BAT-2** Dimmer with presets - buttons with percentages and up/down/off, battery powered
- AVI-B-2401AC-3** Two button control on/off or hold to dim up/down, 120-277VAC
- AVI-B-2402BAT-3** Two button control on/off or hold to dim up/down, battery powered

NETWORK

- AVI-RAB-LTE** Remote access bridge
- AVI-NTM** Network time manager with battery backup

CEILING MOUNT SENSORS

- AVI-KIT-SEN-DUCM** PIR motion and ultrasonic sensor kit
- AVI-KIT-SEN-ICM** PIR motion and photocell sensor kit

For load controllers and additional accessory info, see hew.com/avi-on

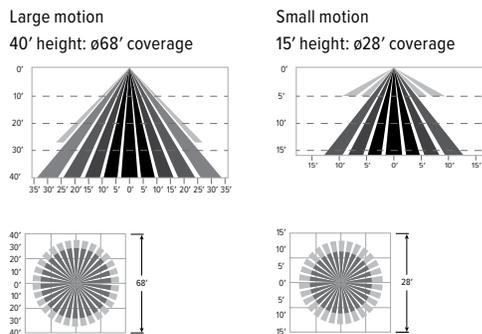
AVI-LVFA-PIR Avi-on wireless fixture control with high bay PIR motion and daylight sensor, bottom mount. DA Driver only.

SPECIFICATIONS

TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 45'
LENS	Single lens detects high and low bay motion.
DETECTION ANGLE	360°
TEMPERATURE RANGE	-30° to 70°C
RELATIVE HUMIDITY	90 to 95% at 30°C
COMMISSIONING	App (iOS or Android)
SYSTEM REQUIREMENTS	Avi-On wireless fixture controls plus desktop and mobile apps
MANUFACTURER	Avi-On



SENSOR COVERAGE PATTERNS



SENSOR DETAIL



Dimensions: 2-5/16" x 1-7/16"



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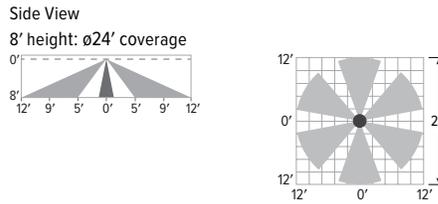
AVI-LVFA-CS2-PIR Avi-on wireless fixture control with PIR motion and daylight sensor. DA Driver only.

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 10'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-30° to 50°C
RELATIVE HUMIDITY	10 to 80% non-condensing
IP RATING	IP20
MANUFACTURER	Avi-On



Bluetooth® Lighting Controls

SENSOR COVERAGE PATTERNS



SENSOR DETAIL



Dimensions: 13/16" x 2-1/4"

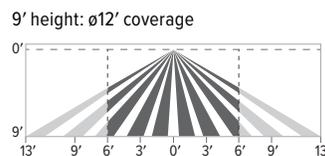
ADDITIONAL CONTROL OPTIONS

AWNS Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing. DA and DSR Drivers only.

SPECIFICATIONS	
TYPE	Radio Frequency
MOUNTING HEIGHT	8' – 12'
DETECTION ANGLE	360°
TEMPERATURE RANGE	0° to 55°C
RELATIVE HUMIDITY	0 to 90%, non-condensing
COMMISSIONING	Clear Connect gateway – Type X with app (iOS or Android)
MANUFACTURER	Lutron



SENSOR COVERAGE PATTERNS



Motion Sensor Coverage

CEILING HEIGHT	COVERAGE AREA (SQ FT)
8'	114
9'	144
10'	178
12'	256

SENSOR DETAIL



Dimensions: ø1-1/8"

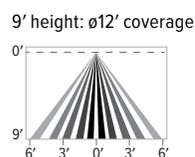
ATHENA CONTROL OPTIONS

CATALOG NUMBER	DESCRIPTION
AWNDR	Lutron Athena wireless node integral fixture control, RF only, for use with D4i DALI-2 or driver with 12V auxiliary power.
AWNS	Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing, for use with D4i DALI-2 or driver with 12V auxiliary power.
AWNDR-BL	Lutron Athena wireless node integral fixture control, RF only, for use with D4i DALI-2 or driver with 12V auxiliary power, black finish.
AWNS-BL	Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing, for use with D4i DALI-2 or driver with 12V auxiliary power, black finish.

VDO Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC). DSR or LDE Drivers only. LDE drivers require driver interface

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 12'
DETECTION ANGLE	360°
TEMPERATURE RANGE	0° to 55°C
RELATIVE HUMIDITY	0 to 90%, non-condensing
COMMISSIONING	App (iOS or Android)
MANUFACTURER	Lutron

SENSOR COVERAGE PATTERNS



Motion Sensor Coverage

CEILING HEIGHT	COVERAGE AREA (SQ FT)
8'	114
9'	144
10'	178
12'	256

SENSOR DETAIL



Dimensions: 2-11/16" x 1"

VIVE CONTROL OPTIONS

CATALOG NUMBER	DESCRIPTION
VRF	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF), for use with sensor-ready driver
VDO	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC), for use with sensor-ready driver
VRF/DBI	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF) and digital link interface, for use with Lutron Hi-lume 1% EcoSystem dimming LED driver
VDO/DBI	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC) and digital link interface, for use with Lutron Hi-lume 1% EcoSystem dimming LED driver

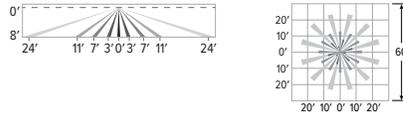
75R | 75S LED Narrow Strip

OCCWS-FSP-311-L_-120/277 Wattstopper PIR motion and daylight sensor, 120/277. Must specify lens: L2, L3, or L7. Factory installed.
OCCWS-FSP-211-L_-120/277 Wattstopper PIR motion and daylight sensor, 120/277. Must specify lens: L2, L3, or L7. Factory installed.
FSIR-100 Remote controller for 211 sensor. Please specify quantity required per project. Ordered and shipped separately.

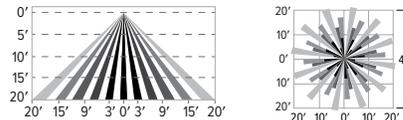
SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 40'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-40° to 75°C
COMMISSIONING	311 Sensor: App (iOS or Android) 211 Sensor: FSIR-100 Remote

SENSOR COVERAGE PATTERNS

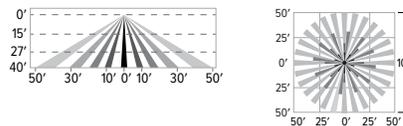
L2 8' height: ø48' coverage



L3 20' height: ø40' coverage



L7 40' height: ø100' coverage



SENSOR DETAIL



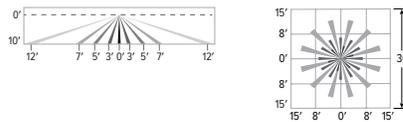
Dimensions
L2/L3: ø2-3/8" | L7: ø3-1/4"

LV-ZLS05-ILW Leviton PIR motion and daylight sensor. DA Driver only. Adjustable via remote. Optional ZLSOR-RA1 remote controller available.
ZLSOR-RA1 Remote controller for ZLS05 sensor. Please specify quantity required per project. Ordered and shipped separately.

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 10'
DETECTION ANGLE	120°
TEMPERATURE RANGE	-20° to 70°C
COMMISSIONING	DIP switches or optional remote: ZLSOR-RA1

SENSOR COVERAGE PATTERNS

10' height: ø24' coverage



SENSOR DETAIL



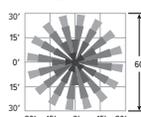
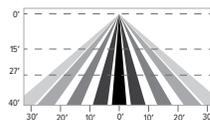
Dimensions: ø1-5/16"

OCCLV-OSFHU-ITW-120-347V Leviton PIR motion sensor, 120-347V.

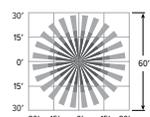
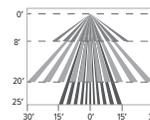
SPECIFICATIONS	
TYPE	PIR Motion
MOUNTING HEIGHT	8' – 40'
LENS	Interchangeable high bay, low bay or aisle mask
DETECTION ANGLE	360°
TEMPERATURE RANGE	-10° to 71°C
RELATIVE HUMIDITY	20% to 90% non-condensing

SENSOR COVERAGE PATTERNS

**High bay
40' height: ø60' coverage**



**Low bay
25' height: ø60' coverage**



SENSOR DETAIL



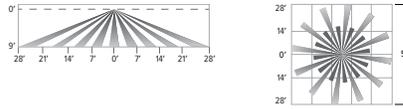
75R | 75S LED Narrow Strip

OCCSS LSXR-10-120-277 Sensor Switch PIR motion sensor, 120-277V
 OCCSS LSXR-10-347/480 Sensor Switch PIR motion sensor, 347/480V

SPECIFICATIONS	
TYPE	PIR Motion
MOUNTING HEIGHT	7' – 15'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-10° to 60°C
RELATIVE HUMIDITY	Up to 90% non-condensing

SENSOR COVERAGE PATTERNS

9' height: ø56' coverage



SENSOR DETAIL



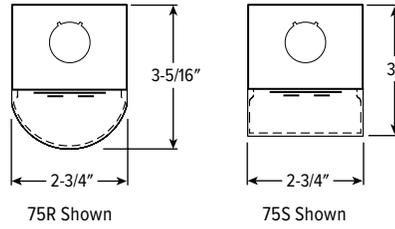
ADDITIONAL DRIVER OPTIONS

Note: Lumen restrictions apply, consult product builder at hew.com/product-builder

CATALOG NUMBER	DESCRIPTION
DRV	Driver without external dimming wires prewired for non-dimming applications
DIM	Driver with external dimming wires prewired for 0-10V low voltage applications
DIM1	1% driver with external dimming wires prewired for 0-10V low voltage applications
DIM LINE	Line voltage dimming driver (TRIAC and ELV compatible, 120V only)
DIM TRC	Line voltage dimming driver (TRIAC compatible, 120V only)
DA	Driver with 12V auxiliary power, without external dimming wires
DSR	Sensor-ready driver without external dimming wires (D4i DALI-2)
SD40	40% step-dimming driver
SD50	50% step-dimming driver
DALI	DALI dimming driver
LDE1	Lutron Hi-lume 1% EcoSystem dimming driver



75R | 75S LED Narrow Strip



CATALOG #: _____

TYPE: _____

PROJECT: _____



FEATURES

- Small fixture profile allows inconspicuous placement in coves or confined spaces
- Round and square lenses provide a clean look for architectural environments
- Row applications produce continuous light with minimal interruption
- Diffuse acrylic lens enhances uniformity and minimizes glare
- Variety of mounting accessories for surface and suspended applications
- Special reflectors are available to provide precise light distribution
- HE option delivers superior efficacies up to 182 lm/W
- Optional wireguard provides added protection
- Six standard finish options and a wide selection of custom colors complement the architectural elements of any space
- 2', 3', 4', and 8' lengths available
- Available on QuickShip
- Wireless in-fixture control solutions available
- Made Right Here® in the USA

SPECIFICATIONS

- HOUSING** – 22-gauge die-formed C.R.S.
- SHIELDING** – Diffuse acrylic lens. Frosted polycarbonate available for 75R, specify FP Option.
- FINISH** – 92% minimum average reflective white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- ELECTRICAL** – High-quality mid-power LED board. L70 > 72,000 hours per IES TM-21. L80 > 102,000 hours with HE option. 25°C maximum ambient operating temperature. 40°C maximum ambient operating temperature with HA Option, lumen restrictions apply, see fixture performance data. 50/60 Hz constant current driver.
- MOUNTING** – Surface (ceiling or wall) or suspended (hanging hardware required).
- LISTINGS** –
 - cETLus conforms to UL STD 1598. Certified to CAN/CSA STD C22.2 No. 250.0. Suitable for damp locations
 - UL 924 available, see Options.
 - DesignLights Consortium qualified product. Not all versions of this product may be DLC qualified, see the DLC Qualified Products List at designlights.org/GPL
 - Build America, Buy America (BABA) and Buy American Act (BAA) compliant. Request certification at hew.com/buy-american
- WARRANTY** – 5-year limited warranty, see hew.com/warranty

ORDERING EXAMPLE: 75R - 4 - L85/835 - OPTIONS - CONTROL/DIM - UNV

SERIES	LENGTH	LUMENS ⁽¹⁾				CRI	CCT
75R Round lens	2 22-1/2"	2'	3'	4'	8'	8 80	27 2700K
	3 33-9/16"	L15 1,500lm	L40 4,000lm	L30 3,000lm	L60 6,000lm	9 90	30 3000K
75S Square lens	4 44-5/8"	L25 2,500lm	L64 6,400lm	L50 5,000lm	L100 10,000lm		35 3500K
	8 89-1/4" ⁽²⁾	L32 3,200lm	L85 8,500lm	L65 6,500lm	L130 13,000lm		40 4000K
		L42 4,200lm	L100 10,000lm	L85 8,500lm	L170 17,000lm		50 5000K
			L100 10,000lm	L200 20,000lm			

OPTIONS ⁽³⁾

See page 3 for FINISH OPTIONS. See page 3 for SPECIAL REFLECTOR OPTIONS. See page 3 for QUICK-CONNECT OPTIONS.

- EM/10WLP** Low-profile 10-watt emergency battery ⁽⁴⁾
- EM/10WRM** Remote mount 10-watt emergency battery
- EM/10WRM/RTS** Remote mount 10-watt emergency battery with regressed test switch
- HE** High efficacy lumen package ⁽⁵⁾
- HA** High ambient operating temperature, 40°C ⁽⁶⁾
- WG-75** 11-gauge white powder coat wireguard ⁽⁷⁾
- 315** 1-1/2" ceiling spacer
- VBV** (2) Y-hangers
- VBV-2** (2) Y-hangers with 2' chains
- RA-75** Row aligner ⁽⁸⁾
- 45AMB** (2) 45° adjustable mounting brackets ⁽⁹⁾

- FP** Frosted polycarbonate lens for 75R
- (L__)** Additional lower lumen packages available ⁽¹⁰⁾
Example: 7,000 nominal lumens = 75R-4-L85/835-(L70)
- QC__** Quick-connect wiring harness
- GEN** Approved for UL 924 emergency generator circuit through-feed wiring ⁽¹¹⁾
- SP1** 10kV surge protection, 120 or 277V
- SP2** 10kV surge protection, 208 or 240V
- SP3** 10kV surge protection, 347V

AIRCRAFT CABLES (EXAMPLE: ACF/D48) ⁽¹²⁾

Prefix	Type	Length
ACF/ Feeder	D 1" grid & hardpan	24 24"
ACJ/ Joiner	N 9/16" grid	48 48"
	S Slot grid	96 96"

CONTROL ⁽¹³⁾

See page 6 for ADDITIONAL CONTROL OPTIONS.

- None
- AVI-LVFA** Avi-on wireless fixture control ⁽¹⁴⁾
- AVI-LVFA-PIR** Avi-on wireless fixture control with high bay PIR motion and daylight sensor, bottom mount ⁽¹⁵⁾
- AVI-LVFA-CS2-PIR** Avi-on wireless fixture control with PIR motion and daylight sensor, bottom mount ⁽¹⁶⁾
- AWN R** Lutron Athena wireless node integral fixture control, RF only ⁽¹⁷⁾
- AWN S** Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing ⁽¹⁸⁾

DRIVER

- See page 8 for ADDITIONAL DRIVER OPTIONS.
- DIM** Driver with external 0-10V dimming wires
- DRV** Driver without external dimming wires
- DA** Driver with 12V auxiliary power, without external dimming wires ⁽¹⁹⁾
- DSR** Sensor-ready driver without external dimming wires (D4i DALI-2) ⁽²⁰⁾

VOLTAGE

- 120 120V
- 208 208V
- 240 240V
- 277 277V
- UNV 120-277V
- 347 347V ⁽²¹⁾

QUICKSHIP

75R-4-L50/835-QS-DIM-UNV	75R-8-L100/835-QS-DIM-UNV	75S-4-L50/835-QS-DIM-UNV	75S-8-L100/835-QS-DIM-UNV
75R-4-L50/840-QS-DIM-UNV	75R-8-L100/840-QS-DIM-UNV	75S-4-L50/840-QS-DIM-UNV	75S-8-L100/840-QS-DIM-UNV

NOTES

- Lumen output based on 80 CRI/3500K CCT. Actual performance may vary +/-5%, see page 2 for FIXTURE PERFORMANCE DATA. Additional lumen packages available, see options.
- Ships with (2) 4' lenses.
- Remote EM batteries: max remote distance 50', including suspension length. Large remote box provided. Specify CEC in the option code when California Energy Commission regulations are required. See page 4 for REMOTE MOUNT BATTERY DETAILS.
- Not available with 2' fixtures.
- Not available with 3' Length, 2' L15, 4' L30, or 8' L60 lumen packages. See page 2 for FIXTURE PERFORMANCE DATA.
- Lumen restrictions apply. See page 2 for FIXTURE PERFORMANCE DATA.
- Shipped separately, field-installed.
- Required when row mounting with aircraft cables.
- Cord recommended, ships separately. See page 4 for MOUNTING ACCESSORY DETAILS. Field-adjustable up and down in 7-1/2" increments.
- Specify in increments of 100 nominal lumens. Option must be specified with next higher lumen package.
- Maximum mounting height is 15.4' (4.7 m). Minimum lumen output is 400 lm/ft. See hew.com/UL924 for details.
- Units specified with aircraft cable require cord and RA-75 row aligner. See page 4 for MOUNTING ACCESSORY DETAILS.
- See page 4 for SENSOR & NODE PLACEMENT DETAILS. See page 5 for AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS.
- DA Driver only.
- DA Driver only.
- DA driver only.
- DA and DSR Drivers only.
- DA and DSR Drivers only.
- Avi-on, Lutron Athena, and LV-ZLS05 Controls only.
- Lutron Vive and Athena Controls only.
- Not available with EM batteries, DA, or DSR drivers.



75R | 75S LED Narrow Strip

FIXTURE PERFORMANCE DATA

	LED PACKAGE	DELIVERED LUMENS	STANDARD		HE OPTION		AMBIENT TEMPERATURE ⁽²⁾	
			WATTAGE	EFFICACY (lm/W)	WATTAGE	EFFICACY (lm/W)	EM	NO EM
2'	L15	1511	10.8	140	-	-	40	40
	L25	2470	18.2	136	14.8	167	40	40
	L32	2936	21.3	138	17.2	170	40	40
3'	L42	4124	31.4	132	23.0	180	35	40
	L40	3885	28.2	138	-	-	35	40
	L64	6259	48.2	130	-	-	30	35
4'	L30	2916	19.7	148	-	-	40	40
	L50	4867	33.0	148	26.7	182	40	40
	L65	5994	42.3	142	35.8	168	40	40
	L85	8098	56.2	144	47.6	170	35	40
	L100	9640	68.3	141	56.9	169	30	30
8'	L60	5520	35.3	157	-	-	40	40
	L100	9568	65.9	145	54.1	177	35	35
	L130	12353	87.9	141	70.8	175	35	35
	L170	16197	112.4	144	94.8	171	35	35
	L200	19281	136.5	141	113.9	169	30	30

MULTIPLIER TABLES

COLOR TEMPERATURE	
CCT	CONVERSION FACTOR
2700K	0.97
3000K	0.99
3500K	1.00
4000K	1.03
5000K	1.06

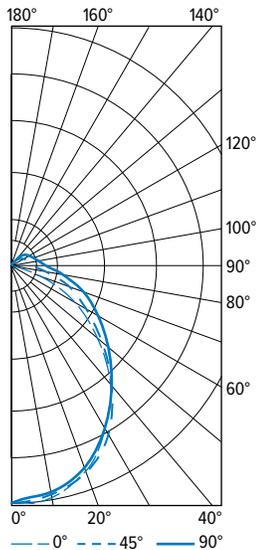
COLOR TEMPERATURE	
CCT	CONVERSION FACTOR
2700K	0.80
3000K	0.82
3500K	0.83
4000K	0.86
5000K	0.89

LENS	CONVERSION FACTOR
Standard	1.00
FP Option	0.95

- Photometrics tested in accordance with IESNA LM-79. Results based on 80 CRI/3500K CCT, average wattage for 120V through 277V input, and 25°C ambient temperature. Actual performance may vary +/-5%.
 - To calculate lumen output in emergency mode, multiply the battery wattage by the efficacy.
 - Use multiplier tables to calculate additional options.
- ¹ Maximum ambient operating temperature (°C) when specified with HA option.

PHOTOMETRY

75R-4-L85/835 Total Luminaire Output: 8098 lumens; 56.2 Watts | Efficacy: 144 lm/W | 80 CRI; 3500K CCT



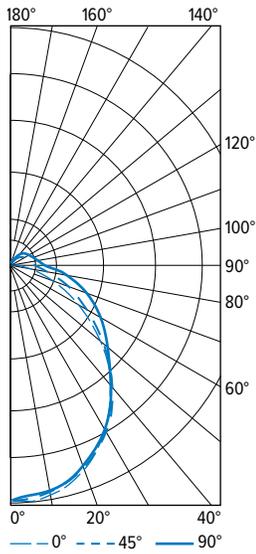
VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
	0°	45°	90°	
0	2594	2594	2594	
5	2622	2585	2553	246
15	2503	2497	2480	703
25	2256	2306	2324	1059
35	1915	2042	2111	1264
45	1481	1673	1824	1281
55	1003	1296	1488	1135
65	620	942	1117	891
75	267	630	775	613
85	63	401	501	378
90	9	311	407	
95	1	249	329	225
105	0	150	219	136
115	0	94	149	83
125	0	53	102	47
135	0	28	63	24
145	0	12	35	10
155	0	6	16	3
165	0	0	4	0
175	0	0	0	0
180	0	0	0	

ZONE	LUMENS	% FIXTURE
0 - 30	2008	25
0 - 40	3272	40
0 - 60	5688	70
0 - 90	7570	94
90 - 120	443	6
90 - 150	524	7
90 - 180	527	7
0 - 180	8098	100

PHOTOMETRY CONTINUED ON NEXT PAGE.

75R | 75S LED Narrow Strip

75S-4-L85/835 Total Luminaire Output: 8098 lumens; 56.2 Watts | Efficacy: 144 lm/ W | 80 CRI; 3500K CCT

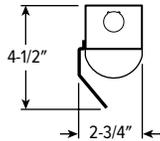


VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
	0°	45°	90°	
0	2732	2732	2732	
5	2756	2720	2682	258
15	2633	2611	2579	734
25	2351	2362	2323	1083
35	1969	2010	1965	1247
45	1516	1554	1583	1209
55	1053	1160	1291	1051
65	618	840	1022	826
75	270	542	745	563
85	47	323	491	332
90	0	246	390	
95	0	230	344	223
105	0	200	291	185
115	0	171	256	149
125	0	139	216	110
135	0	96	166	71
145	0	58	113	38
155	0	36	63	16
165	0	17	31	4
175	0	0	0	0
180	0	0	0	

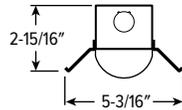
LUMEN SUMMARY	ZONE	LUMENS	% FIXTURE
	0 - 30	2075	26
	0 - 40	3321	41
	0 - 60	5581	69
	0 - 90	7301	90
	90 - 120	557	7
	90 - 150	777	10
	90 - 180	797	10
	0 - 180	8098	100

SPECIAL REFLECTOR OPTIONS

R1015



R1172



Reflectors ordered and shipped separately. Cannot be used with wireguard accessories. To remove reflector, first remove the lens.

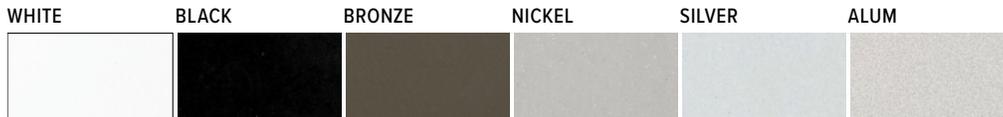
Example: **R1172-4-75LED REFL**

QUICK-CONNECT OPTIONS

Note: Quick-connect wiring required for row mounting. All QC harnesses contain (5) 16ga conductors plus ground.

DESIGNATION	NUMBER OF 16GA WIRES FACTORY CONNECTED (EXCLUDING GROUND)	WIRE COLOR/POWER SUPPLY FACTORY CONNECTIONS	TYPICAL USE
QCBW	2	Black, White	On/off switching (DRV) or line voltage dimming (DIM LINE)
QCRW	2	Red, White	Alternating circuits on/off switching (DRV) or line voltage dimming (DIM LINE)
QCBRW	3	Black, Red, White	On/off switching (DRV) or line voltage dimming when equipped with EM battery packs
QCBW/PK	4	Black, White, Purple, Pink	Single circuit with 0-10V low voltage dimming (DIM)
QCRW/PK	4	Red, White, Purple, Pink	Alternating circuits on/off switching with 0-10V low voltage dimming (DIM)
QCBRW/PK	5	Black, Red, White, Purple, Pink	On/off switching when equipped with EM battery packs and 0-10V dimming (DIM)
QCBW/RPK	5	Black, White, Red, Purple, Pink	On/off switching with 0-10v dimming and 0-10v tunable using shared common
QCUU	N/A	N/A	QC harness passes through fixture, but is not connected to it

FINISH OPTIONS



For custom color, please specify RAL code or a manufacturer code with description. All custom colors other than RAL require two sample swatches, minimum 1" square.



75R | 75S LED Narrow Strip

FIXTURE DETAILS

BACKVIEW

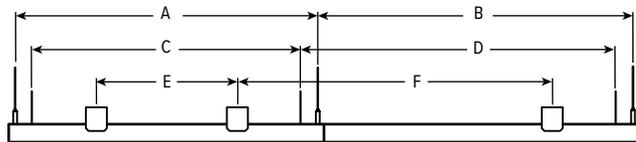


	7/8" KOs	ACTUAL FIXTURE LENGTH
2'	18-3/8"	22-1/2"
3'	29-1/2"	33-9/16"
4'	40-1/2"	44-5/8"
8'	85-1/8"	89-1/4"

MOUNTING ACCESSORY DETAILS

STAND ALONE

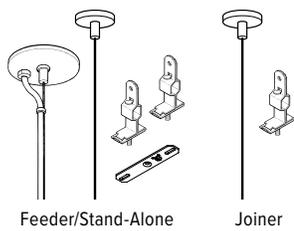
SUBSEQUENT



MOUNTING LENGTH

	AIRCRAFT CABLE		VBY HANGER		315 SPACER	
	A	B	C	D	E	F
2'	21-1/2"	22-1/2"	19"	22-1/2"	10"	22-1/2"
3'	32-1/2"	33-9/16"	30-1/16"	33-9/16"	21"	33-9/16"
4'	43-5/8"	44-5/8"	41-1/4"	44-5/8"	32"	44-5/8"
8'	88-3/16"	89-1/4"	85"	89-1/4"	77"	89-1/4"

STANDARD HARDWARE FOR SUSPENDED PRODUCT (Grid and Hardpan)



Notes:

- Fixtures are provided with adjustable length aircraft cables and mounting hardware, must specify.
- Electrical supply is brought into the feeder fixture, either as part of a row or as a stand-alone unit. Joiner fixtures complete the row.
- The feeder kits are standard with a 5" canopy to cover the junction box and a 2" canopy at the non-feed point. No J-box is required at non-feed points.
- Cable kit provides 10/32 male thread for connection to fixture.

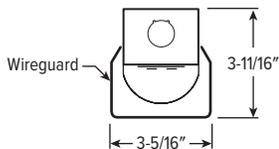
CORD FOR SUSPENDED PRODUCT

Units specified with aircraft cable require cord. Please specify cord type using ordering information below. Long fixture rows may require multiple feed points based on 18ga conductor size.

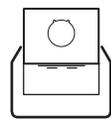
EXAMPLE: S2438D/W				
CORD TYPE	LENGTH	# OF COND. ^[1]	WIRE SIZE	COLOR
S	24 24"	3	8D 18ga	/W White /B Black
	48 48"	4		
	96 96"	5 6		

¹ Includes (2) 22ga purple & pink dimming conductors

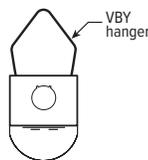
WG-75 75R



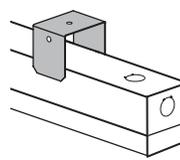
75S



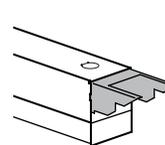
VBY



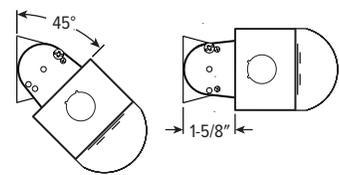
315



RA-75



45AMB



REMOTE MOUNT BATTERY DETAILS

EM/10WRM/RTS



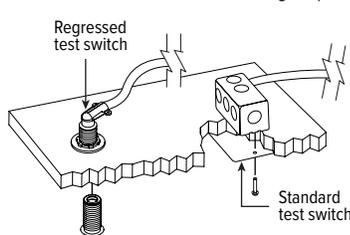
Regressed test switch
ø1-3/4"

EM/10WRM

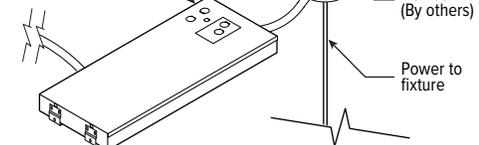


Standard test switch
2-3/4" x 4-1/2"

Max remote distance is 50' including suspension length, connection by others.

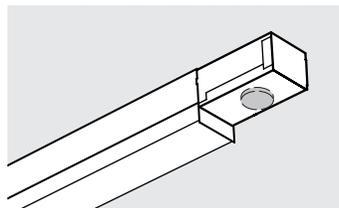


Large remote box
9" x 24" x 2"

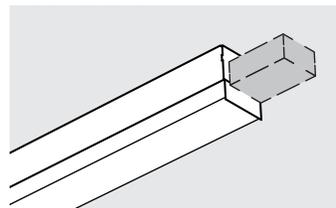


SENSOR & NODE PLACEMENT DETAILS

AVI-LVFA | AWNS | VDO | WS-FSP | LV-ZLS05



LV-OSFHU | SS-LSXR



75R | 75S LED Narrow Strip

AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS

FEATURES

Simple

- Gateway-free distributed control
- Contractor friendly installation
- Occupancy/vacancy/daylight sensing

Scalable

- Virtually unlimited network size
- Spans small areas to large garages
- Flexible control strategies

Secure

- Optional cloud connectivity
- UL IoT platinum security rating
- DLC 5.0 compliant

COMMISSIONING & INSTALLATION TOOLS

Avi-on mobile apps provide intuitive, quick installation and commissioning. Pro tools are available to qualified installers. Live commissioning training and on-site or remote support by Avi-on must be ordered separately through Avi-on.



Commissioning Mobile App



Zone Scanner Web App



Commissioning Pro App

SYSTEM COMPONENTS



The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Avi-on is under license. Other trademarks and trade names are those of their respective owners.

ACCESSORIES

WALL STATIONS

- AVI-B-2401AC-1** Scene controller - buttons numbered 1-4 and up/down/off, 120-277VAC
- AVI-B-2402BAT-1** Scene controller - buttons numbered 1-4 and up/down/off, battery powered
- AVI-B-2401AC-2** Dimmer with presets - buttons with percentages and up/down/off, 120-277VAC
- AVI-B-2402BAT-2** Dimmer with presets - buttons with percentages and up/down/off, battery powered
- AVI-B-2401AC-3** Two button control on/off or hold to dim up/down, 120-277VAC
- AVI-B-2402BAT-3** Two button control on/off or hold to dim up/down, battery powered

NETWORK

- AVI-RAB-LTE** Remote access bridge
- AVI-NTM** Network time manager with battery backup

CEILING MOUNT SENSORS

- AVI-KIT-SEN-DUCM** PIR motion and ultrasonic sensor kit
- AVI-KIT-SEN-ICM** PIR motion and photocell sensor kit

For load controllers and additional accessory info, see hew.com/avi-on

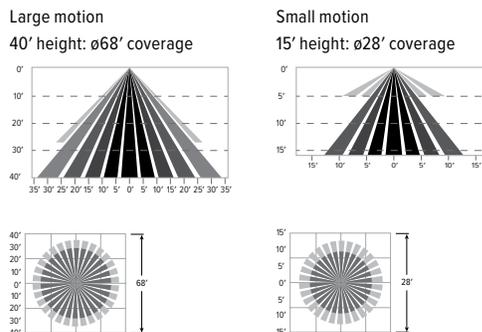
AVI-LVFA-PIR Avi-on wireless fixture control with high bay PIR motion and daylight sensor, bottom mount. DA Driver only.

SPECIFICATIONS

TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 45'
LENS	Single lens detects high and low bay motion.
DETECTION ANGLE	360°
TEMPERATURE RANGE	-30° to 70°C
RELATIVE HUMIDITY	90 to 95% at 30°C
COMMISSIONING	App (iOS or Android)
SYSTEM REQUIREMENTS	Avi-On wireless fixture controls plus desktop and mobile apps
MANUFACTURER	Avi-On



SENSOR COVERAGE PATTERNS



SENSOR DETAIL



Dimensions: 2-5/16" x 1-7/16"



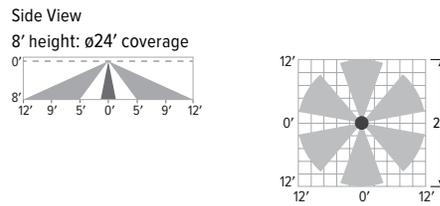
75R | 75S LED Narrow Strip

AVI-LVFA-CS2-PIR Avi-on wireless fixture control with PIR motion and daylight sensor. DA Driver only.

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 10'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-30° to 50°C
RELATIVE HUMIDITY	10 to 80% non-condensing
IP RATING	IP20
MANUFACTURER	Avi-On



SENSOR COVERAGE PATTERNS



SENSOR DETAIL



Dimensions: 13/16" x 2-1/4"

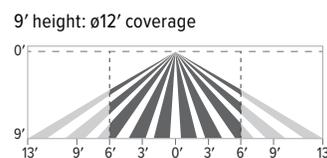
ADDITIONAL CONTROL OPTIONS

AWNS Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing. DA and DSR Drivers only.

SPECIFICATIONS	
TYPE	Radio Frequency
MOUNTING HEIGHT	8' – 12'
DETECTION ANGLE	360°
TEMPERATURE RANGE	0° to 55°C
RELATIVE HUMIDITY	0 to 90%, non-condensing
COMMISSIONING	Clear Connect gateway – Type X with app (iOS or Android)
MANUFACTURER	Lutron



SENSOR COVERAGE PATTERNS



Motion Sensor Coverage

CEILING HEIGHT	COVERAGE AREA (SQ FT)
8'	114
9'	144
10'	178
12'	256

SENSOR DETAIL



Dimensions: ø1-1/8"

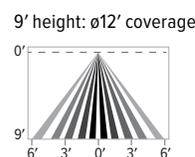
ATHENA CONTROL OPTIONS

CATALOG NUMBER	DESCRIPTION
AWNDR	Lutron Athena wireless node integral fixture control, RF only, for use with D4i DALI-2 or driver with 12V auxiliary power.
AWNS	Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing, for use with D4i DALI-2 or driver with 12V auxiliary power.
AWNDR-BL	Lutron Athena wireless node integral fixture control, RF only, for use with D4i DALI-2 or driver with 12V auxiliary power, black finish.
AWNS-BL	Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing, for use with D4i DALI-2 or driver with 12V auxiliary power, black finish.

VDO Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC). DSR or LDE Drivers only. LDE drivers require driver interface

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 12'
DETECTION ANGLE	360°
TEMPERATURE RANGE	0° to 55°C
RELATIVE HUMIDITY	0 to 90%, non-condensing
COMMISSIONING	App (iOS or Android)
MANUFACTURER	Lutron

SENSOR COVERAGE PATTERNS



Motion Sensor Coverage

CEILING HEIGHT	COVERAGE AREA (SQ FT)
8'	114
9'	144
10'	178
12'	256

SENSOR DETAIL



Dimensions: 2-11/16" x 1"

VIVE CONTROL OPTIONS

CATALOG NUMBER	DESCRIPTION
VRF	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF), for use with sensor-ready driver
VDO	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC), for use with sensor-ready driver
VRF/DBI	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF) and digital link interface, for use with Lutron Hi-lume 1% EcoSystem dimming LED driver
VDO/DBI	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC) and digital link interface, for use with Lutron Hi-lume 1% EcoSystem dimming LED driver

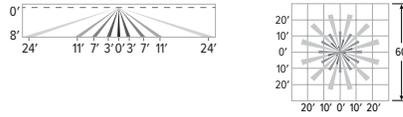
75R | 75S LED Narrow Strip

OCCWS-FSP-311-L_-120/277 Wattstopper PIR motion and daylight sensor, 120/277. Must specify lens: L2, L3, or L7. Factory installed.
OCCWS-FSP-211-L_-120/277 Wattstopper PIR motion and daylight sensor, 120/277. Must specify lens: L2, L3, or L7. Factory installed.
FSIR-100 Remote controller for 211 sensor. Please specify quantity required per project. Ordered and shipped separately.

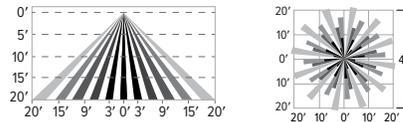
SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 40'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-40° to 75°C
COMMISSIONING	311 Sensor: App (iOS or Android) 211 Sensor: FSIR-100 Remote

SENSOR COVERAGE PATTERNS

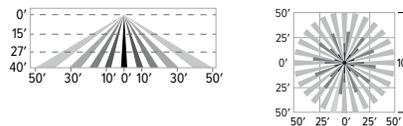
L2 8' height: ø48' coverage



L3 20' height: ø40' coverage



L7 40' height: ø100' coverage



SENSOR DETAIL



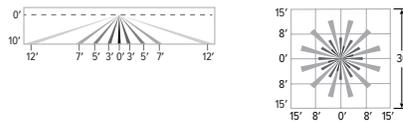
Dimensions
L2/L3: ø2-3/8" | L7: ø3-1/4"

LV-ZLS05-ILW Leviton PIR motion and daylight sensor. DA Driver only. Adjustable via remote. Optional ZLSOR-RA1 remote controller available.
ZLSOR-RA1 Remote controller for ZLS05 sensor. Please specify quantity required per project. Ordered and shipped separately.

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 10'
DETECTION ANGLE	120°
TEMPERATURE RANGE	-20° to 70°C
COMMISSIONING	DIP switches or optional remote: ZLSOR-RA1

SENSOR COVERAGE PATTERNS

10' height: ø24' coverage



SENSOR DETAIL



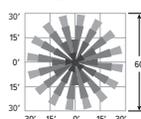
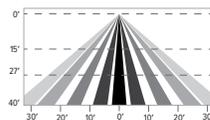
Dimensions: ø1-5/16"

OCCLV-OSFHU-ITW-120-347 Leviton PIR motion sensor, 120-347V.

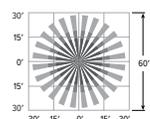
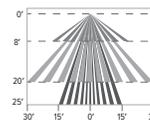
SPECIFICATIONS	
TYPE	PIR Motion
MOUNTING HEIGHT	8' – 40'
LENS	Interchangeable high bay, low bay or aisle mask
DETECTION ANGLE	360°
TEMPERATURE RANGE	-10° to 71°C
RELATIVE HUMIDITY	20% to 90% non-condensing

SENSOR COVERAGE PATTERNS

**High bay
40' height: ø60' coverage**



**Low bay
25' height: ø60' coverage**



SENSOR DETAIL



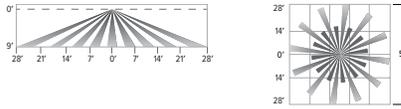
75R | 75S LED Narrow Strip

OCCSS LSXR-10-120-277 Sensor Switch PIR motion sensor, 120-277V
 OCCSS LSXR-10-347/480 Sensor Switch PIR motion sensor, 347/480V

SPECIFICATIONS	
TYPE	PIR Motion
MOUNTING HEIGHT	7' – 15'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-10° to 60°C
RELATIVE HUMIDITY	Up to 90% non-condensing

SENSOR COVERAGE PATTERNS

9' height: ø56' coverage



SENSOR DETAIL



ADDITIONAL DRIVER OPTIONS

Note: Lumen restrictions apply, consult product builder at hew.com/product-builder

CATALOG NUMBER	DESCRIPTION
DRV	Driver without external dimming wires prewired for non-dimming applications
DIM	Driver with external dimming wires prewired for 0-10V low voltage applications
DIM1	1% driver with external dimming wires prewired for 0-10V low voltage applications
DIM LINE	Line voltage dimming driver (TRIAC and ELV compatible, 120V only)
DIM TRC	Line voltage dimming driver (TRIAC compatible, 120V only)
DA	Driver with 12V auxiliary power, without external dimming wires
DSR	Sensor-ready driver without external dimming wires (D4i DALI-2)
SD40	40% step-dimming driver
SD50	50% step-dimming driver
DALI	DALI dimming driver
LDE1	Lutron Hi-lume 1% EcoSystem dimming driver

Skydome Edge®

LED PENDANT



The Naturals collection -
Gloss White & Chestnut shown



The Naturals collection -
Black & Elm Gray shown



canopy detail

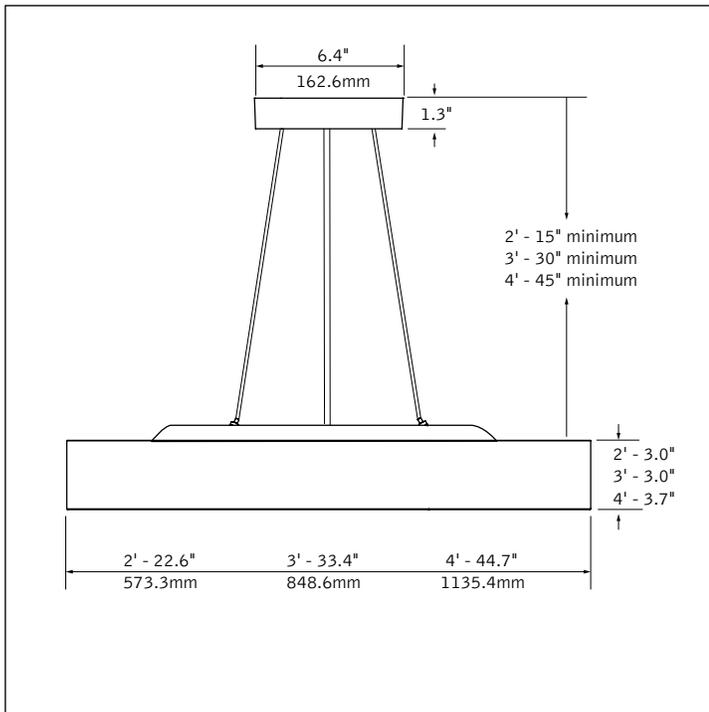


surface mount
companion

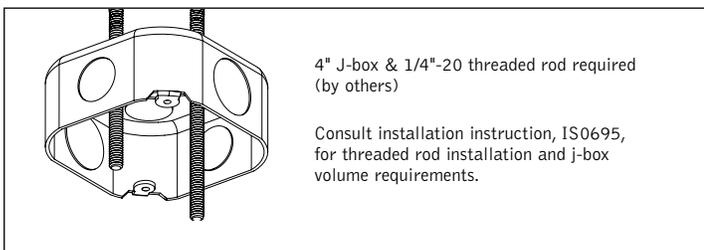


unlit acoustic
companion

DIMENSIONAL DATA



MOUNTING INFORMATION



FEATURES

- Shallow housing.
- Edge lighting technology ensures even illumination of the lens.
- Slot canopy provides no visibility to mechanical elements.
- Knife edge design provides a modern aesthetic.
- Available in nominal 2', 3' and 4' diameters.
- Choice of direct and indirect output levels to meet a wide variety of application needs, specified and controlled independently.
- Available with The Naturals, a series of finishes that exude biophilic beauty.
- PoE compatible: Integrates with Power over Ethernet lighting systems via standard, low-voltage wires.

PERFORMANCE

3' Diameter
2000 Lumens indirect /
9000 Lumens direct

Delivered Lumens: 11000lm
Total System Watts: 106W

PRODUCT OVERVIEW

Lumen Output:	2000-16500lm
Wattage:	17 - 162W
LPW:	104 - 118
SDCM:	2

Photometric performance is measured in accordance with IESNA LM-79.
Visit focalpointlights.com for complete photometric data.

fixture:

project:

SPECIFICATIONS

LED System

LED module incorporates premium LEDs on a robust platform to achieve excellent thermal management. LEDs are placed to promote a uniform appearance. Available in 2700K, 3000K, 3500K or 4000K with 80 or 90 CRI. 3500K and 4000K with CRI>90 have a cyanosis observation index (COI) of 3.3 or less. Drivers are replaceable.

Construction

Extruded aluminum housing. One-piece ABS plastic top cover. Luminaire weights: 2' unit: 24lbs, 3' unit: 48lbs, 4' unit: 82lbs.

Mounting

White canopy provided for below ceiling access. Minimum mounting heights: 2' unit: 15", 3' unit: 30", 4' unit: 45".

Optic

18 Ga. steel reflector finished in High Reflectance white powder coat. Regressed lens of 0.118" thick acrylic.

Electrical

Standard 120-277V driver includes 0-10V analog dimming. Power factor > .9. PoE compatible: Integrates with Power over Ethernet lighting systems via standard, low-voltage wires.

Nominal Size	Direct Distribution	Driver Quantity	
		Direct Only	Direct/Indirect
2'	2000DN - 5000DN	1	2
3'	4000DN - 7000DN	1	2
	9000DN	2	3
4'	7000DN	1	2
	9000DN - 1400DN	2	3

Emergency Battery

Bodine BSL6LST. Emergency output - 6 watts for 90 minutes. Maximum mounting height: 14.25ft.

Labels

UL and cUL Listed. Suitable for Dry or Damp Locations, indoor use only.

Finish

Polyester powder coat applied over a multi-stage pre-treatment. The Naturals: 100% low VOC vinyl. Canopy White as standard.

Lumen Maintenance

Reported: L70 at >61,000 hours Calculated: L70 at 221,000 hours
L90 at 57,000hrs L90 at 57,000hrs

Derived from EPA TM-21 calculator. Based on typical conditions, consult factory for additional data.

Reliability

At Focal Point, our products are designed to stand the test of time. Each luminaire is engineered using superior components, manufactured with the utmost care and rigorously tested. Contact us for reliability data.

Warranty

LED system rated for operation in ambient environments up to 25°C. 5 year limited warranty.

PERFORMANCE CHART (Direct only) See page 3 for additional performance.

Nominal Size	Delivered Lumens	Tested System Watts	LPW
2'	2000	17	116
	3000	26	118
	4000	35	118
	5000	44	114
3'	4000	35	118
	5000	43	117
	7000	63	113
4'	9000	82	109
	7000	62	112
	9000	85	110
	11000	105	107
	14000	135	104

Based on 3500K, 80CRI. Lumen multiplier for 90CRI = 0.85. Lumen output may vary +/- 5%. Actual wattage may vary +/- 5%.

ORDERING	FSDEP
Luminaire Series	FSDEP
Skydome Edge	
Nominal Size	
2' Diameter	2
3' Diameter	3
4' Diameter	4
Shielding	FL
Frosted Lens	
Direct Distribution	
2' Diameter	
2000 Lumen	2000DN
3000 Lumen	3000DN
4000 Lumen	4000DN
5000 Lumen	5000DN
3' Diameter	
4000 Lumen	4000DN
5000 Lumen	5000DN
7000 Lumen	7000DN
9000 Lumen	9000DN
4' Diameter	
7000 Lumen	7000DN
9000 Lumen	9000DN
11,000 Lumen	11000DN
14,000 Lumen	14000DN
Indirect Distribution	
No Uplight	0UP
500 Lumen (L11 & LD1 only)	500UP
1000 Lumen	1000UP
1500 Lumen	1500UP
2000 Lumen	2000UP
(3' & 4' Diameters only)	
2500 Lumen	2500UP
(4' Diameter only)	
Color Temperature	
2700K, 80+ CRI or 90+ CRI	27K or 927K
3000K, 80+ CRI or 90+ CRI	30K or 930K
3500K, 80+ CRI or 90+ CRI	35K or 935K
4000K, 80+ CRI or 90+ CRI	40K or 940K
Circuit	
Single Circuit	1C
Dual Circuit	2C
Voltage	
120/277 UNV Volt	UNV
347 Volt	347
(L11 & LD1 only. Not available with uplight, 0UP only. Not available with EM battery.)	
Low Voltage	LV
Control System & Dimming Level	
0-10V - 1% Dimming	L11
0-10V - 10% Dimming	LD1
Low Voltage, PoE compatible	LVN
(No driver. Not available with EM or EC. LV Voltage only)	
Lutron Hi-Lume EcoSystem (LDE1) - 1% Dimming (9000, 11000 & 14000 lumens not available)	LH1
DALI 1% Dimming (7000, 9000, 11000 & 14000 lumens not available)	D11
Mounting	
24" Aircraft Cable (2' diameter only)	C24
48" Aircraft Cable	C48
96" Aircraft Cable (Consult factory for other lengths)	C96
Factory Options	
Emergency Battery (120/277 Volt only)	EM
Housing Finish	
(See finishes page for The Naturals options)	
Matte Satin White	WH
Titanium Silver	TS
Matte Black	BK
Custom Color (Specify your RAL color value. Extended lead time, consult factory.)	RAL_ _ _ _

PERFORMANCE CHART WITH UPLIGHT

Nominal Size	Direct Distribution	Indirect Distribution	Distribution % (Direct/Indirect)	Total Delivered Lumens	Tested System Watts	LPW	
2'	2000DN	500UP	80/20	2500	24	104	
		1000UP	65/35	3000	29	105	
		1500UP	60/40	3500	35	101	
	3000DN	500UP	85/15	3500	32	108	
		1000UP	75/25	4000	37	109	
		1500UP	65/35	4500	43	105	
	4000DN	500UP	90/10	4500	42	109	
		1000UP	80/20	5000	46	110	
		1500UP	70/30	5500	52	106	
	5000DN	500UP	90/10	5500	51	109	
		1000UP	85/15	6000	55	109	
		1500UP	75/25	6500	62	106	
	3'	4000DN	500UP	90/10	4500	42	109
			1000UP	80/20	5000	47	108
			1500UP	75/25	5500	52	107
2000UP			65/35	6000	58	104	
5000DN		500UP	90/10	5500	51	109	
		1000UP	85/15	6000	55	109	
		1500UP	75/25	6500	61	108	
		2000UP	70/30	7000	67	105	
7000DN		500UP	95/5	7500	71	108	
		1000UP	90/30	8000	75	108	
		1500UP	80/20	8500	80	107	
		2000UP	80/20	9000	87	105	
9000DN		500UP	95/5	9500	90	106	
		1000UP	90/10	10000	95	106	
		1500UP	85/15	10500	100	105	
	2000UP	80/20	11000	106	104		
4'	7000DN	500UP	95/5	7500	69	108	
		1000UP	90/10	8000	74	109	
		1500UP	80/20	8500	78	109	
		2000UP	80/20	9000	83	108	
		2500UP	75/25	9500	89	106	
	9000DN	500UP	95/5	9500	92	107	
		1000UP	90/10	10000	96	108	
		1500UP	85/15	10500	100	108	
		2000UP	80/20	11000	106	107	
		2500UP	80/20	11500	112	106	
	11000DN	500UP	95/5	11500	112	105	
		1000UP	90/10	12000	117	106	
		1500UP	90/10	12500	121	106	
		2000UP	85/15	13000	127	105	
		2500UP	80/20	13500	132	104	
14000DN	500UP	95/5	14500	142	102		
	1000UP	95/5	15000	147	103		
	1500UP	90/10	15500	151	103		
	2000UP	90/10	16000	157	102		
	2500UP	85/15	16500	162	102		

Based on 3500K, 80CRI. Lumen multiplier for 90CRI = 0.85. Lumen output may vary +/- 5%. Actual wattage may vary +/- 5%.

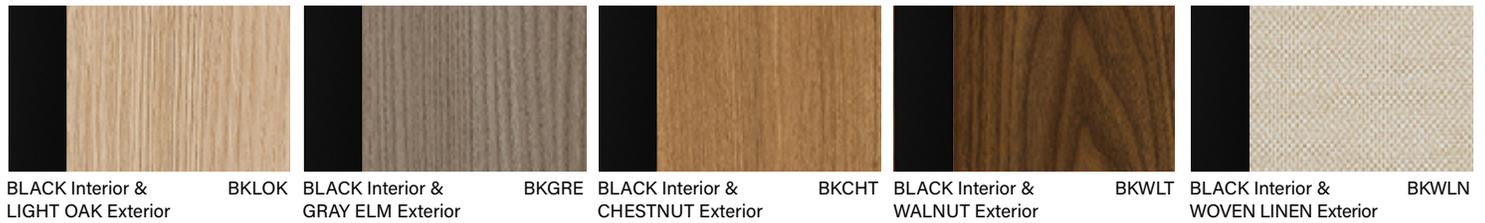


Finishes

STANDARD FINISHES



THE NATURALS (25% SCALE)

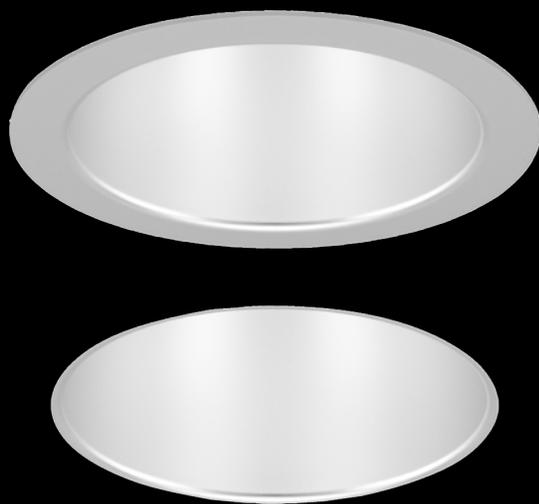




FOCAL POINT®

ID+ 3.5"

OVERLAP & TRIMLESS LED DOWNLIGHTS



Overlap Solite lens



Clear diffuse



Warm diffuse



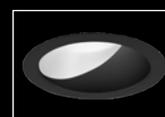
Black



White



Optional painted flanges

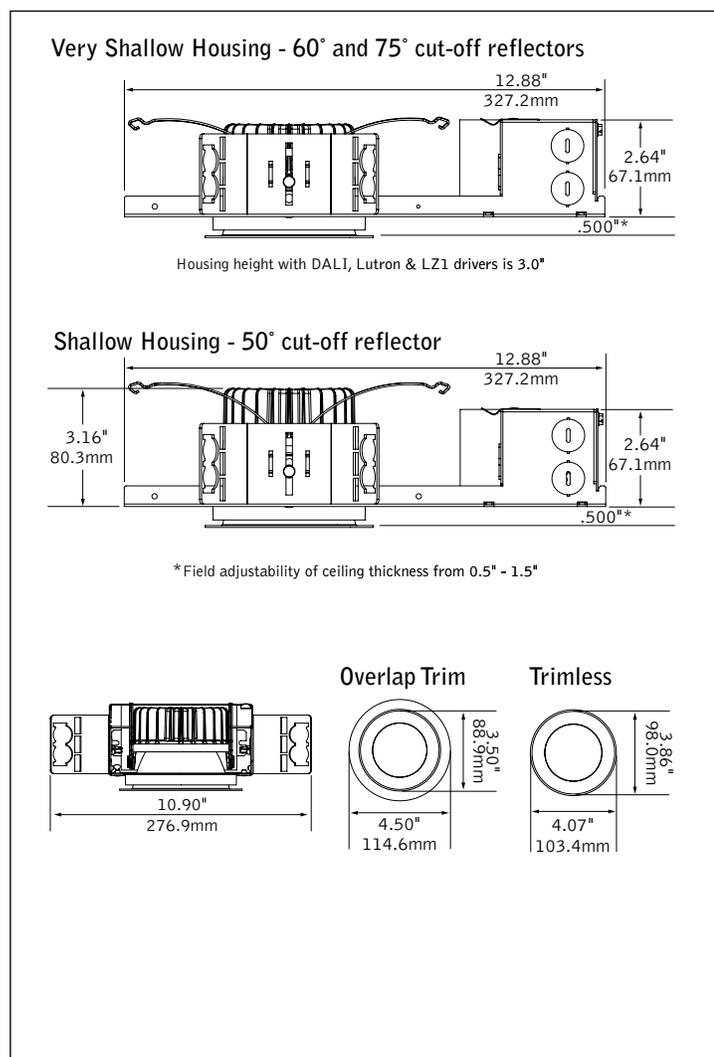


Wall Wash companion



Adjustable Accent companion

DIMENSIONAL DATA



FEATURES

Less than 2.64" low profile housing available.

50°, 60° and 75° cut-off reflector options available.

25° to 90° beam spreads support accent lighting, task lighting and general illumination.

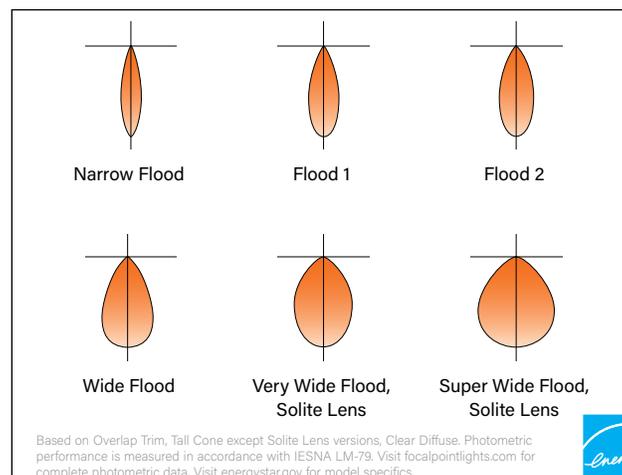
Solite lens with die-cast trim allows for a coordinated aesthetic with ID+ 3.5" Adjustable Accent and delivers 70° or 90° beam spread options.

Tunable White: Supports human activity, well-being, and preferences with a light quality that evolves throughout the day.

Warm Dim: Lighting that enhances spaces with a warm glow, reminiscent of incandescent or halogen light sources.

PoE compatible: Integrates with Power over Ethernet lighting systems via standard, low-voltage wires.

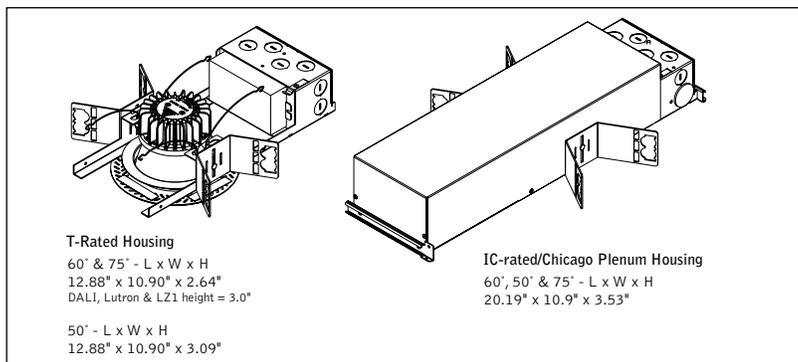
DISTRIBUTIONS



fixture:

project:

STANDARD WHITE HOUSING DETAILS



3.5" ROUND DOWNLIGHT OPTICS

Optic	Cut-Off Degree	Trim Type	Distribution Beam Spread Spacing Criteria					
			NFL	FL1	FL2	WFL	VWFL	SWFL
DNT	50°	Overlap	25° 0.42	37° 0.62	44° 0.72	59° 0.89	67° 1.02	
		Trimless	26° 0.54	37° 0.62	44° 0.76	58° 0.87	-	-
DNS	60°	Overlap	24° 0.42	34° 0.67	47° 0.81	54° 0.87	65° 0.99	
		Trimless	25° 0.42	37° 0.63	45° 0.75	56° 0.92	-	-
DSS	75°	Overlap	-	-	-	-	73° 1.07	91° 1.26
		Trimless	-	-	-	-	74° 1.07	91° 1.24

3.5" ROUND DOWNLIGHT PERFORMANCE TABLES

Based on Overlap, Tall Cone, Wide Flood, Clear Diffuse. Delivered lumen output may vary +/- 5%. Actual wattage may vary +/- 5%.

STANDARD WHITE				
CCT	Lumen Output	Delivered Lumens	System Watts	LPW
3500K, 80CRI	700L	721	8	90
	900L	919	10	94
	1100L	1112	12	96
	1300L	1298	16	83
	1500L	1484	17	85
	1700L	1682	19	86
	1900L	1909	22	87
	2100L	2144	25	86

STANDARD WHITE

TYPE R1

HOUSING ORDERING

Housing Series	FLC3D	FLC3D
Trim Type	RO	
Color Options	SW	
Lumen Output	900L	
Voltage	UNV	
Control System & Dimming Level	LD1	
Housing Type	IC	
Factory Options	CP	
Trim & LED Module	LC3	
Aperture	LC3	
Trim Type	RO	
Color Options	SW	
Lumen Output	900L	
Color Temperature	35K	
Optic	DNS	
Distribution	NFL	
Finish	CD	
Optional Flange Finish	BP	

QS 5/10 DAY* Options in orange qualify for the Quickship program. All options 5-day up to 200 pieces except Emergency Battery 10-day only.

Focal Point LLC reserves the right to change specifications for product improvement without notification.

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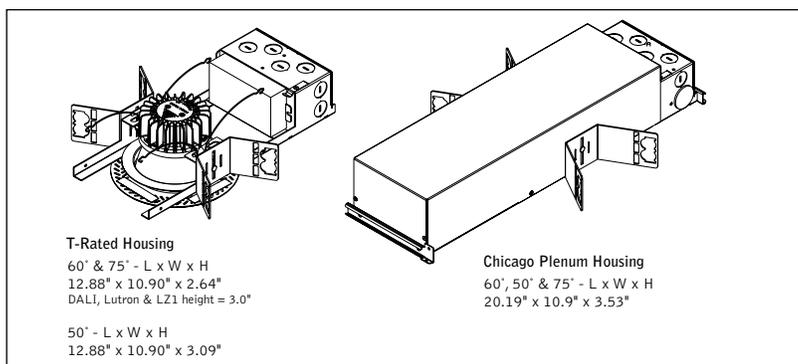
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WARM DIM HOUSING ORDERING

TYPE R1

WARM DIM HOUSING DETAILS



Housing Series	ID+ 3.5" Round	FLC3D	FLC3D
Trim Type	Round Overlap	RO	
	Round Trimless	RT	
Color Options	Warm Dim	WDM	WDM
Lumen Output	1500 Lumen	1500L	1500L
Voltage	120V	120	
	277V	277	

Control System & Dimming Level

0-10V <1% Dimming	LZ1
0-10V - 1% Dimming	L11
0-10V - 10% Dimming	LD1
Forward Phase (120V only)	LFP
Lutron Hi-Lume EcoSystem (LDE1) - 1% Dimming	LH1
DALI <1% Dimming	DZ1
DALI - 1% Dimming	D11

Housing Type

Thermally Protected, Non-IC / Airtight	T
Thermally Protected, Non-IC Wood <small>(Trimless only. Wood kit required)</small>	TW

Factory Options

Bar Hangers	BH
Chicago Plenum	CP
Outdoor Rated	OD

(LD1 driver and T-rated housing only. Not available with CP. See dimming performance table on page 5.)

TRIM & LED MODULE

Aperture

3.5" Round Reflector	LC3
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Trim Type

Round Overlap	RO
Round Die-Cast Overlap (DSS only)	RDO
Round Trimless	RT
Round Die-Cast Trimless (DSS only)	RDT

Color Options

Warm Dim	WDM
----------	-----

Lumen Output

1500 Lumen	1500L
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Color Temperature

Warm Dim: 2700-1800K, 90+ CRI	92718W
Warm Dim: 3000-1800K, 90+ CRI	93018W

Optic

Tall Cone with 50° cut-off	DNT
Short Cone with 60° cut-off	DNS
Super Short Cone with Solite Lens 75° cut-off <small>(Die-cast trims only)</small>	DSS

Distribution

Narrow Flood	NFL
Flood 1	FL1
Flood 2	FL2
Wide Flood	WFL
Very Wide Flood <small>(Overlap all optics. Trimless DSS only)</small>	VWFL
Super Wide Flood <small>(DSS only)</small>	SWFL

Finish

Clear Diffuse	CD
Warm Diffuse	WD
Black	BK
White	WH

Optional Flange Finish

<small>(Overlap CD & WD finish only) (For matching finishes leave blank)</small>	
Black Painted	BP
White Painted	WP

ACCESSORIES

Trimless Wood Ceiling Installation Kit <small>(One kit recommended per 10 downlights)</small>	LC3- WOOD-KIT
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3.5" ROUND DOWNLIGHT OPTICS

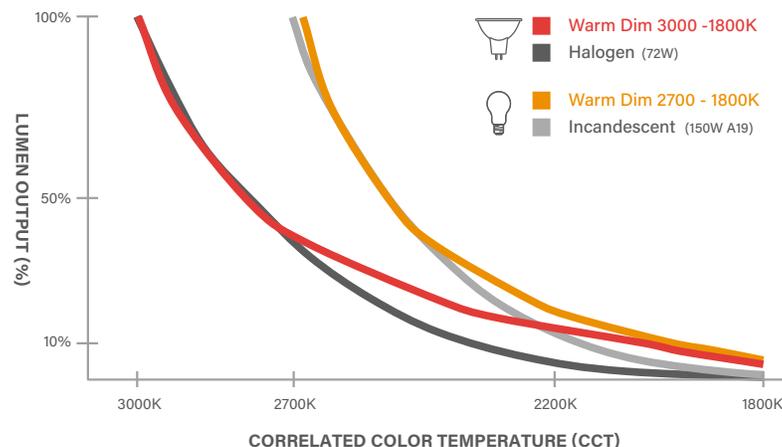
Optic	Cut-Off Degree	Trim Type	Distribution Beam Spread Spacing Criteria					
			NFL	FL1	FL2	WFL	VWFL	SWFL
DNT	50°	Overlap	25° 0.42	37° 0.62	44° 0.72	59° 0.89	67° 1.02	
		Trimless	26° 0.54	37° 0.62	44° 0.76	58° 0.87	-	-
DNS	60°	Overlap	24° 0.42	34° 0.67	47° 0.81	54° 0.87	65° 0.99	
		Trimless	25° 0.42	37° 0.63	45° 0.75	56° 0.92	-	-
DSS	75°	Overlap	-	-	-	-	73° 1.07	91° 1.26
		Trimless	-	-	-	-	74° 1.07	91° 1.24

3.5" ROUND DOWNLIGHT PERFORMANCE TABLE

Based on Overlap, Tall Cone, Wide Flood, Clear Diffuse. Delivered lumen output may vary +/- 5%. Actual wattage may vary +/- 5%

WD WARM DIM				
CCT Range	Lumen Output	Delivered Lumens	System Watts	LPW
2700 - 1800K	1500L	1524	25	61
3000 - 1800K	1500L	1555	25	61

The 3000K to 1800K and 2700K to 1800K ranges mimic the black body curves of halogen and incandescent light sources, respectively.

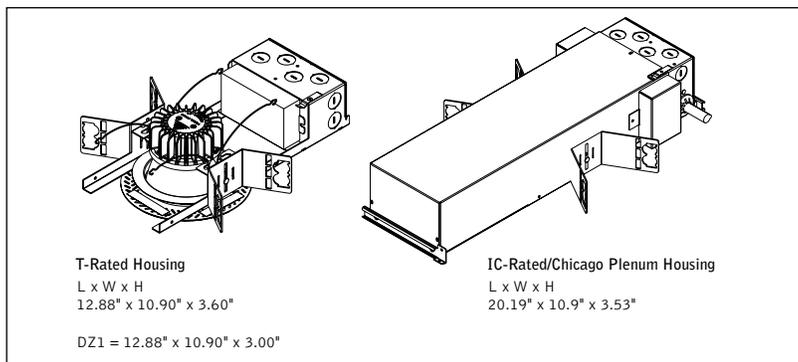




TUNABLE WHITE HOUSING ORDERING

TYPE R1

TUNABLE WHITE HOUSING DETAILS



Housing Series ID+ 3.5" Round	FLC3D	<u>FLC3D</u>
Trim Type Round Overlap Round Trimless	RO RT	_____
Color Options Tunable White: 1800-4000K <small>(900L max. T-rated housings only)</small> Tunable White: 2700-5000K Tunable White: 2700-6500K	1840T 2750T 2765T	_____
Lumen Output 700 Lumen 900 Lumen 1100 Lumen 1300 Lumen	700L 900L 1100L 1300L	_____
Voltage 120/277 Volt <small>(2705T & 2765T only. IC housing only.)</small> 120V 277V	UNV 120 277	_____
Low Voltage <small>(2705T & 2765T only. IC housing only.)</small>	LV	_____

3.5" ROUND DOWNLIGHT OPTICS

Optic	Cut-Off Degree	Trim Type	Distribution Beam Spread Spacing Criteria					
			NFL	FL1	FL2	WFL	VWFL	SWFL
DNT	50°	Overlap	25° 0.42	37° 0.62	44° 0.72	59° 0.89	67° 1.02	
		Trimless	26° 0.54	37° 0.62	44° 0.76	58° 0.87	-	-
DNS	60°	Overlap	24° 0.42	34° 0.67	47° 0.81	54° 0.87	65° 0.99	
		Trimless	25° 0.42	37° 0.63	45° 0.75	56° 0.92	-	-
DSS	75°	Overlap	-	-	-	-	73° 1.07	91° 1.26
		Trimless	-	-	-	-	74° 1.07	91° 1.24

Control System & Dimming Level 0-10V <1% Dimming DALI <1% Dimming <small>(Default driver offers DT6 control. It requires two addresses, one for intensity & one for CCT tuning. Consult factory for DT8. Extended lead time apply.)</small>	LZ1 DZ1	_____
Low Voltage, PoE Compatible <small>(No driver. Not available with EMR. LV voltage only.)</small>	LVN	_____

Housing Type IC-Rated / Airtight <small>(700L only. 2750T or 2765T only.)</small>	IC	_____
Thermally Protected, Non-IC / Airtight	T	_____
Thermally Protected, Non-IC Wood <small>(Trimless only. Wood kit required)</small>	TW	_____

Factory Options Bar Hangers Chicago Plenum <small>(2750T & 2765T; 1100L max. 1840T: 700L only.)</small>	BH CP	_____
Emergency Battery - Remote test switch <small>(Overlap trim only. Not available with CP or IC-rated housing. Above ceiling access required.)</small>	EMR	_____

3.5" ROUND DOWNLIGHT PERFORMANCE TABLES

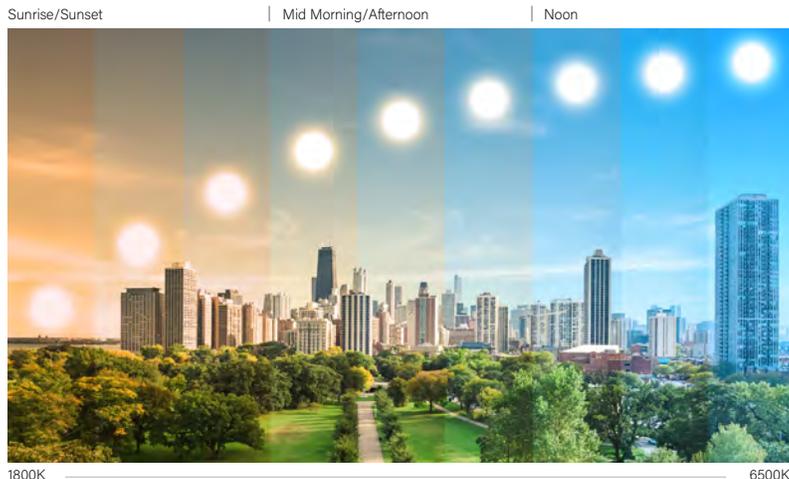
Based on Overlap, Tall Cone, Wide Flood, Clear Diffuse. Delivered lumen output may vary +/- 5%. Actual wattage may vary +/- 5%

TUNABLE WHITE				
CCT	Lumen Output	Delivered Lumens	System Watts	LPW
2700K <small>(2700-5000K & 2700-6500K)</small>	700L	700	13	53
	900L	906	17	54
	1100L	1095	20	54
	1300L	1306	25	53
1800K <small>(1800-4000K)</small>	700L	701	20	36
	900L	898	25	37

TRIM & LED MODULE Aperture 3.5" Round Reflector	LC3	<u>LC3</u>
Trim Type Round Overlap Round Die-Cast Overlap (DSS only) Round Trimless Round Die-Cast Trimless (DSS only)	RO RDO RT RDT	_____
Color Options <small>(Trim & housing must match)</small> Tunable White: 1800-4000K Tunable White: 2700-5000K Tunable White: 2700-6500K	1840T 2750T 2765T	_____
Lumen Output <small>(Trim & housing must match)</small> 700 Lumen 900 Lumen 1100 Lumen 1300 Lumen	700L 900L 1100L 1300L	_____

The Comfort (1800K-4000K), Preference (2700K-5000K), and Activity (2700K-6500K) ranges give specifiers the tools to enhance spaces, mood, and alertness.

DAYLIGHT RANGE



Color Temperature Tunable White: 1800-4000K, 90+ CRI Tunable White: 2700-5000K, 90+ CRI Tunable White: 2700-6500K, 90+ CRI	91840T 92750T 92765T	_____
Optic Tall Cone with 50° cut-off Short Cone with 60° cut-off Super Short Cone with Solite Lens 75° cut-off <small>(Die-cast trims only)</small>	DNT DNS DSS	_____
Distribution Narrow Flood Flood 1 Flood 2 Wide Flood Very Wide Flood <small>(Overlap all optics. Trimless DSS only.)</small> Super Wide Flood (DSS only)	NFL FL1 FL2 WFL VWFL SWFL	_____
Finish Clear Diffuse Warm Diffuse Black White	CD WD BK WH	_____
Optional Flange Finish <small>(Overlap CD & WD finish only) (For matching finishes leave blank)</small> Black Painted White Painted	BP WP	_____

ACCESSORIES Trimless Wood Ceiling Installation Kit <small>(One kit recommended per 10 downlights)</small>	LC3- WOOD-KIT	_____
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HOUSING SPECIFICATIONS

Construction

Thermally protected housing for new construction applications. Insulation to be kept 3" away from housing. Type IC inherently protected, suitable for direct contact with insulation. Restrictive airflow per ASTM-E283. Butterfly brackets allow mounting to 1/2" emt. Order bar hangers as an accessory. Die-cast aluminum heat sink designed for maximum thermal dissipation. Die-formed housing and integral junction box with (7) 1/2" pry outs. Accommodates ceiling thicknesses up to 0.5" standard, field adjustable up to 1.5" thickness. For thicker ceiling consult factory. Fixture will not exceed 5 lb. Trim is inherently airtight and may be used to obtain airtight rating when used with IC-rated or thermally protected, non-IC (T) housings.

Electrical

Choice of constant current dimming drivers. Power factor > .9 typical. PoE compatible: Integrates with Power over Ethernet lighting systems via standard, low-voltage wires.

Emergency

Above ceiling access required. Overlap trim only. Emergency output - 7W for 90 minutes. Maximum mounting height — Clear Diffuse & White: 22.5ft. Black & Warm Diffuse: 15.3ft.

Labels

UL and cUL Listed. Suitable for Dry, Damp or Wet Locations, indoor use only. Specify Outdoor rated (OD) for outdoor recessed ceiling applications.

Outdoor Rated (OD) Driver Dimming Performance table

Lumen Output	Minimum Dimming Level
700L	20%
900L	16%
1100L	13%
1300L	10%
1500L	10%
1700L	10%
1900L	10%
2100L	10%

Lumen Maintenance

Reported: L70 at >55,000 hours Calculated: L70 at 204,000 hours
 L90 at >55,000 hours L90 at 59,000 hours

Derived from EPA TM-21 calculator. Based on typical conditions, consult factory for additional data.

Reliability

At Focal Point, our products are designed to stand the test of time. Each luminaire is engineered using superior components, manufactured with the utmost care and rigorously tested. Contact us for reliability data.

Warranty

LED System rated for operation in ambient environments up to 25°C. 5-year limited warranty. Fixture with Outdoor rated option must be installed in a covered ceiling and is warranted for operation in ambient environments between -20°C to +40°C.

TRIM & LED SPECIFICATIONS

LED System

Proprietary array incorporates premium LEDs on a robust platform. May be specified in 2700K, 3000K, 3500K or 4000K, Warm Dimming (2700K-1800K and 3000K-1800K), or Tunable White (1800K-4000K, 2700K-5000K and 2700K-6500K). CRI>80, >90 or 97. Color accuracy within 2 SDCM (Warm Dimming from 3-5 SDCM). 3500K and 4000K with CRI>90 have a cyanosis observation index (COI) of 3.3 or less. Aluminum heat sink provides appropriate thermal management.

Aesthetics

Parabolic reflector cone ensures glare free optics. DNT & DNS reflector is .050 spun aluminum. DSS reflector is die-cast aluminum. Trims are self-flanged. Non-painted trim matches reflector finish. Painted flange may also be specified.

Optics

50-degree, 60-degree or 75-degree cut-off to light source and its image.

Color Lumen Multipliers

CRI	STANDARD WHITE CCT				WARM DIM CCT RANGES		TUNABLE WHITE CCT RANGES		
	2700	3000	3500	4000	2700-1800K	3000-1800K	1800-4000K	2700-5000K	2700-6500K
80+	0.92	0.98	1.00	1.01	-	-	-	-	-
90+	0.79	0.83	0.82	0.84	1.02	1.04	1.00	1.00	1.00
97	0.67	0.72	0.73	0.76	-	-	-	-	-

Distribution Lumen Multipliers

Trim Type	Optic	Distribution	Multiplier
Round Trimless [RT]	Tall Cone with 50° cut-off [DNT]	Narrow Flood [NFL]	1.12
		Flood 1 [FL1]	0.92
		Flood 2 [FL2]	1.06
		Wide Flood [WFL]	0.92
	Short Cone with 60° cut-off [DNS]	Narrow Flood [NFL]	0.99
		Flood 1 [FL1]	0.96
		Flood 2 [FL2]	0.92
		Wide Flood [WFL]	0.95
Round Overlap [RO]	Tall Cone with 50° cut-off [DNT]	Narrow Flood [NFL]	0.97
		Flood 1 [FL1]	0.94
		Flood 2 [FL2]	1.09
		Wide Flood [WFL]	1.02
		Very Wide Flood [VWFL]	1.02
	Short Cone with 60° cut-off [DNS]	Narrow Flood [NFL]	0.98
		Flood 1 [FL1]	1.17
		Flood 2 [FL2]	1.11
Round Die-Cast Trimless [RDT]	Super Short Cone with Solite Lens with 75° cut-off [DSS]	Wide Flood [WFL]	1.09
		Very Wide Flood [VWFL]	1.07
Round Die-Cast Overlap [RDO]	Super Short Cone with Solite Lens with 75° cut-off [DSS]	Very Wide Flood [VWFL]	1.00
		Super Wide Flood [SWFL]	0.95
Round Die-Cast Overlap [RDO]	Super Short Cone with Solite Lens with 75° cut-off [DSS]	Very Wide Flood [VWFL]	0.96
		Super Wide Flood [SWFL]	0.90

Color Lumen Multipliers

Trim Type	Optic	Color	Multiplier
Round Trimless [RT] and Round Overlap [RO]	Tall Cone with 50° cut-off [DNT]	Clear Diffuse [CD]	1.00
		Warm Diffuse [WD]	0.92
		White [WH]	1.09
		Black [BK]	0.46
Round Die-Cast Trimless [RDT] and Round Die-Cast Overlap [RDO]	Short Cone with 60° cut-off [DNS]	Clear Diffuse [CD]	1.00
		Warm Diffuse [WD]	0.96
		White [WH]	1.12
		Black [BK]	0.62
Round Die-Cast Trimless [RDT] and Round Die-Cast Overlap [RDO]	Super Short Cone with Solite Lens with 75° cut-off [DSS]	Clear Diffuse [CD]	1.00
		Warm Diffuse [WD]	0.97
		White [WH]	1.16
		Black [BK]	0.86

How To Use Lumen Multipliers

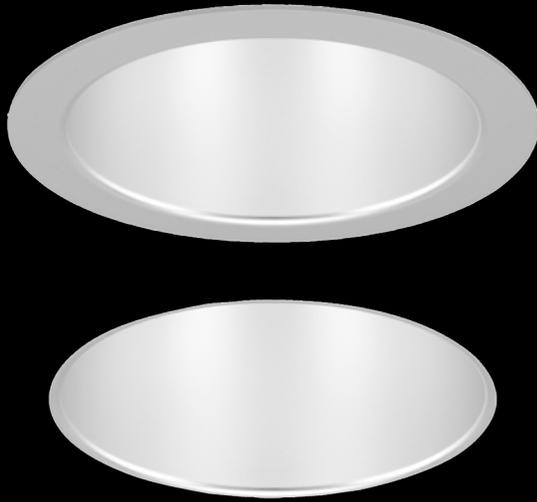
Formula:
 (Lumen Output Value) x (Color Temperature & CRI) x (Distribution) x (Color)

Example:
 LC3-RO-SW-1100L-935K-DNS-FL1-WH
 (1100) x (0.81) x (1.17) x (1.12) ≈ 1167lm (estimated delivered lumens)

Multiplier charts are provided to aid with estimation of lumen levels across options. Apply multipliers against ordered Lumen Output to estimate Delivered Lumens. An estimation should make use of all tables through consecutive application of three multipliers. Refer to IES files for most accurate photometric information.

ID+ 3.5"

OVERLAP & TRIMLESS LED DOWNLIGHTS



Overlap Solite lens



Clear diffuse



Warm diffuse



Black



White



Optional painted flanges



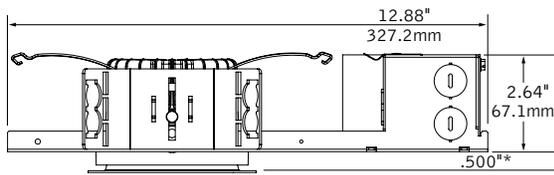
Wall Wash companion



Adjustable Accent companion

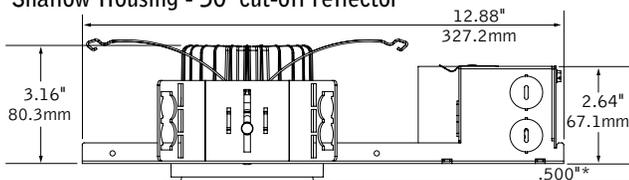
DIMENSIONAL DATA

Very Shallow Housing - 60° and 75° cut-off reflectors

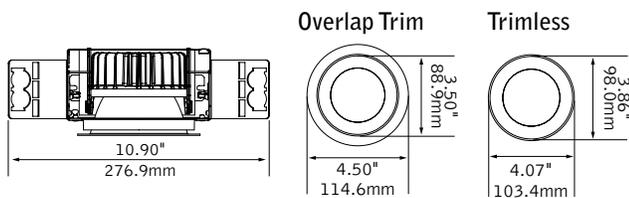


Housing height with DALI, Lutron & LZ1 drivers is 3.0"

Shallow Housing - 50° cut-off reflector



*Field adjustability of ceiling thickness from 0.5" - 1.5"



FEATURES

Less than 2.64" low profile housing available.

50°, 60° and 75° cut-off reflector options available.

25° to 90° beam spreads support accent lighting, task lighting and general illumination.

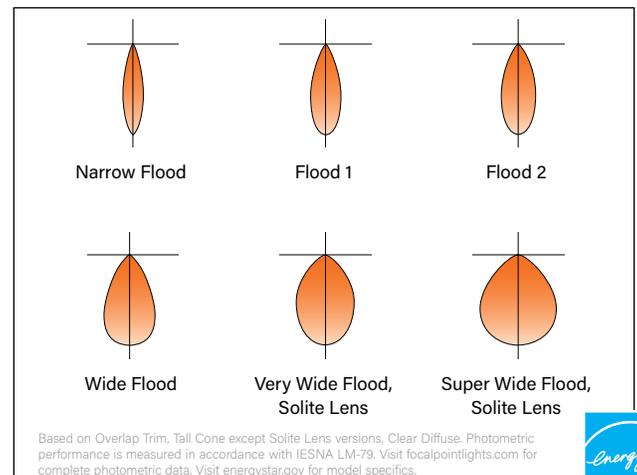
Solite lens with die-cast trim allows for a coordinated aesthetic with ID+ 3.5" Adjustable Accent and delivers 70° or 90° beam spread options.

Tunable White: Supports human activity, well-being, and preferences with a light quality that evolves throughout the day.

Warm Dim: Lighting that enhances spaces with a warm glow, reminiscent of incandescent or halogen light sources.

PoE compatible: Integrates with Power over Ethernet lighting systems via standard, low-voltage wires.

DISTRIBUTIONS



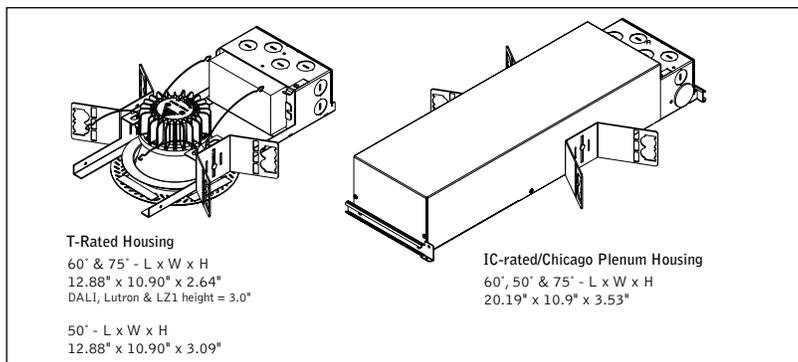
Based on Overlap Trim, Tall Cone except Solite Lens versions, Clear Diffuse. Photometric performance is measured in accordance with IESNA LM-79. Visit focalpointlights.com for complete photometric data. Visit energystar.gov for model specifics.



fixture:

project:

STANDARD WHITE HOUSING DETAILS



3.5" ROUND DOWNLIGHT OPTICS

Optic	Cut-Off Degree	Trim Type	Distribution Beam Spread Spacing Criteria					
			NFL	FL1	FL2	WFL	VWFL	SWFL
DNT	50°	Overlap	25° 0.42	37° 0.62	44° 0.72	59° 0.89	67° 1.02	
		Trimless	26° 0.54	37° 0.62	44° 0.76	58° 0.87	-	-
DNS	60°	Overlap	24° 0.42	34° 0.67	47° 0.81	54° 0.87	65° 0.99	
		Trimless	25° 0.42	37° 0.63	45° 0.75	56° 0.92	-	-
DSS	75°	Overlap	-	-	-	-	73° 1.07	91° 1.26
		Trimless	-	-	-	-	74° 1.07	91° 1.24

3.5" ROUND DOWNLIGHT PERFORMANCE TABLES

Based on Overlap, Tall Cone, Wide Flood, Clear Diffuse. Delivered lumen output may vary +/- 5%. Actual wattage may vary +/- 5%.

STANDARD WHITE				
CCT	Lumen Output	Delivered Lumens	System Watts	LPW
3500K, 80CRI	700L	721	8	90
	900L	919	10	94
	1100L	1112	12	96
	1300L	1298	16	83
	1500L	1484	17	85
	1700L	1682	19	86
	1900L	1909	22	87
	2100L	2144	25	86

STANDARD WHITE

TYPE R1A

HOUSING ORDERING

Housing Series

ID+ 3.5" Round

FLC3D FLC3D

Trim Type

Round Overlap

RO

Round Trimless

RT

Color Options

Standard White, 80 & 90 CRI

SW

High 97 CRI

HC

Lumen Output

700 Lumen (Not available with Lutron or LFP)

700L

900 Lumen (Not available with LFP)

900L

1100 Lumen

1100L

1300 Lumen

1300L

1500 Lumen

1500L

1700 Lumen

1700L

1900 Lumen

1900L

2100 Lumen

2100L

Voltage

120/277 Volt

LVN

(IC-rated housing: SW - 1700lm max., HC - 1500lm max. T-rated & TW housings: SW - 1100lm max., HC - 900lm max.)

120V

120

277V

277

Low Voltage

LV

(IC-rated housing: SW - 1700lm max., HC - 1500lm max. T-rated & TW housings: SW - 1100lm max., HC - 900lm max.)

Control System & Dimming Level

0-10V <1% Dimming

LZ1

0-10V - 1% Dimming

L1

0-10V - 10% Dimming

LD1

Low Voltage, PoE Compatible

LVN

(No driver. Not available with EMR. LV voltage only.)

Forward Phase (120V only)

LFP

Lutron Hi-Lume EcoSystem (LDEI) - 1% Dimming

LH1

DALI <1% Dimming

DZ1

DALI - 1% Dimming

D11

Housing Type

IC-Rated / Airtight

IC

Thermally Protected, Non-IC / Airtight

T

Thermally Protected, Non-IC Wood

TW

(Trimless only. Wood kit required.)

Factory Options

Bar Hangers

BH

Chicago Plenum

CP

Emergency Battery - Remote test switch*

EMR

(Overlap trim only. Not available with CP or IC-rated housing. Above ceiling access required.)

Outdoor Rated

OD

(LD1 driver and T-rated housing only. Not available with CP or EMR. See dimming performance table on page 5.)

TRIM & LED MODULE

Aperture

3.5" Round Reflector

LC3

Trim Type

Round Overlap

RO

Round Die-Cast Overlap (DSS only)

RDO

Round Trimless

RT

Round Die-Cast Trimless (DSS only)

RDT

Color Options

Standard White, 80 & 90 CRI

SW

High 97 CRI

HC

Lumen Output

700 Lumen (Not available with Lutron or LFP)

700L

900 Lumen (Not available with LFP)

900L

1100 Lumen

1100L

1300 Lumen

1300L

1500 Lumen

1500L

1700 Lumen

1700L

1900 Lumen

1900L

2100 Lumen

2100L

Color Temperature

(Add 9 for 90 CRI or H for 97 CRI. Leave blank for 80 CRI. Examples: 2700K, 97 CRI = H27K. 2700K, 80 CRI = 27K.)

2700K, 80/90/97+ CRI

_27K

3000K, 80/90/97+ CRI

_30K

3500K, 80/90/97+ CRI

_35K

4000K, 80/90/97+ CRI

_40K

Optic

Tall Cone with 50° cut-off

DNT

Short Cone with 60° cut-off

DNS

Super Short Cone with Solite Lens 75° cut-off

DSS

(Die-cast trims only. VWFL or SWFL only.)

Distribution

Narrow Flood

NFL

Flood 1

FL1

Flood 2

FL2

Wide Flood

WFL

Very Wide Flood (Overlap all optics. Trimless DSS only)

VWFL

Super Wide Flood (DSS only)

SWFL

Finish

Clear Diffuse

CD

Warm Diffuse

WD

Black

BK

White

WH

Optional Flange Finish

(Overlap CD & WD finish only) (For matching finishes leave blank)

Black Painted

BP

White Painted

WP

ACCESSORIES

Trimless Wood Ceiling Installation Kit

LC3-WOOD-KIT

(One kit recommended per 10 downlights)

QS 5/10 DAY* Options in orange qualify for the Quickship program. All options 5-day up to 200 pieces except Emergency Battery 10-day only.

Focal Point LLC reserves the right to change specifications for product improvement without notification.

fixture:

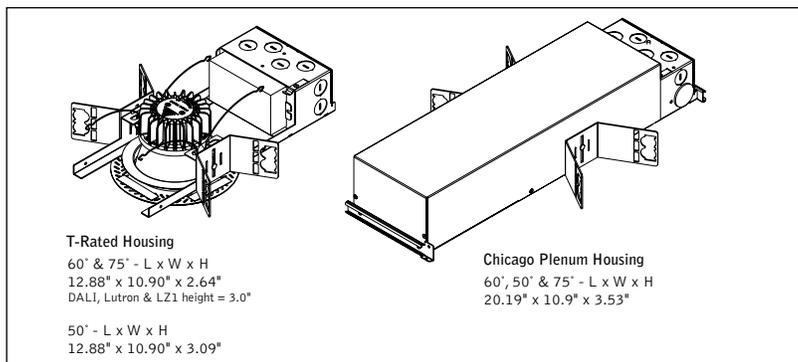
project:



WARM DIM HOUSING ORDERING

TYPE R1A

WARM DIM HOUSING DETAILS



Housing Series	ID+ 3.5" Round	FLC3D	FLC3D
Trim Type	Round Overlap	RO	
	Round Trimless	RT	
Color Options	Warm Dim	WDM	WDM
Lumen Output	1500 Lumen	1500L	1500L
Voltage	120V	120	
	277V	277	

Control System & Dimming Level

0-10V <1% Dimming	LZ1
0-10V - 1% Dimming	L11
0-10V - 10% Dimming	LD1
Forward Phase (120V only)	LFP
Lutron Hi-Lume EcoSystem (LDE1) - 1% Dimming	LH1
DALI <1% Dimming	DZ1
DALI - 1% Dimming	D11

Housing Type

Thermally Protected, Non-IC / Airtight	T
Thermally Protected, Non-IC Wood <small>(Trimless only. Wood kit required)</small>	TW

Factory Options

Bar Hangers	BH
Chicago Plenum	CP
Outdoor Rated	OD

(LD1 driver and T-rated housing only. Not available with CP. See dimming performance table on page 5.)

TRIM & LED MODULE

Aperture

3.5" Round Reflector	LC3
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Trim Type

Round Overlap	RO
Round Die-Cast Overlap (DSS only)	RDO
Round Trimless	RT
Round Die-Cast Trimless (DSS only)	RDT

Color Options

Warm Dim	WDM
----------	-----

Lumen Output

1500 Lumen	1500L
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Color Temperature

Warm Dim: 2700-1800K, 90+ CRI	92718W
Warm Dim: 3000-1800K, 90+ CRI	93018W

Optic

Tall Cone with 50° cut-off	DNT
Short Cone with 60° cut-off	DNS
Super Short Cone with Solite Lens 75° cut-off <small>(Die-cast trims only)</small>	DSS

Distribution

Narrow Flood	NFL
Flood 1	FL1
Flood 2	FL2
Wide Flood	WFL
Very Wide Flood <small>(Overlap all optics. Trimless DSS only)</small>	VWFL
Super Wide Flood <small>(DSS only)</small>	SWFL

Finish

Clear Diffuse	CD
Warm Diffuse	WD
Black	BK
White	WH

Optional Flange Finish

<small>(Overlap CD & WD finish only) (For matching finishes leave blank)</small>	
Black Painted	BP
White Painted	WP

ACCESSORIES

Trimless Wood Ceiling Installation Kit <small>(One kit recommended per 10 downlights)</small>	LC3- WOOD-KIT
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3.5" ROUND DOWNLIGHT OPTICS

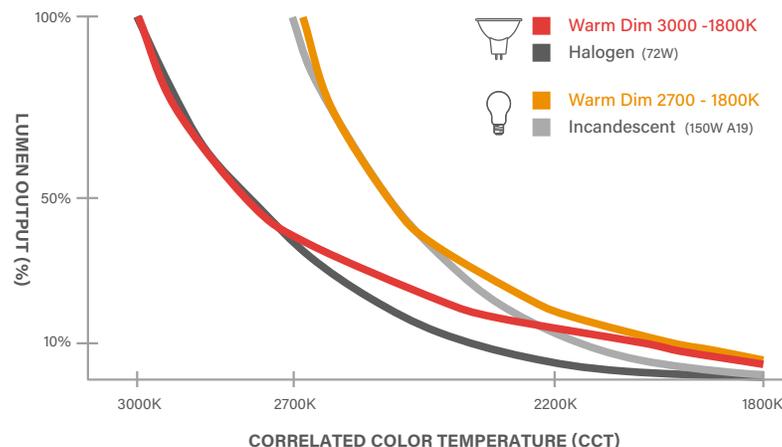
Optic	Cut-Off Degree	Trim Type	Distribution Beam Spread Spacing Criteria					
			NFL	FL1	FL2	WFL	VWFL	SWFL
DNT	50°	Overlap	25° 0.42	37° 0.62	44° 0.72	59° 0.89	67° 1.02	
		Trimless	26° 0.54	37° 0.62	44° 0.76	58° 0.87	-	-
DNS	60°	Overlap	24° 0.42	34° 0.67	47° 0.81	54° 0.87	65° 0.99	
		Trimless	25° 0.42	37° 0.63	45° 0.75	56° 0.92	-	-
DSS	75°	Overlap	-	-	-	-	73° 1.07	91° 1.26
		Trimless	-	-	-	-	74° 1.07	91° 1.24

3.5" ROUND DOWNLIGHT PERFORMANCE TABLE

Based on Overlap, Tall Cone, Wide Flood, Clear Diffuse. Delivered lumen output may vary +/- 5%. Actual wattage may vary +/- 5%

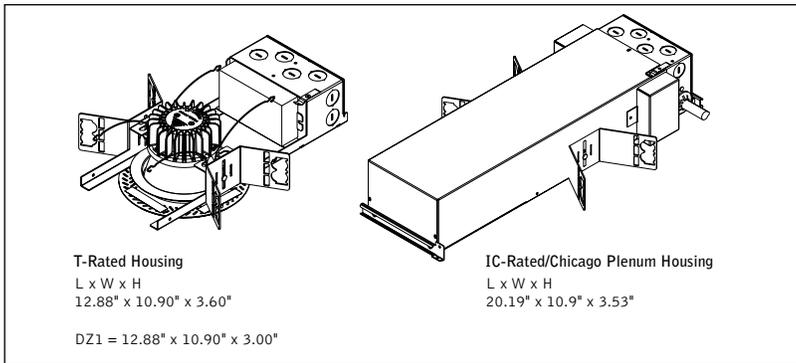
WD WARM DIM				
CCT Range	Lumen Output	Delivered Lumens	System Watts	LPW
2700 - 1800K	1500L	1524	25	61
3000 - 1800K	1500L	1555	25	61

The 3000K to 1800K and 2700K to 1800K ranges mimic the black body curves of halogen and incandescent light sources, respectively.





TUNABLE WHITE HOUSING DETAILS



TUNABLE WHITE HOUSING ORDERING

Housing Series ID+ 3.5" Round	FLC3D	<u>FLC3D</u>
Trim Type Round Overlap Round Trimless	RO RT	_____
Color Options Tunable White: 1800-4000K <small>(900L max. T-rated housings only.)</small> Tunable White: 2700-5000K Tunable White: 2700-6500K	1840T 2750T 2765T	_____
Lumen Output 700 Lumen 900 Lumen 1100 Lumen 1300 Lumen	700L 900L 1100L 1300L	_____
Voltage 120/277 Volt <small>(2705T & 2765T only. IC housing only.)</small> 120V 277V	UNV 120 277	_____
Low Voltage <small>(2705T & 2765T only. IC housing only.)</small>	LV	_____

3.5" ROUND DOWNLIGHT OPTICS

Optic	Cut-Off Degree	Trim Type	Distribution Beam Spread Spacing Criteria					
			NFL	FL1	FL2	WFL	VWFL	SWFL
DNT	50°	Overlap	25° 0.42	37° 0.62	44° 0.72	59° 0.89	67° 1.02	
		Trimless	26° 0.54	37° 0.62	44° 0.76	58° 0.87	-	-
DNS	60°	Overlap	24° 0.42	34° 0.67	47° 0.81	54° 0.87	65° 0.99	
		Trimless	25° 0.42	37° 0.63	45° 0.75	56° 0.92	-	-
DSS	75°	Overlap	-	-	-	-	73° 1.07	91° 1.26
		Trimless	-	-	-	-	74° 1.07	91° 1.24

Control System & Dimming Level

0-10V <1% Dimming DALI <1% Dimming <small>(Default driver offers DT6 control. It requires two addresses, one for intensity & one for CCT tuning. Consult factory for DT8. Extended lead time apply.)</small>	LZ1 DZ1	_____
Low Voltage, PoE Compatible <small>(No driver. Not available with EMR. LV voltage only.)</small>	LVN	_____

Housing Type

IC-Rated / Airtight <small>(700L only. 2750T or 2765T only.)</small> Thermally Protected, Non-IC / Airtight Thermally Protected, Non-IC Wood <small>(Trimless only. Wood kit required.)</small>	IC T TW	_____
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Factory Options

Bar Hangers Chicago Plenum <small>(2750T & 2765T; 1100L max. 1840T: 700L only.)</small> Emergency Battery - Remote test switch <small>(Overlap trim only. Not available with CP or IC-rated housing. Above ceiling access required.)</small>	BH CP EMR	_____
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3.5" ROUND DOWNLIGHT PERFORMANCE TABLES

Based on Overlap, Tall Cone, Wide Flood, Clear Diffuse. Delivered lumen output may vary +/- 5%. Actual wattage may vary +/- 5%

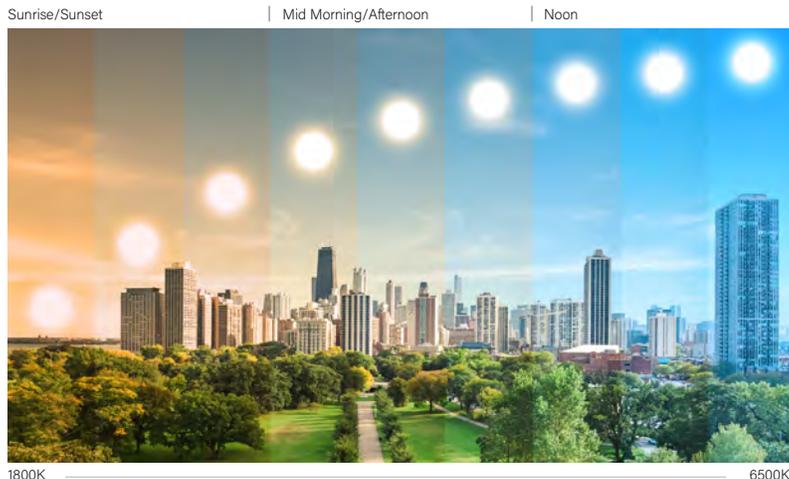
TUNABLE WHITE				
CCT	Lumen Output	Delivered Lumens	System Watts	LPW
2700K <small>(2700-5000K & 2700-6500K)</small>	700L	700	13	53
	900L	906	17	54
	1100L	1095	20	54
	1300L	1306	25	53
1800K <small>(1800-4000K)</small>	700L	701	20	36
	900L	898	25	37

TRIM & LED MODULE

Aperture 3.5" Round Reflector	LC3	<u>LC3</u>
Trim Type Round Overlap Round Die-Cast Overlap (DSS only) Round Trimless Round Die-Cast Trimless (DSS only)	RO RDO RT RDT	_____
Color Options <small>(Trim & housing must match)</small> Tunable White: 1800-4000K Tunable White: 2700-5000K Tunable White: 2700-6500K	1840T 2750T 2765T	_____
Lumen Output <small>(Trim & housing must match)</small> 700 Lumen 900 Lumen 1100 Lumen 1300 Lumen	700L 900L 1100L 1300L	_____
Color Temperature Tunable White: 1800-4000K, 90+ CRI Tunable White: 2700-5000K, 90+ CRI Tunable White: 2700-6500K, 90+ CRI	91840T 92750T 92765T	_____

The Comfort (1800K-4000K), Preference (2700K-5000K), and Activity (2700K-6500K) ranges give specifiers the tools to enhance spaces, mood, and alertness.

DAYLIGHT RANGE



Optic Tall Cone with 50° cut-off Short Cone with 60° cut-off Super Short Cone with Solite Lens 75° cut-off <small>(Die-cast trims only)</small>	DNT DNS DSS	_____
Distribution Narrow Flood Flood 1 Flood 2 Wide Flood Very Wide Flood <small>(Overlap all optics. Trimless DSS only.)</small> Super Wide Flood (DSS only)	NFL FL1 FL2 WFL VWFL SWFL	_____
Finish Clear Diffuse Warm Diffuse Black White	CD WD BK WH	_____
Optional Flange Finish <small>(Overlap CD & WD finish only) (For matching finishes leave blank)</small> Black Painted White Painted	BP WP	_____

ACCESSORIES

Trimless Wood Ceiling Installation Kit <small>(One kit recommended per 10 downlights)</small>	LC3- WOOD-KIT	_____
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HOUSING SPECIFICATIONS

Construction

Thermally protected housing for new construction applications. Insulation to be kept 3" away from housing. Type IC inherently protected, suitable for direct contact with insulation. Restrictive airflow per ASTM-E283. Butterfly brackets allow mounting to 1/2" emt. Order bar hangers as an accessory. Die-cast aluminum heat sink designed for maximum thermal dissipation. Die-formed housing and integral junction box with (7) 1/2" pry outs. Accommodates ceiling thicknesses up to 0.5" standard, field adjustable up to 1.5" thickness. For thicker ceiling consult factory. Fixture will not exceed 5 lb. Trim is inherently airtight and may be used to obtain airtight rating when used with IC-rated or thermally protected, non-IC (T) housings.

Electrical

Choice of constant current dimming drivers. Power factor > .9 typical. PoE compatible: Integrates with Power over Ethernet lighting systems via standard, low-voltage wires.

Emergency

Above ceiling access required. Overlap trim only. Emergency output - 7W for 90 minutes. Maximum mounting height — Clear Diffuse & White: 22.5ft. Black & Warm Diffuse: 15.3ft.

Labels

UL and cUL Listed. Suitable for Dry, Damp or Wet Locations, indoor use only. Specify Outdoor rated (OD) for outdoor recessed ceiling applications.

Outdoor Rated (OD) Driver Dimming Performance table

Lumen Output	Minimum Dimming Level
700L	20%
900L	16%
1100L	13%
1300L	10%
1500L	10%
1700L	10%
1900L	10%
2100L	10%

Lumen Maintenance

Reported: L70 at >55,000 hours Calculated: L70 at 204,000 hours
 L90 at >55,000 hours L90 at 59,000 hours

Derived from EPA TM-21 calculator. Based on typical conditions, consult factory for additional data.

Reliability

At Focal Point, our products are designed to stand the test of time. Each luminaire is engineered using superior components, manufactured with the utmost care and rigorously tested. Contact us for reliability data.

Warranty

LED System rated for operation in ambient environments up to 25°C. 5-year limited warranty. Fixture with Outdoor rated option must be installed in a covered ceiling and is warranted for operation in ambient environments between -20°C to +40°C.

TRIM & LED SPECIFICATIONS

LED System

Proprietary array incorporates premium LEDs on a robust platform. May be specified in 2700K, 3000K, 3500K or 4000K, Warm Dimming (2700K-1800K and 3000K-1800K), or Tunable White (1800K-4000K, 2700K-5000K and 2700K-6500K). CRI>80, >90 or 97. Color accuracy within 2 SDCM (Warm Dimming from 3-5 SDCM). 3500K and 4000K with CRI>90 have a cyanosis observation index (COI) of 3.3 or less. Aluminum heat sink provides appropriate thermal management.

Aesthetics

Parabolic reflector cone ensures glare free optics. DNT & DNS reflector is .050 spun aluminum. DSS reflector is die-cast aluminum. Trims are self-flanged. Non-painted trim matches reflector finish. Painted flange may also be specified.

Optics

50-degree, 60-degree or 75-degree cut-off to light source and its image.

Color Lumen Multipliers

CRI	STANDARD WHITE CCT				WARM DIM CCT RANGES		TUNABLE WHITE CCT RANGES		
	2700	3000	3500	4000	2700-1800K	3000-1800K	1800-4000K	2700-5000K	2700-6500K
80+	0.92	0.98	1.00	1.01	-	-	-	-	-
90+	0.79	0.83	0.82	0.84	1.02	1.04	1.00	1.00	1.00
97	0.67	0.72	0.73	0.76	-	-	-	-	-

Distribution Lumen Multipliers

Trim Type	Optic	Distribution	Multiplier
Round Trimless [RT]	Tall Cone with 50° cut-off [DNT]	Narrow Flood [NFL]	1.12
		Flood 1 [FL1]	0.92
		Flood 2 [FL2]	1.06
		Wide Flood [WFL]	0.92
	Short Cone with 60° cut-off [DNS]	Narrow Flood [NFL]	0.99
		Flood 1 [FL1]	0.96
		Flood 2 [FL2]	0.92
		Wide Flood [WFL]	0.95
Round Overlap [RO]	Tall Cone with 50° cut-off [DNT]	Narrow Flood [NFL]	0.97
		Flood 1 [FL1]	0.94
		Flood 2 [FL2]	1.09
		Wide Flood [WFL]	1.02
		Very Wide Flood [VWFL]	1.02
	Short Cone with 60° cut-off [DNS]	Narrow Flood [NFL]	0.98
		Flood 1 [FL1]	1.17
		Flood 2 [FL2]	1.11
		Wide Flood [WFL]	1.09
		Very Wide Flood [VWFL]	1.07
Round Die-Cast Trimless [RDT]	Super Short Cone with Solite Lens with 75° cut-off [DSS]	Very Wide Flood [VWFL]	1.00
		Super Wide Flood [SWFL]	0.95
Round Die-Cast Overlap [RDO]	Super Short Cone with Solite Lens with 75° cut-off [DSS]	Very Wide Flood [VWFL]	0.96
		Super Wide Flood [SWFL]	0.90

Color Lumen Multipliers

Trim Type	Optic	Color	Multiplier
Round Trimless [RT] and Round Overlap [RO]	Tall Cone with 50° cut-off [DNT]	Clear Diffuse [CD]	1.00
		Warm Diffuse [WD]	0.92
		White [WH]	1.09
		Black [BK]	0.46
Round Die-Cast Trimless [RDT] and Round Die-Cast Overlap [RDO]	Super Short Cone with Solite Lens with 75° cut-off [DSS]	Clear Diffuse [CD]	1.00
		Warm Diffuse [WD]	0.97
		White [WH]	1.16
		Black [BK]	0.86

How To Use Lumen Multipliers

Formula:

(Lumen Output Value) x (Color Temperature & CRI) x (Distribution) x (Color)

Example:

LC3-RO-SW-1100L-935K-DNS-FL1-WH
 (1100) x (0.81) x (1.17) x (1.12) ≈ 1167lm (estimated delivered lumens)

Multiplier charts are provided to aid with estimation of lumen levels across options. Apply multipliers against ordered Lumen Output to estimate Delivered Lumens. An estimation should make use of all tables through consecutive application of three multipliers. Refer to IES files for most accurate photometric information.

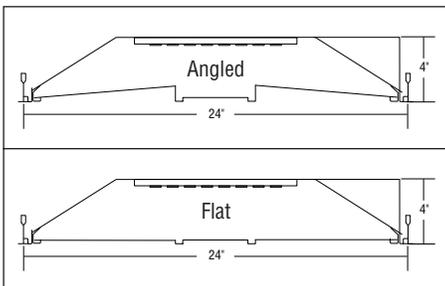
High Performance Recessed (HPR-LED) 2x4



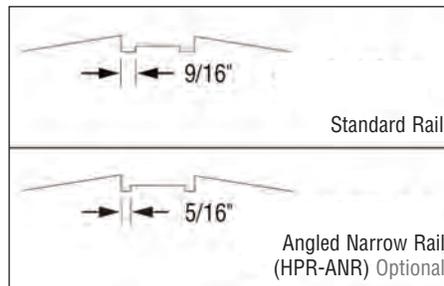
Refer to page 2 for all door styles

DESCRIPTION

HPR LED is a highly efficient recessed luminaire delivering excellent visual comfort and outstanding performance. Advanced optical design makes HPR LED a powerful solution for low-ceiling applications and eliminates the shadows common to other LED recessed products. This Product is enrolled in the International Living Future Institute (ILFI) Declare 2.0 Program and is third-party verified with options achieving **Red List Approved** and **Declared** status.



DIMENSIONS



NARROW RAIL OPTION

Available in angled door style with the same center optic choices. The optional narrow rails are approximately 5/16" wide. The standard rails are approximately 9/16" wide.

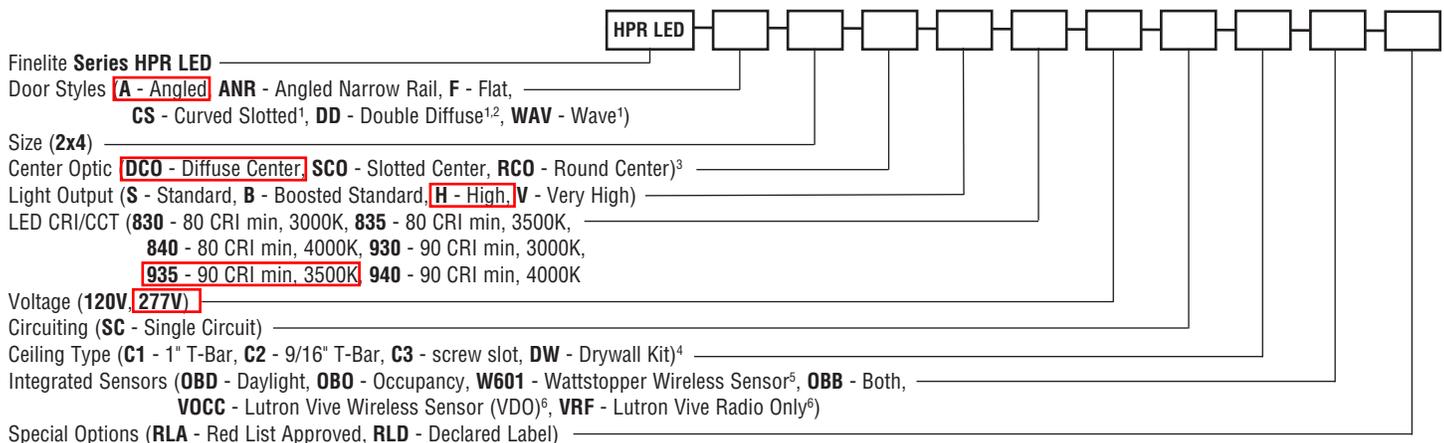


100% SERVICEABLE FROM BELOW

The replaceable light engine and driver are easy to access from below the ceiling.

ORDERING GUIDE

Sample Number: HPR LED - A - 2x4 - DCO - S - 835 - 277V - SC - C1 - OBO - RLA



¹ Curved Slotted, Double Diffuse and Wave door not available with Center Optic options

³ Only available with Angled (A), Angled Narrow Rail (ANR) and Flat (F) door options

⁵ LMFS-601 w/ 0-10V driver(s) and LMFI-111, up to 6 drivers may be connected. LMFS-601 w/ DALI driver, only 1 driver can be connected.

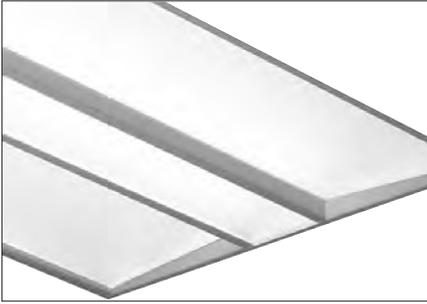
² Double Diffuse not available with sensors

⁴ Surface Mount available

⁶ Lutron Vive Integrated Sensors require a DALI driver

High Performance Recessed (HPR-LED) 2x4

DOOR STYLES



A - Angled
ANR - Angled Narrow Rail

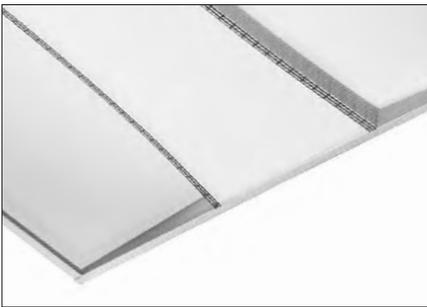


F - Flat

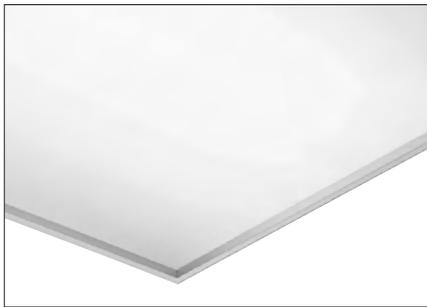


WAV - Wave

DOOR STYLES



CS - Curved Slotted



DD - Double Diffuse

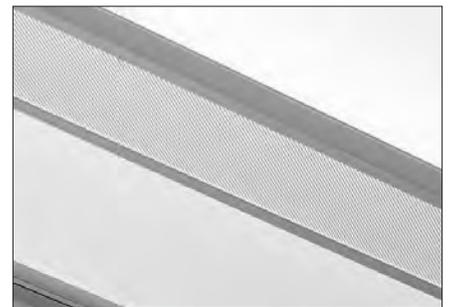
CENTER OPTICS



DCO - Diffuse Center



SCO - Slotted Center



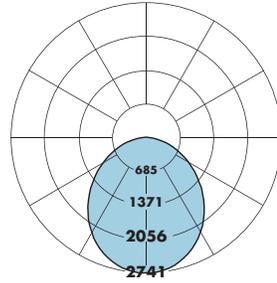
RCO - Round Center

DCO, SCO, and RCO are only available on Angled (A), Angled Narrow Rail (ANR), and Flat (F) doors.

High Performance Recessed (HPR-LED) 2x4

PHOTOMETRY

HPR LED-A-2x4-DCO-V
Very High Output - Angled Rail
Efficacy: 127 lumens per watt
Total luminaire output: 6979 Lumens
55.1 Watts
Peak Candela Value: 2741 @ 0°
CCT: 3500K
ITL LM79 Report 85145



CANDLEPOWER SUMMARY						
	0.0	22.5	45	67.5	ACROSS	Flux
0	2741	2741	2741	2741	2741	
5	2730	2728	2728	2727	2727	259
10	2685	2684	2683	2682	2678	
15	2613	2607	2609	2605	2602	735
20	2511	2506	2502	2498	2498	
25	2380	2374	2371	2366	2367	1091
30	2223	2216	2213	2209	2211	
35	2043	2036	2033	2030	2033	1271
40	1845	1838	1836	1834	1837	
45	1635	1628	1627	1626	1630	1256
50	1417	1412	1412	1410	1413	
55	1200	1195	1196	1195	1187	1069
60	986	984	984	978	974	
65	780	778	774	766	761	766
70	582	583	576	569	565	
75	401	400	393	388	389	420
80	239	236	232	229	229	
85	103	100	97	91	89	111
90	0	0	0	0	0	

Angled (A) and Flat (F) Total Light Output, 3500K, 80 CRI (Lumens)			
S*	B*	H*	V**
3772	4742	5416	6979
Power, 3500K, 80 CRI (Watts)			
S*	B*	H*	V**
27.0	35.2	40.6	55.1
Efficacy, 3500K, 80 CRI (Lumens Per Watt)			
S*	B*	H*	V**
140	135	135	127

* Family Correlation based on 3500K Very High Output (V) test - 120V.
** Based on source ITL report: 85145

Angled Narrow Rail (ANR) Total Light Output, 3500K, 80 CRI (Lumens)			
S*	B*	H*	V ^x
3680	4626	5283	6808
Power (Watts)			
S*	B*	H*	V ^x
26.9	35.1	40.5	55.0
Efficacy, 3500K, 80 CRI (Lumens Per Watt)			
S*	B*	H*	V ^x
137	132	130	124

* Family Correlation based on 3500K Very High Output (V) test - 120V.
** Based on source ITL report: 85151

**S - Standard Output, B - Boosted Standard Output,
H - High Output, V - Very High Output**

Lumen Adjustment Factors - 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors - 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

Apply a lumen adjustment factor to calculate lumens for the desired CCT and CRI.

**SAMPLE LUMEN
ADJUSTMENT CALCULATION**

High Output (H) Angled (A) & Flat (F)
4000K, 90 CRI

Lumen Adjustment Factor = 0.789

Total Light Output =
5416 lm x 0.789 = 4273 lm

$$\text{Efficacy} = \frac{4273 \text{ lm}}{40.6 \text{ W}} = 105 \text{ lm/W}$$

** Correlation based on ITL report: 85145

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High Performance Recessed (HPR-LED) 2x4

Wave (WAV) Total Light Output, 3500K, 80 CRI (Lumens)			
S*	B*	H*	V†
3821	4804	5486	7069
Power, 3500K, 80 CRI (Watts)			
S*	B*	H*	V†
27.0	35.2	40.6	55.1
Efficacy, 3500K, 80 CRI (Lumens Per Watt)			
S*	B*	H*	V†
142	136	135	128

* Family Correlation based on 3500K Very High Output (V) test - 120V.
† Based on source ITL report: 85837

Curve Slotted (CS) Total Light Output, 3500K, 80 CRI (Lumens)			
S*	B*	H*	V‡
3569	4486	5124	6602
Power, 3500K, 80 CRI (Watts)			
S*	B*	H*	V‡
27.0	35.2	40.6	55.1
Efficacy, 3500K, 80 CRI (Lumens Per Watt)			
S*	B*	H*	V‡
132	127	126	120

* Family Correlation based on 3500K Very High Output (V) test - 120V.
‡ Based on source ITL report: 86020

Double Diffuse (DD) Total Light Output, 3500K, 80 CRI (Lumens)			
S*	B*	H*	V‡
3076	3867	4417	5691
Power, 3500K, 80 CRI (Watts)			
S*	B*	H*	V‡
27.0	35.2	40.6	55.1
Efficacy, 3500K, 80 CRI (Lumens Per Watt)			
S*	B*	H*	V‡
114	110	109	103

* Family Correlation based on 3500K Very High Output (V) test - 120V.
‡ Based on source ITL report: 85156

Lumen Adjustment Factors - 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors - 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

Apply a lumen adjustment factor to calculate lumens for the desired CCT and CRI.

S - Standard Output, **B** - Boosted Standard Output,
H - High Output, **V** - Very High Output

High Performance Recessed (HPR-LED) 2x4

SPECIFICATIONS

CONSTRUCTION: Die-formed 20-gauge cold-rolled steel housing. All components are hard-tooled to tolerances of +/- 0.010". UV stabilized weather-strip pile gasket with polypropylene backing. Hinged door frame assembly provides easy access to light arrays and driver compartment for servicing from below. Seismic brackets are integrated into the luminaire assembly. Additional wire entrances are positioned on the ends of the housing to allow easy wiring access for the installer.

REFLECTORS: Die-formed 20-gauge cold-rolled steel reflectors are finished in 96LG high reflectance matte white powder coat paint.

AIR RETURN: Refer to 2x4 Air Return Tech Sheet for more information.

OPTICAL SYSTEM: Components include diffuser panels and a central optic element held in place with a frame constructed from die-formed cold-rolled steel. The diffusers are UV-stabilized and impact-resistant frosted virgin acrylic, 0.120" thick. They are either angled toward the central optic or parallel to the ceiling plane. The standard center rails are approximately 9/16" wide. Optional narrows rails are approximately 5/16" wide. Optional wave door includes frosted acrylic panel that undulates from side to side.

DOUBLE DIFFUSE: Visible diffuser: UV-stabilized and impact-resistant frosted virgin acrylic, 0.120" thick. Inner diffuser: 0.120" thick with 60% round perforations white/white.

DOOR STYLE: Curved Slotted (CS) includes perforated rails that slope inward and a diffuse frosted acrylic center optic.

CENTER OPTIC OPTIONS: Only available with Angled (A), Angled Narrow Rail (ANR), and Flat (F) door styles.

Diffuse Center Optic (DCO): UV-stabilized and impact-resistant frosted virgin acrylic.

Slotted Center Optic (SCO): Die-formed cold-rolled steel panel with a 1/16" x 1/2" rectangular hole pattern. Virgin acrylic overlay.

Round Center Optic (RCO): Die-formed cold-rolled steel panel with precision-punched 3/32" round hole pattern arranged in staggered formation. Virgin acrylic overlay.

LIGHT OUTPUT: Four lumen packages available, Standard (S), Boosted Standard (B), High (H), and Very High (V). A separate chart summarizes lumen distribution and wattage. Light engines are replaceable.

LUMEN MAINTENANCE: 90% of initial light output (L90) at 100,000+ hours; 70% of initial light output (L70) at 200,000+ hours.

DRIVER: Replaceable 120V/277V Constant Current Reduction dimming driver standard. Can be wired dimming or non-dimming. 0-10V dimming controls with a range of 10%- 100%. Dimming to 1% available, consult factory. Driver is fully accessible from below the ceiling. Power Factor: 0.9. Total Harmonic Distortion (THD): <20%. Expected driver lifetime: 100,000 hours.

LUTRON DRIVER OPTIONS: LUTES1 (Hi-lume 1% EcoSystem with Soft-On, Fade to Black dimming (LDE1 series)); LUT2W (Hi-lume 1% 2-wire, 120V forward phase dimming (LTEA series)); Contact factory for availability of discontinued Lutron drivers, L3DA-3-wire and L3DA EcoSystem.

ELECTRICAL: Optional emergency to generator/inverter wiring, internal generator transfer switch, nightlight wiring, step-dimming driver, backup battery. Chicago Plenum option. Factory-choice low-profile backup battery available. Bodine BSL722 battery pack also available. Backup batteries deliver 2305 lumens. One quarter of the 2x4 will be illuminated in emergency mode.

INTEGRATED SENSORS: Integrated PIR (Passive Infrared) Occupancy (OBO) or Daylight Sensors (OBD) available with Flush and Bottom Glow downlight diffusers. PIR sensors not recommended for stairwell applications. Refer to Occupancy Sensor & Daylight Sensor tech sheet and the Embedded Intelligence landing page for more information and additional sensor options.

MOUNTING: Standard flange design works with most lay-in ceiling types. Integral pry-out tabs secure the luminaire to the ceiling grid from above. Tie-in locations for tie-wire on all corners. Consult local code for appropriate tie-wire recommendations. Drywall Kit available. Surface mount and air return versions available; refer to separate tech sheets.

FINISH: Housing and door assembly painted with 96 LG high reflectance matte white powder coat paint. Optional adder: Anti-microbial paint. Contact factory.

FEED: Optional whips (with flex connectors) supplied in a maximum of 11' lengths. Lead Wires

LABELS: Luminaire and electrical components are ETL-listed conforming to UL 916, 1598, 8750, 924 in the U.S.A. and CAN/CSA C22.2 No. 205, 250, and 141 in Canada. In accordance with NEC Code 410.73 (G), this luminaire contains an internal driver disconnect. Damp Location. IC-rated. Finelite products use electronic components that are RoHS compliant, and the mechanical components of the luminaire have been verified to not knowingly contain any restricted substances listed per RoHS Directive 2011/65/EU. Simply add - RLF (Red List Free) or - RLD (Declared) to your part number.

WEIGHT: 33 lbs maximum.

DLC QUALIFIED: Contact factory

WARRANTY: 10-year performance-based warranty on all standard components. Optional accessories such as emergency battery packs are covered by their individual manufacturer warranties.



* LutVDO & LutVRF can be provided with 1% DALI Sensor Ready Driver (Osram Dexas), 5% DALI Sensor Ready Driver (Philips SR DALI) or any Lutron EcoSystem 1% or 5% LED driver. Customer to specify driver required.

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed



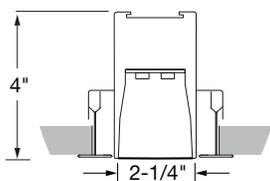
High Performance 2" Aperture is a patented, linear LED luminaire family. HP-2 delivers excellent performance using an advanced optical design and mid-power LEDs. Achieving 90% of initial light output at 100,000+ hours and backed by a 10-year performance-based warranty on all standard components.

This product is enrolled in the International Living Future Institute (ILFI) Declare 2.0 Program and is third-party verified with options achieving **Red List Approved** and **Red List Declared** status.

Note: see page 6 for all aesthetic options

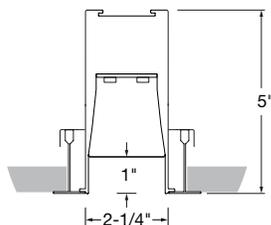
CROSS SECTIONS

Recessed



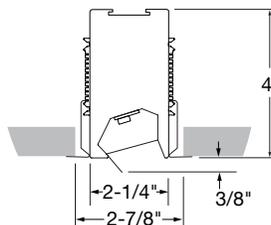
Flush Downlight Diffuser (standard)

Regressed



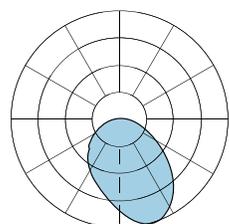
Flat Diffuser with 1" Regressed

Wall Wash Recessed

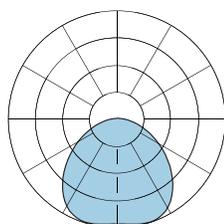


Kicker (standard)

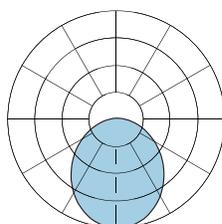
OPTIC OPTIONS



Downlight Asymmetric Optic (DAO)



Downlight Spread Optic (DSO)



Standard Downlight Flush Optic (F)

ALSO AVAILABLE IN



Pendant (D, ID, I)



Wall Mount (WM)



Surface Mount (SM)



Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Ordering Guide Example: HP - 2 - R - D - 36' - S - 835 - F - 96LG - 120 - SC - FC-10% - FA50 - C1 - FE - SW - LGD18W - OBO - CP

BODY TYPE

OUTPUT AND LED TYPE

Platform	Series Name	Luminaire Type	Luminaire Distribution	Total Length of Run	Downlight Output (Flush)	LED CRI/CCT
HP - High Performance	2	R - Recessed R RG - Recessed Regressed (Wall Wash not available)	D - Direct WW-D - Wall Wash Direct	4 FT Minimum 2' section length. Increments accurate to 1/16" (±1/32"), standard. 12' maximum section length.	S - Standard (336 lm/ft) B - Boosted (423 lm/ft) H - High (639 lm/ft) V - Very High (822 lm/ft) TL - Tailored: _____lm/ft* Lumen provided above are for Flush lens only, see pg. 12 for WW lumens * Specify Tailored lm/ft of outputs between Standard (S) and Very High (V). Consult factory for tailored lumen output outside of this range.	830 - 80 CRI, 3000K 835 - 80 CRI, 3500K 840 - 80 CRI, 4000K 930 - 90 CRI, 3000K 935 - 90 CRI, 3500K 940 - 90 CRI, 4000K 8TW - 80 CRI, Tunable White 9TW - 90 CRI, Tunable White

MECHANICAL/OPTICAL OPTIONS

ELECTRICAL OPTIONS

Downlight	Reflector System	Voltage	Circuiting ²
F - Flush (standard) ^{8,9} DL - 1" Drop Down Lens ⁸ RG-D - Flat Diffuser with 1" Regress ^{1,8} RG-WCB - White Cross Blade Baffle ^{1,8} RG-LHE - Hollowed Ellipse Louver ^{1,8} RG-LHC - Hex Louver ^{1,8}	DAO-L - Downlight Asymmetric Left ^{4,8} DAO-R - Downlight Asymmetric Right ^{4,8} DSO - Downlight Spread Optic ^{4,8} K - Kicker for Wall Wash only (standard) ⁵ FO - Fully Open for Wall Wash only	96LG - 96 Low Gloss White SW - Signal White for Wall Wash only	SC - Single Circuit* One single circuit in a run MC - Multi-Circuit* More than one switch leg or zone. Factory shop drawings required * Battery, Night Light, and Emergency to Generator circuits are in addition to the normal luminaire circuit(s)

ELECTRICAL OPTIONS

Driver Selection			
0-10V Driver Options FC-10% - 0-10V 10% (standard) FC-1% - 0-10V 1% OTi-10% - EldoLED OTi, 0-10V 10% ³ OTi-1% - EldoLED OTi, 0-10V 1% ³ ELD-10V-0% - EldoLED SOLOdrive, 0-10V 0.1% 10V-TW-10% - EldoLED OTi, 0-10V 10% (Tunable White) ³	DALI Driver Options FC-DALI-1% - DALI 1% DXL-DALI-1% - EldoLED Dexal, 1% ELD-DALI-0% - EldoLED SOLOdrive, 0.1% ELD-DALI-TW - EldoLED DUALdrive LightShape, 0.1% (Tunable White)	DMX Driver Options ELD-DMX - EldoLED POWERdrive, 0.1% ELD-DMX-TW - EldoLED POWERdrive, 0.1% (Tunable White)	Lutron Driver Options LUT-ES1 - Lutron, Ecosystem 1% LUT-TW - Lutron LD2 Dali-2 1% (Tunable White)

See Page 3 for additional driver options and details

MOUNTING OPTIONS

OTHER OPTIONS

Ceiling Hardware Type	Endcap Style	Finish
C1 - 15/16" T-Bar C1T - 15/16" Tegular C2 - 9/16" T-Bar C2T - 9/16" Tegular C3 - Screw Slot	C3F - Flush Screw Slot SF - Spackle Flange VF - Visible Flange TZ4 - Tech Zone 4" _____ (C1, C2, C2T, C3, C3F)	FE - Flat Endcap (standard) SW - Signal White (standard) FB - Finelite Black SA - Satin Aluminum #### - RAL Color Code ⁷ _____

OTHER OPTIONS

Emergency Style (Optional) <small>See page 5 Backup Battery table</small>	Integrated Sensor (Optional) ⁸	Special Options (Optional)
LGD18W - Legrand 18W Brand Battery Back-up LGD10W - Legrand 10W Brand Battery Back-up EM/GEN - Emergency to Generator NL - Night Light BSL310LP - Bodine Battery Back up Low Profile GTD - Generator Transfer Device ALCR - Automatic Load Control Relay	OBO - Occupancy ⁹ OBD - Daylight ⁹ W601 - Wattstopper Wireless Sensor ¹⁰ OBE - Enlighted ¹¹ REE - Remote Enlighted ¹² CLM - Encelium RF SLM - Encelium Sensor	AOCC-W - Lutron Athena Sensor (Device Color White) ¹³ AOCC-B - Lutron Athena Sensor (Device Color Black) ¹³ ARF-W - Lutron Athena RF (Device Color White) ¹³ ARF-B - Lutron Athena RF (Device Color Black) ¹³ VOCC - Lutron Vive Wireless Sensor (VDO) ¹⁴ VRF - Lutron Vive Radio Only ¹⁴

¹ Recessed Regressed straight run only
² Contact factory for switching options
³ Add DTO to gain "Dim to Off" functionality (FC-10% - DTO, FC-1% - DTO)
⁴ Not available with Regressed or Curves
⁵ Kicker standard in Signal White. Customer Custom color kickers have a surcharge

⁶ B & V outputs only
⁷ 20 business days lead time for color
⁸ Minimum fixture length with a sensor is 3ft.
⁹ Not available with Wall Wash
¹⁰ LMFS-601 w/ 0-10V driver(s) and LMFI-111, up to 6 drivers may be connected. LMFS-601 w/ Dali driver, only 1 driver can be connected.
¹¹ Enlighted components installed by Finelite, provided by others

¹² Enlighted for Wall Wash fixtures. Enlighted Control Unit & Sensor Cable installed for Remote mounting sensor.
¹³ 0-10V Drivers - AOCC up to 10 drivers may be connected; ARF up to 40 drivers may be connected DALI Drivers - AOCC & ARF up to 4 drivers can be connected.
¹⁴ Lutron Vive Integrated Sensors require a DALI driver
¹⁵ Only available with C1, C2, and C3 mounting hardware with Finelite Gridbox

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

SUPPLEMENTARY DRIVER PAGE

0-10V Driver Options

FC-10%	Factory Choice, 0-10V 10% Dimming (Linear)
FC-10%-DTO	Factory Choice, 0-10V 10% Dimming, Dim-to-Off (Linear)
FC-1%	Factory Choice, 0-10V 1% Dimming (Linear)
FC-1%-DTO	Factory Choice, 0-10V 1% Dimming, Dim-to-Off (Linear)
ELD-10V-0%	EldoLED SOLOdrive, 0-10V 0.1% Dimming (Linear)
ELD-10V-1%	EldoLED ECOdrive, 0-10V 1% Dimming (Linear)
10V-TW-10%	EldoLED OTi, 0-10V 10% Dimming, <i>Tunable White</i> (Linear)
10V-TW-10%-DTO	EldoLED OTi, 0-10V 10% Dimming, Dim-to-Off, <i>Tunable White</i> (Linear)
OTi-10%	EldoLED OTi, 0-10V 10% Dimming (Linear)
OTi-10%-DTO	EldoLED OTi, 0-10V 10% Dimming, Dim-to-Off (Linear)
OTi-1%	EldoLED OTi, 0-10V 1% Dimming (Linear)
OTi-1%-DTO	EldoLED OTi, 0-10V 1% Dimming, Dim-to-Off (Linear)

DALI Driver Options

FC-DALI-1%	Factory Choice, DALI 1% Dimming (Logarithmic)
DXL-DALI-1%	EldoLED Dexal, DALI 1% Dimming (Logarithmic)
ELD-DALI-0%	EldoLED SOLOdrive, DALI 0.1% Dimming (Logarithmic)
ELD-DALI-1%	EldoLED ECOdrive, DALI 1% Dimming (Logarithmic)
ELD-DALI-TW	EldoLED DUALdrive Light Shape, DALI 0.1% Dimming, <i>Tunable White</i> (Logarithmic Dimming , Linear CCT Control)

DMX Driver Options

ELD-DMX	EldoLED POWERdrive, DMX 0.1% Dimming (8 Bit, 1CH) (Linear)
ELD-DMX-16	EldoLED POWERdrive, DMX 0.1% Dimming (16 Bit, 2CH) (Linear)
ELD-DMX-TW	EldoLED POWERdrive, DMX 0.1% Dimming, <i>Tunable White</i> (8 Bit, 2CH - CH1 Warm / CH2 Cool) (Linear)
ELD-DMX-TW16	EldoLED POWERdrive, DMX 0.1% Dimming, <i>Tunable White</i> (16 Bit, 4CH - CH1, 2 Warm / CH3, 4 Cool) (Linear)

Lutron Driver Options

LUT-ES1	Lutron, Ecosystem 1% Dimming
LUT-TW	Lutron LD2 Dali-2 1%, <i>Tunable White</i>

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

SPECIFICATIONS

BODY TYPE

CONSTRUCTION: Precision-cut 6063-T6 extruded aluminum body. Internal joiner system and plug-together wiring are standard.

LENGTHS: Any length, 2' minimum, in increments down to 1/16th" ($\pm 1/32"$). 12' maximum section length. Hollowed Ellipse Louver (**LHE**), Hex Louver (**LHC**), and White Cross Blade Baffle (**WCB**) are available in 1' increments.

MITERED CORNERS ¹: Illuminated corners of greater than 60° and less than 180° in a single plane, available with Flush Diffuser, Bottom Glow Diffuser, Regressed Diffuser, or White Cross Blade Baffle ². Corners not available with Wall Wash (**WW-D**), Hollowed Ellipse Louver (**LHE**), Hex Louver (**LHC**) or 1" Drop Down Lens. Contact factory for Double miters using the White Cross Blade Baffle. Consult factory for tailored lighting options.

OUTPUT AND LED TYPE

LIGHT OUTPUT: Four lumen packages available, Standard (**S**), Boosted Standard (**B**), High (**H**), and Very High (**V**). For lengths 3' and greater, the uplight and downlight can be specified with different lumen packages and dual controls. For Tailored Outputs outside of range from Standard (**S**) to Very High (**V**), consult factory. Light engines are replaceable.

MECHANICAL/OPTICAL OPTIONS

DOWNLIGHT OPTION: 12' maximum diffuser length. Flush frost white snap-in diffuser standard, 73% transmissive, 99% diffusion. Internal secondary diffusers at corners ensure visually seamless, uniform, continuous illumination. Available with Flush (**F**), Bottom Glow (**BG**), 1" Drop Down Lens (**DL**), White Cross Blade Baffle (**WCB**)^{3,4}, Ellipse Louver (**LHE**)³, Hex Louver (**LHC**)³, Downlight Asymmetric Optic (**DAO**)⁵, Downlight Spread Optic (**DSO**)⁵, and Regressed downlight diffusers (**RG**)³. 1" Drop Down Lens made of highly efficient acrylic. Available with a solid endcap or an endcap with a diffuse filler to continue the luminous aesthetic. Downlight Spread & Downlight Asymmetric Optics are extruded lenses with a subtle ribbed appearance providing a batwing or asymmetric distribution for improved optical performance. Consult factory for more tailored lumen outputs.

LUMEN MAINTENANCE: 90% of initial light output (L90) at 100,000+ hours; 70% of initial light output (L70) at 200,000+ hours.

REFLECTORS: Die-formed 20-gauge cold-rolled steel reflectors finished in 96LG High Reflectance white powder coat paint. The standard Semi-Specular Aluminum (**SSA**) Kicker (**K**) reflector delivers light high on the vertical surface. The Kicker reflector can be easily removed for open distribution (**FO**).

ELECTRICAL OPTIONS

STATIC WHITE FEED: Standard with one 18-gauge/5-conductor single-circuit feed wire controlling uplight and downlight together (power and dimming). Specify dual feed wires for independent control of uplight and downlight. 14-gauge feed wire used when luminaire current exceeds 5 amps.

TUNABLE WHITE FEED: Standard with one 18-gauge/5-conductor single-circuit feed. 14-gauge feed used when luminaire current exceeds 5 amps. DMX feeds cannot be cut or spliced. DMX feeds should be ordered based on fixed lengths.

0-10V:

- One 18-gauge / 3-conductor power
- One 18-gauge / 4-conductor for dimming and controls

Dali:

- One 18-gauge / 5-conductor power and controls

DMX:

- One 18-gauge / 3-conductor power
- One DMX feed

STATIC WHITE DRIVER: Replaceable 120V, 277V, and 347V constant current reduction dimming driver standard. Can be wired dimming or non-dimming. 0-10V dimming controls with a range of 10%- 100% standard. Dimming to 1% available. Separate dimming for uplight and downlight available. Driver is fully accessible from below the ceiling.

– **Power Factor:** ≥ 0.9

– **Total Harmonic Distortion (THD):** <20%

– **Expected driver lifetime:** 100,000 hours

LUTRON DRIVER OPTIONS:

LUT-ES1 - Hi-lume 1% EcoSystem with Soft-On, Fade-to-Black dimming (LDE1 series).

TUNABLE WHITE DRIVER: Replaceable LED driver. Driver is accessible from below the ceiling. 120V and 277V.

– **Power factor:** ≥ 0.90

– **Total Harmonic Distortion (THD):** <20%

– **Dimming Range:** 100%-10%

– **Expected driver lifetime:** 100,000 hours

LUTRON TUNABLE WHITE DRIVER OPTION:

LUT-TW - Lutron LD2 Dali-2 1%, Tunable White.

¹ Not available with Wall Wash

² White Cross Blade (WCB) baffles not available with custom angles. Available in 90 degrees only

³ Recessed Regressed straight run only

⁴ White Cross Blade Baffle (WCB) currently not advisable for drywall

⁵ Not available with Regressed or Curves

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

SPECIFICATIONS

MOUNTING OPTIONS

HANGING HARDWARE:

- **Recessed T-Bar:** Standard bracket design works with most lay-in ceiling types. Brackets secure luminaire to the ceiling grid from above. Tie-in T-Bar brackets connect the luminaire to the T-Bar for securing to structure. Consult local codes for tie-wire recommendations.
- **Recessed Spackle Flange:** Drywall surfaces (walls or ceilings): 1/4" - 20 stud and nut (provided by others). Mounted with three equidistant suspension points.

TUNABLE WHITE DMX HANGING HARDWARE: For grid ceiling applications the dual GridBox™ mounting is supplied (standard). For hard ceiling applications the ceiling mounting box is supplied (standard). DMX feeds cannot be cut or spliced. DMX feeds should be ordered based on fixed lengths. Available DMX pendant feed lengths are 5' (standard), 12', and 30'.

TUNABLE WHITE DMX INTERCONNECTION CABLES: Luminaires are prewired with plug-and-play interconnected cables to support easy plug-together joining of fixture runs. DMX to RJ45 adapters and an RJ45 terminator for every 32 DMX drivers are included.

OTHER OPTIONS

ENDCAPS: Flat endcaps (**FE**) at each end of run add 1/16" to each end of luminaire. Drop Down Lens Illuminated Endcap (**DE**) includes diffuse element to continue luminance of drop lens.

EMERGENCY STYLE: Optional emergency to generator/inverter wiring, internal generator transfer switch, nightlight wiring, step-dimming driver, backup battery.

Backup Battery

	Legrand 18W	Legrand 10W / Bodine BSL310LP
HP2-R-D		
Min. Housing Length	8*	4**
EM Lumen Output	1608	956
EM Section Illuminated	2'	2' or 4'
HP2-R-WW-D		
Min. Housing Length	8*	4**
EM Lumen Output	1500	891
EM Section Illuminated	4'	4'

* Minimum fixture housing length for battery pack approved without sensor. ** Exception: 5' not available, 6'+ okay. The lumens are based on 835. For other CCT/CRI, refer to the Lumen Adjustment Factor table on page 11.

Bodine GTD and Legrand ALCR Min. Length	
Configuration	Min Length
Generator	6'
Generator + OCC	8'
Daylight	6'
Generator + Daylight	8'

TUNABLE WHITE ELECTRICAL OPTIONS ⁶:

TW Driver Options

- **0-10V:** EM/GEN, GTD or Battery BackUp
- **DMX:** Battery Back Up
- **DALI:** EM/GEN, GTD or Battery Back Up
- **LUTRON:** EM/GEN, GTD or Battery Back Up

INTEGRATED SENSORS: Integrated PIR (Passive Infrared) Occupancy (**OBO**) or Daylight Sensors (**OBD**) available with Flush and Bottom Glow downlight diffusers. PIR sensors not recommended for stairwell applications. Refer to Occupancy Sensor & Daylight Sensor tech sheet and the Embedded Intelligence landing page for more information and additional sensor options. Minimum fixture length with a sensor is 3ft. The default location for the Connected Lighting Module (**CLM**) will be on the top side of the fixture for all mounting types except for Surface Mount (**SM**). In SM fixtures the CLM will be located on the direct side of fixture housed in a bracket that is flush with the direct lens.

FINISHES: Finelite Signal White (**SW**) powder coat, Finelite Black (RAL 9005) with semi gloss fine texture (**FB**), and Satin Aluminum (**SA**) are standard. Optional Adder: 179 RAL colors ⁷ are available.

LABELS: Luminaire and electrical components are ETL-listed conforming to UL 1598 in the U.S.A. and CAN/CSA C22.2 No. 250.0 in Canada. In accordance with NEC Code 410.130 (G), this luminaire contains an internal driver disconnect. UL 924 and UL 2108 - PoE options available on request. These fixtures are rated for Damp Location. IC Rated. HP-2 can be used to comply with 2016 Title 24, Part 6 (JA8); high efficacy LED light source requirements. Finelite products use electronic components that are RoHS compliant, and the mechanical components of the luminaire have been verified to not knowingly contain any restricted substances listed per RoHS Directive 2015/863. Consult factory for tailored lighting options. Finelite makes the specification process easy when putting healthier products on your projects. Simply add - **RLA** (Red List Approved) or - **RLD** (Red List Declared) to your part number.

WEIGHT ⁸: R - 2.3 lb/ft; WW-R - 2.9 lb/ft

WARRANTY: 10-year performance-based warranty on all standard components. Optional accessories such as emergency battery packs are covered by their individual manufacturer warranties.

⁶ Consult Finelite for Generator Transfer Device and Battery Backup fit

⁷ 20 business days lead time for color

⁸ Excludes Battery Backup and Generator Transfer Device weight

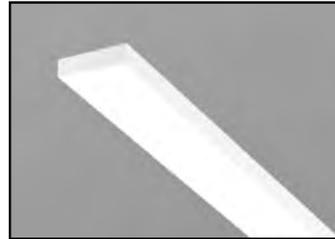
Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

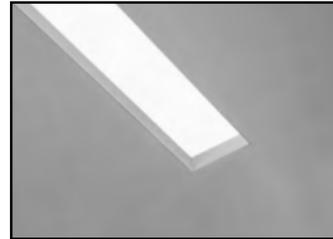
AESTHETIC OPTIONS



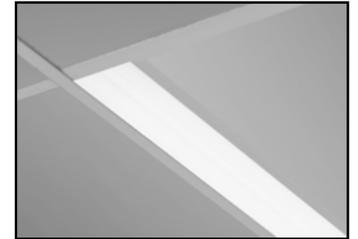
Flush Diffuser (**F**)



1" Drop Down Lens (**DL**)



Flat Diffuser with 1" Regressed (**RG-D**)



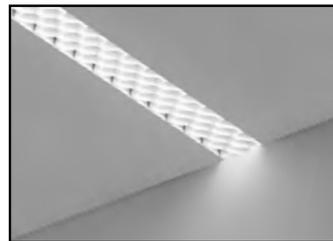
Downlight Asymmetric Optic (**DAO**)¹
Externally flush



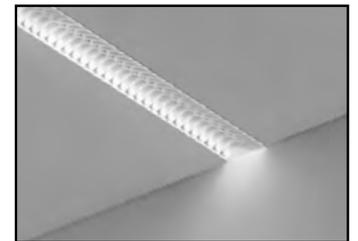
Downlight Spread Optic (**DSO**)¹
Externally flush



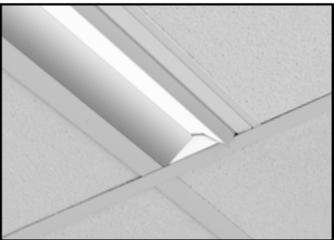
White Cross Blade Baffle² (**RG-WCB**)



Hex Louver² (**RG-LHC**)



Hollowed Ellipse Louver² (**RG-LHE**)



Kicker (**K**) - Wall Wash only

¹ With a subtle ribbed appearance providing specialized distribution

² Regressed only. Not available with Wall Wash

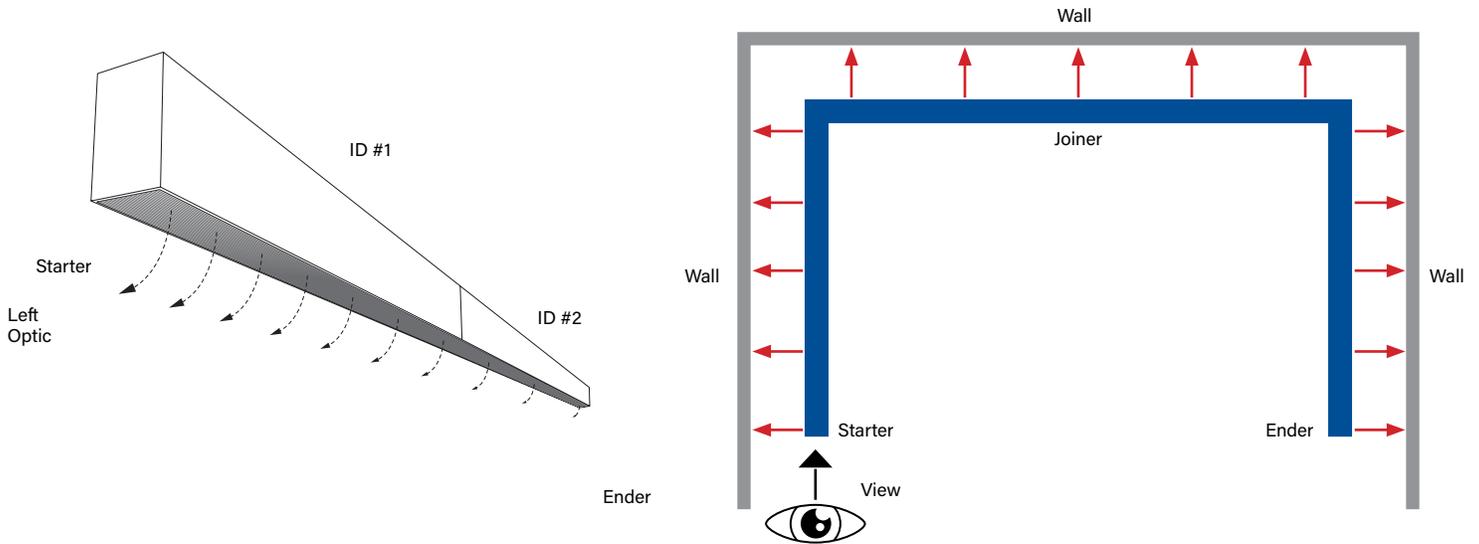
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Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

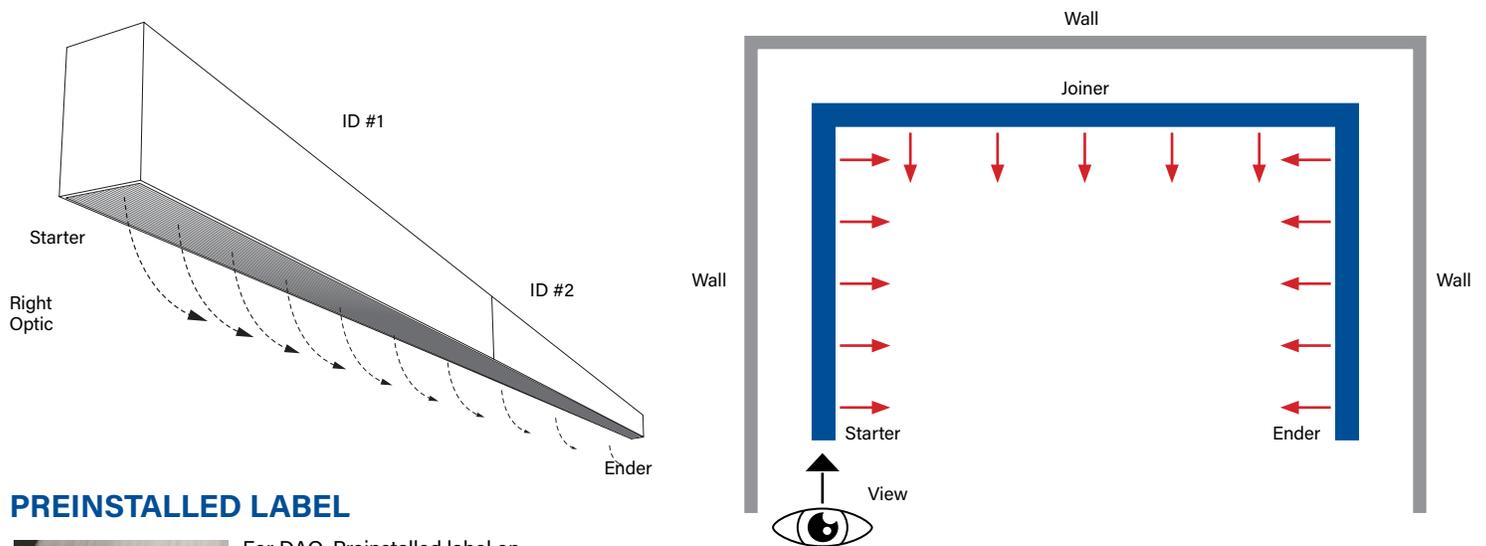
DOWNLIGHT ASYMMETRIC OPTIONS

The diagrams below show a linear run from power feed to ender. Specifying DAO-L distributes light to the left or DAO-R distributes light to the right. For proper orientation: view luminaire from starter end when specifying the direction of the Downlight Asymmetric optic.

Downlight Asymmetric Optic Left (DAO-L)



Downlight Asymmetric Optic Right (DAO-R)



PREINSTALLED LABEL



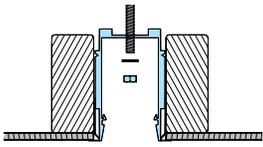
For DAO, Preinstalled label on diffuser shows direction of light. Remove after installation.

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

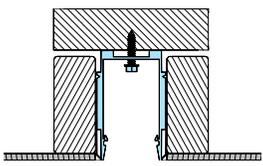
High Performance 2" Aperture (HP-2) Recessed

HARD CEILING MOUNTING OPTIONS

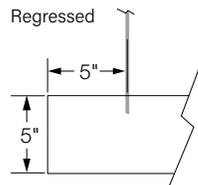
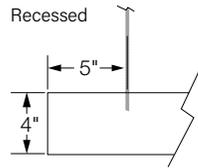
Threaded Rod Option



Screw Mount Option

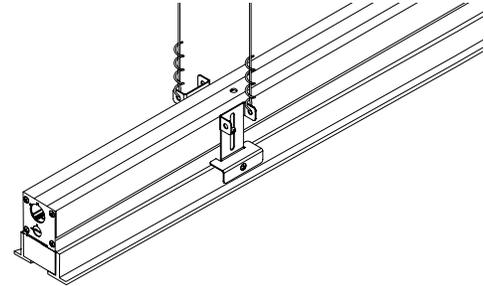


Mounting Location for Securing to Structure



Two mounting options: threaded rod and screw mounting options. Mounting locations are located on each end of the luminaire. Mounting location is 5" away from each end of luminaire.

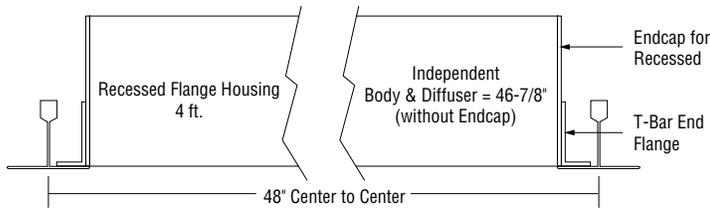
T-BAR INSTALLATION



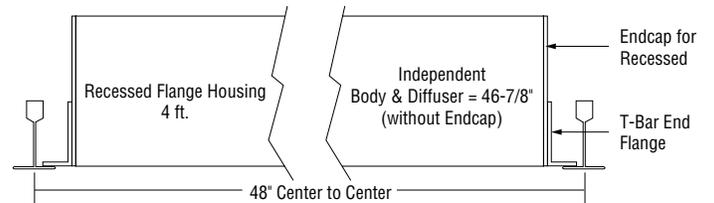
HP-2 R for T-Bar installations comes standard with a splice plate at the end of the luminaire. Mounting brackets (supplied) secure the luminaire to T-Bar and provide support to structure location. All even foot length (2, 4, 6, ...) luminaire runs are reduced in length by an appropriate amount to fit within typical 2x2 and 2x4 T-Bar grid systems. For uncommon T-Bar systems please consult factory.

GRID LENGTH DETAIL - 4' EXAMPLE

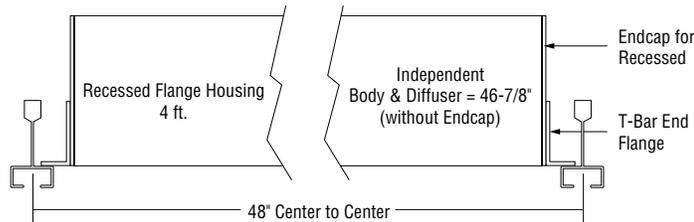
15/16" T-Bar



9/16" T-Bar

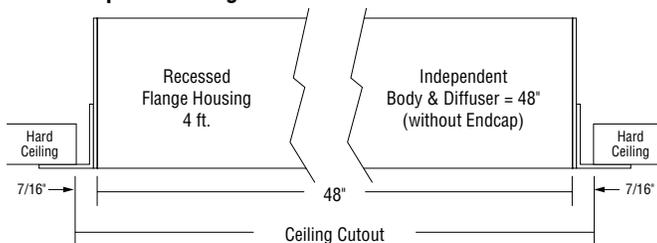


9/16" Screw Slot

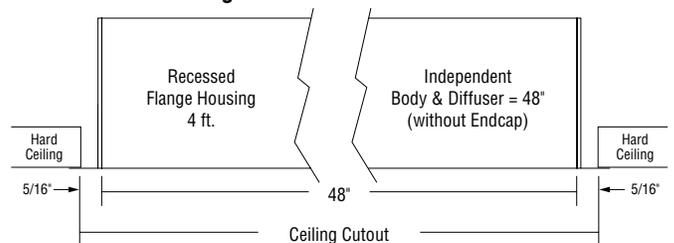


HARD CEILING LENGTH DETAIL - 4' EXAMPLE

Spackle Flange



Visible Flange

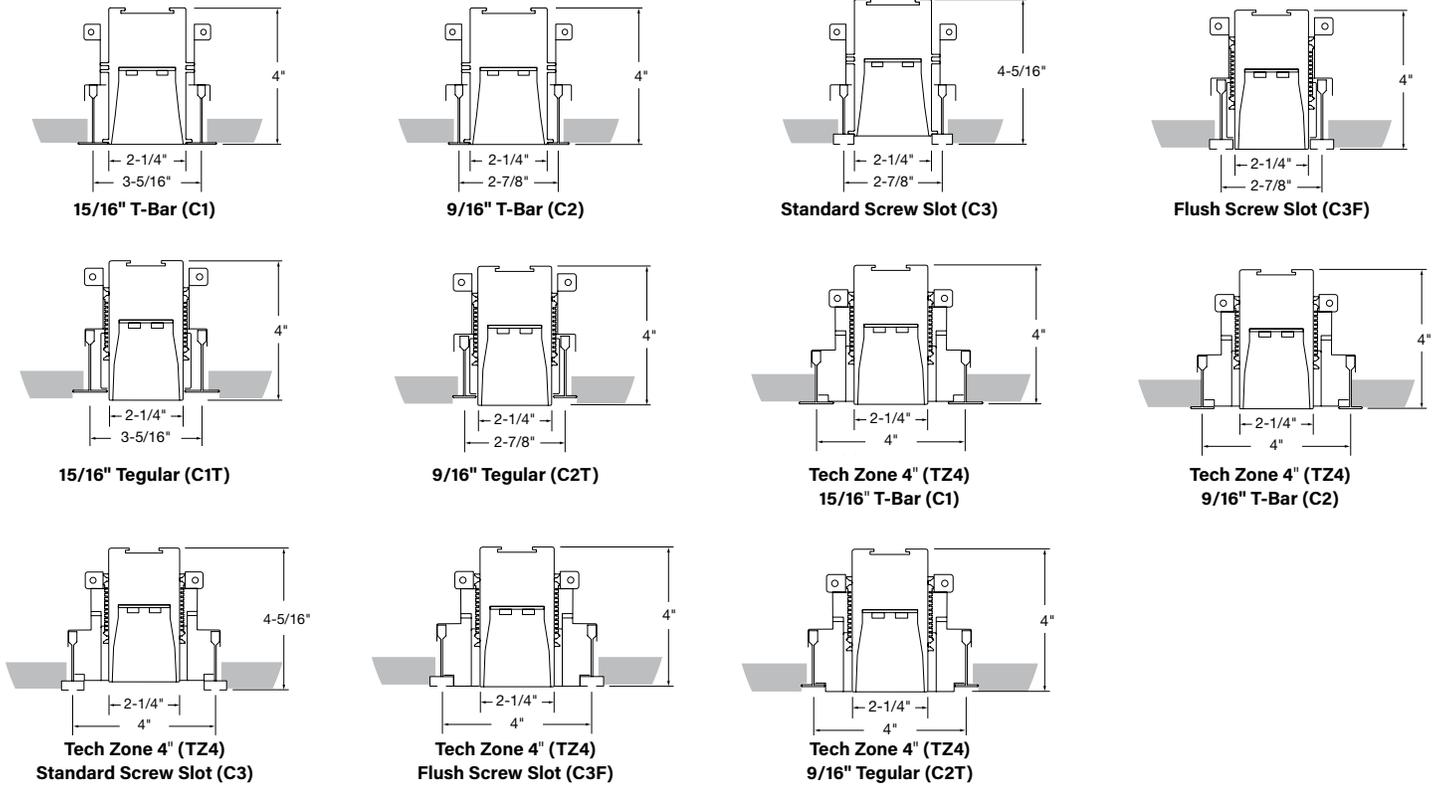


Submitted by:		Date:
Type:	Project:	
Ordering Info:		

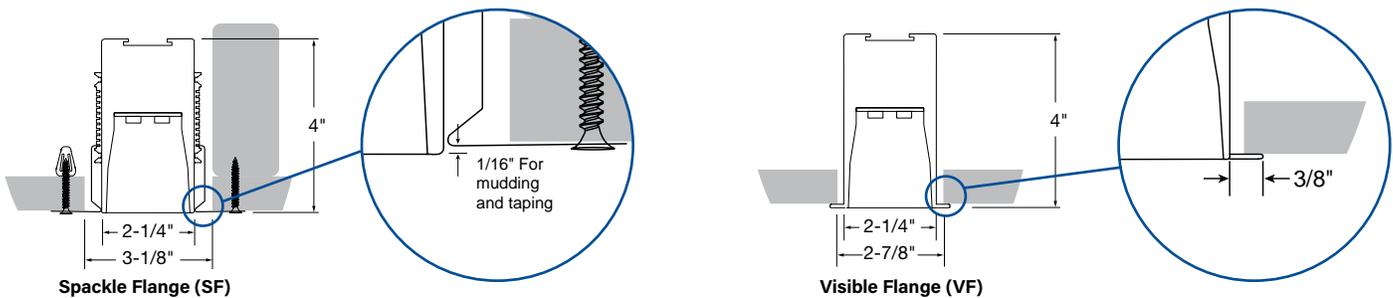
High Performance 2" Aperture (HP-2) Recessed

RECESSED MOUNTING TYPES - T-BAR

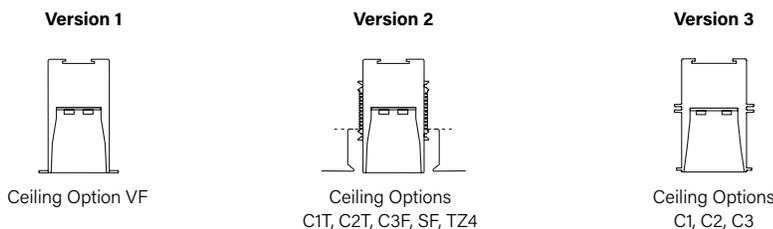
Rough-In Dimensions



RECESSED MOUNTING TYPES - CUTOUT DIMENSIONS



HOUSING



Note: +/- 1/16"

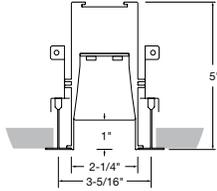
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Submitted by:		Date:
Type:	Project:	
Ordering Info:		

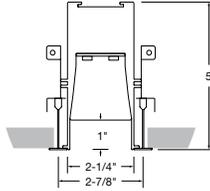
High Performance 2" Aperture (HP-2) Recessed

REGRESSED MOUNTING TYPES - T-BAR

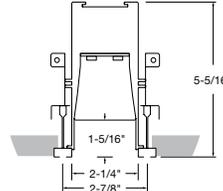
Rough-In Dimensions



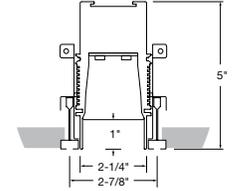
15/16" T-Bar (C1)



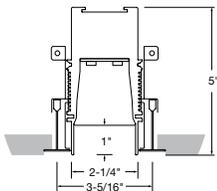
9/16" T-Bar (C2)



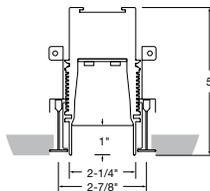
Standard Screw Slot (C3)



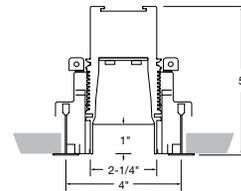
Flush Screw Slot (C3F)



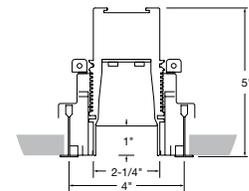
15/16" Tegular (C1T)



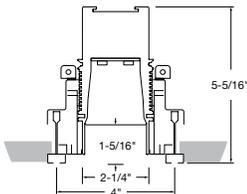
9/16" Tegular (C2T)



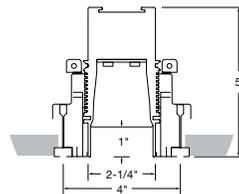
Tech Zone 4" (TZ4)
15/16" T-Bar (C1)



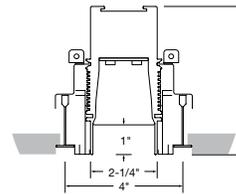
Tech Zone 4" (TZ4)
9/16" T-Bar (C2)



Tech Zone 4" (TZ4)
Standard Screw Slot (C3)

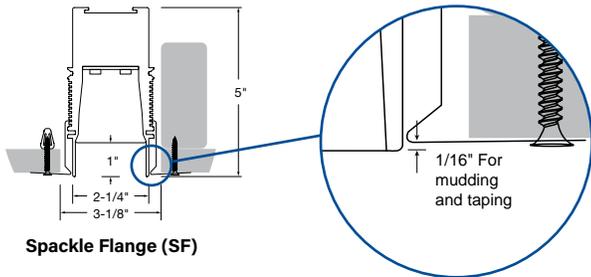


Tech Zone 4" (TZ4)
Flush Screw Slot (C3F)

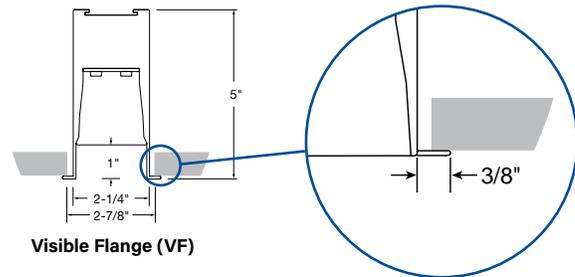


Tech Zone 4" (TZ4)
9/16" Tegular (C2T)

REGRESSED MOUNTING TYPES - CUTOUT DIMENSIONS



Spackle Flange (SF)

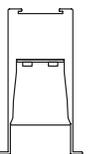


Visible Flange (VF)

Regressed Lens: Regressed lens version is 5" tall with a lens that is regressed 1" from ceiling line.

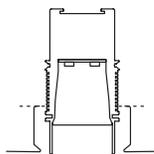
HOUSING

Version 1



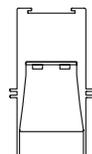
Ceiling Option VF

Version 2



Ceiling Options
C1T, C2T, C3F, SF, TZ4

Version 3



Ceiling Options
C1, C2, C3

Note: +/- 1/16"

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Recessed Photometry - 4' Luminaire 3500K

HP2-R-D-4'-V-835-DAO

Downlight: Downlight Asymmetric Optic - Right

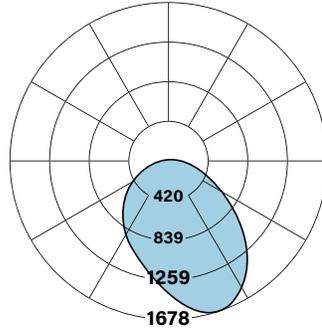
Efficacy: 105 lm/W

Total luminaire output: 3741 lumens (935 lm/ft)
35.5 watts (8.9 W/ft)

Peak Candela Value: 1670 @ 0°

CRI: 80 / CCT: 3500K

ITL LM79 Report REP-051921-01



HP2-R-D-4'-V-835-DSO

Downlight: Downlight Spread Optic

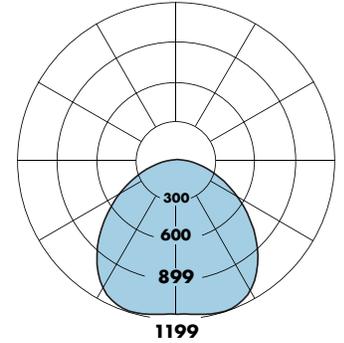
Efficacy: 92 lm/W

Total luminaire output: 3273 lumens (818 lm/ft)
35.7 watts (8.9 W/ft)

Peak Candela Value: 1197 @ 0°

CRI: 80 / CCT: 3500K

ITL LM79 Report 94139



Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1531	1925	2910	3741

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
383	481	727	935

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.5	4.4	6.8	8.9

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
110	109	107	105

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.

² Based on ITL report: REP-051921-01

Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1340	1684	2546	3273

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
335	421	636	818

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.5	4.4	6.8	8.9

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
96	95	93	92

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.

² Based on ITL report: 94139

Wattage is Real Power. If you would like additional details to calculate Apparent Power, please contact your local Finelite representative.

Sample Lumen Adjustment Calculation

Lumen Adjustment Factors 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

High Output (H) / 4000K, 90 CRI

Lumen Adjustment Factor: 0.789

Total Light Output: 2910 lm x 0.789 = 2296 lm

Total Light Output per Foot: 707 lm/ft x 0.789 = 574 lm/ft.

watts/foot: 6.8 W/ft.

$$\text{Efficacy} = \frac{574 \frac{\text{lm}}{\text{ft.}}}{6.8 \frac{\text{W}}{\text{ft.}}} = 84 \text{ lm/W}$$

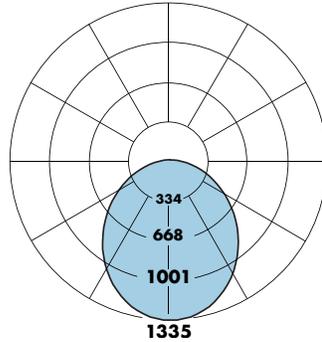
Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Recessed Photometry - 4' Luminaire 3500K

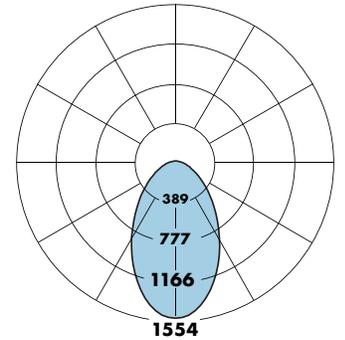
HP2-R-D-4'-V-835
Downlight: Flush Diffuser

Efficacy: 89 lm/W
Total luminaire output: 3287 lumens (822 lm/ft)
36.9 watts (9.2 W/ft)
Peak Candela Value: 1335 @ 0°
CRI: 80 / CCT: 3500K
ITL LM79 Report 85135



HP2-R RG-D-4'-V-835
Downlight: Regressed Diffuser

Efficacy: 79 lm/W
Total luminaire output: 2907 lumens (727 lm/ft)
37 watts (9.3 W/ft)
Peak Candela Value: 1554 @ 0°
CRI: 80 / CCT: 3500K
ITL LM79 Report 90351



Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1346	1692	2557	3287

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
336	423	639	822

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.6	4.6	7.1	9.2

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
93	92	90	89

Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1190	1496	2261	2907

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
298	374	565	727

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.6	4.6	7.1	9.3

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
82	81	80	79

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.
² Based on ITL report: 85135

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.
² Based on ITL report: 90351

Wattage is Real Power. If you would like additional details to calculate Apparent Power, please contact your local Finelite representative.

Sample Lumen Adjustment Calculation

Lumen Adjustment Factors 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

High Output (H) / 4000K, 90 CRI
Lumen Adjustment Factor: 0.789
Total Light Output: 2557 lm x 0.789 = 2017 lm
Total Light Output per Foot: 639 lm/ft x 0.789 = 504 lm/ft.
watts/foot: 71 W/ft.

$$\text{Efficacy} = \frac{504 \frac{\text{lm}}{\text{ft.}}}{7.1 \frac{\text{W}}{\text{ft.}}} = 71 \text{ lm/W}$$

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Wall Wash Recessed - 4' Luminaire 3500K

HP2-R-WW-D-K-4'-V-835

Downlight: With Kicker

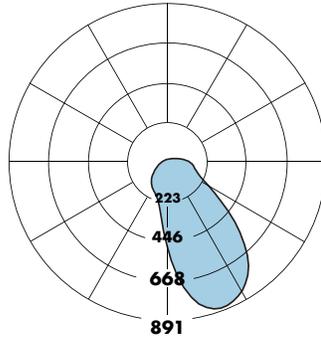
Efficacy: 76 lm/W

Total luminaire output: 1500 lumens (375 lm/ft)
19.6 watts (4.9 W/ft)

Peak Candela Value: 882 @ 25°

CRI: 80 / CCT: 3500K

ITL LM79 Report 85137



Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
614	772	1167	1500

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
154	193	292	375

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
2.0	2.5	3.8	4.9

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
76	77	77	77

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.

² Based on ITL report: 85137

Wattage is Real Power. If you would like additional details to calculate Apparent Power, please contact your local Finelite representative.

Sample Lumen Adjustment Calculation

Lumen Adjustment Factors 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

High Output (H) / 4000K, 90 CRI
Lumen Adjustment Factor: 0.789
Total Light Output: 1167 lm x 0.789 = 921 lm
Total Light Output per Foot: 292 lm/ft x 0.789 = 230 lm/ft.
watts/foot: 3.8 W/ft.

$$\text{Efficacy} = \frac{292 \frac{\text{lm}}{\text{ft.}}}{3.8 \frac{\text{W}}{\text{ft.}}} = 61 \text{ lm/W}$$

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

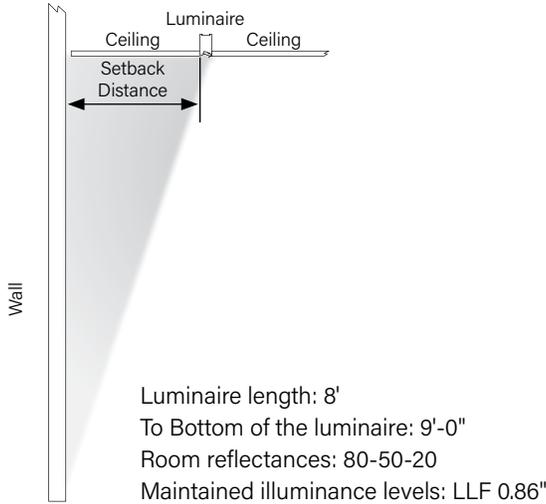
WALL WASH RECESSED - SETBACK INFO AND APPLICATION DATA

HP2-R-WW-D-K-4'-V-835

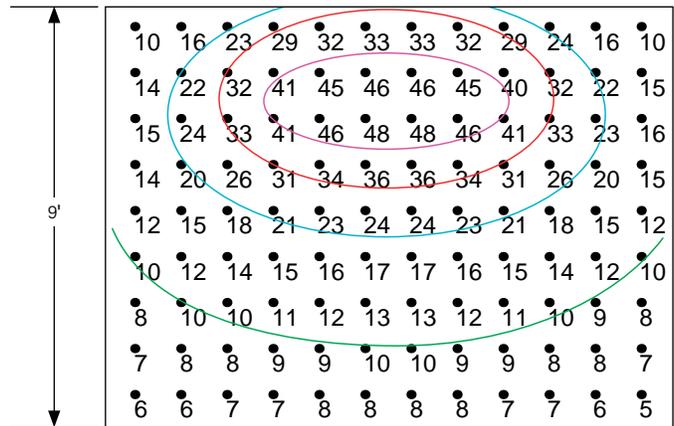
Downlight: With Kicker

Total luminaire output: 1500 lumens (375 lm/ft)
19.6 watts (4.9 W/ft)

CRI: 80 / CCT: 3500K



Setback Distance - 2'



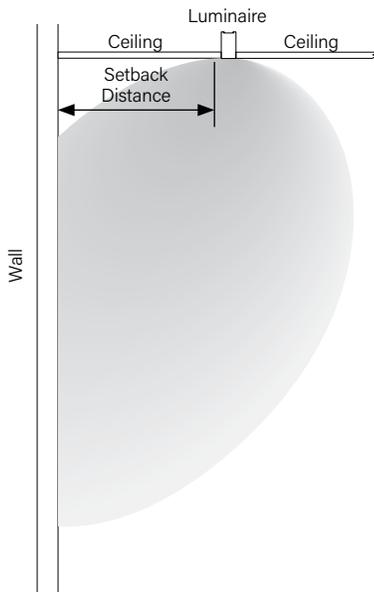
DOWNLIGHT ASYMMETRIC OPTIC - SETBACK INFO AND APPLICATION DATA

HP2-R-D-4ft-V-835-DAO

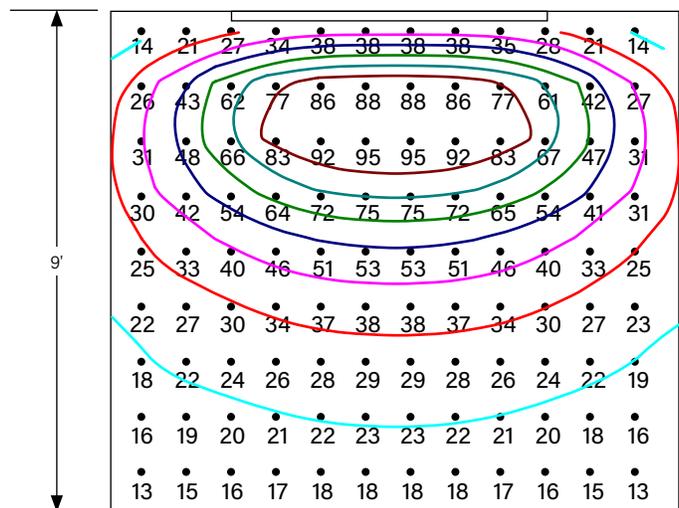
Downlight: DAO

Total luminaire output: 3742 lumens (936 lm/ft)
35.6 watts (8.9 W/ft)

CRI: 80 / CCT: 3500K



Setback Distance - 2'



Submitted by:		Date:
Type:	Project:	
Ordering Info:		

0-10V Tunable White

Finelite's contractor friendly Tunable White luminaires are available at low cost, with powerful and simple 0-10V tuning and intensity controls.

TUNABLE WHITE FEATURES

- CCT range: 2700K - 6500K
- Dimming Range: 100% to 10%
- CRI Options: 80 CRI or 90 CRI

Note:

Dim to Off options available.

LUMINAIRE FAMILY MODIFICATIONS/RESTRICTIONS

Recessed Direct	Section Lengths											
	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	
Output S,B,H,V Single Circuit	Rows can be comprised of 2'-12' sections. Tailored lengths available.											
Integral Battery Backup (BSL310LP)							✓		✓		✓	

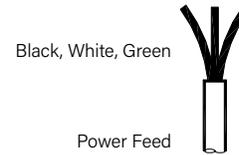
PHOTOMETRY

Apply a power adjustment factor to calculate wattage usage

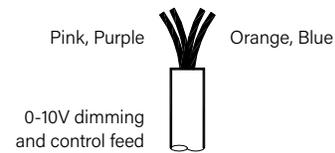
POWER	CONVERSION FACTOR
	1.1X

(Example: a 50 watt luminaire in static white would draw 55 watts using 0-10V Tunable White)

DUAL FEED DETAIL



WIRING LEGEND		
Black	Hot	Line Voltage
White	Neutral	Line Voltage
Green	Ground	



WIRING LEGEND		
Pink	Dimming	0-10V DC
Purple	Dimming	0-10V DC
Orange	TW	0-10V DC
Blue	TW	0-10V DC



Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed



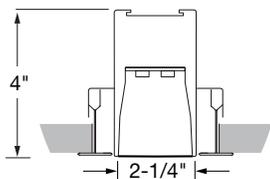
High Performance 2" Aperture is a patented, linear LED luminaire family. HP-2 delivers excellent performance using an advanced optical design and mid-power LEDs. Achieving 90% of initial light output at 100,000+ hours and backed by a 10-year performance-based warranty on all standard components.

This product is enrolled in the International Living Future Institute (ILFI) Declare 2.0 Program and is third-party verified with options achieving **Red List Approved** and **Red List Declared** status.

Note: see page 6 for all aesthetic options

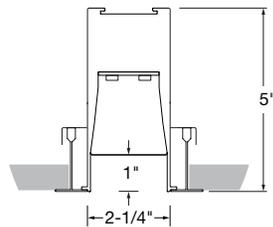
CROSS SECTIONS

Recessed



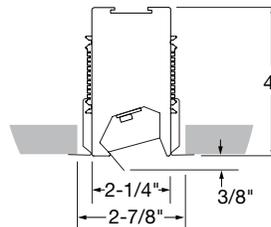
Flush Downlight Diffuser (standard)

Regressed



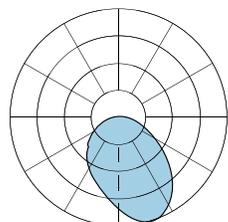
Flat Diffuser with 1" Regressed

Wall Wash Recessed

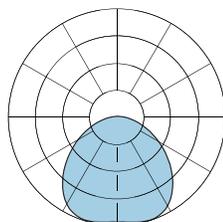


Kicker (standard)

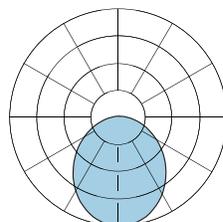
OPTIC OPTIONS



Downlight Asymmetric Optic (DAO)



Downlight Spread Optic (DSO)



Standard Downlight Flush Optic (F)

ALSO AVAILABLE IN



Pendant (D, ID, I)



Wall Mount (WM)



Surface Mount (SM)



Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Ordering Guide Example: HP - 2 - R - D - 36' - S - 835 - F - 96LG - 120 - SC - FC-10% - FA50 - C1 - FE - SW - LGD18W - OBO - CP

BODY TYPE

OUTPUT AND LED TYPE

Platform	Series Name	Luminaire Type	Luminaire Distribution	Total Length of Run	Downlight Output (Flush)	LED CRI/CCT
HP - High Performance	2	R - Recessed R RG - Recessed Regressed (Wall Wash not available)	D - Direct WW-D - Wall Wash Direct	4 FT Minimum 2' section length. Increments accurate to 1/16" (±1/32"), standard. 12' maximum section length.	S - Standard (336 lm/ft) B - Boosted (423 lm/ft) H - High (639 lm/ft) V - Very High (822 lm/ft) TL - Tailored: _____lm/ft* Lumen provided above are for Flush lens only, see pg. 12 for WW lumens * Specify Tailored lm/ft of outputs between Standard (S) and Very High (V). Consult factory for tailored lumen output outside of this range.	830 - 80 CRI, 3000K 835 - 80 CRI, 3500K 840 - 80 CRI, 4000K 930 - 90 CRI, 3000K 935 - 90 CRI, 3500K 940 - 90 CRI, 4000K 8TW - 80 CRI, Tunable White 9TW - 90 CRI, Tunable White

MECHANICAL/OPTICAL OPTIONS

ELECTRICAL OPTIONS

Downlight	Reflector System	Voltage	Circuiting ²
F - Flush (standard) ^{8,9} DL - 1" Drop Down Lens ⁸ RG-D - Flat Diffuser with 1" Regress ^{1,8} RG-WCB - White Cross Blade Baffle ^{1,8} RG-LHE - Hollowed Ellipse Louver ^{1,8} RG-LHC - Hex Louver ^{1,8}	DAO-L - Downlight Asymmetric Left ^{4,8} DAO-R - Downlight Asymmetric Right ^{4,8} DSO - Downlight Spread Optic ^{4,8} K - Kicker for Wall Wash only (standard) ⁵ FO - Fully Open for Wall Wash only	96LG - 96 Low Gloss White SW - Signal White for Wall Wash only	120 - 120 Voltage 277 - 277 Voltage 347 - 347 Voltage (OTI only)
			SC - Single Circuit* One single circuit in a run MC - Multi-Circuit* More than one switch leg or zone. Factory shop drawings required * Battery, Night Light, and Emergency to Generator circuits are in addition to the normal luminaire circuit(s)

ELECTRICAL OPTIONS

Driver Selection

0-10V Driver Options

- FC-10% - 0-10V 10% (standard)
- FC-1% - 0-10V 1%
- OTI-10% - EldoLED OTI, 0-10V 10%³
- OTI-1% - EldoLED OTI, 0-10V 1%³
- ELD-10V-0% - EldoLED SOLOdrive, 0-10V 0.1%
- 10V-TW-10% - EldoLED OTI, 0-10V 10% (Tunable White)³

DALI Driver Options

- FC-DALI-1% - DALI 1%
- DXL-DALI-1% - EldoLED Dexal, 1%
- ELD-DALI-0% - EldoLED SOLOdrive, 0.1%
- ELD-DALI-TW - EldoLED DUALdrive LightShape, 0.1% (Tunable White)

DMX Driver Options

- ELD-DMX - EldoLED POWERdrive, 0.1%
- ELD-DMX-TW - EldoLED POWERdrive, 0.1% (Tunable White)

Lutron Driver Options

- LUT-ES1 - Lutron, Ecosystem 1%
- LUT-TW - Lutron LD2 Dali-2 1% (Tunable White)

See Page 3 for additional driver options and details

MOUNTING OPTIONS

OTHER OPTIONS

Ceiling Hardware Type	Endcap Style	Finish
C1 - 15/16" T-Bar C1T - 15/16" Tegular C2 - 9/16" T-Bar C2T - 9/16" Tegular C3 - Screw Slot	C3F - Flush Screw Slot SF - Spackle Flange VF - Visible Flange TZ4 - Tech Zone 4" _____ (C1, C2, C2T, C3, C3F)	FE - Flat Endcap (standard) SW - Signal White (standard) FB - Finelite Black SA - Satin Aluminum #### - RAL Color Code ⁷ _____

OTHER OPTIONS

Emergency Style (Optional) <small>See page 5 Backup Battery table</small>	Integrated Sensor (Optional) ⁸	Special Options (Optional)
LGD18W - Legrand 18W Brand Battery Back-up LGD10W - Legrand 10W Brand Battery Back-up EM/GEN - Emergency to Generator NL - Night Light BSL310LP - Bodine Battery Back up Low Profile GTD - Generator Transfer Device ALCR - Automatic Load Control Relay	OBO - Occupancy ⁹ OBD - Daylight ⁹ W601 - Wattstopper Wireless Sensor ¹⁰ OBE - Enlighted ¹¹ REE - Remote Enlighted ¹² CLM - Encelium RF SLM - Encelium Sensor	AOCC-W - Lutron Athena Sensor (Device Color White) ¹³ AOCC-B - Lutron Athena Sensor (Device Color Black) ¹³ ARF-W - Lutron Athena RF (Device Color White) ¹³ ARF-B - Lutron Athena RF (Device Color Black) ¹³ VOCC - Lutron Vive Wireless Sensor (VDO) ¹⁴ VRF - Lutron Vive Radio Only ¹⁴
		CP - Chicago Plenum ¹⁵ FLX - Flex Whip RLA - Red List Approved RLD - Red List Declared

¹ Recessed Regressed straight run only

² Contact factory for switching options

³ Add DTO to gain "Dim to Off" functionality (FC-10% - DTO, FC-1% - DTO)

⁴ Not available with Regressed or Curves

⁵ Kicker standard in Signal White. Customer Custom color kickers have a surcharge

⁶ B & V outputs only

⁷ 20 business days lead time for color

⁸ Minimum fixture length with a sensor is 3ft.

⁹ Not available with Wall Wash

¹⁰ LMFS-601 w/ 0-10V driver(s) and LMFI-111, up to 6 drivers may be connected.

¹¹ LMFS-601 w/ Dali driver, only 1 driver can be connected.

¹² Enlighted components installed by Finelite, provided by others

¹³ Enlighted for Wall Wash fixtures. Enlighted Control Unit & Sensor Cable installed for Remote mounting sensor.

¹⁴ 0-10V Drivers - AOCC up to 10 drivers may be connected; ARF up to 40 drivers may be connected DALI Drivers - AOCC & ARF up to 4 drivers can be connected.

¹⁵ Lutron Vive Integrated Sensors require a DALI driver

¹⁶ Only available with C1, C2, and C3 mounting hardware with Finelite Gridbox

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

SUPPLEMENTARY DRIVER PAGE

0-10V Driver Options

FC-10%	Factory Choice, 0-10V 10% Dimming (Linear)
FC-10%-DTO	Factory Choice, 0-10V 10% Dimming, Dim-to-Off (Linear)
FC-1%	Factory Choice, 0-10V 1% Dimming (Linear)
FC-1%-DTO	Factory Choice, 0-10V 1% Dimming, Dim-to-Off (Linear)
ELD-10V-0%	EldoLED SOLOdrive, 0-10V 0.1% Dimming (Linear)
ELD-10V-1%	EldoLED ECOdrive, 0-10V 1% Dimming (Linear)
10V-TW-10%	EldoLED OTi, 0-10V 10% Dimming, <i>Tunable White</i> (Linear)
10V-TW-10%-DTO	EldoLED OTi, 0-10V 10% Dimming, Dim-to-Off, <i>Tunable White</i> (Linear)
OTi-10%	EldoLED OTi, 0-10V 10% Dimming (Linear)
OTi-10%-DTO	EldoLED OTi, 0-10V 10% Dimming, Dim-to-Off (Linear)
OTi-1%	EldoLED OTi, 0-10V 1% Dimming (Linear)
OTi-1%-DTO	EldoLED OTi, 0-10V 1% Dimming, Dim-to-Off (Linear)

DALI Driver Options

FC-DALI-1%	Factory Choice, DALI 1% Dimming (Logarithmic)
DXL-DALI-1%	EldoLED Dexal, DALI 1% Dimming (Logarithmic)
ELD-DALI-0%	EldoLED SOLOdrive, DALI 0.1% Dimming (Logarithmic)
ELD-DALI-1%	EldoLED ECOdrive, DALI 1% Dimming (Logarithmic)
ELD-DALI-TW	EldoLED DUALdrive Light Shape, DALI 0.1% Dimming, <i>Tunable White</i> (Logarithmic Dimming , Linear CCT Control)

DMX Driver Options

ELD-DMX	EldoLED POWERdrive, DMX 0.1% Dimming (8 Bit, 1CH) (Linear)
ELD-DMX-16	EldoLED POWERdrive, DMX 0.1% Dimming (16 Bit, 2CH) (Linear)
ELD-DMX-TW	EldoLED POWERdrive, DMX 0.1% Dimming, <i>Tunable White</i> (8 Bit, 2CH - CH1 Warm / CH2 Cool) (Linear)
ELD-DMX-TW16	EldoLED POWERdrive, DMX 0.1% Dimming, <i>Tunable White</i> (16 Bit, 4CH - CH1, 2 Warm / CH3, 4 Cool) (Linear)

Lutron Driver Options

LUT-ES1	Lutron, Ecosystem 1% Dimming
LUT-TW	Lutron LD2 Dali-2 1%, <i>Tunable White</i>

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

SPECIFICATIONS

BODY TYPE

CONSTRUCTION: Precision-cut 6063-T6 extruded aluminum body. Internal joiner system and plug-together wiring are standard.

LENGTHS: Any length, 2' minimum, in increments down to 1/16th" ($\pm 1/32"$). 12' maximum section length. Hollowed Ellipse Louver (**LHE**), Hex Louver (**LHC**), and White Cross Blade Baffle (**WCB**) are available in 1' increments.

MITERED CORNERS ¹ : Illuminated corners of greater than 60° and less than 180° in a single plane, available with Flush Diffuser, Bottom Glow Diffuser, Regressed Diffuser, or White Cross Blade Baffle ². Corners not available with Wall Wash (**WW-D**), Hollowed Ellipse Louver (**LHE**), Hex Louver (**LHC**) or 1" Drop Down Lens. Contact factory for Double miters using the White Cross Blade Baffle. Consult factory for tailored lighting options.

OUTPUT AND LED TYPE

LIGHT OUTPUT: Four lumen packages available, Standard (**S**), Boosted Standard (**B**), High (**H**), and Very High (**V**). For lengths 3' and greater, the uplight and downlight can be specified with different lumen packages and dual controls. For Tailored Outputs outside of range from Standard (**S**) to Very High (**V**), consult factory. Light engines are replaceable.

MECHANICAL/OPTICAL OPTIONS

DOWNLIGHT OPTION: 12' maximum diffuser length. Flush frost white snap-in diffuser standard, 73% transmissive, 99% diffusion. Internal secondary diffusers at corners ensure visually seamless, uniform, continuous illumination. Available with Flush (**F**), Bottom Glow (**BG**), 1" Drop Down Lens (**DL**), White Cross Blade Baffle (**WCB**) ^{3,4}, Ellipse Louver (**LHE**) ³, Hex Louver (**LHC**) ³, Downlight Asymmetric Optic (**DAO**) ⁵, Downlight Spread Optic (**DSO**) ⁵, and Regressed downlight diffusers (**RG**) ³. 1" Drop Down Lens made of highly efficient acrylic. Available with a solid endcap or an endcap with a diffuse filler to continue the luminous aesthetic. Downlight Spread & Downlight Asymmetric Optics are extruded lenses with a subtle ribbed appearance providing a batwing or asymmetric distribution for improved optical performance. Consult factory for more tailored lumen outputs.

LUMEN MAINTENANCE: 90% of initial light output (L90) at 100,000+ hours; 70% of initial light output (L70) at 200,000+ hours.

REFLECTORS: Die-formed 20-gauge cold-rolled steel reflectors finished in 96LG High Reflectance white powder coat paint. The standard Semi-Specular Aluminum (**SSA**) Kicker (**K**) reflector delivers light high on the vertical surface. The Kicker reflector can be easily removed for open distribution (**FO**).

ELECTRICAL OPTIONS

STATIC WHITE FEED: Standard with one 18-gauge/5-conductor single-circuit feed wire controlling uplight and downlight together (power and dimming). Specify dual feed wires for independent control of uplight and downlight. 14-gauge feed wire used when luminaire current exceeds 5 amps.

TUNABLE WHITE FEED: Standard with one 18-gauge/5-conductor single-circuit feed. 14-gauge feed used when luminaire current exceeds 5 amps. DMX feeds cannot be cut or spliced. DMX feeds should be ordered based on fixed lengths.

0-10V:

- One 18-gauge / 3-conductor power
- One 18-gauge / 4-conductor for dimming and controls

Dali:

- One 18-gauge / 5-conductor power and controls

DMX:

- One 18-gauge / 3-conductor power
- One DMX feed

STATIC WHITE DRIVER: Replaceable 120V, 277V, and 347V constant current reduction dimming driver standard. Can be wired dimming or non-dimming. 0-10V dimming controls with a range of 10%- 100% standard. Dimming to 1% available. Separate dimming for uplight and downlight available. Driver is fully accessible from below the ceiling.

– **Power Factor:** ≥ 0.9

– **Total Harmonic Distortion (THD):** <20%

– **Expected driver lifetime:** 100,000 hours

LUTRON DRIVER OPTIONS:

LUT-ES1 - Hi-lume 1% EcoSystem with Soft-On, Fade-to-Black dimming (LDE1 series).

TUNABLE WHITE DRIVER: Replaceable LED driver. Driver is accessible from below the ceiling. 120V and 277V.

– **Power factor:** ≥ 0.90

– **Total Harmonic Distortion (THD):** <20%

– **Dimming Range:** 100%-10%

– **Expected driver lifetime:** 100,000 hours

LUTRON TUNABLE WHITE DRIVER OPTION:

LUT-TW - Lutron LD2 Dali-2 1%, Tunable White.

¹ Not available with Wall Wash

² White Cross Blade (WCB) baffles not available with custom angles. Available in 90 degrees only

³ Recessed Regressed straight run only

⁴ White Cross Blade Baffle (WCB) currently not advisable for drywall

⁵ Not available with Regressed or Curves

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

SPECIFICATIONS

MOUNTING OPTIONS

HANGING HARDWARE:

- **Recessed T-Bar:** Standard bracket design works with most lay-in ceiling types. Brackets secure luminaire to the ceiling grid from above. Tie-in T-Bar brackets connect the luminaire to the T-Bar for securing to structure. Consult local codes for tie-wire recommendations.
- **Recessed Spackle Flange:** Drywall surfaces (walls or ceilings): 1/4" - 20 stud and nut (provided by others). Mounted with three equidistant suspension points.

TUNABLE WHITE DMX HANGING HARDWARE: For grid ceiling applications the dual GridBox™ mounting is supplied (standard). For hard ceiling applications the ceiling mounting box is supplied (standard). DMX feeds cannot be cut or spliced. DMX feeds should be ordered based on fixed lengths. Available DMX pendant feed lengths are 5' (standard), 12', and 30'.

TUNABLE WHITE DMX INTERCONNECTION CABLES: Luminaires are prewired with plug-and-play interconnected cables to support easy plug-together joining of fixture runs. DMX to RJ45 adapters and an RJ45 terminator for every 32 DMX drivers are included.

OTHER OPTIONS

ENDCAPS: Flat endcaps (**FE**) at each end of run add 1/16" to each end of luminaire. Drop Down Lens Illuminated Endcap (**DE**) includes diffuse element to continue luminance of drop lens.

EMERGENCY STYLE: Optional emergency to generator/inverter wiring, internal generator transfer switch, nightlight wiring, step-dimming driver, backup battery.

Backup Battery

	Legrand 18W	Legrand 10W / Bodine BSL310LP
HP2-R-D		
Min. Housing Length	8*	4**
EM Lumen Output	1608	956
EM Section Illuminated	2'	2' or 4'
HP2-R-WW-D		
Min. Housing Length	8*	4**
EM Lumen Output	1500	891
EM Section Illuminated	4'	4'

* Minimum fixture housing length for battery pack approved without sensor. ** Exception: 5' not available, 6'+ okay. The lumens are based on 835. For other CCT/CRI, refer to the Lumen Adjustment Factor table on page 11.

Bodine GTD and Legrand ALCR Min. Length	
Configuration	Min Length
Generator	6'
Generator + OCC	8'
Daylight	6'
Generator + Daylight	8'

TUNABLE WHITE ELECTRICAL OPTIONS ⁶:

TW Driver Options

- **0-10V:** EM/GEN, GTD or Battery BackUp
- **DMX:** Battery Back Up
- **DALI:** EM/GEN, GTD or Battery Back Up
- **LUTRON:** EM/GEN, GTD or Battery Back Up

INTEGRATED SENSORS: Integrated PIR (Passive Infrared) Occupancy (**OBO**) or Daylight Sensors (**OBD**) available with Flush and Bottom Glow downlight diffusers. PIR sensors not recommended for stairwell applications. Refer to Occupancy Sensor & Daylight Sensor tech sheet and the Embedded Intelligence landing page for more information and additional sensor options. Minimum fixture length with a sensor is 3ft. The default location for the Connected Lighting Module (**CLM**) will be on the topside of the fixture for all mounting types except for Surface Mount (**SM**). In SM fixtures the CLM will be located on the direct side of fixture housed in a bracket that is flush with the direct lens.

FINISHES: Finelite Signal White (**SW**) powder coat, Finelite Black (RAL 9005) with semi gloss fine texture (**FB**), and Satin Aluminum (**SA**) are standard. Optional Adder: 179 RAL colors ⁷ are available.

LABELS: Luminaire and electrical components are ETL-listed conforming to UL 1598 in the U.S.A. and CAN/CSA C22.2 No. 250.0 in Canada. In accordance with NEC Code 410.130 (G), this luminaire contains an internal driver disconnect. UL 924 and UL 2108 - PoE options available on request. These fixtures are rated for Damp Location. IC Rated. HP-2 can be used to comply with 2016 Title 24, Part 6 (JA8); high efficacy LED light source requirements. Finelite products use electronic components that are RoHS compliant, and the mechanical components of the luminaire have been verified to not knowingly contain any restricted substances listed per RoHS Directive 2015/863. Consult factory for tailored lighting options. Finelite makes the specification process easy when putting healthier products on your projects. Simply add – **RLA** (Red List Approved) or – **RLD** (Red List Declared) to your part number.

WEIGHT ⁸: R - 2.3 lb/ft; WW-R - 2.9 lb/ft

WARRANTY: 10-year performance-based warranty on all standard components. Optional accessories such as emergency battery packs are covered by their individual manufacturer warranties.

⁶ Consult Finelite for Generator Transfer Device and Battery Backup fit

⁷ 20 business days lead time for color

⁸ Excludes Battery Backup and Generator Transfer Device weight

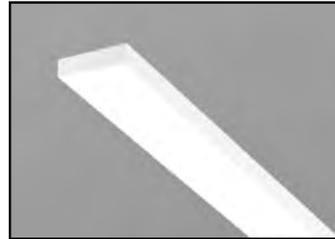
Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

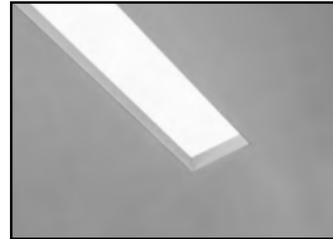
AESTHETIC OPTIONS



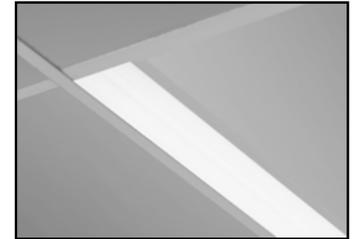
Flush Diffuser (**F**)



1" Drop Down Lens (**DL**)



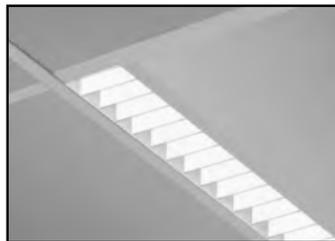
Flat Diffuser with 1" Regressed (**RG-D**)



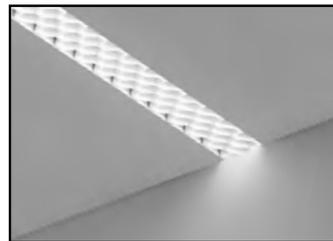
Downlight Asymmetric Optic (**DAO**)¹
Externally flush



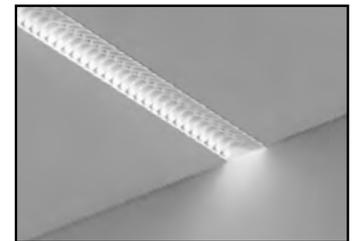
Downlight Spread Optic (**DSO**)¹
Externally flush



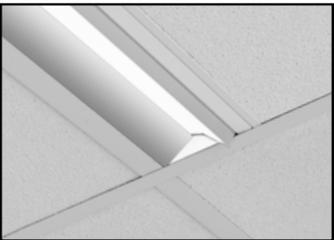
White Cross Blade Baffle² (**RG-WCB**)



Hex Louver² (**RG-LHC**)



Hollowed Ellipse Louver² (**RG-LHE**)



Kicker (**K**) - Wall Wash only

¹ With a subtle ribbed appearance providing specialized distribution

² Regressed only. Not available with Wall Wash

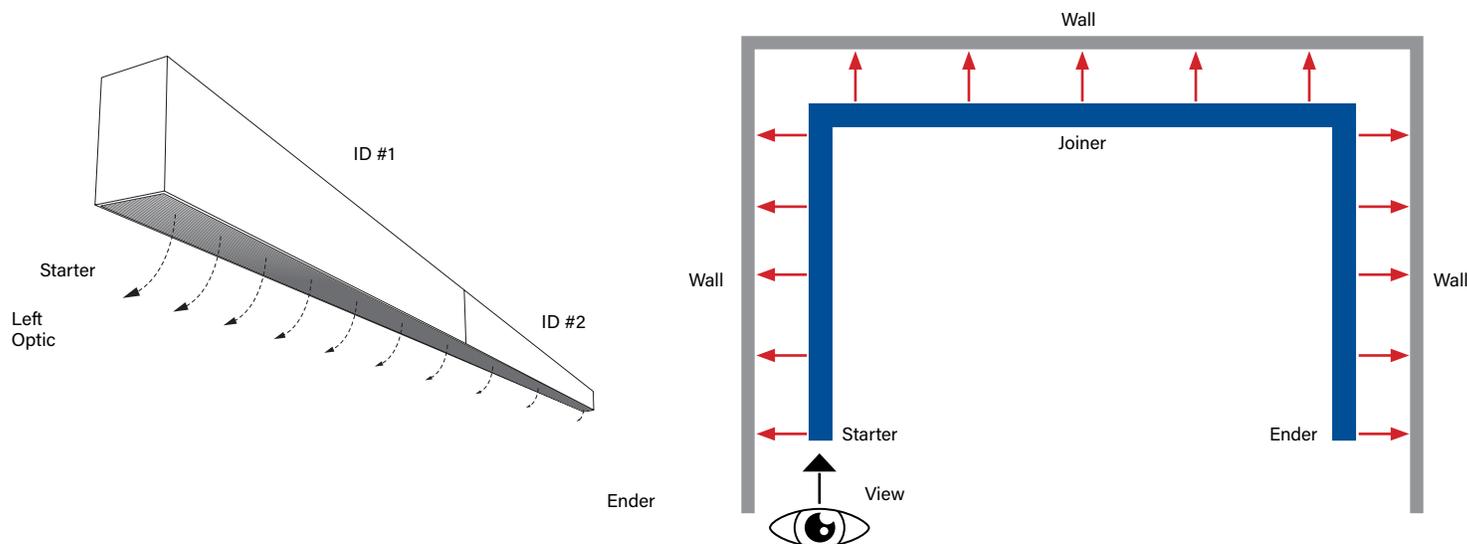
Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

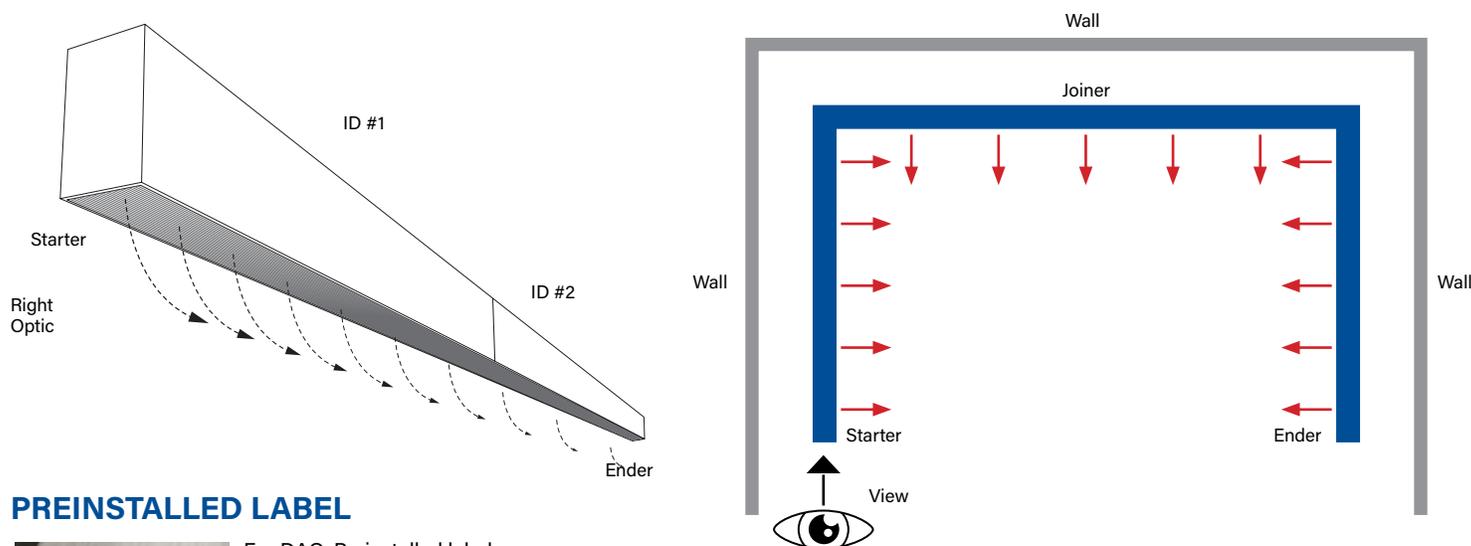
DOWNLIGHT ASYMMETRIC OPTIONS

The diagrams below show a linear run from power feed to ender. Specifying DAO-L distributes light to the left or DAO-R distributes light to the right. For proper orientation: view luminaire from starter end when specifying the direction of the Downlight Asymmetric optic.

Downlight Asymmetric Optic Left (DAO-L)



Downlight Asymmetric Optic Right (DAO-R)



PREINSTALLED LABEL



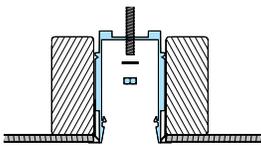
For DAO, Preinstalled label on diffuser shows direction of light. Remove after installation.

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

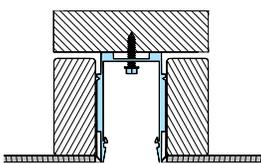
High Performance 2" Aperture (HP-2) Recessed

HARD CEILING MOUNTING OPTIONS

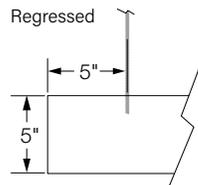
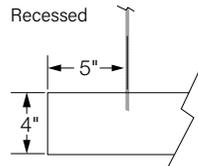
Threaded Rod Option



Screw Mount Option

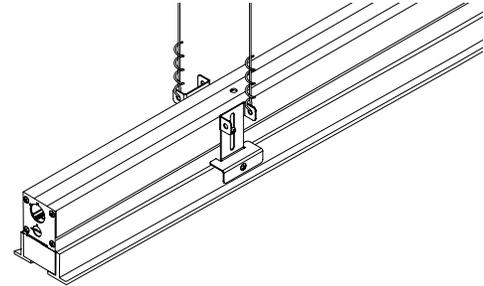


Mounting Location for Securing to Structure



Two mounting options: threaded rod and screw mounting options. Mounting locations are located on each end of the luminaire. Mounting location is 5" away from each end of luminaire.

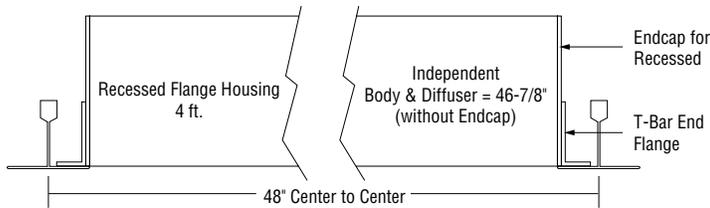
T-BAR INSTALLATION



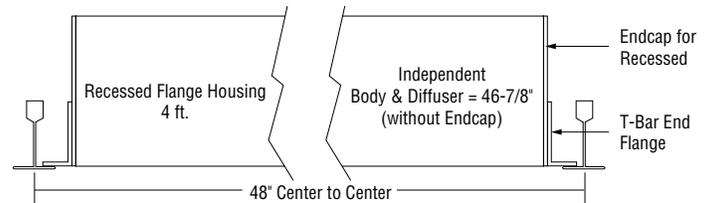
HP-2 R for T-Bar installations comes standard with a splice plate at the end of the luminaire. Mounting brackets (supplied) secure the luminaire to T-Bar and provide support to structure location. All even foot length (2, 4, 6, ...) luminaire runs are reduced in length by an appropriate amount to fit within typical 2x2 and 2x4 T-Bar grid systems. For uncommon T-Bar systems please consult factory.

GRID LENGTH DETAIL - 4' EXAMPLE

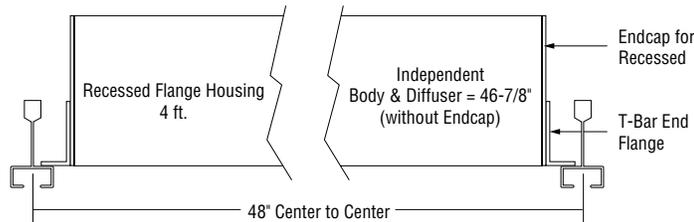
15/16" T-Bar



9/16" T-Bar

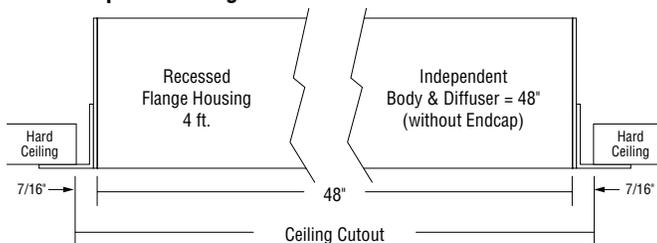


9/16" Screw Slot

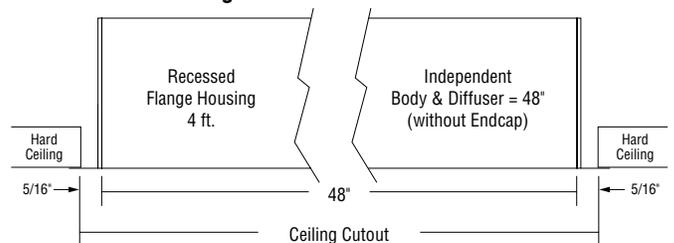


HARD CEILING LENGTH DETAIL - 4' EXAMPLE

Spackle Flange



Visible Flange

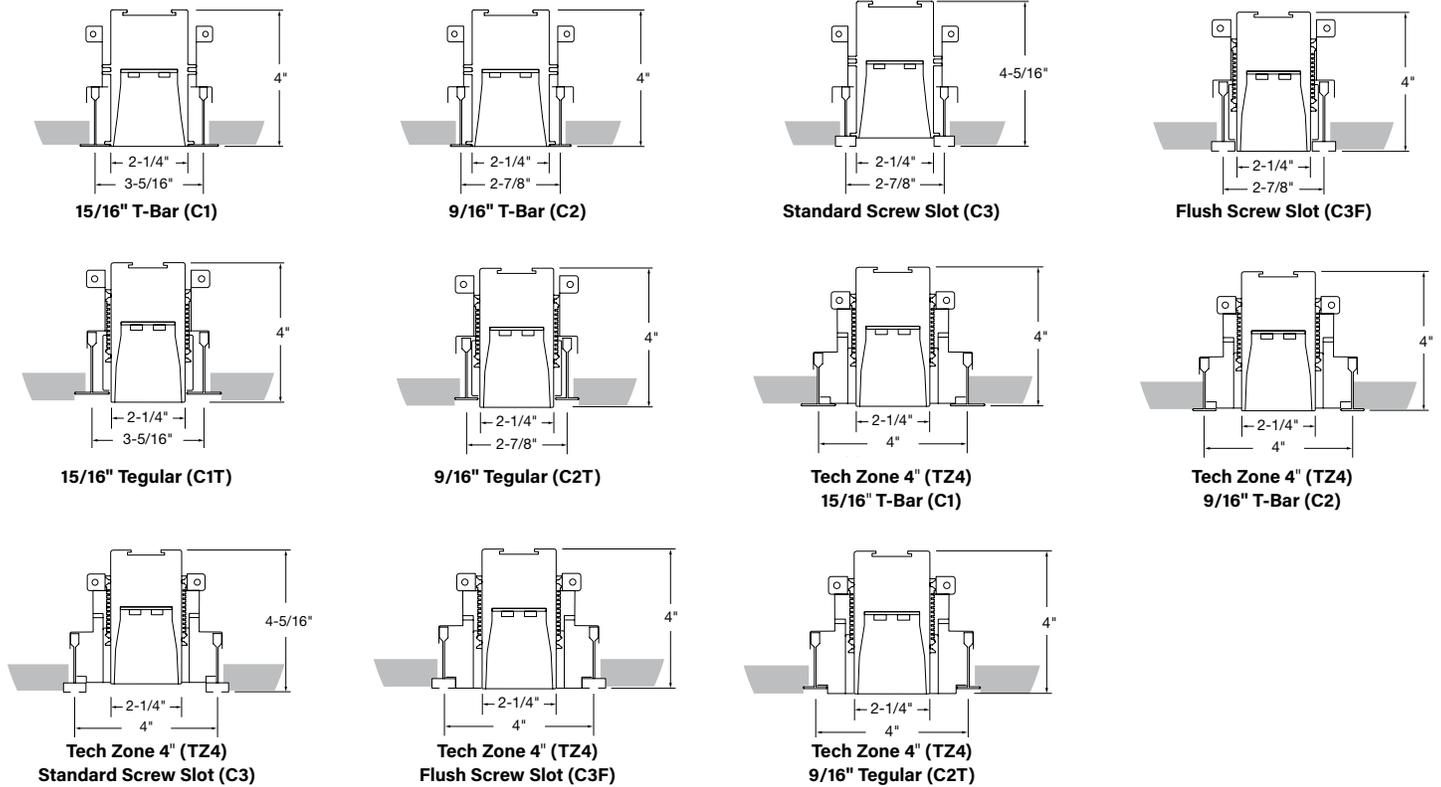


Submitted by:		Date:
Type:	Project:	
Ordering Info:		

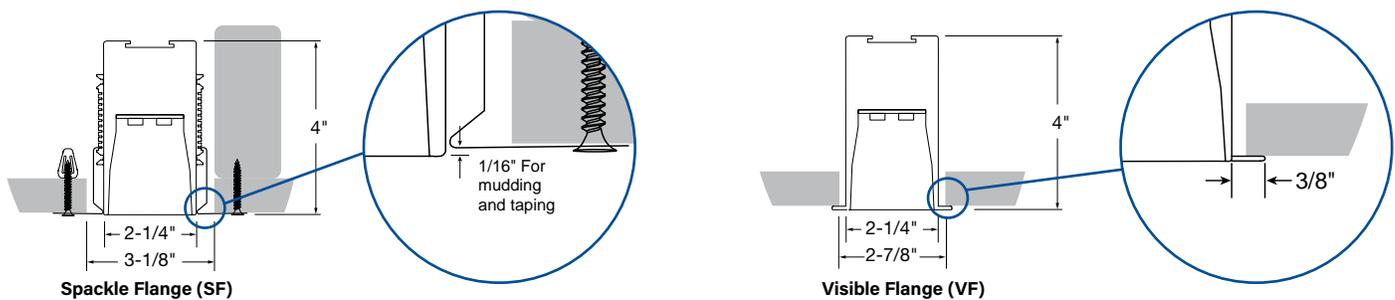
High Performance 2" Aperture (HP-2) Recessed

RECESSED MOUNTING TYPES - T-BAR

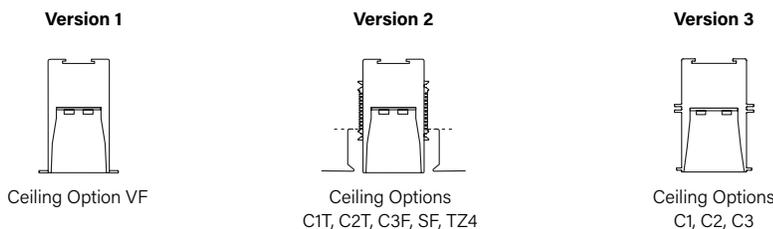
Rough-In Dimensions



RECESSED MOUNTING TYPES - CUTOUT DIMENSIONS



HOUSING



Note: +/- 1/16"

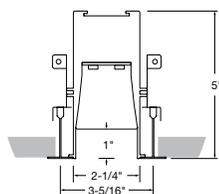
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Protected by one or more US Patents: 8915613; D702,391; D702,390; D700,732

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

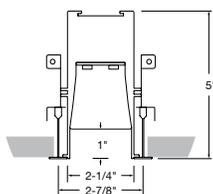
High Performance 2" Aperture (HP-2) Recessed

REGRESSED MOUNTING TYPES - T-BAR

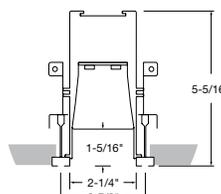
Rough-In Dimensions



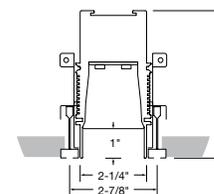
15/16" T-Bar (C1)



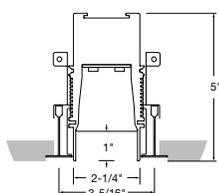
9/16" T-Bar (C2)



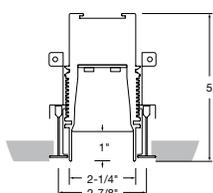
Standard Screw Slot (C3)



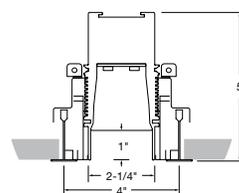
Flush Screw Slot (C3F)



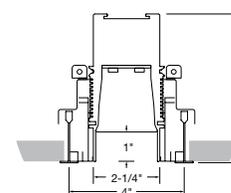
15/16" Tegular (C1T)



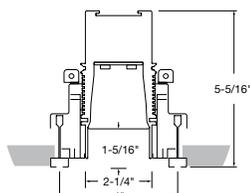
9/16" Tegular (C2T)



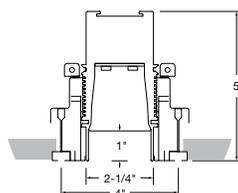
Tech Zone 4" (TZ4)
15/16" T-Bar (C1)



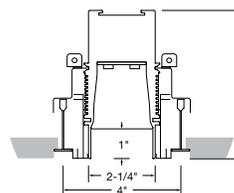
Tech Zone 4" (TZ4)
9/16" T-Bar (C2)



Tech Zone 4" (TZ4)
Standard Screw Slot (C3)

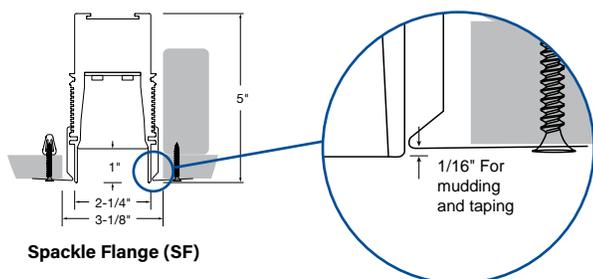


Tech Zone 4" (TZ4)
Flush Screw Slot (C3F)

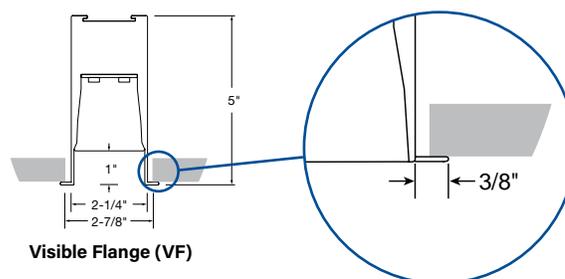


Tech Zone 4" (TZ4)
9/16" Tegular (C2T)

REGRESSED MOUNTING TYPES - CUTOUT DIMENSIONS



Spackle Flange (SF)

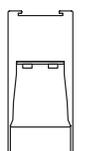


Visible Flange (VF)

Regressed Lens: Regressed lens version is 5" tall with a lens that is regressed 1" from ceiling line.

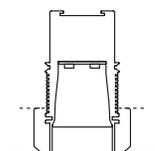
HOUSING

Version 1



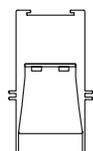
Ceiling Option VF

Version 2



Ceiling Options
C1T, C2T, C3F, SF, TZ4

Version 3



Ceiling Options
C1, C2, C3

Note: +/- 1/16"

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Recessed Photometry - 4' Luminaire 3500K

HP2-R-D-4'-V-835-DAO

Downlight: Downlight Asymmetric Optic - Right

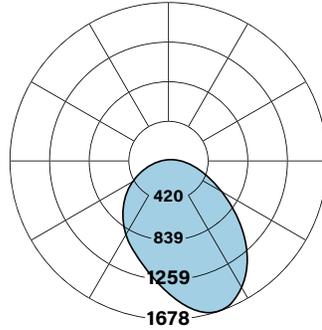
Efficacy: 105 lm/W

Total luminaire output: 3741 lumens (935 lm/ft)
35.5 watts (8.9 W/ft)

Peak Candela Value: 1670 @ 0°

CRI: 80 / CCT: 3500K

ITL LM79 Report REP-051921-01



HP2-R-D-4'-V-835-DSO

Downlight: Downlight Spread Optic

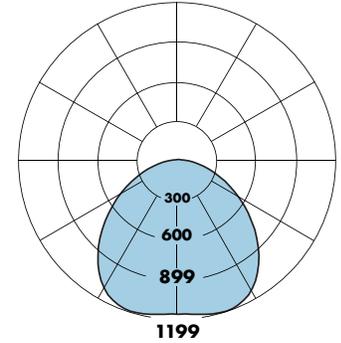
Efficacy: 92 lm/W

Total luminaire output: 3273 lumens (818 lm/ft)
35.7 watts (8.9 W/ft)

Peak Candela Value: 1197 @ 0°

CRI: 80 / CCT: 3500K

ITL LM79 Report 94139



Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1531	1925	2910	3741

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
383	481	727	935

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.5	4.4	6.8	8.9

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
110	109	107	105

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.

² Based on ITL report: REP-051921-01

Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1340	1684	2546	3273

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
335	421	636	818

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.5	4.4	6.8	8.9

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
96	95	93	92

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.

² Based on ITL report: 94139

Wattage is Real Power. If you would like additional details to calculate Apparent Power, please contact your local Finelite representative.

Sample Lumen Adjustment Calculation

Lumen Adjustment Factors 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

High Output (H) / 4000K, 90 CRI

Lumen Adjustment Factor: 0.789

Total Light Output: 2910 lm x 0.789 = 2296 lm

Total Light Output per Foot: 707 lm/ft x 0.789 = 574 lm/ft.

watts/foot: 6.8 W/ft.

$$\text{Efficacy} = \frac{574 \frac{\text{lm}}{\text{ft.}}}{6.8 \frac{\text{W}}{\text{ft.}}} = 84 \text{ lm/W}$$

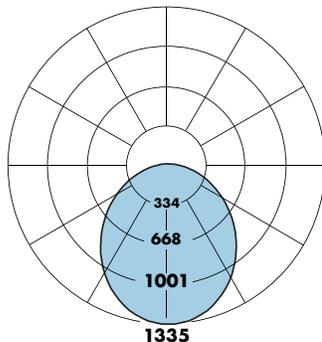
Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Recessed Photometry - 4' Luminaire 3500K

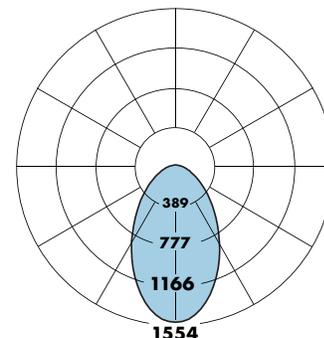
HP2-R-D-4'-V-835
Downlight: Flush Diffuser

Efficacy: 89 lm/W
Total luminaire output: 3287 lumens (822 lm/ft)
 36.9 watts (9.2 W/ft)
Peak Candela Value: 1335 @ 0°
 CRI: 80 / CCT: 3500K
 ITL LM79 Report 85135



HP2-R RG-D-4'-V-835
Downlight: Regressed Diffuser

Efficacy: 79 lm/W
Total luminaire output: 2907 lumens (727 lm/ft)
 37 watts (9.3 W/ft)
Peak Candela Value: 1554 @ 0°
 CRI: 80 / CCT: 3500K
 ITL LM79 Report 90351



Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1346	1692	2557	3287

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
336	423	639	822

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.6	4.6	7.1	9.2

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
93	92	90	89

Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1190	1496	2261	2907

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
298	374	565	727

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.6	4.6	7.1	9.3

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
82	81	80	79

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.

² Based on ITL report: 85135

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.

² Based on ITL report: 90351

Wattage is Real Power. If you would like additional details to calculate Apparent Power, please contact your local Finelite representative.

Sample Lumen Adjustment Calculation

Lumen Adjustment Factors 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

High Output (H) / 4000K, 90 CRI
Lumen Adjustment Factor: 0.789
Total Light Output: 2557 lm x 0.789 = 2017 lm
Total Light Output per Foot: 639 lm/ft x 0.789 = 504 lm/ft.
watts/foot: 71 W/ft.

$$\text{Efficacy} = \frac{504 \frac{\text{lm}}{\text{ft.}}}{7.1 \frac{\text{W}}{\text{ft.}}} = 71 \text{ lm/W}$$

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Wall Wash Recessed - 4' Luminaire 3500K

HP2-R-WW-D-K-4'-V-835

Downlight: With Kicker

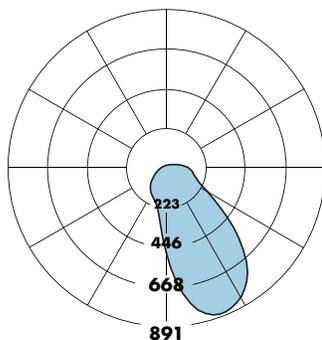
Efficacy: 76 lm/W

Total luminaire output: 1500 lumens (375 lm/ft)
19.6 watts (4.9 W/ft)

Peak Candela Value: 882 @ 25°

CRI: 80 / CCT: 3500K

ITL LM79 Report 85137



Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
614	772	1167	1500

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
154	193	292	375

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
2.0	2.5	3.8	4.9

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
76	77	77	77

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.

² Based on ITL report: 85137

Wattage is Real Power. If you would like additional details to calculate Apparent Power, please contact your local Finelite representative.

Sample Lumen Adjustment Calculation

Lumen Adjustment Factors 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

High Output (H) / 4000K, 90 CRI

Lumen Adjustment Factor: 0.789

Total Light Output: 1167 lm x 0.789 = 921 lm

Total Light Output per Foot: 292 lm/ft x 0.789 = 230 lm/ft.

watts/foot: 3.8 W/ft.

$$\text{Efficacy} = \frac{292 \frac{\text{lm}}{\text{ft.}}}{3.8 \frac{\text{W}}{\text{ft.}}} = 61 \text{ lm/W}$$

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

WALL WASH RECESSED - SETBACK INFO AND APPLICATION DATA

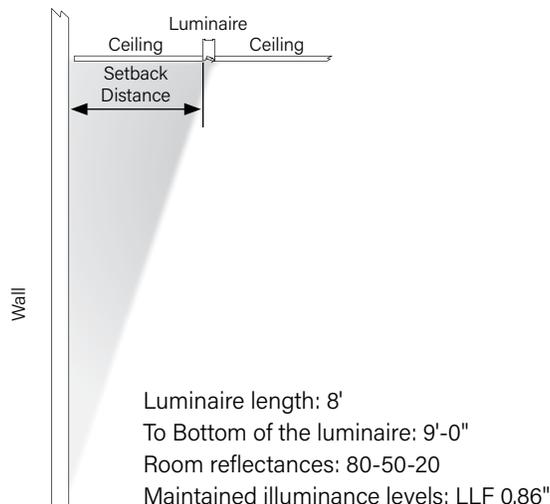
HP2-R-WW-D-K-4'-V-835

Downlight: With Kicker

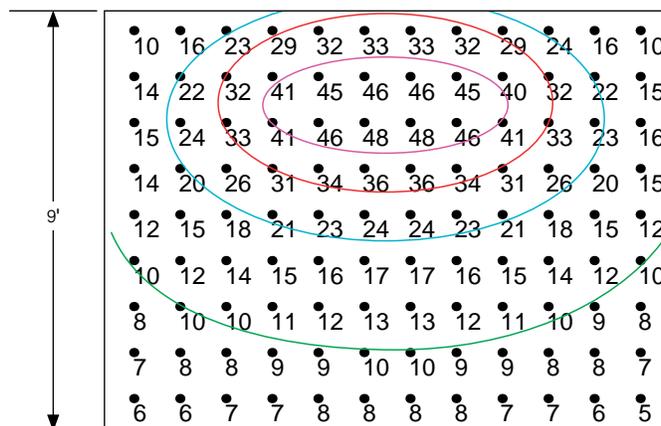
Total luminaire output: 1500 lumens (375 lm/ft)

19.6 watts (4.9 W/ft)

CRI: 80 / CCT: 3500K



Setback Distance - 2'



DOWNLIGHT ASYMMETRIC OPTIC - SETBACK INFO AND APPLICATION DATA

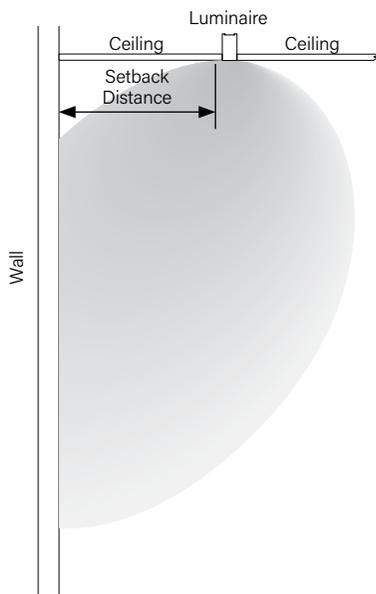
HP2-R-D-4ft-V-835-DAO

Downlight: DAO

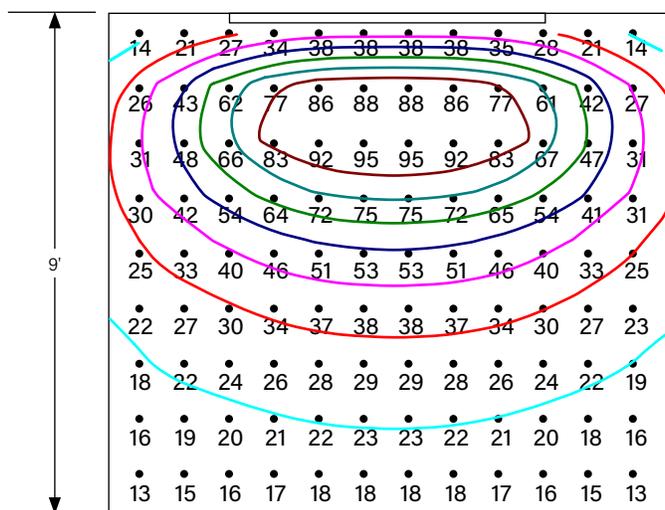
Total luminaire output: 3742 lumens (936 lm/ft)

35.6 watts (8.9 W/ft)

CRI: 80 / CCT: 3500K



Setback Distance - 2'



Submitted by:		Date:
Type:	Project:	
Ordering Info:		

0-10V Tunable White

Finelite's contractor friendly Tunable White luminaires are available at low cost, with powerful and simple 0-10V tuning and intensity controls.

TUNABLE WHITE FEATURES

- CCT range: 2700K - 6500K
- Dimming Range: 100% to 10%
- CRI Options: 80 CRI or 90 CRI

Note:
Dim to Off options available.

LUMINAIRE FAMILY MODIFICATIONS/RESTRICTIONS

Recessed Direct	Section Lengths											
	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	
Output S,B,H,V Single Circuit	Rows can be comprised of 2'-12' sections. Tailored lengths available.											
Integral Battery Backup (BSL310LP)							✓		✓		✓	

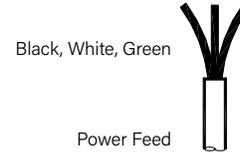
PHOTOMETRY

Apply a power adjustment factor to calculate wattage usage

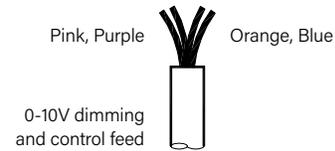
POWER	CONVERSION FACTOR
	1.1X

(Example: a 50 watt luminaire in static white would draw 55 watts using 0-10V Tunable White)

DUAL FEED DETAIL



WIRING LEGEND		
Black	Hot	Line Voltage
White	Neutral	Line Voltage
Green	Ground	

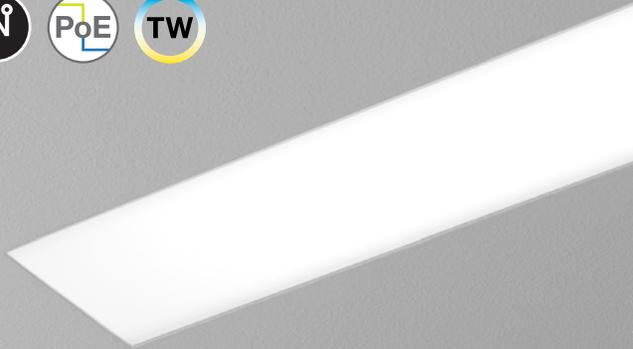


WIRING LEGEND		
Pink	Dimming	0-10V DC
Purple	Dimming	0-10V DC
Orange	TW	0-10V DC
Blue	TW	0-10V DC



Seem[®] 2 Drywall/Hard/Specialty Ceiling

LED



trim flange



corner detail



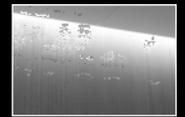
regress lens



grid ceiling companion



wall to ceiling companion

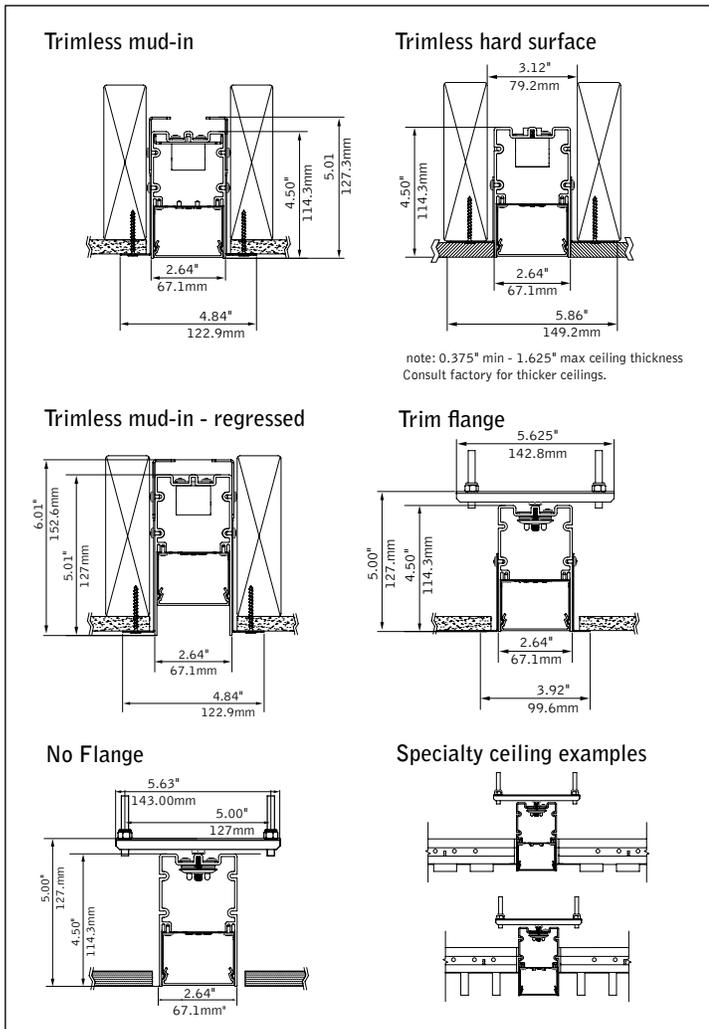


perimeter companion



suspended & wall mount companions

DIMENSIONAL DATA



FEATURES

Narrow extruded aluminum 2.5" aperture recessed slot LED.

Integrates with ceiling or wall in a variety of mounting styles for a clean, unobtrusive aesthetic.

Individual units and continuous runs in 1" increments.

Frosted acrylic lens provides uninterrupted illumination, without pixels or shadows.

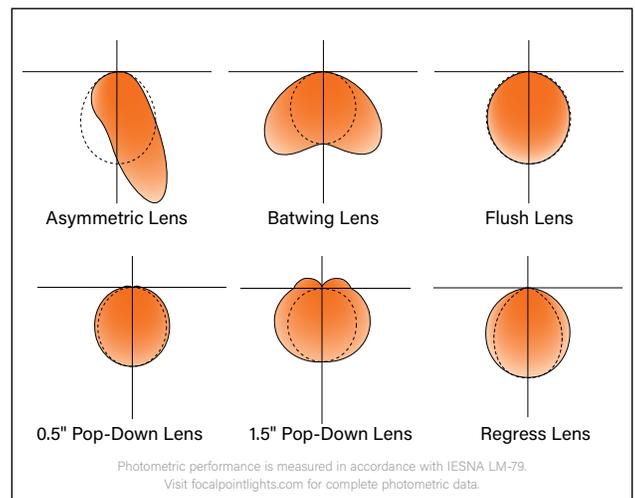
LED position and lens material optimized to provide the perfect blend of high performance and visual comfort.

Tunable White: Supports human activity, well-being, and preferences with a light quality that evolves throughout the day.

Connected Solutions: Integrates with wired and wireless building lighting control systems.

PoE compatible: Integrates with Power over Ethernet lighting systems via standard, low-voltage wires.

DISTRIBUTIONS

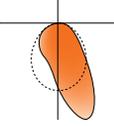
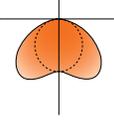
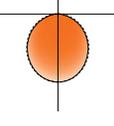
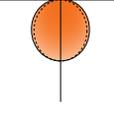
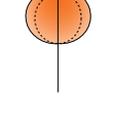
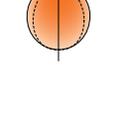


fixture:

project:

TYPE R4

4' PERFORMANCE CHART

Shielding	Lumens per Foot	Delivered Lumens	Tested System Watts	LPW
Asymmetric Lens 	125LF	500	5.9	85
	250LF	1000	8.2	122
	375LF	1500	11.1	135
	500LF	2000	14.5	138
	625LF	2500	17.9	140
	750LF	3000	22.1	136
	875LF	3500	25.9	135
Batwing Lens 	125LF	500	5.5	91
	250LF	1000	8.7	115
	375LF	1500	12.0	125
	500LF	2000	15.5	129
	625LF	2500	20.0	125
	750LF	3000	24.0	125
	875LF	3500	28.1	125
Flush Lens 	125LF	500	5.6	89
	250LF	1000	9.0	111
	375LF	1500	12.4	121
	500LF	2000	16.2	124
	625LF	2500	20.8	120
	750LF	3000	24.9	120
	875LF	3500	29.3	119
Pop Down 0.5" Lens 	125LF	500	5.9	85
	250LF	1000	9.5	105
	375LF	1500	13.1	114
	500LF	2000	17.2	116
	625LF	2500	22.1	113
	750LF	3000	26.7	112
	875LF	3500	31.3	112
Pop Down 1.5" Lens 	125LF	500	5.8	86
	250LF	1000	9.3	107
	375LF	1500	12.9	116
	500LF	2000	16.9	118
	625LF	2500	21.8	115
	750LF	3000	26.2	114
	875LF	3500	30.8	114
Regress Lens 	125LF	500	5.9	85
	250LF	1000	9.6	104
	375LF	1500	13.4	112
	500LF	2000	17.5	114
	625LF	2500	22.5	111
	750LF	3000	27.1	111
	875LF	3500	31.9	110
	1000LF	4000	36.9	109

Based on 3500K, 4' lengths. Lumen multiplier: Continuous runs = 0.93 Lumen output may vary +/- 5%. Actual wattage may vary +/- 5%.

STANDARD WHITE

Luminaire Series

Seem 2 LED **FSM2L**

Shielding

Asymmetric Lens AS

Batwing Lens BW

Flush Lens **FL**

Pop Down 0.5" Lens PD05

Pop Down 1.5" Lens PD15

(2' to 8' Individual Units Only)

Regress Lens SR

Lumen Output

125 Lumens per foot 125LF

(LD1, L11 & D11 driver only. 4' minimum. Not available on patterns.)

250 Lumens per foot 250LF

(3' minimum with LH1. Not available on patterns with LH1)

375 Lumens per foot 375LF

500 Lumens per foot 500LF

625 Lumens per foot **625LF**

750 Lumens per foot 750LF

875 Lumens per foot 875LF

1000 Lumens per foot 1000LF

Color Temperature

2700K, 80+ CRI or 90+ CRI 27K or 927K

3000K, 80+ CRI or 90+ CRI 30K or 930K

3500K, 80+ CRI or 90+ CRI 35K or **935K**

4000K, 80+ CRI or 90+ CRI 40K or 940K

Circuits & Zones

1 Circuit, non-emergency **1C**

Consult Ordering Guide on page 3 for multiple circuiting and zoning options

Voltage

120/277 UNV Volt **UNV**

347 Volt (L11 and LD1 driver only) 347V

Low voltage LV

Control System & Dimming Level

0-10V - 10% Dimming **LD1**

0-10V - 1% Dimming L11

Low Voltage, PoE compatible LVN

(No driver. Not available with EM or EC. LV Voltage only.)

Lutron Hi-Lume EcoSystem (LDE1) -* LH1

1% Dimming

DALI 1% Dimming* D11

*(Not available with patterns.)

Wattstopper Fixture Sensor** LMFS1

Low Density - 1% Dimming

Wattstopper Fixture Sensor** LMFS2

High Density - 1% Dimming

Lutron Athena Wireless Sensor** LAWS

Enlighted Smart Sensor - 1% Dimming** ENL1

WaveLinx Pro - 1% Dimming** WLXP

** (3' minimum length. 7' minimum with ECD/EM. Not available with pop-down lenses. See sensor layout guide)

Ceiling Configuration

No Flange for specialty ceilings NF

(Ex. slat, panel, cloud systems.)

Trim Flange Drywall TF

Trim Flange Wood TFW

Mud-in Trimless, 1/2" Drywall XF1

Mud-in Trimless, 5/8" Drywall XF2

Mud-in Trimless, any Drywall Thickness XFF

Non-Drywall Hard Surface XFN

Hard Surface, Wood XFW

Factory Options

(See Ordering Guide for ordering details for DC, EC, EM & ECD.)

Chicago Plenum CP

(Not available with Flex Whip)

Daylight Circuit _DC

Emergency Circuit _EC

Emergency Battery Pack† _EM

Emergency Control Device‡ _ECD

† (4' minimum. 6' minimum with patterns. 120/277 Volt only. Not available at corners.)

6' New York City Flex Whip (120V) FNY1

6' New York City Flex Whip (277V) FNY2

6' Flex Whip FW

Finish

Matte White Housing **WH**

Luminaire Length

Specify luminaire/row length in 1" increments **_ft_in** Length per plan

(2' minimum. Leave blank for patterns.)

Pattern Options

(4' minimum length)

'L' pattern A' x B'

'U' pattern A' x B' x C'

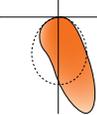
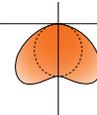
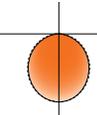
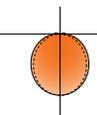
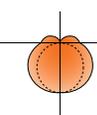
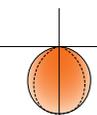
Rectangular pattern A' x B' R

(Consult factory for other pattern options)





4' PERFORMANCE CHART

Shielding	Lumens per Foot	Delivered Lumens	Tested System Watts	LPW
Asymmetric Lens 	125LF	500	7.25	79.3
	250LF	1000	12.90	93.1
	375LF	1500	18.55	98.5
	500LF	2000	18.3	101.1
	625LF	2500	24.21	102.5
	750LF	3000	29.86	106.8
	875LF	3500	34.34	107.5
Batwing Lens 	1000LF	4000	45.08	107.8
	125LF	500	7.25	76.0
	250LF	1000	12.90	89.2
	375LF	1500	18.55	94.4
	500LF	2000	18.3	96.9
	625LF	2500	24.21	98.3
	750LF	3000	29.86	102.4
Flush Lens 	875LF	3500	34.34	103.0
	1000LF	4000	39.71	103.3
	125LF	500	7.25	69.0
	250LF	1000	12.90	80.9
	375LF	1500	18.55	85.7
	500LF	2000	18.3	87.9
	625LF	2500	24.21	89.2
Pop Down 0.5" Lens 	750LF	3000	29.86	92.9
	875LF	3500	34.34	93.5
	1000LF	4000	39.71	93.7
	125LF	500	7.25	66.2
	250LF	1000	12.90	77.7
	375LF	1500	18.55	82.2
	500LF	2000	18.3	84.4
Pop Down 1.5" Lens 	625LF	2500	24.21	85.6
	750LF	3000	29.86	89.2
	875LF	3500	34.34	89.7
	1000LF	4000	39.71	90
	125LF	500	7.25	65.5
	250LF	1000	12.90	76.9
	375LF	1500	18.55	81.4
Regress Lens 	500LF	2000	18.3	83.5
	625LF	2500	24.21	84.7
	750LF	3000	29.86	88.3
	875LF	3500	34.34	88.8
	1000LF	4000	39.71	89.1
	125LF	500	7.25	60.4
	250LF	1000	12.90	70.9

Based on 2700K, 80CRI, 4' lengths. Lumen output may vary +/- 5%. Actual wattage may vary +/- 5%

Lumen Multiplier		Wattage Multipliers	
CRI	Multiplier	CCT	Multiplier
80+	1.00	2700K	1.00
90+	0.89	3000K	0.92
		3500K	0.88
		4000K	0.86
		5000K	0.85
		5700K	0.87

TYPE R4



TUNABLE WHITE

Luminaire Series

Seem 2 LED FSM2L

Shielding

- Asymmetric Lens AS
- Batwing Lens BW
- Flush Lens FL
- Pop Down 0.5" Lens PD05
- Pop Down 1.5" Lens PD15
- Regress Lens SR

(Housing height 5.5" Ceiling applications only)

Lumen Output

- 125 Lumens per foot 125LF
- 250 Lumens per foot 250LF
- 375 Lumens per foot 375LF
- 500 Lumens per foot 500LF
- 625 Lumens per foot 625LF
- 750 Lumens per foot 750LF
- 875 Lumens per foot 875LF
- 1000 Lumens per foot 1000LF

Color Temperature

- Tunable White: 2700-6500K, 80+ CRI 2765T
- Tunable White: 2700-6500K, 90+ CRI 92765T

Circuits & Zones

- 1 Circuit, non-emergency 1C
- Consult Ordering Guide on page 3 for multiple circuiting and zoning options _C_Z_DL

Voltage

- 120/277 UNV Volt UNV
- 347 Volt Support 347V
- Low voltage LV

Control System & Dimming Level

- DALI 1% Dimming* D1TW
- (Default driver offers DT6 control. It requires two addresses, one for intensity & one for CCT tuning. Consult factory for DT8. Extended lead time applies.)

Ceiling Configuration

- No Flange for specialty ceilings (Ex. slat, panel, cloud systems.) NF
- Trim Flange Drywall TF
- Trim Flange Wood TFW
- Mud-in Trimless, 1/2" Drywall XF1
- Mud-in Trimless, 5/8" Drywall XF2
- Mud-in Trimless, any Drywall Thickness XFF
- Non-Drywall Hard Surface XFN
- Hard Surface, Wood XFW

Factory Options

(See Ordering Guide for ordering details for DC, EC, EM & ECD.)

Chicago Plenum CP

(Not available with Flex Whip)

- Daylight Circuit _DC
- Emergency Circuit _EC
- Emergency Battery Pack† _EM
- Emergency Control Device† _ECD

†(4' minimum. 6' minimum with patterns. 120/277 Volt only. Not available at corners.)

- 6' New York City Flex Whip (120V) FNY1
- 6' New York City Flex Whip (277V) FNY2
- 6' Flex Whip FW

Finish

- Matte White Housing WH

Luminaire Length

- Specify luminaire/row length in 1" increments _ft _in
- (2" minimum. Leave blank for patterns.)

Pattern Options

(4' minimum length)

- 'L' pattern A' x B'
- 'U' pattern A' x B' x C'
- Rectangular pattern A' x B' R

(Consult factory for other pattern options)

SPECIFICATIONS

LED System

Proprietary linear LED module incorporates premium LEDs on a robust platform to achieve excellent thermal management. LEDs are placed to promote a uniform appearance. Available in 2700K, 3000K, 3500K or 4000K with CRI>80 or CRI>90, 3 SDCM. 3500K and 4000K with CRI>90 have a cyanosis observation index (COI) of 3.3 or less. LED modules and drivers are replaceable from below.

Construction

One piece extruded aluminum housing. 20 Ga. steel end caps. Housing for new construction applications. Flush lens weights: 4' unit 12.2 lbs., 8' unit: 24.4 lbs. Regress lens weights: 4' unit: 13.2 lbs., 8' unit: 26.4 lbs..

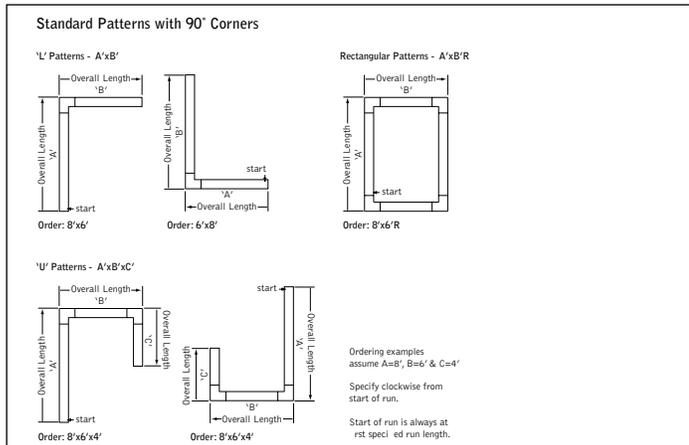
Optic

Reflectors fabricated of 22 Ga. steel finished in High Reflectance White powder coat. Extruded acrylic lens .07" thick with satin finish, up to 8' continuous.

Electrical

Luminaires are pre-wired with factory installed branch circuit wiring and over-molded quick connects. Standard 120-277V constant current driver includes 0-10V analog dimming. Power factor > .9. PoE compatible: Integrates with Power over Ethernet lighting systems via standard, low-voltage wires. PoE runs require an independent PoE node and power feed for each luminaire section.

DETAILS



Emergency

Emergency Battery output - 10 watts for 90 minutes. Maximum mounting height: 17.9ft. Emergency Circuit with Connected Solutions (LMFS1, LMFS2, ENL1, WLXP) shipped standard with leads to connect UL924 compliant device, by others.

Labels

UL and cUL listed. Suitable for Dry or Damp Locations, indoor use only.

Finish

Polyester powder coat applied over a multi-stage pre-treatment.

Lumen Maintenance

Reported: L70 at >61,000 hours	Calculated: L70 at 385,000 hours
L90 at >61,000 hours	L90 at 103,000 hours

Derived from EPA TM-21 calculator. Based on typical conditions, consult factory for additional data.

Reliability

At Focal Point, our products are designed to stand the test of time. Each luminaire is engineered using superior components, manufactured with the utmost care and rigorously tested. Contact us for reliability data.

Warranty

LED system rated for operation in ambient environments up to 25°C. 5-year limited warranty.

Focal Point provides flexibility in meeting the needs of each project by integrating with several building lighting control systems. A variety of sensors, drivers and other components can be specified that allow the luminaires to communicate with wired and wireless networks. All zoning can be digitally reconfigured through the application software. Daylight harvesting, occupancy sensing, integration with HVAC systems, and individual controls enable the monitoring and modulating of light levels and temperature in order to save energy, reduce costs and maximize occupants' comfort. All Connected Solutions luminaires require a compatible building control system.†

Connected Solution	Ordering Code	Model #**	Protocol	Compatible Networks*	Occupancy & Daylight	Temperature Reporting	Communication to Luminaire	Drivers
legrand WATTSTOPPER®	LMFS1	LMFS-601 & LMFI-111	DLM Wireless	DLM	Integrated	No	Wireless	Advance by Signify
	LMFSD	LMFS-601						Optotronic by eldoLED (Dexal)
COOPER Lighting Solutions	WLXP	OEM-WAA	WaveLinx Wireless	WaveLinx Pro Trellix	Integrated	No	Wireless (WaveLinx Pro Wireless Area Controller)	Advance by Signify
CRESTRON	D11	Specified Driver	DALI	Crestron Züm Wireless & SpaceBuilder	Enabled	No	Wired	eldoLED ECOdrive
Enlighted	ENL1	SU-5E-IOT	Enlighted RF	Enlighted	Integrated	Yes	Wireless	Advance by Signify
LUTRON	LAWS	A-WN-D01-OCC-WH	DALI, 0-10V	Athena Wireless	Integrated	No	Wireless	Advance by Signify
	LH1	LDE1	EcoSystem	Quantum, Energi Savr Node, Energi TriPak	Enabled	No	Wired	Lutron Hi-Lume

*Not all compatible networks may be listed. **For performance data and additional control system details please visit the connected solutions manufacturer websites. Primary drivers are listed in **bold**. To specify a particular driver please consult factory. †Controls systems supplied by others.



Ordering Guide

Direct Only Linear Circuitry, Zones & Factory Options

HOW TO USE THIS GUIDE

Fill out the worksheet on the following page to specify your requirements for circuitry, zones, and factory options.

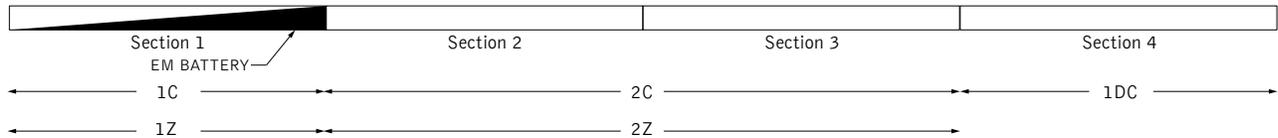
Refer to the run chart for standard run configurations, consult factory for custom configurations.

Complete the Totals / Ordering Codes at the bottom of the worksheet and add to your ordering logic on the cut sheet.

Submit the worksheet along with your order.

TOTAL RUN LENGTH: <u>32ft</u>		JOB NAME: _____			FIXTURE TYPE: _____				
EXAMPLE	HOUSING SECTION	SECTION LENGTH	SHARED ELECTRICAL FEED, NORMAL POWER			FACTORY OPTIONS			
			SWITCHING CIRCUIT	DIMMING ZONE	DAYLIGHT ZONE	SEPARATE ELECTRICAL FEEDS			EM
						DAYLIGHT CIRCUIT	EMERGENCY CIRCUIT	ECD	
1	8	1C	1Z					1EM	
2	8	2C	2Z						
3	8	2C	2Z						
4	8				1DC				
Totals / Ordering Codes		2C	2Z		1DC			1EM	

ORDERING: FSM4L-FL-625LF-35K- **2C2Z** -UNV-LD1-G2- **1DC-1EM** -WH-32ft



KEY	
C = Switching Circuit Switched Hot / Shared Neutral	DC = Daylight Circuit Switched Hot / Separate Neutral
Z = Dimming Zone Dimming Control Wires	EC = Emergency Circuit Switched Hot / Separate Neutral
DL = Daylight Zone Daylight Dimming Control Wires	EM = Emergency Battery Unswitched Hot / Shared Neutral
	ECD = Emergency Control Device Unswitched Hot / Separate Neutral

DEFAULTS

- Zones and Factory Options illuminate entire sections from 4' to 8' in length.
- One shared or isolated circuit and zone required per housing section.
- Limit of one EM or ECD per housing section.
- Additional electrical feed required for applications greater than three shared circuits and zones.
- Each DC, EC and ECD require an additional electrical feed.
- ECD not available in the same housing section as EC.
- Longer lead times and additional pricing may apply for custom run configurations.

CUSTOM LENGTHS

- If partial illumination of emergency or daylight section is required, indicate in ordering guide and add "partial illumination" in Order Notes. Drawing required.
- Engineering validation required, longer lead times may apply.



Ordering Guide Worksheet

Linear Circuitry, Zones & Factory Options

TOTAL RUN LENGTH: _____		JOB NAME: _____			FIXTURE TYPE: _____			
HOUSING SECTION	SECTION LENGTH	SHARED ELECTRICAL FEED, NORMAL POWER			FACTORY OPTIONS			EM
		SWITCHING CIRCUIT	DIMMING ZONE	DAYLIGHT ZONE	SEPARATE ELECTRICAL FEEDS			
DAYLIGHT CIRCUIT	EMERGENCY CIRCUIT				ECD			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Totals / Ordering Codes								

WORKSHEET

Combine to create Circuits & Zones ordering code

Enter as individual Factory Options

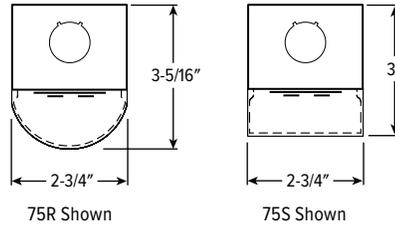
RUN CHART

Run length (ft)	Housing Configuration Section Lengths	Run length (ft)	Housing Configuration Section Lengths	Run length (ft)	Housing Configuration Section Lengths	Run length (ft)	Housing Configuration Section Lengths
9	5 + 4	21	8 + 8 + 5	33	8 + 8 + 8 + 5 + 4	45	8 + 8 + 8 + 8 + 8 + 5
10	6 + 4	22	8 + 8 + 6	34	8 + 8 + 8 + 6 + 4	46	8 + 8 + 8 + 8 + 8 + 6
11	7 + 4	23	8 + 8 + 7	35	8 + 8 + 8 + 7 + 4	47	8 + 8 + 8 + 8 + 8 + 7
12	8 + 4	24	8 + 8 + 8	36	8 + 8 + 8 + 8 + 4	48	8 + 8 + 8 + 8 + 8 + 8
13	8 + 5	25	8 + 8 + 5 + 4	37	8 + 8 + 8 + 8 + 5		
14	8 + 6	26	8 + 8 + 6 + 4	38	8 + 8 + 8 + 8 + 6		
15	8 + 7	27	8 + 8 + 7 + 4	39	8 + 8 + 8 + 8 + 7		
16	8 + 8	28	8 + 8 + 8 + 4	40	8 + 8 + 8 + 8 + 8		
17	8 + 5 + 4	29	8 + 8 + 8 + 5	41	8 + 8 + 8 + 8 + 5 + 4		
18	8 + 6 + 4	30	8 + 8 + 8 + 6	42	8 + 8 + 8 + 8 + 6 + 4		
19	8 + 7 + 4	31	8 + 8 + 8 + 7	43	8 + 8 + 8 + 8 + 7 + 4		
20	8 + 8 + 4	32	8 + 8 + 8 + 8	44	8 + 8 + 8 + 8 + 8 + 4		

Standard run configurations, consult factory for custom configurations.



75R | 75S LED Narrow Strip



CATALOG #: _____

TYPE: _____

PROJECT: _____



FEATURES

- Small fixture profile allows inconspicuous placement in coves or confined spaces
- Round and square lenses provide a clean look for architectural environments
- Row applications produce continuous light with minimal interruption
- Diffuse acrylic lens enhances uniformity and minimizes glare
- Variety of mounting accessories for surface and suspended applications
- Special reflectors are available to provide precise light distribution
- HE option delivers superior efficacies up to 182 lm/W
- Optional wireguard provides added protection
- Six standard finish options and a wide selection of custom colors complement the architectural elements of any space
- 2', 3', 4', and 8' lengths available
- Available on QuickShip
- Wireless in-fixture control solutions available
- Made Right Here® in the USA

SPECIFICATIONS

- HOUSING** – 22-gauge die-formed C.R.S.
- SHIELDING** – Diffuse acrylic lens. Frosted polycarbonate available for 75R, specify FP Option.
- FINISH** – 92% minimum average reflective white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- ELECTRICAL** – High-quality mid-power LED board. L70 > 72,000 hours per IES TM-21. L80 > 102,000 hours with HE option. 25°C maximum ambient operating temperature. 40°C maximum ambient operating temperature with HA Option, lumen restrictions apply, see fixture performance data. 50/60 Hz constant current driver.
- MOUNTING** – Surface (ceiling or wall) or suspended (hanging hardware required).
- LISTINGS** –
 - cETLus conforms to UL STD 1598. Certified to CAN/CSA STD C22.2 No. 250.0. Suitable for damp locations
 - UL 924 available, see Options.
 - DesignLights Consortium qualified product. Not all versions of this product may be DLC qualified, see the DLC Qualified Products List at designlights.org/GPL
 - Build America, Buy America (BABA) and Buy American Act (BAA) compliant. Request certification at hew.com/buy-american
- WARRANTY** – 5-year limited warranty, see hew.com/warranty

ORDERING EXAMPLE: 75R - 4 - L85/835 - OPTIONS - CONTROL/DIM - UNV

SERIES	LENGTH	LUMENS ⁽¹⁾				CRI	CCT
75R Round lens	2 22-1/2"	2'	3'	4'	8'	8 80	27 2700K
	3 33-9/16"	L15 1,500lm	L40 4,000lm	L30 3,000lm	L60 6,000lm	9 90	30 3000K
75S Square lens	4 44-5/8"	L25 2,500lm	L64 6,400lm	L50 5,000lm	L100 10,000lm		35 3500K
	8 89-1/4" ⁽²⁾	L32 3,200lm		L65 6,500lm	L130 13,000lm		40 4000K
		L42 4,200lm		L85 8,500lm	L170 17,000lm		50 5000K
				L100 10,000lm	L200 20,000lm		

OPTIONS ⁽³⁾

See page 3 for FINISH OPTIONS. See page 3 for SPECIAL REFLECTOR OPTIONS. See page 3 for QUICK-CONNECT OPTIONS.

- EM/10WLP** Low-profile 10-watt emergency battery ⁽⁴⁾
- EM/10WRM** Remote mount 10-watt emergency battery
- EM/10WRM/RTS** Remote mount 10-watt emergency battery with regressed test switch
- HE** High efficacy lumen package ⁽⁵⁾
- HA** High ambient operating temperature, 40°C ⁽⁶⁾
- WG-75** 11-gauge white powder coat wireguard ⁽⁷⁾
- 315** 1-1/2" ceiling spacer
- VBV** (2) Y-hangers
- VBV-2** (2) Y-hangers with 2' chains
- RA-75** Row aligner ⁽⁸⁾
- 45AMB** (2) 45° adjustable mounting brackets ⁽⁹⁾

- FP** Frosted polycarbonate lens for 75R
- (L__)** Additional lower lumen packages available ⁽¹⁰⁾
Example: 7,000 nominal lumens = 75R-4-L85/835-(L70)
- QC__** Quick-connect wiring harness
- GEN** Approved for UL 924 emergency generator circuit through-feed wiring ⁽¹¹⁾
- SP1** 10kV surge protection, 120 or 277V
- SP2** 10kV surge protection, 208 or 240V
- SP3** 10kV surge protection, 347V

AIRCRAFT CABLES (EXAMPLE: ACF/D48) ⁽¹²⁾

Prefix	Type	Length
ACF/ Feeder	D 1" grid & hardpan	24 24"
ACJ/ Joiner	N 9/16" grid	48 48"
	S Slot grid	96 96"

CONTROL ⁽¹³⁾

See page 6 for ADDITIONAL CONTROL OPTIONS.

- None
- AVI-LVFA** Avi-on wireless fixture control ⁽¹⁴⁾
- AVI-LVFA-PIR** Avi-on wireless fixture control with high bay PIR motion and daylight sensor, bottom mount ⁽¹⁵⁾
- AVI-LVFA-CS2-PIR** Avi-on wireless fixture control with PIR motion and daylight sensor, bottom mount ⁽¹⁶⁾
- AWN R** Lutron Athena wireless node integral fixture control, RF only ⁽¹⁷⁾
- AWN S** Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing ⁽¹⁸⁾

DRIVER

See page 8 for ADDITIONAL DRIVER OPTIONS.

- DIM** Driver with external 0-10V dimming wires
- DRV** Driver without external dimming wires
- DA** Driver with 12V auxiliary power, without external dimming wires ⁽¹⁹⁾
- DSR** Sensor-ready driver without external dimming wires (D4i DALI-2) ⁽²⁰⁾

VOLTAGE

- 120 120V
- 208 208V
- 240 240V
- 277 277V
- UNV 120-277V
- 347 347V ⁽²¹⁾

QUICKSHIP

75R-4-L50/835-QS-DIM-UNV	75R-8-L100/835-QS-DIM-UNV	75S-4-L50/835-QS-DIM-UNV	75S-8-L100/835-QS-DIM-UNV
75R-4-L50/840-QS-DIM-UNV	75R-8-L100/840-QS-DIM-UNV	75S-4-L50/840-QS-DIM-UNV	75S-8-L100/840-QS-DIM-UNV

NOTES

- Lumen output based on 80 CRI/3500K CCT. Actual performance may vary +/-5%, see page 2 for FIXTURE PERFORMANCE DATA. Additional lumen packages available, see options.
- Ships with (2) 4' lenses.
- Remote EM batteries: max remote distance 50', including suspension length. Large remote box provided. Specify CEC in the option code when California Energy Commission regulations are required. See page 4 for REMOTE MOUNT BATTERY DETAILS.
- Not available with 2' fixtures.
- Not available with 3' Length, 2' L15, 4' L30, or 8' L60 lumen packages. See page 2 for FIXTURE PERFORMANCE DATA.
- Lumen restrictions apply. See page 2 for FIXTURE PERFORMANCE DATA.
- Shipped separately, field-installed.
- Required when row mounting with aircraft cables.
- Cord recommended, ships separately. See page 4 for MOUNTING ACCESSORY DETAILS. Field-adjustable up and down in 7-1/2" increments.
- Specify in increments of 100 nominal lumens. Option must be specified with next higher lumen package.
- Maximum mounting height is 15.4' (4.7 m). Minimum lumen output is 400 lm/ft. See hew.com/UL924 for details.
- Units specified with aircraft cable require cord and RA-75 row aligner. See page 4 for MOUNTING ACCESSORY DETAILS.
- See page 4 for SENSOR & NODE PLACEMENT DETAILS. See page 5 for AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS.
- DA Driver only.
- DA Driver only.
- DA driver only.
- DA and DSR Drivers only.
- DA and DSR Drivers only.
- Avi-on, Lutron Athena, and LV-ZLS05 Controls only.
- Lutron Vive and Athena Controls only.
- Not available with EM batteries, DA, or DSR drivers.



75R | 75S LED Narrow Strip

FIXTURE PERFORMANCE DATA

	LED PACKAGE	DELIVERED LUMENS	STANDARD		HE OPTION		AMBIENT TEMPERATURE ⁽²⁾	
			WATTAGE	EFFICACY (lm/W)	WATTAGE	EFFICACY (lm/W)	EM	NO EM
2'	L15	1511	10.8	140	-	-	40	40
	L25	2470	18.2	136	14.8	167	40	40
	L32	2936	21.3	138	17.2	170	40	40
3'	L42	4124	31.4	132	23.0	180	35	40
	L40	3885	28.2	138	-	-	35	40
	L64	6259	48.2	130	-	-	30	35
4'	L30	2916	19.7	148	-	-	40	40
	L50	4867	33.0	148	26.7	182	40	40
	L65	5994	42.3	142	35.8	168	40	40
	L85	8098	56.2	144	47.6	170	35	40
	L100	9640	68.3	141	56.9	169	30	30
8'	L60	5520	35.3	157	-	-	40	40
	L100	9568	65.9	145	54.1	177	35	35
	L130	12353	87.9	141	70.8	175	35	35
	L170	16197	112.4	144	94.8	171	35	35
	L200	19281	136.5	141	113.9	169	30	30

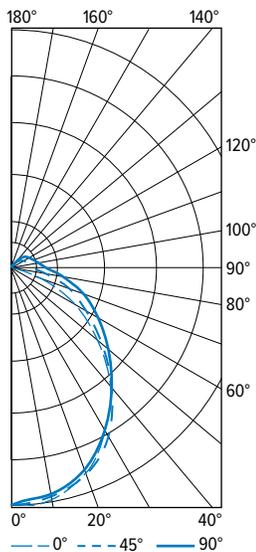
MULTIPLIER TABLES

		COLOR TEMPERATURE	
		CCT	CONVERSION FACTOR
80 CRI	2700K		0.97
	3000K		0.99
	3500K		1.00
	4000K		1.03
	5000K		1.06
90 CRI	2700K		0.80
	3000K		0.82
	3500K		0.83
	4000K		0.86
	5000K		0.89
		LENS	
		Standard	CONVERSION FACTOR
		FP Option	0.95

- Photometrics tested in accordance with IESNA LM-79. Results based on 80 CRI/3500K CCT, average wattage for 120V through 277V input, and 25°C ambient temperature. Actual performance may vary +/-5%.
 - To calculate lumen output in emergency mode, multiply the battery wattage by the efficacy.
 - Use multiplier tables to calculate additional options.
- ¹ Maximum ambient operating temperature (°C) when specified with HA option.

PHOTOMETRY

75R-4-L85/835 Total Luminaire Output: 8098 lumens; 56.2 Watts | Efficacy: 144 lm/W | 80 CRI; 3500K CCT



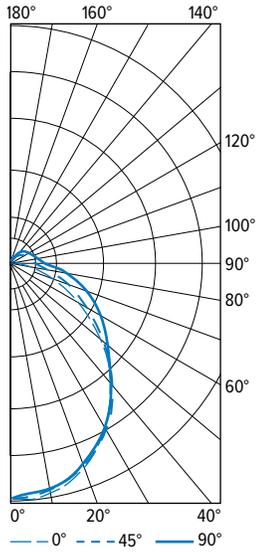
VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
	0°	45°	90°	
0	2594	2594	2594	
5	2622	2585	2553	246
15	2503	2497	2480	703
25	2256	2306	2324	1059
35	1915	2042	2111	1264
45	1481	1673	1824	1281
55	1003	1296	1488	1135
65	620	942	1117	891
75	267	630	775	613
85	63	401	501	378
90	9	311	407	
95	1	249	329	225
105	0	150	219	136
115	0	94	149	83
125	0	53	102	47
135	0	28	63	24
145	0	12	35	10
155	0	6	16	3
165	0	0	4	0
175	0	0	0	0
180	0	0	0	0

	ZONE	LUMENS	% FIXTURE
LUMEN SUMMARY	0 - 30	2008	25
	0 - 40	3272	40
	0 - 60	5688	70
	0 - 90	7570	94
	90 - 120	443	6
	90 - 150	524	7
	90 - 180	527	7
	0 - 180	8098	100

PHOTOMETRY CONTINUED ON NEXT PAGE.

75R | 75S LED Narrow Strip

75S-4-L85/835 Total Luminaire Output: 8098 lumens; 56.2 Watts | Efficacy: 144 lm/ W | 80 CRI; 3500K CCT

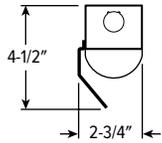


VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
	0°	45°	90°	
0	2732	2732	2732	
5	2756	2720	2682	258
15	2633	2611	2579	734
25	2351	2362	2323	1083
35	1969	2010	1965	1247
45	1516	1554	1583	1209
55	1053	1160	1291	1051
65	618	840	1022	826
75	270	542	745	563
85	47	323	491	332
90	0	246	390	
95	0	230	344	223
105	0	200	291	185
115	0	171	256	149
125	0	139	216	110
135	0	96	166	71
145	0	58	113	38
155	0	36	63	16
165	0	17	31	4
175	0	0	0	0
180	0	0	0	

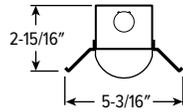
LUMEN SUMMARY	ZONE	LUMENS	% FIXTURE
	0 - 30	2075	26
	0 - 40	3321	41
	0 - 60	5581	69
	0 - 90	7301	90
	90 - 120	557	7
	90 - 150	777	10
	90 - 180	797	10
	0 - 180	8098	100

SPECIAL REFLECTOR OPTIONS

R1015



R1172



Reflectors ordered and shipped separately. Cannot be used with wireguard accessories. To remove reflector, first remove the lens.

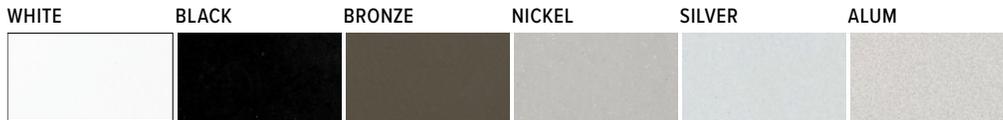
Example: R1172-4-75LED REFL

QUICK-CONNECT OPTIONS

Note: Quick-connect wiring required for row mounting. All QC harnesses contain (5) 16ga conductors plus ground.

DESIGNATION	NUMBER OF 16GA WIRES FACTORY CONNECTED (EXCLUDING GROUND)	WIRE COLOR/POWER SUPPLY FACTORY CONNECTIONS	TYPICAL USE
QCBW	2	Black, White	On/off switching (DRV) or line voltage dimming (DIM LINE)
QCRW	2	Red, White	Alternating circuits on/off switching (DRV) or line voltage dimming (DIM LINE)
QCBRW	3	Black, Red, White	On/off switching (DRV) or line voltage dimming when equipped with EM battery packs
QCBW/PK	4	Black, White, Purple, Pink	Single circuit with 0-10V low voltage dimming (DIM)
QCRW/PK	4	Red, White, Purple, Pink	Alternating circuits on/off switching with 0-10V low voltage dimming (DIM)
QCBRW/PK	5	Black, Red, White, Purple, Pink	On/off switching when equipped with EM battery packs and 0-10V dimming (DIM)
QCBW/RPK	5	Black, White, Red, Purple, Pink	On/off switching with 0-10v dimming and 0-10v tunable using shared common
QCUU	N/A	N/A	QC harness passes through fixture, but is not connected to it

FINISH OPTIONS



For custom color, please specify RAL code or a manufacturer code with description. All custom colors other than RAL require two sample swatches, minimum 1" square.

75R | 75S LED Narrow Strip

FIXTURE DETAILS

BACKVIEW

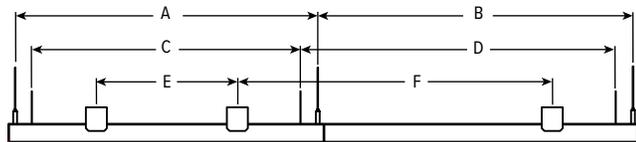


	7/8" KOs	ACTUAL FIXTURE LENGTH
2'	18-3/8"	22-1/2"
3'	29-1/2"	33-9/16"
4'	40-1/2"	44-5/8"
8'	85-1/8"	89-1/4"

MOUNTING ACCESSORY DETAILS

STAND ALONE

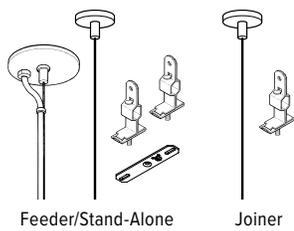
SUBSEQUENT



MOUNTING LENGTH

	AIRCRAFT CABLE		VBY HANGER		315 SPACER	
	A	B	C	D	E	F
2'	21-1/2"	22-1/2"	19"	22-1/2"	10"	22-1/2"
3'	32-1/2"	33-9/16"	30-1/16"	33-9/16"	21"	33-9/16"
4'	43-5/8"	44-5/8"	41-1/4"	44-5/8"	32"	44-5/8"
8'	88-3/16"	89-1/4"	85"	89-1/4"	77"	89-1/4"

STANDARD HARDWARE FOR SUSPENDED PRODUCT (Grid and Hardpan)



Notes:

- Fixtures are provided with adjustable length aircraft cables and mounting hardware, must specify.
- Electrical supply is brought into the feeder fixture, either as part of a row or as a stand-alone unit. Joiner fixtures complete the row.
- The feeder kits are standard with a 5" canopy to cover the junction box and a 2" canopy at the non-feed point. No J-box is required at non-feed points.
- Cable kit provides 10/32 male thread for connection to fixture.

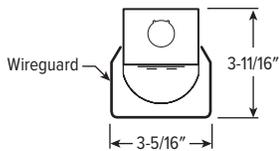
CORD FOR SUSPENDED PRODUCT

Units specified with aircraft cable require cord. Please specify cord type using ordering information below. Long fixture rows may require multiple feed points based on 18ga conductor size.

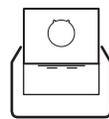
EXAMPLE: S2438D/W				
CORD TYPE	LENGTH	# OF COND. ^[1]	WIRE SIZE	COLOR
S	24 24"	3	8D 18ga	/W White /B Black
	48 48"	4		
	96 96"	5 6		

¹ Includes (2) 22ga purple & pink dimming conductors

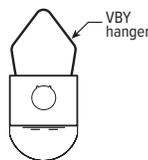
WG-75 75R



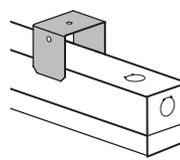
75S



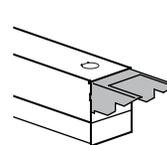
VBY



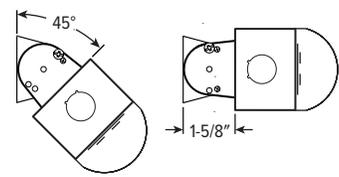
315



RA-75



45AMB



REMOTE MOUNT BATTERY DETAILS

EM/10WRM/RTS



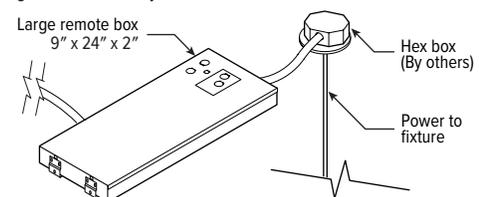
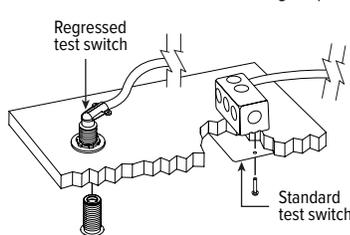
Regressed test switch
ø1-3/4"

EM/10WRM



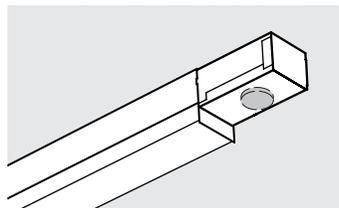
Standard test switch
2-3/4" x 4-1/2"

Max remote distance is 50' including suspension length, connection by others.

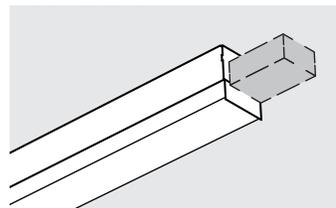


SENSOR & NODE PLACEMENT DETAILS

AVI-LVFA | AWNS | VDO | WS-FSP | LV-ZLS05



LV-OSFHU | SS-LSXR



75R | 75S LED Narrow Strip

AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS

FEATURES

Simple

- Gateway-free distributed control
- Contractor friendly installation
- Occupancy/vacancy/daylight sensing

Scalable

- Virtually unlimited network size
- Spans small areas to large garages
- Flexible control strategies

Secure

- Optional cloud connectivity
- UL IoT platinum security rating
- DLC 5.0 compliant

COMMISSIONING & INSTALLATION TOOLS

Avi-on mobile apps provide intuitive, quick installation and commissioning. Pro tools are available to qualified installers. Live commissioning training and on-site or remote support by Avi-on must be ordered separately through Avi-on.



Commissioning Mobile App



Zone Scanner Web App



Commissioning Pro App

SYSTEM COMPONENTS



The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Avi-on is under license. Other trademarks and trade names are those of their respective owners.

ACCESSORIES

WALL STATIONS

- AVI-B-2401AC-1** Scene controller - buttons numbered 1-4 and up/down/off, 120-277VAC
- AVI-B-2402BAT-1** Scene controller - buttons numbered 1-4 and up/down/off, battery powered
- AVI-B-2401AC-2** Dimmer with presets - buttons with percentages and up/down/off, 120-277VAC
- AVI-B-2402BAT-2** Dimmer with presets - buttons with percentages and up/down/off, battery powered
- AVI-B-2401AC-3** Two button control on/off or hold to dim up/down, 120-277VAC
- AVI-B-2402BAT-3** Two button control on/off or hold to dim up/down, battery powered

NETWORK

- AVI-RAB-LTE** Remote access bridge
- AVI-NTM** Network time manager with battery backup

CEILING MOUNT SENSORS

- AVI-KIT-SEN-DUCM** PIR motion and ultrasonic sensor kit
- AVI-KIT-SEN-ICM** PIR motion and photocell sensor kit

For load controllers and additional accessory info, see hew.com/avi-on

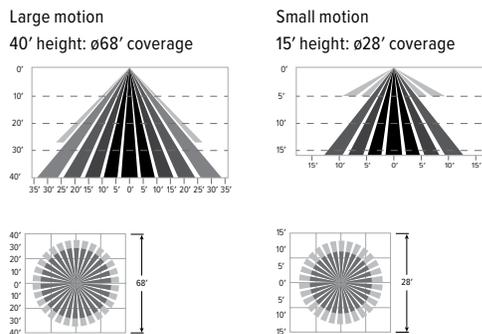
AVI-LVFA-PIR Avi-on wireless fixture control with high bay PIR motion and daylight sensor, bottom mount. DA Driver only.

SPECIFICATIONS

TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 45'
LENS	Single lens detects high and low bay motion.
DETECTION ANGLE	360°
TEMPERATURE RANGE	-30° to 70°C
RELATIVE HUMIDITY	90 to 95% at 30°C
COMMISSIONING	App (iOS or Android)
SYSTEM REQUIREMENTS	Avi-On wireless fixture controls plus desktop and mobile apps
MANUFACTURER	Avi-On



SENSOR COVERAGE PATTERNS



SENSOR DETAIL



Dimensions: 2-5/16" x 1-7/16"



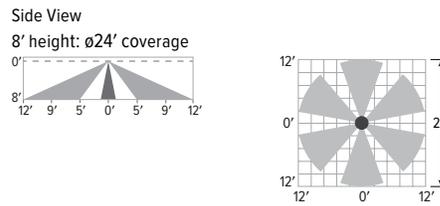
75R | 75S LED Narrow Strip

AVI-LVFA-CS2-PIR Avi-on wireless fixture control with PIR motion and daylight sensor. DA Driver only.

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 10'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-30° to 50°C
RELATIVE HUMIDITY	10 to 80% non-condensing
IP RATING	IP20
MANUFACTURER	Avi-On



SENSOR COVERAGE PATTERNS



SENSOR DETAIL



Dimensions: 13/16" x 2-1/4"

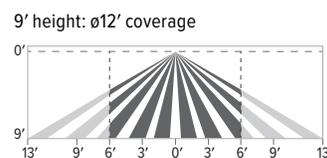
ADDITIONAL CONTROL OPTIONS

AWNS Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing. DA and DSR Drivers only.

SPECIFICATIONS	
TYPE	Radio Frequency
MOUNTING HEIGHT	8' – 12'
DETECTION ANGLE	360°
TEMPERATURE RANGE	0° to 55°C
RELATIVE HUMIDITY	0 to 90%, non-condensing
COMMISSIONING	Clear Connect gateway – Type X with app (iOS or Android)
MANUFACTURER	Lutron



SENSOR COVERAGE PATTERNS



Motion Sensor Coverage

CEILING HEIGHT	COVERAGE AREA (SQ FT)
8'	114
9'	144
10'	178
12'	256

SENSOR DETAIL



Dimensions: ø1-1/8"

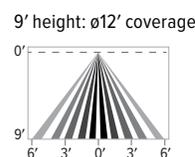
ATHENA CONTROL OPTIONS

CATALOG NUMBER	DESCRIPTION
AWNDR	Lutron Athena wireless node integral fixture control, RF only, for use with D4i DALI-2 or driver with 12V auxiliary power.
AWNS	Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing, for use with D4i DALI-2 or driver with 12V auxiliary power.
AWNDR-BL	Lutron Athena wireless node integral fixture control, RF only, for use with D4i DALI-2 or driver with 12V auxiliary power, black finish.
AWNS-BL	Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing, for use with D4i DALI-2 or driver with 12V auxiliary power, black finish.

VDO Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC). DSR or LDE Drivers only. LDE drivers require driver interface

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 12'
DETECTION ANGLE	360°
TEMPERATURE RANGE	0° to 55°C
RELATIVE HUMIDITY	0 to 90%, non-condensing
COMMISSIONING	App (iOS or Android)
MANUFACTURER	Lutron

SENSOR COVERAGE PATTERNS



Motion Sensor Coverage

CEILING HEIGHT	COVERAGE AREA (SQ FT)
8'	114
9'	144
10'	178
12'	256

SENSOR DETAIL



Dimensions: 2-11/16" x 1"

VIVE CONTROL OPTIONS

CATALOG NUMBER	DESCRIPTION
VRF	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF), for use with sensor-ready driver
VDO	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC), for use with sensor-ready driver
VRF/DBI	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF) and digital link interface, for use with Lutron Hi-lume 1% EcoSystem dimming LED driver
VDO/DBI	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC) and digital link interface, for use with Lutron Hi-lume 1% EcoSystem dimming LED driver

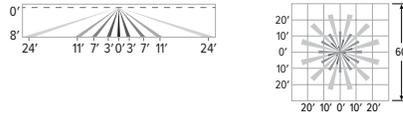
75R | 75S LED Narrow Strip

OCCWS-FSP-311-L_-120/277 Wattstopper PIR motion and daylight sensor, 120/277. Must specify lens: L2, L3, or L7. Factory installed.
OCCWS-FSP-211-L_-120/277 Wattstopper PIR motion and daylight sensor, 120/277. Must specify lens: L2, L3, or L7. Factory installed.
FSIR-100 Remote controller for 211 sensor. Please specify quantity required per project. Ordered and shipped separately.

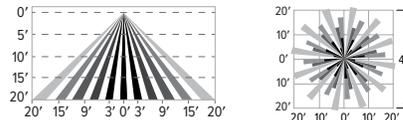
SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 40'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-40° to 75°C
COMMISSIONING	311 Sensor: App (iOS or Android) 211 Sensor: FSIR-100 Remote

SENSOR COVERAGE PATTERNS

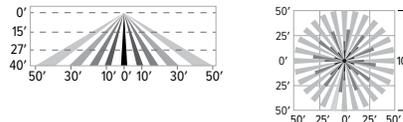
L2 8' height: ø48' coverage



L3 20' height: ø40' coverage



L7 40' height: ø100' coverage



SENSOR DETAIL



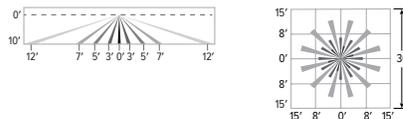
Dimensions
L2/L3: ø2-3/8" | L7: ø3-1/4"

LV-ZLS05-ILW Leviton PIR motion and daylight sensor. DA Driver only. Adjustable via remote. Optional ZLSOR-RA1 remote controller available.
ZLSOR-RA1 Remote controller for ZLS05 sensor. Please specify quantity required per project. Ordered and shipped separately.

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 10'
DETECTION ANGLE	120°
TEMPERATURE RANGE	-20° to 70°C
COMMISSIONING	DIP switches or optional remote: ZLSOR-RA1

SENSOR COVERAGE PATTERNS

10' height: ø24' coverage



SENSOR DETAIL



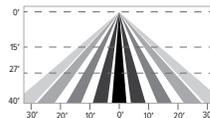
Dimensions: ø1-5/16"

OCCLV-OSFHU-ITW-120-347V Leviton PIR motion sensor, 120-347V.

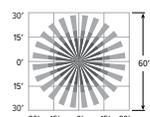
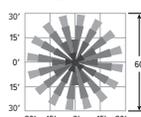
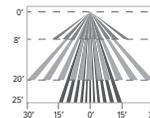
SPECIFICATIONS	
TYPE	PIR Motion
MOUNTING HEIGHT	8' – 40'
LENS	Interchangeable high bay, low bay or aisle mask
DETECTION ANGLE	360°
TEMPERATURE RANGE	-10° to 71°C
RELATIVE HUMIDITY	20% to 90% non-condensing

SENSOR COVERAGE PATTERNS

**High bay
40' height: ø60' coverage**



**Low bay
25' height: ø60' coverage**



SENSOR DETAIL



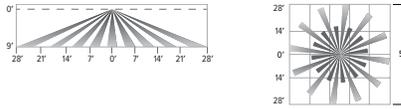
75R | 75S LED Narrow Strip

OCCSS LSXR-10-120-277 Sensor Switch PIR motion sensor, 120-277V
 OCCSS LSXR-10-347/480 Sensor Switch PIR motion sensor, 347/480V

SPECIFICATIONS	
TYPE	PIR Motion
MOUNTING HEIGHT	7' – 15'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-10° to 60°C
RELATIVE HUMIDITY	Up to 90% non-condensing

SENSOR COVERAGE PATTERNS

9' height: ø56' coverage



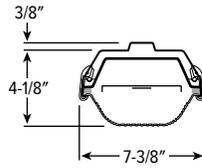
SENSOR DETAIL



ADDITIONAL DRIVER OPTIONS

Note: Lumen restrictions apply, consult product builder at hew.com/product-builder

CATALOG NUMBER	DESCRIPTION
DRV	Driver without external dimming wires prewired for non-dimming applications
DIM	Driver with external dimming wires prewired for 0-10V low voltage applications
DIM1	1% driver with external dimming wires prewired for 0-10V low voltage applications
DIM LINE	Line voltage dimming driver (TRIAC and ELV compatible, 120V only)
DIM TRC	Line voltage dimming driver (TRIAC compatible, 120V only)
DA	Driver with 12V auxiliary power, without external dimming wires
DSR	Sensor-ready driver without external dimming wires (D4i DALI-2)
SD40	40% step-dimming driver
SD50	50% step-dimming driver
DALI	DALI dimming driver
LDE1	Lutron Hi-lume 1% EcoSystem dimming driver



Shown with PCFR or HIAFR diffuser

CATALOG #: _____

TYPE: _____

PROJECT: _____



ORDERING EXAMPLE: 96 - 4 - L62/840 - HIAFR - OPTIONS - CONTROL/DRV - UNV

SERIES	LENGTH	LUMENS ^[1]	CRI	CCT	SHIELDING
96	2 2'	2'	8 80	30 3000K	HIAFR Frosted, ribbed, impact-resistant acrylic
	4 4'	L21 2,100lm		35 3500K	SFRA Frosted, smooth, impact-resistant acrylic
	8 8' ^[2]	L29 2,900lm	40 4000K	50 5000K	PCFR Frosted, ribbed, UV stabilized polycarbonate ^[3]
		L40 4,000lm		SFPC Frosted, smooth, UV stabilized polycarbonate	
		4'	L40 4,000lm		DFR Drop, frosted, impact-resistant acrylic
			L62 6,200lm		DCL Drop, clear, impact-resistant acrylic with frosted ends
			L81 8,100lm		SCLA Clear, smooth, impact-resistant acrylic
			L110 11,000lm		SCPC Clear, smooth, UV stabilized polycarbonate

OPTIONS ^[4]

EM/6WC	6-watt emergency, low temperature battery ^[5]	TP	Tamper-resistant screws ^[11]
EM/10W	10-watt emergency battery ^[6]	WET/1	(1) 1/2" watertight hub, side access ^[12]
EM/10WRM/WET	Remote mount 10-watt emergency battery with wet location enclosure. ^[7]	WET/2	(2) 1/2" watertight hubs, side access ^[13]
(L____)	Additional lower lumen packages available. ^[8] Example: 4,100 lumens = 96-4-L62/840-HIAFR-(L41)	WTT/1	(1) 1/2" watertight hub, back access ^[14]
LA	Low ambient operating temperature ^[9]	WTT/2	(2) 1/2" watertight hubs, back access ^[15]
PCL	Injection-molded polycarbonate latches ^[10]	SSCMB	(2) Stainless steel chain mounting brackets
		WMB	(2) Stainless steel 45° wall mount brackets
		GC2/L/10	10' adjustable cable suspension system with loop

CONTROL ^[16]

See page 6 for ADDITIONAL CONTROL OPTIONS.

-	None
AVI-LVFA	Avi-on wireless fixture control ^[17]
AVI-LVFA-PIR-ELB	Avi-on wireless fixture control with PIR motion and daylight sensor, end mount ^[18]

DRIVER

See page 6 for ADDITIONAL DRIVER OPTIONS.

DIM	Driver with external 0-10V dimming wires
DRV	Driver without external dimming wires
DA	Driver with 12V auxiliary power, without external dimming wires ^[19]

VOLTAGE

120	120V
277	277V
UNV	120-277V
347	347V ^[20]

ACCESSORIES

TPTG TOOL Tamper-resistant tool for tri-groove screws. ^[21]

NOTES

- Lumen output based on HIAFR Shielding, 80 CRI/4000K CCT. Actual performance may vary +/-5%, see page 2 for FIXTURE PERFORMANCE DATA. Additional lumen packages available, see Options.
- Acrylic diffusers only.
- Not available with 8' units.
- Stainless steel latches required for applications with harsh chemicals. Cord and receptacle options available. See page 4 for CORD OPTIONS. See page 3 for MOUNTING DETAILS.
- Not available with L110 or L220 lumen packages. 4' or 8' only. Rated for -20°C to 25°C ambient temperature.
- Not available with L110 or L220 lumen packages. 4' or 8' only. Temperature restrictions apply. See page 2 for FIXTURE PERFORMANCE DATA.
- 40°C maximum ambient operating temperature. Max remote distance 50'. Includes (2) 1/2" watertight hubs. See page 3 for FIXTURE DETAILS.
- Specify in increments of 100 nominal lumens. Option must be specified with next higher lumen package.
- DIM driver only. Not available with EM batteries, controls, or 347V. Lumen restrictions apply. See FIXTURE PERFORMANCE DATA on page 2.
- Not recommended for use in harsh environments, such as a car wash.
- When TP option is specified, fixture is not NSF/ANSI 2 certified. Requires a tamper-resistant tool, see Accessories.
- Factory-installed in end of housing. Increases overall length by 1/8"
- Factory-installed in ends of housing. Not available with occupancy sensor option. Increases overall length by 1/4"
- 4' only, factory-installed in back of fixture.
- 4' and 8' only, factory-installed in back of fixture.
- See page 4 for SENSOR PLACEMENT DETAILS. See page 5 for AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS.
- DA Driver only.
- DA Driver only. IP66-rated.
- Avi-on Controls only.
- Not available with EM batteries or DA Driver.
- Ordered separately, please specify quantity required per project.



96 LED Fully Enclosed & Gasketed Industrial

FEATURES

- Fully gasketed fixture is built tough to resist contaminants
- Standard stainless steel latches protect the fixture from corrosion in harsh environments
- Toggle latches ensure a tight seal and provide easy access to electrical components
- Tamper-resistant latches available
- Closed-cell polyurethane gasket poured and formed in place to ensure tight seal—does not absorb water or support fungal growth
- NEMA 4X, IP65, IP66, IP67, and NSF/ANSI Standard 2 – Splash Zone certified
- Low ambient option for extreme cold environments
- Wireless in-fixture control solutions available
- Made Right Here® in the USA

SPECIFICATIONS

- ENCLOSURE** – Outer housing consists of 5VA (f1) fiberglass, rated for flame and weather resistance.
- INTERNAL HOUSING** – .050" aluminum.
- LATCHING** – Stainless steel latches. Injection-molded polycarbonate latches available (not recommended for use in harsh environments, such as a car wash).
- REFLECTOR** – 92% minimum average reflective white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal.
- SHIELDING** – Frosted, ribbed, impact-resistant acrylic.
- ELECTRICAL** – High-quality mid-power LED board. L70 >60,000 hours. -20°C to 40°C maximum ambient operating temperature, -40°C minimum with LA option (restrictions apply, see fixture performance data). 50/60 Hz constant current driver.
- MOUNTING** – Surface or suspended. Stainless steel ceiling mount brackets included. Wall mount when specified with WMB.
- LISTINGS** –
 - cETLus conforms to UL STD 1598 and UL STD 8750. Certified to CAN/CSA STD C22.2 No. 250.0. Suitable for wet locations when specified with watertight hub, STOW or SOOW cord, or mini-male receptacle option.
 - NSF/ANSI Standard 2–Splash Zone certified, IP65, IP66, and IP67 certified, and rated for NEMA 4X.
 - Build America, Buy American (BABA) and Buy American Act (BAA) compliant. Request certification at hew.com/buy-american
- WARRANTY** – 5-year limited warranty, see hew.com/warranty

FIXTURE PERFORMANCE DATA

	LED PACKAGE	DELIVERED LUMENS	WATTAGE	EFFICACY (lm/W)	MAXIMUM TEMPERATURE (°C)		MINIMUM TEMPERATURE (°C)
					STANDARD	EMERGENCY	LA OPTION
2'	L21	2201	18	122	40	–	30
	L29	3028	25	121	40	–	30
	L40	3836	31	124	40	–	30
4'	L40	4086	30	136	40	40	30
	L62	6434	48	134	40	30	40
	L81	8121	65	125	30	25	40
	L110	11075	88	126	30	–	40
8'	L80	8018	61	131	40	40	40
	L130	13026	95	137	40	30	40
	L160	16188	123	132	30	25	40
	L220	22056	166	133	30	–	40

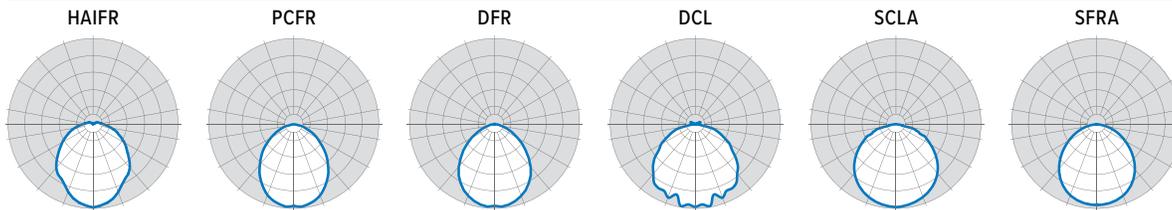
MULTIPLIER TABLES

	COLOR TEMPERATURE		SHIELDING	
	CCT	CONVERSION FACTOR	LENS	CONVERSION FACTOR
80 CRI	3000K	0.96	HIAFR	1.00
	3500K	0.97	SFRA	1.07
	4000K	1.00	PCFR	0.91
	5000K	1.03	SFPC	Consult Factory
90 CRI	3000K	0.79	DFR	1.05
	3500K	0.80	DCL ⁽¹⁾	1.06
	4000K	0.83	SCLA ⁽¹⁾	1.09
	5000K	0.86	SCPC ⁽¹⁾	Consult Factory

- Photometrics tested in accordance with IESNA LM-79. Results based on HIAFR shielding, 80 CRI/4000K CCT, average wattage for 120V through 277V input, and 25°C ambient temperature. Actual performance may vary +/-5%.
- To calculate lumen output in emergency mode, multiply the battery wattage by the efficacy.
- Use multiplier tables to calculate additional options.

¹ Due to clear lens, striations in the light distribution will be visible.

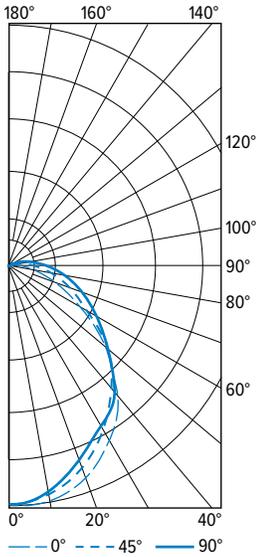
PHOTOMETRY



96-4-L62/840-HIAFR-DRV Report #: 20008.0; 08/15/17 | Total Luminaire Output: 6434 lumens; 48.3 Watts | Efficacy: 133.1 lm/W | 83.6 CRI; 4041K CCT



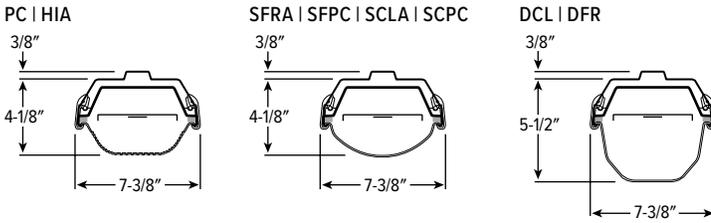
96 LED Fully Enclosed & Gasketed Industrial



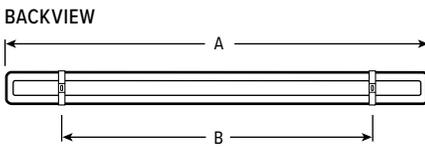
VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
	0°	45°	90°	
0	2318	2318	2318	
5	2352	2298	2283	220
15	2259	2169	2120	617
25	2066	1943	1865	899
35	1780	1666	1704	1065
45	1370	1379	1389	1055
55	943	1007	1062	901
65	546	695	828	691
75	231	449	599	457
85	38	251	361	252
90	15	185	272	
95	14	150	217	143
105	8	84	138	79
115	4	39	85	39
125	0	8	42	14
135	0	0	9	2
145	0	0	2	1
155	0	0	0	0
165	0	0	0	0
175	0	0	0	0
180	0	0	0	

LUMEN SUMMARY	ZONE	LUMENS	% FIXTURE
	0 - 30	1736	27
	0 - 40	2801	44
	0 - 60	4757	74
	0 - 90	6156	96
	90 - 120	262	4
	90 - 150	275	4
	90 - 180	278	4
	0 - 180	6434	100

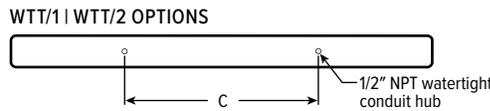
CROSS SECTIONS



FIXTURE DETAILS



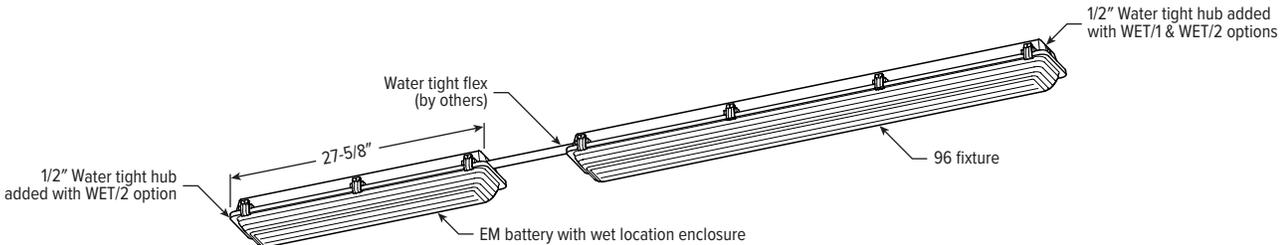
NOMINAL LENGTH	OVERALL LENGTH (A)	MOUNTING DISTANCE (B)
2'	27-5/8"	12" - 17" OC
4'	51-7/8"	30" - 42" OC
8'	100-1/4"	48" - 80" OC



NOMINAL LENGTH	DISTANCE (C)
4'	24" OC
8' (WTT/2 only)	45-3/4" OC

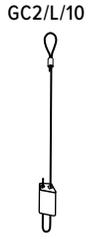
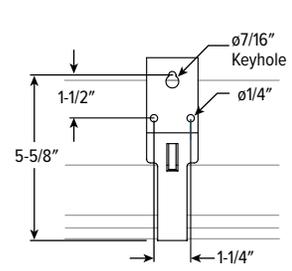
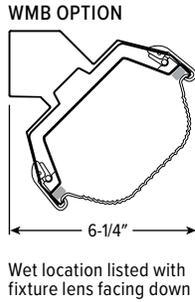
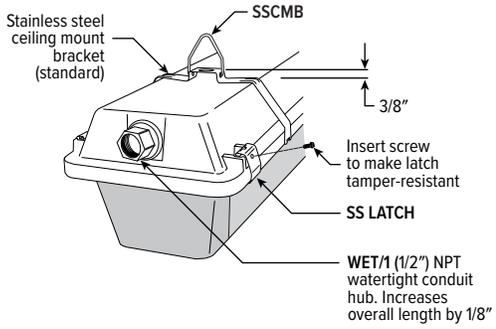
REMOTE MOUNT BATTERY

Max remote distance 50'. Includes (2) 1/2" watertight hubs.



MOUNTING DETAILS

96 LED Fully Enclosed & Gasketed Industrial

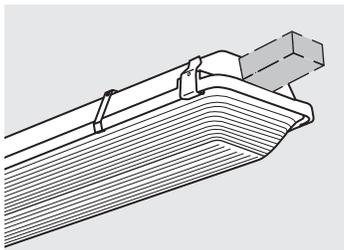


CORD OPTIONS

EXAMPLE: 5WMRC6		
NUMBER OF CONDUCTORS	POWER CONNECTION – NON-DIMMING	CORD LENGTH
3 3-wire	WMR Mini-male receptacle only	-
	WC STOW cord	6 6'
4 4-wire	WMRC Mini-male receptacle with STOW cord	20 20'
POWER CONNECTION – DIMMING		
5 5-wire	WMR Mini-male receptacle only	-
	WC SOOW cord	6 6'
6 6-wire	WMRC Mini-male receptacle with SOOW cord	20 20'

Wet location cord sets are yellow.

SENSOR PLACEMENT DETAILS



SEE NEXT PAGE FOR CONTROL DETAILS

96 LED Fully Enclosed & Gasketed Industrial

AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS

FEATURES

Simple

- Gateway-free distributed control
- Contractor friendly installation
- Occupancy/vacancy/daylight sensing

Scalable

- Virtually unlimited network size
- Spans small areas to large garages
- Flexible control strategies

Secure

- Optional cloud connectivity
- UL IoT platinum security rating
- DLC 5.0 compliant

COMMISSIONING & INSTALLATION TOOLS

Avi-on mobile apps provide intuitive, quick installation and commissioning. Pro tools are available to qualified installers. Live commissioning training and on-site or remote support by Avi-on must be ordered separately through Avi-on.



Commissioning Mobile App



Zone Scanner Web App



Commissioning Pro App

SYSTEM COMPONENTS



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ACCESSORIES

WALL STATIONS

- AVI-B-2401AC-1 Scene controller - buttons numbered 1-4 and up/down/off, 120-277VAC
- AVI-B-2402BAT-1 Scene controller - buttons numbered 1-4 and up/down/off, battery powered
- AVI-B-2401AC-2 Dimmer with presets - buttons with percentages and up/down/off, 120-277VAC
- AVI-B-2402BAT-2 Dimmer with presets - buttons with percentages and up/down/off, battery powered
- AVI-B-2401AC-3 Two button control on/off or hold to dim up/down, 120-277VAC
- AVI-B-2402BAT-3 Two button control on/off or hold to dim up/down, battery powered

NETWORK

- AVI-RAB-LTE Remote access bridge
- AVI-NTM Network time manager with battery backup

CEILING MOUNT SENSORS

- AVI-KIT-SEN-DUCM PIR motion and ultrasonic sensor kit
- AVI-KIT-SEN-ICM PIR motion and photocell sensor kit

For load controllers and additional accessory info, see hew.com/avi-on

AVI-LVFA-PIR-ELB Avi-on wireless fixture control with PIR motion and daylight sensor, end mount. DA Driver only.

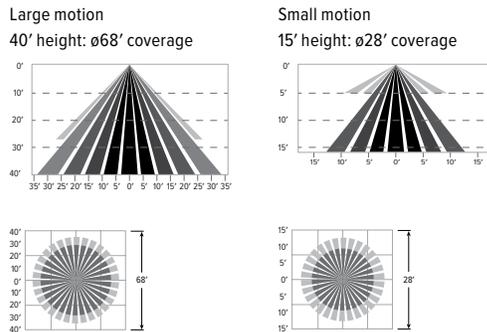
SPECIFICATIONS

TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 45'
LENS	Single lens detects high and low bay motion.
DETECTION ANGLE	360°
TEMPERATURE RANGE	-30° to 70°C
RELATIVE HUMIDITY	90 to 95% at 30°C
COMMISSIONING	App (iOS or Android)
SYSTEM REQUIREMENTS	Avi-On wireless fixture controls plus desktop and mobile apps
MANUFACTURER	Avi-On



IP66 certified for wet locations.

SENSOR COVERAGE PATTERNS



SENSOR DETAIL



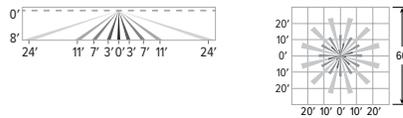
ADDITIONAL CONTROL OPTIONS

OCCWS-FSP-321B-L_-120-480 Wattstopper PIR motion and daylight sensor using 0-10V internal control, 120V-480V. Must specify lens: L2, L3 or L7. Factory installed.
OCCWS-FSP-221B-L_-120-480 Wattstopper PIR motion and daylight sensor using 0-10V internal control, 120V-480V. Must specify lens: L2, L3 or L7. Factory installed.
FSIR-100 Remote controller for 221B sensor. Please specify quantity required per project. Ordered and shipped separately.

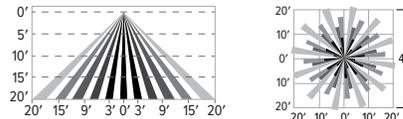
SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 40'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-40° to 75°C
COMMISSIONING	321B Sensor: App (iOS or Android) 221B Sensor: FSIR-100 Remote

SENSOR COVERAGE PATTERNS

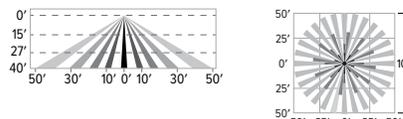
L2 8' height: ø48' coverage



L3 20' height: ø40' coverage



L7 40' height: ø100' coverage



SENSOR DETAIL

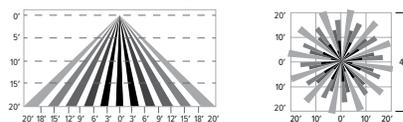


OCCWS-HB350W-L3W-___ Wattstopper PIR motion sensor. Must specify voltage: 120 or 277V.

SPECIFICATIONS	
TYPE	PIR Motion
MOUNTING HEIGHT	20'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-40° to 70°C
RELATIVE HUMIDITY	20 to 90%, non-condensing

SENSOR COVERAGE PATTERNS

20' height: ø40' coverage



SENSOR DETAIL

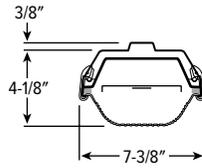


IP65 certified for wet locations. Not rated for NEMA 4X.

ADDITIONAL DRIVER OPTIONS

Note: Lumen restrictions apply, consult product builder at hew.com/product-builder

CATALOG NUMBER	DESCRIPTION
DRV	Driver without external dimming wires prewired for non-dimming applications
DIM	Driver with external dimming wires prewired for 0-10V low voltage applications
DIM1	1% driver with external dimming wires prewired for 0-10V low voltage applications
DIM LINE	Line voltage dimming driver (TRIAC and ELV compatible, 120V only)
DIM TRC	Line voltage dimming driver (TRIAC compatible, 120V only)
DA	Driver with 12V auxiliary power, without external dimming wires
SD40	40% step-dimming driver
SD50	50% step-dimming driver
DALI	DALI dimming driver
LDE1	Lutron Hi-lume 1% EcoSystem dimming driver



Shown with PCFR or HIAFR diffuser

CATALOG #: _____

TYPE: _____

PROJECT: _____



ORDERING EXAMPLE: 96 - 4 - L62/840 - HIAFR - OPTIONS - CONTROL/DRV - UNV

SERIES	LENGTH	LUMENS ^[1]	CRI	CCT	SHIELDING
96	2 2'	2'	8 80	30 3000K	HIAFR Frosted, ribbed, impact-resistant acrylic
	4 4'	L21 2,100lm		35 3500K	SFRA Frosted, smooth, impact-resistant acrylic
	8 8' ^[2]	L29 2,900lm	9 90	40 4000K	PCFR Frosted, ribbed, UV stabilized polycarbonate ^[3]
		L40 4,000lm		50 5000K	SFPC Frosted, smooth, UV stabilized polycarbonate
		4'	L130 13,000lm		DFR Drop, frosted, impact-resistant acrylic
			L160 16,000lm		DCL Drop, clear, impact-resistant acrylic with frosted ends
			L220 22,000lm		SCLA Clear, smooth, impact-resistant acrylic
			L40 4,000lm		SCPC Clear, smooth, UV stabilized polycarbonate
			L62 6,200lm		
			L81 8,100lm		
		L110 11,000lm			

OPTIONS ^[4]

EM/6WC	6-watt emergency, low temperature battery ^[5]	TP	Tamper-resistant screws ^[11]
EM/10W	10-watt emergency battery ^[6]	WET/1	(1) 1/2" watertight hub, side access ^[12]
EM/10WRM/WET	Remote mount 10-watt emergency battery with wet location enclosure. ^[7]	WET/2	(2) 1/2" watertight hubs, side access ^[13]
(L____)	Additional lower lumen packages available. ^[8] Example: 4,100 lumens = 96-4-L62/840-HIAFR-(L41)	WTT/1	(1) 1/2" watertight hub, back access ^[14]
LA	Low ambient operating temperature ^[9]	WTT/2	(2) 1/2" watertight hubs, back access ^[15]
PCL	Injection-molded polycarbonate latches ^[10]	SSCMB	(2) Stainless steel chain mounting brackets
		WMB	(2) Stainless steel 45° wall mount brackets
		GC2/L/10	10' adjustable cable suspension system with loop

CONTROL ^[16]

See page 6 for ADDITIONAL CONTROL OPTIONS.

-	None
AVI-LVFA	Avi-on wireless fixture control ^[17]
AVI-LVFA-PIR-ELB	Avi-on wireless fixture control with PIR motion and daylight sensor, end mount ^[18]

DRIVER

See page 6 for ADDITIONAL DRIVER OPTIONS.

DIM	Driver with external 0-10V dimming wires
DRV	Driver without external dimming wires
DA	Driver with 12V auxiliary power, without external dimming wires ^[19]

VOLTAGE

120	120V
277	277V
UNV	120-277V
347	347V ^[20]

ACCESSORIES

TPTG TOOL Tamper-resistant tool for tri-groove screws. ^[21]

NOTES

- Lumen output based on HIAFR Shielding, 80 CRI/4000K CCT. Actual performance may vary +/-5%, see page 2 for FIXTURE PERFORMANCE DATA. Additional lumen packages available, see Options.
- Acrylic diffusers only.
- Not available with 8' units.
- Stainless steel latches required for applications with harsh chemicals. Cord and receptacle options available. See page 4 for CORD OPTIONS. See page 3 for MOUNTING DETAILS.
- Not available with L110 or L220 lumen packages. 4' or 8' only. Rated for -20°C to 25°C ambient temperature.
- Not available with L110 or L220 lumen packages. 4' or 8' only. Temperature restrictions apply. See page 2 for FIXTURE PERFORMANCE DATA.
- 40°C maximum ambient operating temperature. Max remote distance 50'. Includes (2) 1/2" watertight hubs. See page 3 for FIXTURE DETAILS.
- Specify in increments of 100 nominal lumens. Option must be specified with next higher lumen package.
- DIM driver only. Not available with EM batteries, controls, or 347V. Lumen restrictions apply. See FIXTURE PERFORMANCE DATA on page 2.
- Not recommended for use in harsh environments, such as a car wash.
- When TP option is specified, fixture is not NSF/ANSI 2 certified. Requires a tamper-resistant tool, see Accessories.
- Factory-installed in end of housing. Increases overall length by 1/8"
- Factory-installed in ends of housing. Not available with occupancy sensor option. Increases overall length by 1/4"
- 4' only, factory-installed in back of fixture.
- 4' and 8' only, factory-installed in back of fixture.
- See page 4 for SENSOR PLACEMENT DETAILS. See page 5 for AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS.
- DA Driver only.
- DA Driver only. IP66-rated.
- Avi-on Controls only.
- Not available with EM batteries or DA Driver.
- Ordered separately, please specify quantity required per project.



96 LED Fully Enclosed & Gasketed Industrial

FEATURES

- Fully gasketed fixture is built tough to resist contaminants
- Standard stainless steel latches protect the fixture from corrosion in harsh environments
- Toggle latches ensure a tight seal and provide easy access to electrical components
- Tamper-resistant latches available
- Closed-cell polyurethane gasket poured and formed in place to ensure tight seal—does not absorb water or support fungal growth
- NEMA 4X, IP65, IP66, IP67, and NSF/ANSI Standard 2 – Splash Zone certified
- Low ambient option for extreme cold environments
- Wireless in-fixture control solutions available
- Made Right Here® in the USA

SPECIFICATIONS

- ENCLOSURE** – Outer housing consists of 5VA (f1) fiberglass, rated for flame and weather resistance.
- INTERNAL HOUSING** – .050" aluminum.
- LATCHING** – Stainless steel latches. Injection-molded polycarbonate latches available (not recommended for use in harsh environments, such as a car wash).
- REFLECTOR** – 92% minimum average reflective white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal.
- SHIELDING** – Frosted, ribbed, impact-resistant acrylic.
- ELECTRICAL** – High-quality mid-power LED board. L70 >60,000 hours. -20°C to 40°C maximum ambient operating temperature, -40°C minimum with LA option (restrictions apply, see fixture performance data). 50/60 Hz constant current driver.
- MOUNTING** – Surface or suspended. Stainless steel ceiling mount brackets included. Wall mount when specified with WMB.
- LISTINGS** –
 - cETLus conforms to UL STD 1598 and UL STD 8750. Certified to CAN/CSA STD C22.2 No. 250.0. Suitable for wet locations when specified with watertight hub, STOW or SOOW cord, or mini-male receptacle option.
 - NSF/ANSI Standard 2–Splash Zone certified, IP65, IP66, and IP67 certified, and rated for NEMA 4X.
 - Build America, Buy American (BABA) and Buy American Act (BAA) compliant. Request certification at hew.com/buy-american
- WARRANTY** – 5-year limited warranty, see hew.com/warranty

FIXTURE PERFORMANCE DATA

	LED PACKAGE	DELIVERED LUMENS	WATTAGE	EFFICACY (lm/W)	MAXIMUM TEMPERATURE (°C)		MINIMUM TEMPERATURE (°C)
					STANDARD	EMERGENCY	LA OPTION
2'	L21	2201	18	122	40	–	30
	L29	3028	25	121	40	–	30
	L40	3836	31	124	40	–	30
4'	L40	4086	30	136	40	40	30
	L62	6434	48	134	40	30	40
	L81	8121	65	125	30	25	40
	L110	11075	88	126	30	–	40
8'	L80	8018	61	131	40	40	40
	L130	13026	95	137	40	30	40
	L160	16188	123	132	30	25	40
	L220	22056	166	133	30	–	40

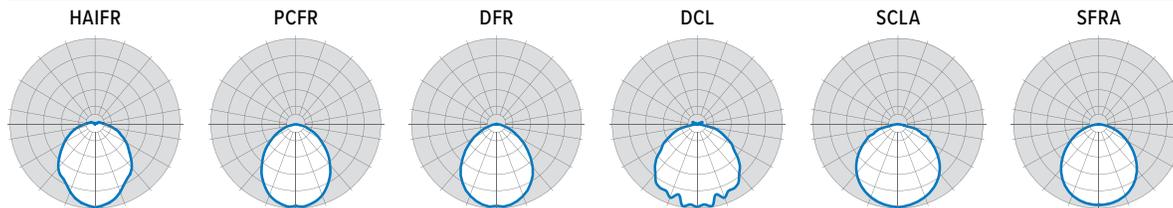
MULTIPLIER TABLES

	COLOR TEMPERATURE		SHIELDING	
	CCT	CONVERSION FACTOR	LENS	CONVERSION FACTOR
80 CRI	3000K	0.96	HIAFR	1.00
	3500K	0.97	SFRA	1.07
	4000K	1.00	PCFR	0.91
	5000K	1.03	SFPC	Consult Factory
90 CRI	3000K	0.79	DFR	1.05
	3500K	0.80	DCL ⁽¹⁾	1.06
	4000K	0.83	SCLA ⁽¹⁾	1.09
	5000K	0.86	SCPC ⁽¹⁾	Consult Factory

- Photometrics tested in accordance with IESNA LM-79. Results based on HIAFR shielding, 80 CRI/4000K CCT, average wattage for 120V through 277V input, and 25°C ambient temperature. Actual performance may vary +/-5%.
- To calculate lumen output in emergency mode, multiply the battery wattage by the efficacy.
- Use multiplier tables to calculate additional options.

¹ Due to clear lens, striations in the light distribution will be visible.

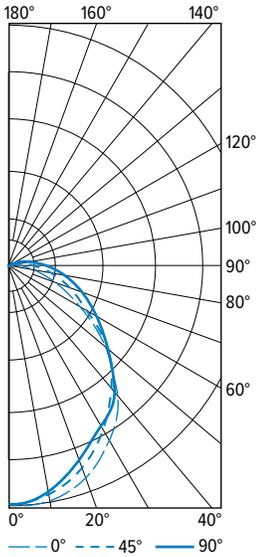
PHOTOMETRY



96-4-L62/840-HIAFR-DRV Report #: 20008.0; 08/15/17 | Total Luminaire Output: 6434 lumens; 48.3 Watts | Efficacy: 133.1 lm/W | 83.6 CRI; 4041K CCT



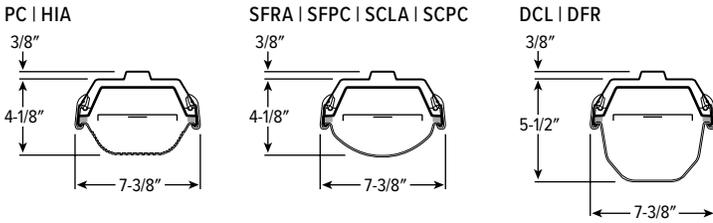
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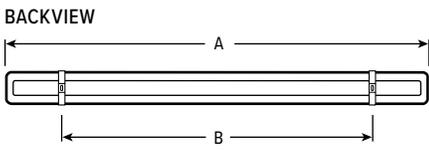
VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
	0°	45°	90°	
0	2318	2318	2318	
5	2352	2298	2283	220
15	2259	2169	2120	617
25	2066	1943	1865	899
35	1780	1666	1704	1065
45	1370	1379	1389	1055
55	943	1007	1062	901
65	546	695	828	691
75	231	449	599	457
85	38	251	361	252
90	15	185	272	
95	14	150	217	143
105	8	84	138	79
115	4	39	85	39
125	0	8	42	14
135	0	0	9	2
145	0	0	2	1
155	0	0	0	0
165	0	0	0	0
175	0	0	0	0
180	0	0	0	

LUMEN SUMMARY	ZONE	LUMENS	% FIXTURE
	0 - 30	1736	27
	0 - 40	2801	44
	0 - 60	4757	74
	0 - 90	6156	96
	90 - 120	262	4
	90 - 150	275	4
	90 - 180	278	4
	0 - 180	6434	100

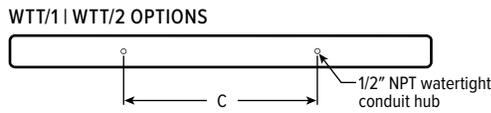
CROSS SECTIONS



FIXTURE DETAILS



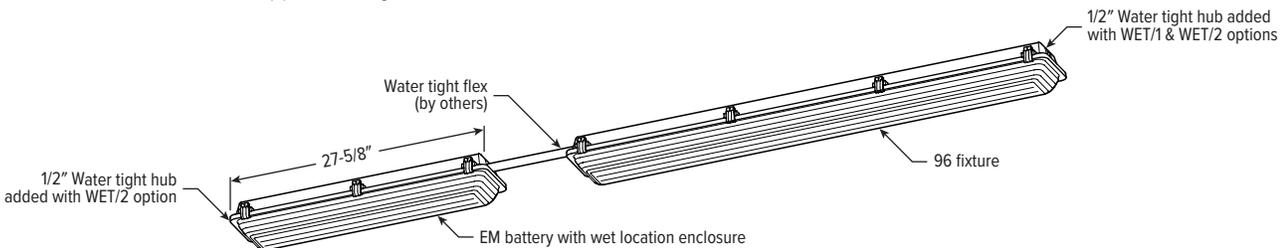
NOMINAL LENGTH	OVERALL LENGTH (A)	MOUNTING DISTANCE (B)
2'	27-5/8"	12"- 17" OC
4'	51-7/8"	30"- 42" OC
8'	100-1/4"	48"- 80" OC



NOMINAL LENGTH	DISTANCE (C)
4'	24" OC
8' (WTT/2 only)	45-3/4" OC

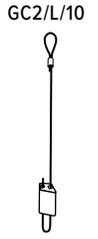
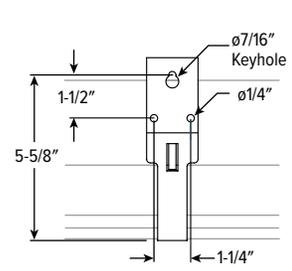
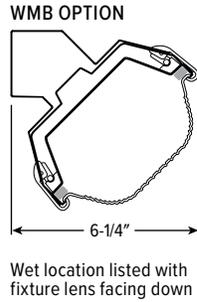
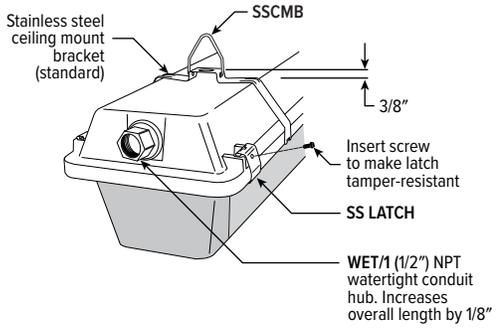
REMOTE MOUNT BATTERY

Max remote distance 50'. Includes (2) 1/2" watertight hubs.



MOUNTING DETAILS

96 LED Fully Enclosed & Gasketed Industrial

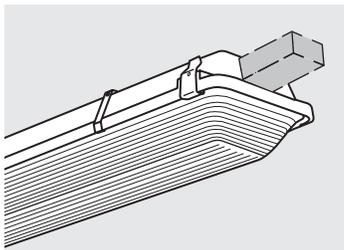


CORD OPTIONS

EXAMPLE: 5WMRC6		
NUMBER OF CONDUCTORS	POWER CONNECTION – NON-DIMMING	CORD LENGTH
3 3-wire	WMR Mini-male receptacle only	-
	WC STOW cord	6 6'
4 4-wire	WMRC Mini-male receptacle with STOW cord	20 20'
POWER CONNECTION – DIMMING		
5 5-wire	WMR Mini-male receptacle only	-
	WC SOOW cord	6 6'
6 6-wire	WMRC Mini-male receptacle with SOOW cord	20 20'

Wet location cord sets are yellow.

SENSOR PLACEMENT DETAILS



SEE NEXT PAGE FOR CONTROL DETAILS

96 LED Fully Enclosed & Gasketed Industrial

AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS

FEATURES

Simple

- Gateway-free distributed control
- Contractor friendly installation
- Occupancy/vacancy/daylight sensing

Scalable

- Virtually unlimited network size
- Spans small areas to large garages
- Flexible control strategies

Secure

- Optional cloud connectivity
- UL IoT platinum security rating
- DLC 5.0 compliant

COMMISSIONING & INSTALLATION TOOLS

Avi-on mobile apps provide intuitive, quick installation and commissioning. Pro tools are available to qualified installers. Live commissioning training and on-site or remote support by Avi-on must be ordered separately through Avi-on.



Commissioning Mobile App



Zone Scanner Web App



Commissioning Pro App

SYSTEM COMPONENTS



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ACCESSORIES

WALL STATIONS

- AVI-B-2401AC-1** Scene controller - buttons numbered 1-4 and up/down/off, 120-277VAC
- AVI-B-2402BAT-1** Scene controller - buttons numbered 1-4 and up/down/off, battery powered
- AVI-B-2401AC-2** Dimmer with presets - buttons with percentages and up/down/off, 120-277VAC
- AVI-B-2402BAT-2** Dimmer with presets - buttons with percentages and up/down/off, battery powered
- AVI-B-2401AC-3** Two button control on/off or hold to dim up/down, 120-277VAC
- AVI-B-2402BAT-3** Two button control on/off or hold to dim up/down, battery powered

NETWORK

- AVI-RAB-LTE** Remote access bridge
- AVI-NTM** Network time manager with battery backup

CEILING MOUNT SENSORS

- AVI-KIT-SEN-DUCM** PIR motion and ultrasonic sensor kit
- AVI-KIT-SEN-ICM** PIR motion and photocell sensor kit

For load controllers and additional accessory info, see hew.com/avi-on

AVI-LVFA-PIR-ELB Avi-on wireless fixture control with PIR motion and daylight sensor, end mount. DA Driver only.

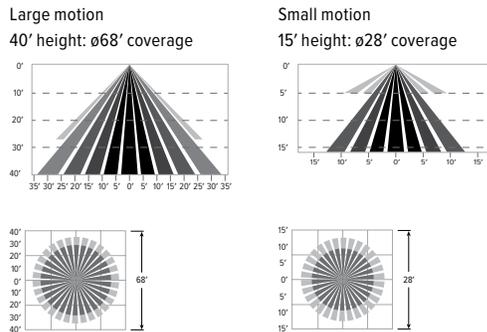
SPECIFICATIONS

TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 45'
LENS	Single lens detects high and low bay motion.
DETECTION ANGLE	360°
TEMPERATURE RANGE	-30° to 70°C
RELATIVE HUMIDITY	90 to 95% at 30°C
COMMISSIONING	App (iOS or Android)
SYSTEM REQUIREMENTS	Avi-On wireless fixture controls plus desktop and mobile apps
MANUFACTURER	Avi-On



IP66 certified for wet locations.

SENSOR COVERAGE PATTERNS



SENSOR DETAIL



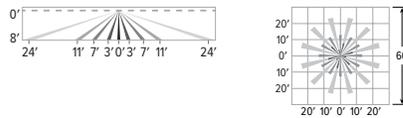
ADDITIONAL CONTROL OPTIONS

OCCWS-FSP-321B-L_-120-480 Wattstopper PIR motion and daylight sensor using 0-10V internal control, 120V-480V. Must specify lens: L2, L3 or L7. Factory installed.
OCCWS-FSP-221B-L_-120-480 Wattstopper PIR motion and daylight sensor using 0-10V internal control, 120V-480V. Must specify lens: L2, L3 or L7. Factory installed.
FSIR-100 Remote controller for 221B sensor. Please specify quantity required per project. Ordered and shipped separately.

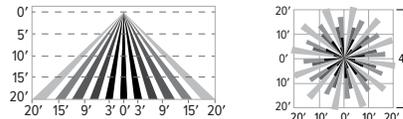
SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 40'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-40° to 75°C
COMMISSIONING	321B Sensor: App (iOS or Android) 221B Sensor: FSIR-100 Remote

SENSOR COVERAGE PATTERNS

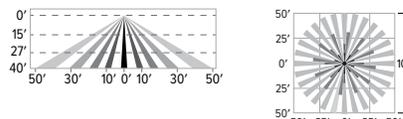
L2 8' height: ø48' coverage



L3 20' height: ø40' coverage



L7 40' height: ø100' coverage



SENSOR DETAIL

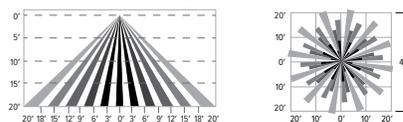


OCCWS-HB350W-L3W-___ Wattstopper PIR motion sensor. Must specify voltage: 120 or 277V.

SPECIFICATIONS	
TYPE	PIR Motion
MOUNTING HEIGHT	20'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-40° to 70°C
RELATIVE HUMIDITY	20 to 90%, non-condensing

SENSOR COVERAGE PATTERNS

20' height: ø40' coverage



SENSOR DETAIL



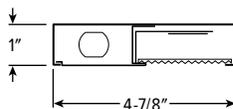
IP65 certified for wet locations. Not rated for NEMA 4X.

ADDITIONAL DRIVER OPTIONS

Note: Lumen restrictions apply, consult product builder at hew.com/product-builder

CATALOG NUMBER	DESCRIPTION
DRV	Driver without external dimming wires prewired for non-dimming applications
DIM	Driver with external dimming wires prewired for 0-10V low voltage applications
DIM1	1% driver with external dimming wires prewired for 0-10V low voltage applications
DIM LINE	Line voltage dimming driver (TRIAC and ELV compatible, 120V only)
DIM TRC	Line voltage dimming driver (TRIAC compatible, 120V only)
DA	Driver with 12V auxiliary power, without external dimming wires
SD40	40% step-dimming driver
SD50	50% step-dimming driver
DALI	DALI dimming driver
LDE1	Lutron Hi-lume 1% EcoSystem dimming driver

1SF LED Solid Front Under Cabinet Light



CATALOG #: _____

Type: _____

PROJECT: _____



FEATURES

- Small profile installs inconspicuously in confined spaces
- Delivers uniform, glare-free task lighting for work areas
- Housing keyhole slots and knockouts provide quick and easy installation
- Individual or continuous row mounting
- All-welded construction provides long lasting performance
- Available with attractive rocker switch for easy on/off
- Optional anti-microbial white finish available for use in healthcare applications
- Maximize energy savings with efficacies up to 117 lm/W
- Low UGR meets LEED and WELL requirements
- Wireless in-fixture control solutions available
- Made Right Here® in the USA

SPECIFICATIONS

- HOUSING – 20-gauge die-formed, welded C.R.S.
- SHIELDING – Diffuse matte acrylic, .080" thick.
- FINISH – 92% minimum average reflective white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- ELECTRICAL – High-quality mid-power LED board(s). L80 > 72,000 hours per IES TM-21. 25°C maximum ambient operating temperature. 50/60 Hz constant current driver.
- MOUNTING – Surface.
- LISTINGS –
 - cCSAus certified as luminaire suitable for dry or damp locations.
 - Build America, Buy America (BABA) and Buy American Act (BAA) compliant. Request certification at hew.com/buy-american
- WARRANTY – 5-year limited warranty, see hew.com/warranty

ORDERING EXAMPLE: 1SF 4 - L24/835 - AF12125 - OPTIONS - CONTROL/DRV - UNV

ORDERING INFO

SERIES	LENGTH	LUMENS ^[1]	CRI	CCT	SHIELDING
1SF	1 1'	1'	8 80	30 3000K	DMA Diffuse matte acrylic, .080" thick
	2 2'	L6 600lm		35 3500K	AF12125 Frosted acrylic, pattern #12, .125" thick
	3 3'	2'		40 4000K	
	4 4'	L12 1,200lm			
	LENGTH PER PLAN	3'			
		L18 1,800lm			
		4'			
		L24 2,400lm			

OPTIONS

- GCO Grounded convenience outlet ^[3]
- C&P/120 6-1/2' cord and plug, NEMA 5-15P ^[4]
- WRS/120 White rocker switch ^[5]
- AMW Anti-microbial white finish

CONTROL ^[2]

- See page 3 for ADDITIONAL CONTROL OPTIONS.
- None
- AVI-LVFA Avi-on wireless fixture control ^[6]

DRIVER ^[7]

- DIM Driver with external 0-10V dimming wires
- DRV Driver without external dimming wires
- DA Driver with 12V auxiliary power, without external dimming wires ^[8]

VOLTAGE

- 120 120V
- 277 277V
- UNV 120-277V

NOTES

- Lumen output based on AF12125 shielding, 80 CRI/3500K CCT. Actual performance may vary +/-5%. See page 2 for FIXTURE PERFORMANCE DATA.
- See page 3 for AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS.
- 120V only; not available with 1' fixture; cannot be used with occupancy sensor in 2' fixture.
- 120V only.
- 120V only.
- DA Driver only. Not available with 1' fixture.
- Consult factory for additional driver options.
- Avi-on Controls only.



1SF LED Solid Front Under Cabinet Light

FIXTURE PERFORMANCE DATA

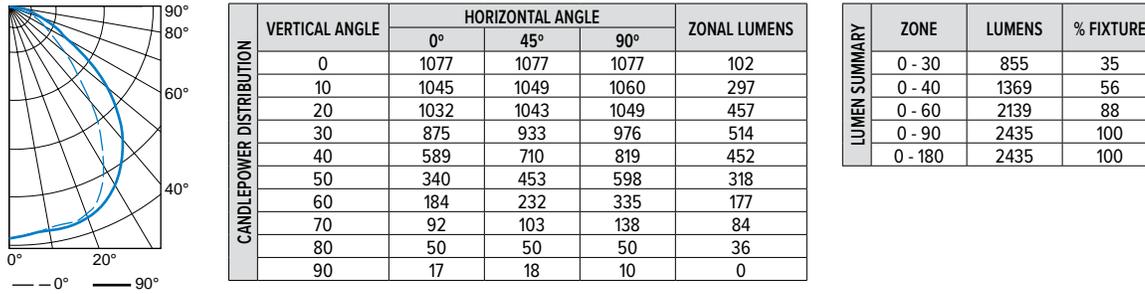
	LED PACKAGE	DELIVERED LUMENS	WATTAGE	EFFICACY (lm/W)	UNIFIED GLARE RATING (UGR) ^[1]	
					CROSSWISE	ENDWISE
1'	L6	610	5.9	103	17.5	19.6
2'	L12	1283	11.4	113	17.5	19.6
3'	L18	1857	16.0	116	17.5	19.6
4'	L24	2435	20.8	117	16.5	18.6

MULTIPLIER TABLE	
COLOR TEMPERATURE	
CCT	CONVERSION FACTOR
3000K	0.99
3500K	1.00
4000K	1.03

- ¹ UGR reference values based on 4H x 8H room size with 70%, 50%, and 20% reflectance. Actual values vary based on luminaire options and application specifications.
- Photometrics tested in accordance with IESNA LM-79. Results based on AF12125 shielding, 80 CRI/3500K CCT, wattage for 120V through 277V input, and 25°C ambient temperature. Actual performance may vary +/-5%.
 - Use multiplier table to calculate additional options.

PHOTOMETRY

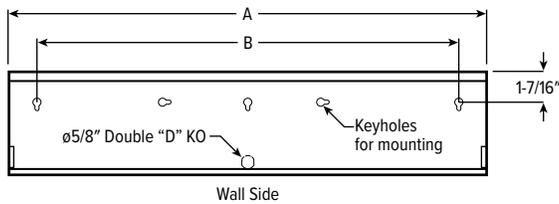
1SF-4-L24/835-AF12125 Total Luminaire Output: 2435 lumens; 20.8 Watts | Efficacy: 117 lm/W | 80 CRI; 3500K CCT



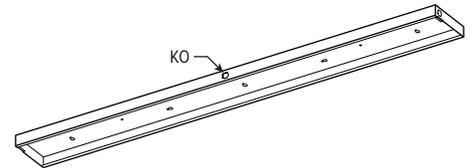
FIXTURE DETAILS

BACK VIEW

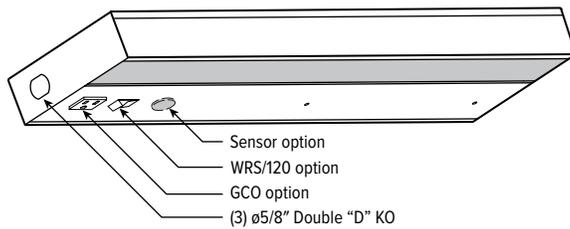
Top of housing provided with adequate keyhole slots and knockout for mounting and wiring.



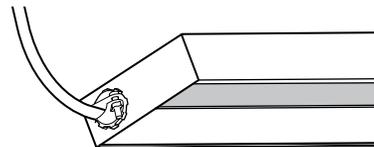
NOMINAL LENGTH	ACTUAL LENGTH (A)	ACTUAL LENGTH (B)
1'	12-1/8"	7-1/2"
2'	22-5/8"	20"
3'	34-3/8"	29"
4'	46-1/4"	38"



OPTION DETAILS



POWER ENTRY



FINISH OPTIONS



For custom color, please specify RAL code or a manufacturer code with description. All custom colors other than RAL require two sample swatches, minimum 1" square.

1SF LED Solid Front Under Cabinet Light

AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS

FEATURES

Simple

- Gateway-free distributed control
- Contractor friendly installation
- Occupancy/vacancy/daylight sensing

Scalable

- Virtually unlimited network size
- Spans small offices to large warehouses
- Flexible control strategies

Secure

- Optional cloud connectivity
- UL IoT platinum security rating
- DLC 5.0 compliant

COMMISSIONING & INSTALLATION TOOLS

Avi-on mobile apps provide intuitive, quick installation and commissioning. Pro tools are available to qualified installers. Live commissioning training and on-site or remote support by Avi-on must be ordered separately through Avi-on.



Commissioning Mobile App

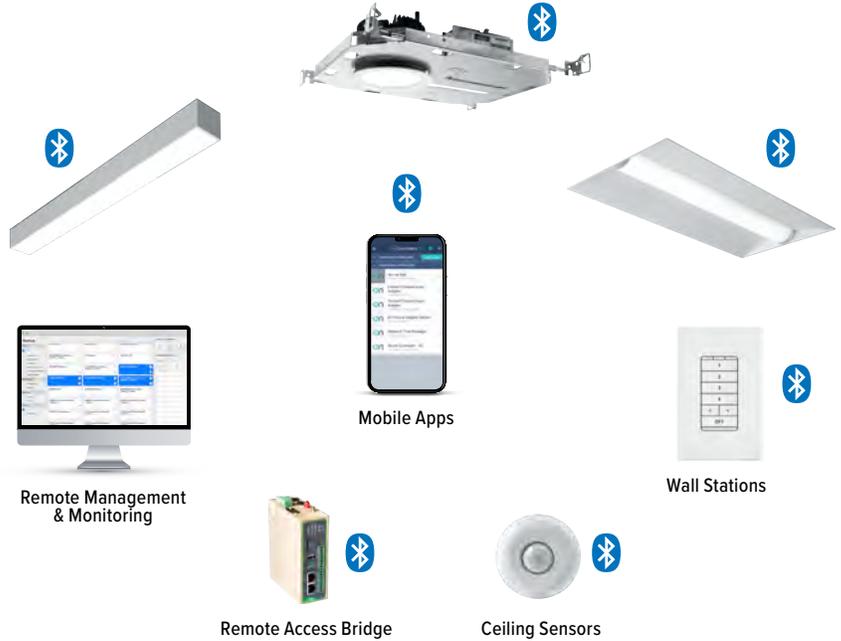


Zone Scanner Web App



Commissioning Pro App

SYSTEM COMPONENTS



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ACCESSORIES

WALL STATIONS	
AVI-B-2401AC-1	Scene controller - buttons numbered 1-4 and up/down/off, 120-277VAC
AVI-B-2402BAT-1	Scene controller - buttons numbered 1-4 and up/down/off, battery powered
AVI-B-2401AC-2	Dimmer with presets - buttons with percentages and up/down/off, 120-277VAC
AVI-B-2402BAT-2	Dimmer with presets - buttons with percentages and up/down/off, battery powered
AVI-B-2401AC-3	Two button control on/off or hold to dim up/down, 120-277VAC
AVI-B-2402BAT-3	Two button control on/off or hold to dim up/down, battery powered

NETWORK	
AVI-RAB-LTE	Remote access bridge
AVI-NTM	Network time manager with battery backup
CEILING MOUNT SENSORS	
AVI-KIT-SEN-DUCM	PIR motion and ultrasonic sensor kit
AVI-KIT-SEN-ICM	PIR motion and photocell sensor kit

For load controllers and additional accessory info, see hew.com/avi-on

ADDITIONAL CONTROL OPTIONS

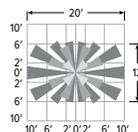
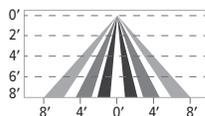
Not available with 1' fixture.

OCCLV-OSF10-IOW-___ Leviton PIR motion sensor. Must specify voltage: 120 or 277. Factory-installed.

SPECIFICATIONS	
TYPE	PIR Motion
MOUNTING HEIGHT	8'
DETECTION ANGLE	360°
TEMPERATURE RANGE	0° to 55°C
RELATIVE HUMIDITY	20% to 90% non-condensing

SENSOR COVERAGE PATTERNS

8' height: ø16' coverage

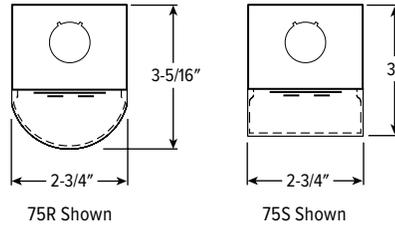


SENSOR DETAIL





75R | 75S LED Narrow Strip



CATALOG #: _____

TYPE: _____

PROJECT: _____



FEATURES

- Small fixture profile allows inconspicuous placement in coves or confined spaces
- Round and square lenses provide a clean look for architectural environments
- Row applications produce continuous light with minimal interruption
- Diffuse acrylic lens enhances uniformity and minimizes glare
- Variety of mounting accessories for surface and suspended applications
- Special reflectors are available to provide precise light distribution
- HE option delivers superior efficacies up to 182 lm/W
- Optional wireguard provides added protection
- Six standard finish options and a wide selection of custom colors complement the architectural elements of any space
- 2', 3', 4', and 8' lengths available
- Available on QuickShip
- Wireless in-fixture control solutions available
- Made Right Here® in the USA

SPECIFICATIONS

- HOUSING** – 22-gauge die-formed C.R.S.
- SHIELDING** – Diffuse acrylic lens. Frosted polycarbonate available for 75R, specify FP Option.
- FINISH** – 92% minimum average reflective white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- ELECTRICAL** – High-quality mid-power LED board. L70 > 72,000 hours per IES TM-21. L80 > 102,000 hours with HE option. 25°C maximum ambient operating temperature. 40°C maximum ambient operating temperature with HA Option, lumen restrictions apply, see fixture performance data. 50/60 Hz constant current driver.
- MOUNTING** – Surface (ceiling or wall) or suspended (hanging hardware required).
- LISTINGS** –
 - cETLus conforms to UL STD 1598. Certified to CAN/CSA STD C22.2 No. 250.0. Suitable for damp locations
 - UL 924 available, see Options.
 - DesignLights Consortium qualified product. Not all versions of this product may be DLC qualified, see the DLC Qualified Products List at designlights.org/GPL
 - Build America, Buy America (BABA) and Buy American Act (BAA) compliant. Request certification at hew.com/buy-american
- WARRANTY** – 5-year limited warranty, see hew.com/warranty

ORDERING EXAMPLE: 75R - 4 - L85/835 - OPTIONS - CONTROL/DIM - UNV

SERIES	LENGTH	LUMENS ⁽¹⁾				CRI	CCT
75R Round lens	2 22-1/2"	2'	3'	4'	8'	8 80	27 2700K
	3 33-9/16"	L15 1,500lm	L40 4,000lm	L30 3,000lm	L60 6,000lm	9 90	30 3000K
75S Square lens	4 44-5/8"	L25 2,500lm	L64 6,400lm	L50 5,000lm	L100 10,000lm		35 3500K
	8 89-1/4" ⁽²⁾	L32 3,200lm		L65 6,500lm	L130 13,000lm		40 4000K
		L42 4,200lm		L85 8,500lm	L170 17,000lm		50 5000K
				L100 10,000lm	L200 20,000lm		

OPTIONS⁽³⁾

See page 3 for FINISH OPTIONS. See page 3 for SPECIAL REFLECTOR OPTIONS. See page 3 for QUICK-CONNECT OPTIONS.

- EM/10WLP** Low-profile 10-watt emergency battery⁽⁴⁾
- EM/10WRM** Remote mount 10-watt emergency battery
- EM/10WRM/RTS** Remote mount 10-watt emergency battery with regressed test switch
- HE** High efficacy lumen package⁽⁵⁾
- HA** High ambient operating temperature, 40°C⁽⁶⁾
- WG-75** 11-gauge white powder coat wireguard⁽⁷⁾
- 315** 1-1/2" ceiling spacer
- VBV** (2) Y-hangers
- VBV-2** (2) Y-hangers with 2' chains
- RA-75** Row aligner⁽⁸⁾
- 45AMB** (2) 45° adjustable mounting brackets⁽⁹⁾

- FP** Frosted polycarbonate lens for 75R
- (L__)** Additional lower lumen packages available⁽¹⁰⁾. Example: 7,000 nominal lumens = 75R-4-L85/835-(L70)
- QC__** Quick-connect wiring harness
- GEN** Approved for UL 924 emergency generator circuit through-feed wiring⁽¹¹⁾
- SP1** 10kV surge protection, 120 or 277V
- SP2** 10kV surge protection, 208 or 240V
- SP3** 10kV surge protection, 347V

AIRCRAFT CABLES (EXAMPLE: ACF/D48)⁽¹²⁾

Prefix	Type	Length
ACF/ Feeder	D 1" grid & hardpan	24 24"
ACJ/ Joiner	N 9/16" grid	48 48"
	S Slot grid	96 96"

CONTROL⁽¹³⁾

See page 6 for ADDITIONAL CONTROL OPTIONS.

- None
- AVI-LVFA** Avi-on wireless fixture control⁽¹⁴⁾
- AVI-LVFA-PIR** Avi-on wireless fixture control with high bay PIR motion and daylight sensor, bottom mount⁽¹⁵⁾
- AVI-LVFA-CS2-PIR** Avi-on wireless fixture control with PIR motion and daylight sensor, bottom mount⁽¹⁶⁾
- AWN R** Lutron Athena wireless node integral fixture control, RF only⁽¹⁷⁾
- AWN S** Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing⁽¹⁸⁾

DRIVER

See page 8 for ADDITIONAL DRIVER OPTIONS.

- DIM** Driver with external 0-10V dimming wires
- DRV** Driver without external dimming wires
- DA** Driver with 12V auxiliary power, without external dimming wires⁽¹⁹⁾
- DSR** Sensor-ready driver without external dimming wires (D4i DALI-2)⁽²⁰⁾

VOLTAGE

- 120 120V
- 208 208V
- 240 240V
- 277 277V
- UNV 120-277V
- 347 347V⁽²¹⁾

QUICKSHIP

75R-4-L50/835-QS-DIM-UNV	75R-8-L100/835-QS-DIM-UNV	75S-4-L50/835-QS-DIM-UNV	75S-8-L100/835-QS-DIM-UNV
75R-4-L50/840-QS-DIM-UNV	75R-8-L100/840-QS-DIM-UNV	75S-4-L50/840-QS-DIM-UNV	75S-8-L100/840-QS-DIM-UNV

NOTES

- Lumen output based on 80 CRI/3500K CCT. Actual performance may vary +/-5%, see page 2 for FIXTURE PERFORMANCE DATA. Additional lumen packages available, see options.
- Ships with (2) 4' lenses.
- Remote EM batteries: max remote distance 50', including suspension length. Large remote box provided. Specify CEC in the option code when California Energy Commission regulations are required. See page 4 for REMOTE MOUNT BATTERY DETAILS.
- Not available with 2' fixtures.
- Not available with 3' Length, 2' L15, 4' L30, or 8' L60 lumen packages. See page 2 for FIXTURE PERFORMANCE DATA.
- Lumen restrictions apply. See page 2 for FIXTURE PERFORMANCE DATA.
- Shipped separately, field-installed.
- Required when row mounting with aircraft cables.
- Cord recommended, ships separately. See page 4 for MOUNTING ACCESSORY DETAILS. Field-adjustable up and down in 7-1/2" increments.
- Specify in increments of 100 nominal lumens. Option must be specified with next higher lumen package.
- Maximum mounting height is 15.4' (4.7 m). Minimum lumen output is 400 lm/ft. See hew.com/UL924 for details.
- Units specified with aircraft cable require cord and RA-75 row aligner. See page 4 for MOUNTING ACCESSORY DETAILS.
- See page 4 for SENSOR & NODE PLACEMENT DETAILS. See page 5 for AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS.
- DA Driver only.
- DA Driver only.
- DA driver only.
- DA and DSR Drivers only.
- DA and DSR Drivers only.
- Avi-on, Lutron Athena, and LV-ZLS05 Controls only.
- Lutron Vive and Athena Controls only.
- Not available with EM batteries, DA, or DSR drivers.



75R | 75S LED Narrow Strip

FIXTURE PERFORMANCE DATA

	LED PACKAGE	DELIVERED LUMENS	STANDARD		HE OPTION		AMBIENT TEMPERATURE ⁽²⁾	
			WATTAGE	EFFICACY (lm/W)	WATTAGE	EFFICACY (lm/W)	EM	NO EM
2'	L15	1511	10.8	140	-	-	40	40
	L25	2470	18.2	136	14.8	167	40	40
	L32	2936	21.3	138	17.2	170	40	40
3'	L42	4124	31.4	132	23.0	180	35	40
	L40	3885	28.2	138	-	-	35	40
	L64	6259	48.2	130	-	-	30	35
4'	L30	2916	19.7	148	-	-	40	40
	L50	4867	33.0	148	26.7	182	40	40
	L65	5994	42.3	142	35.8	168	40	40
	L85	8098	56.2	144	47.6	170	35	40
	L100	9640	68.3	141	56.9	169	30	30
8'	L60	5520	35.3	157	-	-	40	40
	L100	9568	65.9	145	54.1	177	35	35
	L130	12353	87.9	141	70.8	175	35	35
	L170	16197	112.4	144	94.8	171	35	35
	L200	19281	136.5	141	113.9	169	30	30

MULTIPLIER TABLES

COLOR TEMPERATURE	
CCT	CONVERSION FACTOR
2700K	0.97
3000K	0.99
3500K	1.00
4000K	1.03
5000K	1.06

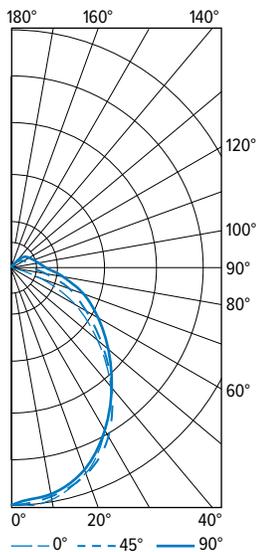
COLOR TEMPERATURE	
CCT	CONVERSION FACTOR
2700K	0.80
3000K	0.82
3500K	0.83
4000K	0.86
5000K	0.89

LENS	CONVERSION FACTOR
Standard	1.00
FP Option	0.95

- Photometrics tested in accordance with IESNA LM-79. Results based on 80 CRI/3500K CCT, average wattage for 120V through 277V input, and 25°C ambient temperature. Actual performance may vary +/-5%.
 - To calculate lumen output in emergency mode, multiply the battery wattage by the efficacy.
 - Use multiplier tables to calculate additional options.
- ¹ Maximum ambient operating temperature (°C) when specified with HA option.

PHOTOMETRY

75R-4-L85/835 Total Luminaire Output: 8098 lumens; 56.2 Watts | Efficacy: 144 lm/W | 80 CRI; 3500K CCT



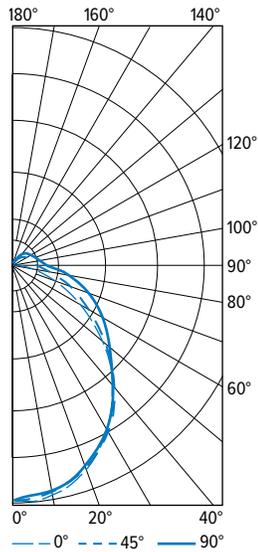
VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
	0°	45°	90°	
0	2594	2594	2594	
5	2622	2585	2553	246
15	2503	2497	2480	703
25	2256	2306	2324	1059
35	1915	2042	2111	1264
45	1481	1673	1824	1281
55	1003	1296	1488	1135
65	620	942	1117	891
75	267	630	775	613
85	63	401	501	378
90	9	311	407	
95	1	249	329	225
105	0	150	219	136
115	0	94	149	83
125	0	53	102	47
135	0	28	63	24
145	0	12	35	10
155	0	6	16	3
165	0	0	4	0
175	0	0	0	0
180	0	0	0	

LUMEN SUMMARY	ZONE	LUMENS	% FIXTURE
	0 - 30	2008	25
	0 - 40	3272	40
	0 - 60	5688	70
	0 - 90	7570	94
	90 - 120	443	6
	90 - 150	524	7
	90 - 180	527	7
	0 - 180	8098	100

PHOTOMETRY CONTINUED ON NEXT PAGE.

75R | 75S LED Narrow Strip

75S-4-L85/835 Total Luminaire Output: 8098 lumens; 56.2 Watts | Efficacy: 144 lm/ W | 80 CRI; 3500K CCT

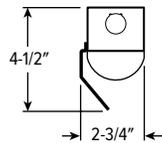


VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
	0°	45°	90°	
0	2732	2732	2732	
5	2756	2720	2682	258
15	2633	2611	2579	734
25	2351	2362	2323	1083
35	1969	2010	1965	1247
45	1516	1554	1583	1209
55	1053	1160	1291	1051
65	618	840	1022	826
75	270	542	745	563
85	47	323	491	332
90	0	246	390	
95	0	230	344	223
105	0	200	291	185
115	0	171	256	149
125	0	139	216	110
135	0	96	166	71
145	0	58	113	38
155	0	36	63	16
165	0	17	31	4
175	0	0	0	0
180	0	0	0	

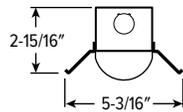
LUMEN SUMMARY	ZONE	LUMENS	% FIXTURE
	0 - 30	2075	26
	0 - 40	3321	41
	0 - 60	5581	69
	0 - 90	7301	90
	90 - 120	557	7
	90 - 150	777	10
	90 - 180	797	10
	0 - 180	8098	100

SPECIAL REFLECTOR OPTIONS

R1015



R1172



Reflectors ordered and shipped separately. Cannot be used with wireguard accessories. To remove reflector, first remove the lens.

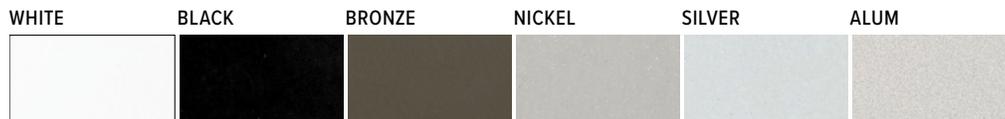
Example: R1172-4-75LED REFL

QUICK-CONNECT OPTIONS

Note: Quick-connect wiring required for row mounting. All QC harnesses contain (5) 16ga conductors plus ground.

DESIGNATION	NUMBER OF 16GA WIRES FACTORY CONNECTED (EXCLUDING GROUND)	WIRE COLOR/POWER SUPPLY FACTORY CONNECTIONS	TYPICAL USE
QCBW	2	Black, White	On/off switching (DRV) or line voltage dimming (DIM LINE)
QCRW	2	Red, White	Alternating circuits on/off switching (DRV) or line voltage dimming (DIM LINE)
QCBRW	3	Black, Red, White	On/off switching (DRV) or line voltage dimming when equipped with EM battery packs
QCBW/PK	4	Black, White, Purple, Pink	Single circuit with 0-10V low voltage dimming (DIM)
QCRW/PK	4	Red, White, Purple, Pink	Alternating circuits on/off switching with 0-10V low voltage dimming (DIM)
QCBRW/PK	5	Black, Red, White, Purple, Pink	On/off switching when equipped with EM battery packs and 0-10V dimming (DIM)
QCBW/RPK	5	Black, White, Red, Purple, Pink	On/off switching with 0-10v dimming and 0-10v tunable using shared common
QCUU	N/A	N/A	QC harness passes through fixture, but is not connected to it

FINISH OPTIONS



For custom color, please specify RAL code or a manufacturer code with description. All custom colors other than RAL require two sample swatches, minimum 1" square.

75R | 75S LED Narrow Strip

FIXTURE DETAILS

BACKVIEW

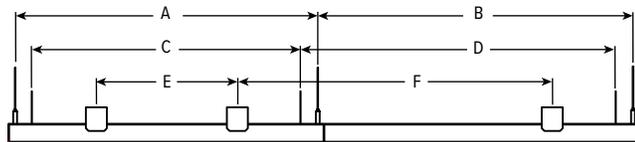


	7/8" KOs	ACTUAL FIXTURE LENGTH
2'	18-3/8"	22-1/2"
3'	29-1/2"	33-9/16"
4'	40-1/2"	44-5/8"
8'	85-1/8"	89-1/4"

MOUNTING ACCESSORY DETAILS

STAND ALONE

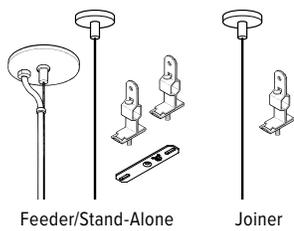
SUBSEQUENT



MOUNTING LENGTH

	AIRCRAFT CABLE		VBY HANGER		315 SPACER	
	A	B	C	D	E	F
2'	21-1/2"	22-1/2"	19"	22-1/2"	10"	22-1/2"
3'	32-1/2"	33-9/16"	30-1/16"	33-9/16"	21"	33-9/16"
4'	43-5/8"	44-5/8"	41-1/4"	44-5/8"	32"	44-5/8"
8'	88-3/16"	89-1/4"	85"	89-1/4"	77"	89-1/4"

STANDARD HARDWARE FOR SUSPENDED PRODUCT (Grid and Hardpan)



Notes:

- Fixtures are provided with adjustable length aircraft cables and mounting hardware, must specify.
- Electrical supply is brought into the feeder fixture, either as part of a row or as a stand-alone unit. Joiner fixtures complete the row.
- The feeder kits are standard with a 5" canopy to cover the junction box and a 2" canopy at the non-feed point. No J-box is required at non-feed points.
- Cable kit provides 10/32 male thread for connection to fixture.

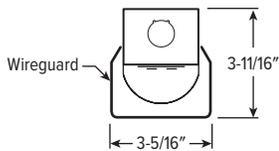
CORD FOR SUSPENDED PRODUCT

Units specified with aircraft cable require cord. Please specify cord type using ordering information below. Long fixture rows may require multiple feed points based on 18ga conductor size.

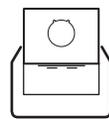
EXAMPLE: S2438D/W				
CORD TYPE	LENGTH	# OF COND. ^[1]	WIRE SIZE	COLOR
S	24 24"	3	8D 18ga	/W White /B Black
	48 48"	4		
	96 96"	5 6		

¹ Includes (2) 22ga purple & pink dimming conductors

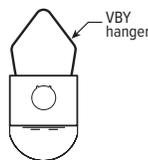
WG-75 75R



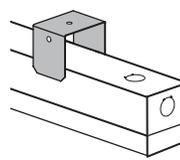
75S



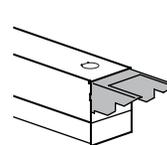
VBY



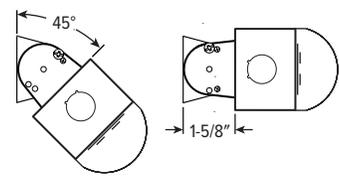
315



RA-75



45AMB



REMOTE MOUNT BATTERY DETAILS

EM/10WRM/RTS



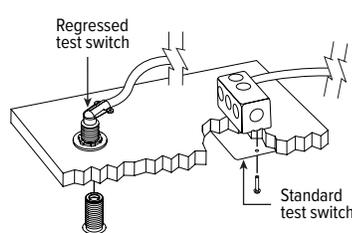
Regressed test switch
ø1-3/4"

EM/10WRM

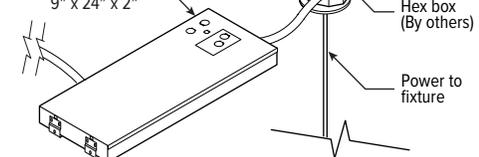


Standard test switch
2-3/4" x 4-1/2"

Max remote distance is 50' including suspension length, connection by others.

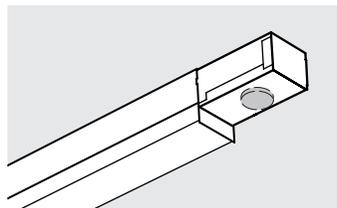


Large remote box
9" x 24" x 2"

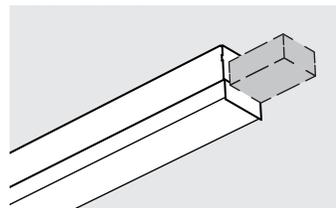


SENSOR & NODE PLACEMENT DETAILS

AVI-LVFA | AWNS | VDO | WS-FSP | LV-ZLS05



LV-OSFHU | SS-LSXR



75R | 75S LED Narrow Strip

AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS

FEATURES

Simple

- Gateway-free distributed control
- Contractor friendly installation
- Occupancy/vacancy/daylight sensing

Scalable

- Virtually unlimited network size
- Spans small areas to large garages
- Flexible control strategies

Secure

- Optional cloud connectivity
- UL IoT platinum security rating
- DLC 5.0 compliant

COMMISSIONING & INSTALLATION TOOLS

Avi-on mobile apps provide intuitive, quick installation and commissioning. Pro tools are available to qualified installers. Live commissioning training and on-site or remote support by Avi-on must be ordered separately through Avi-on.



Commissioning Mobile App



Zone Scanner Web App



Commissioning Pro App

SYSTEM COMPONENTS



The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Avi-on is under license. Other trademarks and trade names are those of their respective owners.

ACCESSORIES

WALL STATIONS

- AVI-B-2401AC-1** Scene controller - buttons numbered 1-4 and up/down/off, 120-277VAC
- AVI-B-2402BAT-1** Scene controller - buttons numbered 1-4 and up/down/off, battery powered
- AVI-B-2401AC-2** Dimmer with presets - buttons with percentages and up/down/off, 120-277VAC
- AVI-B-2402BAT-2** Dimmer with presets - buttons with percentages and up/down/off, battery powered
- AVI-B-2401AC-3** Two button control on/off or hold to dim up/down, 120-277VAC
- AVI-B-2402BAT-3** Two button control on/off or hold to dim up/down, battery powered

NETWORK

- AVI-RAB-LTE** Remote access bridge
- AVI-NTM** Network time manager with battery backup

CEILING MOUNT SENSORS

- AVI-KIT-SEN-DUCM** PIR motion and ultrasonic sensor kit
- AVI-KIT-SEN-ICM** PIR motion and photocell sensor kit

For load controllers and additional accessory info, see hew.com/avi-on

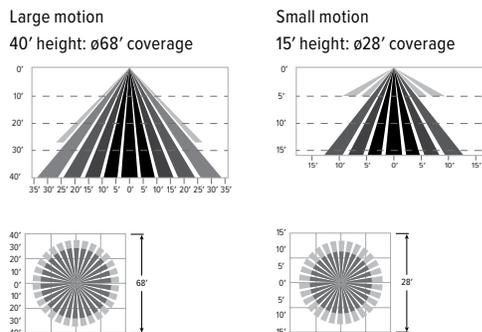
AVI-LVFA-PIR Avi-on wireless fixture control with high bay PIR motion and daylight sensor, bottom mount. DA Driver only.

SPECIFICATIONS

TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 45'
LENS	Single lens detects high and low bay motion.
DETECTION ANGLE	360°
TEMPERATURE RANGE	-30° to 70°C
RELATIVE HUMIDITY	90 to 95% at 30°C
COMMISSIONING	App (iOS or Android)
SYSTEM REQUIREMENTS	Avi-On wireless fixture controls plus desktop and mobile apps
MANUFACTURER	Avi-On



SENSOR COVERAGE PATTERNS



SENSOR DETAIL



Dimensions: 2-5/16" x 1-7/16"



75R | 75S LED Narrow Strip

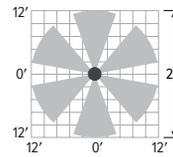
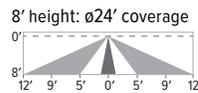
AVI-LVFA-CS2-PIR Avi-on wireless fixture control with PIR motion and daylight sensor. DA Driver only.

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 10'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-30° to 50°C
RELATIVE HUMIDITY	10 to 80% non-condensing
IP RATING	IP20
MANUFACTURER	Avi-On



SENSOR COVERAGE PATTERNS

Side View



SENSOR DETAIL



Dimensions: 13/16" x 2-1/4"

ADDITIONAL CONTROL OPTIONS

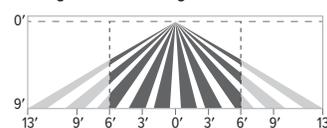
AWNS Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing. DA and DSR Drivers only.

SPECIFICATIONS	
TYPE	Radio Frequency
MOUNTING HEIGHT	8' – 12'
DETECTION ANGLE	360°
TEMPERATURE RANGE	0° to 55°C
RELATIVE HUMIDITY	0 to 90%, non-condensing
COMMISSIONING	Clear Connect gateway – Type X with app (iOS or Android)
MANUFACTURER	Lutron



SENSOR COVERAGE PATTERNS

9' height: ø12' coverage



Motion Sensor Coverage

CEILING HEIGHT	COVERAGE AREA (SQ FT)
8'	114
9'	144
10'	178
12'	256

SENSOR DETAIL



Dimensions: ø1-1/8"

ATHENA CONTROL OPTIONS

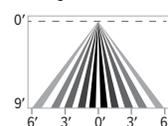
CATALOG NUMBER	DESCRIPTION
AWNDR	Lutron Athena wireless node integral fixture control, RF only, for use with D4i DALI-2 or driver with 12V auxiliary power.
AWNS	Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing, for use with D4i DALI-2 or driver with 12V auxiliary power.
AWNDR-BL	Lutron Athena wireless node integral fixture control, RF only, for use with D4i DALI-2 or driver with 12V auxiliary power, black finish.
AWNS-BL	Lutron Athena wireless node integral fixture control, RF with daylight and occupancy sensing, for use with D4i DALI-2 or driver with 12V auxiliary power, black finish.

VDO Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC). DSR or LDE Drivers only. LDE drivers require driver interface

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 12'
DETECTION ANGLE	360°
TEMPERATURE RANGE	0° to 55°C
RELATIVE HUMIDITY	0 to 90%, non-condensing
COMMISSIONING	App (iOS or Android)
MANUFACTURER	Lutron

SENSOR COVERAGE PATTERNS

9' height: ø12' coverage



Motion Sensor Coverage

CEILING HEIGHT	COVERAGE AREA (SQ FT)
8'	114
9'	144
10'	178
12'	256

SENSOR DETAIL



Dimensions: 2-11/16" x 1"

VIVE CONTROL OPTIONS

CATALOG NUMBER	DESCRIPTION
VRF	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF), for use with sensor-ready driver
VDO	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC), for use with sensor-ready driver
VRF/DBI	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF) and digital link interface, for use with Lutron Hi-lume 1% EcoSystem dimming LED driver
VDO/DBI	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC) and digital link interface, for use with Lutron Hi-lume 1% EcoSystem dimming LED driver



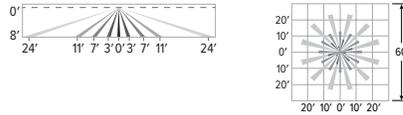
75R | 75S LED Narrow Strip

OCCWS-FSP-311-L_-120/277 Wattstopper PIR motion and daylight sensor, 120/277. Must specify lens: L2, L3, or L7. Factory installed.
OCCWS-FSP-211-L_-120/277 Wattstopper PIR motion and daylight sensor, 120/277. Must specify lens: L2, L3, or L7. Factory installed.
FSIR-100 Remote controller for 211 sensor. Please specify quantity required per project. Ordered and shipped separately.

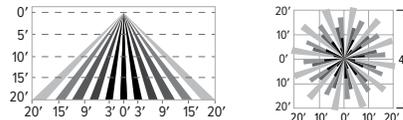
SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 40'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-40° to 75°C
COMMISSIONING	311 Sensor: App (iOS or Android) 211 Sensor: FSIR-100 Remote

SENSOR COVERAGE PATTERNS

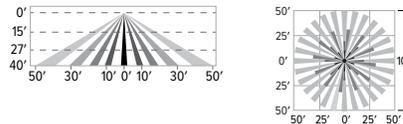
L2 8' height: ø48' coverage



L3 20' height: ø40' coverage



L7 40' height: ø100' coverage



SENSOR DETAIL



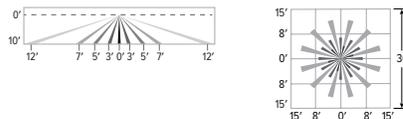
Dimensions
L2/L3: ø2-3/8" | L7: ø3-1/4"

LV-ZLS05-ILW Leviton PIR motion and daylight sensor. DA Driver only. Adjustable via remote. Optional ZLSOR-RA1 remote controller available.
ZLSOR-RA1 Remote controller for ZLS05 sensor. Please specify quantity required per project. Ordered and shipped separately.

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8' – 10'
DETECTION ANGLE	120°
TEMPERATURE RANGE	-20° to 70°C
COMMISSIONING	DIP switches or optional remote: ZLSOR-RA1

SENSOR COVERAGE PATTERNS

10' height: ø24' coverage



SENSOR DETAIL



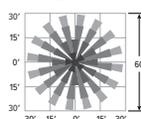
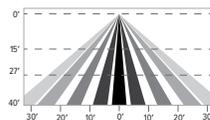
Dimensions: ø1-5/16"

OCCLV-OSFHU-ITW-120-347V Leviton PIR motion sensor, 120-347V.

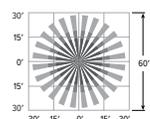
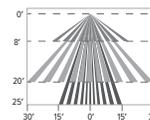
SPECIFICATIONS	
TYPE	PIR Motion
MOUNTING HEIGHT	8' – 40'
LENS	Interchangeable high bay, low bay or aisle mask
DETECTION ANGLE	360°
TEMPERATURE RANGE	-10° to 71°C
RELATIVE HUMIDITY	20% to 90% non-condensing

SENSOR COVERAGE PATTERNS

**High bay
40' height: ø60' coverage**



**Low bay
25' height: ø60' coverage**



SENSOR DETAIL



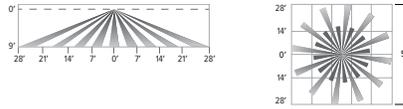
75R | 75S LED Narrow Strip

OCCSS LSXR-10-120-277 Sensor Switch PIR motion sensor, 120-277V
 OCCSS LSXR-10-347/480 Sensor Switch PIR motion sensor, 347/480V

SPECIFICATIONS	
TYPE	PIR Motion
MOUNTING HEIGHT	7' – 15'
DETECTION ANGLE	360°
TEMPERATURE RANGE	-10° to 60°C
RELATIVE HUMIDITY	Up to 90% non-condensing

SENSOR COVERAGE PATTERNS

9' height: ø56' coverage



SENSOR DETAIL



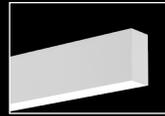
ADDITIONAL DRIVER OPTIONS

Note: Lumen restrictions apply, consult product builder at hew.com/product-builder

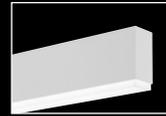
CATALOG NUMBER	DESCRIPTION
DRV	Driver without external dimming wires prewired for non-dimming applications
DIM	Driver with external dimming wires prewired for 0-10V low voltage applications
DIM1	1% driver with external dimming wires prewired for 0-10V low voltage applications
DIM LINE	Line voltage dimming driver (TRIAC and ELV compatible, 120V only)
DIM TRC	Line voltage dimming driver (TRIAC compatible, 120V only)
DA	Driver with 12V auxiliary power, without external dimming wires
DSR	Sensor-ready driver without external dimming wires (D4i DALI-2)
SD40	40% step-dimming driver
SD50	50% step-dimming driver
DALI	DALI dimming driver
LDE1	Lutron Hi-lume 1% EcoSystem dimming driver

Seem® 2

LED DIRECT/INDIRECT WALL MOUNT



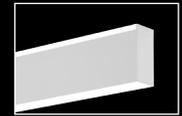
flush lens



0.5" pop-down lens



1.5" pop-down lens



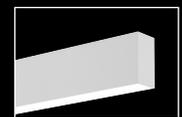
0.5" pop-up lens / flush lens



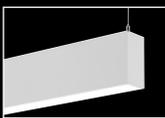
The Naturals collection - Walnut shown



corner detail



direct only companion

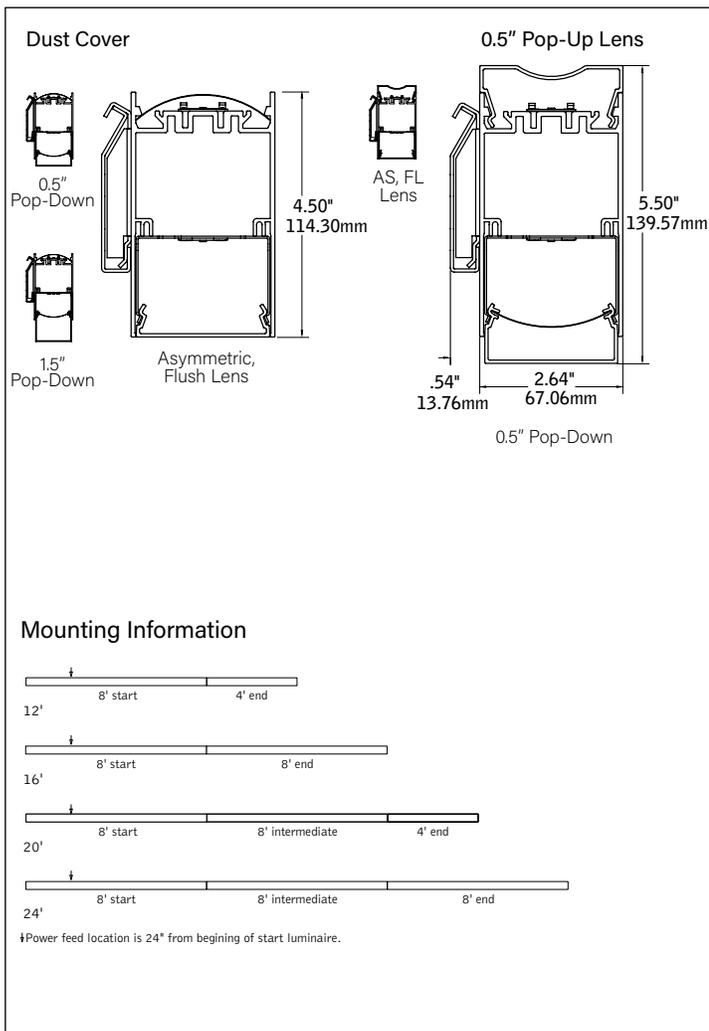


suspended companion



recessed companion

DIMENSIONAL DATA



FEATURES

Narrow extruded aluminum 2.5" linear direct/indirect LED with indirect Asymmetric Optic, Dust Cover, and Pop-lens options.

Frosted acrylic lenses provide uninterrupted illumination, without pixels or shadows.

LED position and lens material optimized to provide the perfect blend of high performance and visual comfort.

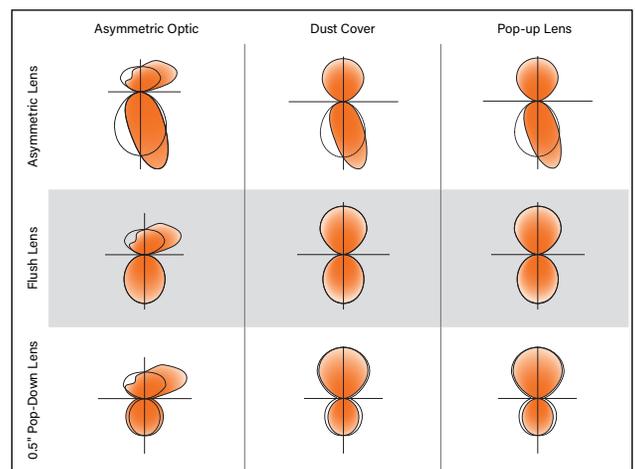
Choice of output levels and light distributions to meet a wide variety of application needs.

Individual units and continuous runs in 1' increments.

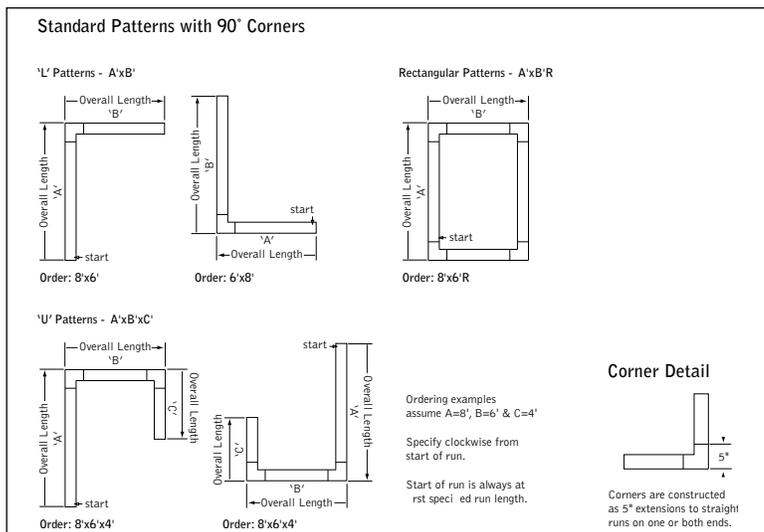
PoE compatible: Integrates with Power over Ethernet lighting systems via standard, low-voltage wires.

Available with The Naturals, a series of finishes that exude biophilic beauty.

DISTRIBUTIONS



DETAILS



SPECIFICATIONS

LED System

Proprietary linear LED module incorporates premium LEDs on a robust platform to achieve excellent thermal management. LEDs are placed to promote a uniform appearance. Available in 2700K, 3000K, 3500K or 4000K with CRI>80 or CRI>90. 3500K and 4000K with CRI>90 have a cyanosis observation index (COI) of 3.3 or less. LED modules and drivers are replaceable from below. Color accuracy <3 SDCM.

Construction

One piece extruded aluminum housing. Cast aluminum end caps. 8' unit weight: 30 lbs.

Optic

Reflectors fabricated of 20 Ga. steel finished in Matte White powder coat. Extruded acrylic lens with frosted finish, up to 8' continuous.

Electrical

Luminaires are pre-wired with factory installed branch circuit wiring and over-molded quick connects. Standard 120-277V constant current driver includes 0-10V analog dimming. Power factor > .9. PoE compatible: Integrates with Power over Ethernet lighting systems via standard, low-voltage wires. PoE runs require an independent PoE node and power feed for each luminaire section.

Emergency

Emergency output - 10 watts for 90 minutes. Maximum mounting height: 20 ft.

Labels

UL and cUL listed. Suitable for Dry or Damp Locations, indoor use only.

Finish

Polyester powder coat applied over a multi-stage pre-treatment. The Naturals: 100% low VOC vinyl.

Lumen Maintenance

Reported: L70 at >61,000 hours Calculated: L70 at 257,000 hours
 L90 at >61,000 hours L90 at 69,000 hours

Derived from EPA TM-21 calculator. Based on typical conditions, consult factory for additional data.

Reliability

At Focal Point, our products are designed to stand the test of time. Each luminaire is engineered using superior components, manufactured with the utmost care and rigorously tested. Contact us for reliability data.

Warranty

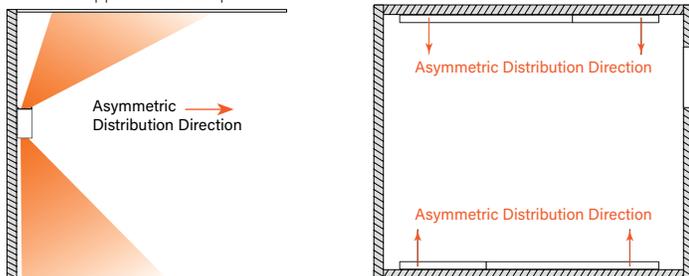
LED system rated for operation in ambient environments up to 25°C. 5-year limited warranty.

4' PERFORMANCE CHART

See page 3.

ASYMMETRIC OPTIC / ASYMMETRIC LENS

Standard Application Example



Focal Point LLC reserves the right to change specifications for product improvement without notification.

ORDERING

	Luminaire Series	FSM2BW	_FSM2BW
	Seem 2 LED Direct/Indirect	FSM2BW	
	Shielding		
	Asymmetric Lens bottom	ASAS	
Asymmetric Optic top	Flush Lens bottom	ASFL	
	0.5" Pop-down Lens bottom	ASPD05	
Asymmetric Optic top	1.5" Pop-down Lens bottom	ASPD15	
	(Individual Units Only)		
	Asymmetric Lens bottom	DCAS	
Dust Cover top	Flush Lens bottom	DCFL	
	0.5" Pop-down Lens bottom	DCPD05	
Dust Cover top	1.5" Pop-down Lens bottom	DCPD15	
	(Individual Units Only)		
	Asymmetric Lens bottom	PUAS	
0.5" Pop-up Lens top	Flush Lens bottom	PUFL	
	0.5" Pop-down Lens bottom	PUPD05	
	Direct Distribution		
	125 Lumens per foot (LD1 & L11 only)	125DN	
	250 Lumens per foot	250DN	
	375 Lumens per foot	375DN	
	500 Lumens per foot	500DN	
	625 Lumens per foot	625DN	
	750 Lumens per foot	750DN	
	875 Lumens per foot	875DN	
	1000 Lumens per foot	1000DN	
	Indirect Distribution		
	250 Lumens per foot	250UP	
	375 Lumens per foot	375UP	
	500 Lumens per foot	500UP	
	625 Lumens per foot	625UP	
	750 Lumens per foot	750UP	
	875 Lumens per foot	875UP	
	1000 Lumens per foot	1000UP	
	1250 Lumens per foot (Not available with Pop-up Lens.)	1250UP	
	Color Temperature		
	2700K, 80+CRI or 90+CRI	27K or 927K	
	3000K, 80+CRI or 90+CRI	30K or 930K	
	3500K, 80+CRI or 90+CRI	35K or 935K	
	4000K, 80+CRI or 90+CRI	40K or 940K	
	Circuits & Zones		
	1 Circuit, non-emergency	1C	
	2 non-emergency circuits provide independent control of Direct and Indirect sources	2C	
	Consult Ordering Guide on page X for multiple circuiting and zoning options	_C_Z_DL	
	Voltage		
	120/277 UNV Volt	UNV	
	347V (LD1 & L11 only)	347	
	Low voltage	LV	
	Control System & Dimming Level		
	0-10V - 10% Dimming	LD1	
	0-10V - 1% Dimming	L11	
	Low-voltage, PoE compatible (No driver. Not available with EM or EC. LV Voltage only)	LVN	
	Lutron Hi-Lume EcoSystem (LDE1) - 1% Dimming	LH1	
	DALI 1% Dimming (750, 875, 1000 DN or UP, 1250UP consult factory)	D11	
	Mounting		_WM
	Wall Mount	WM	
	Factory Options		
	(See Ordering Guide on page 4 for ordering details for DC, EC, EM & ECD.)		
	Daylight Circuit	_DC	
	Emergency Circuit	_EC	
	Emergency Battery Pack ¹	_EM	
	Emergency Control Device ¹	_ECD	
	¹ (4' minimum. 120/277 Volt only.)		
	Finish		
	(See finishes page for The Naturals options)		
	Black	BK	
	Titanium Silver	TS	
	Matte White Housing	WH	
	Luminaire Length		Length per plan
	Specify luminaire/row length in 1' increments (4' minimum. Leave blank for patterns. Smaller increments available, consult factory)	X'	
	Pattern Options		
	(4' minimum length)		
	'L' pattern	A' x B'	
	'U' pattern	A' x B' x C'	
	Rectangular pattern	A' x B' R	
	(Consult factory for other pattern options)		



Options in orange qualify for the Quickship program. 1000' total. Refer to Quickship Guide for complete details including EM/EC options.

4' PERFORMANCE CHART

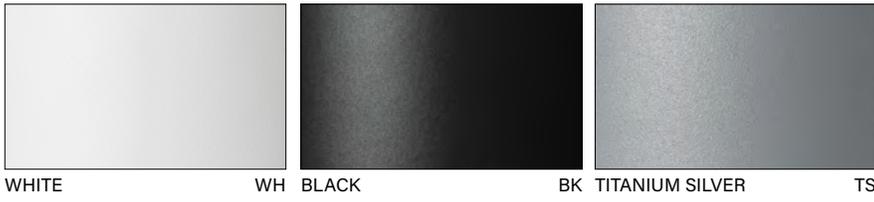
Direct Distribution	Indirect Distribution	Distribution % (Direct/Indirect)	Total Delivered Lumens	Tested System Watts	Lumens Per Watt (LPW)										
					ASAS	ASFL	ASPD05	ASPD15	DCAS	DCFL	DCPD05	DCPD15	PUAS	PUFL	PUPD05
125DN	250UP	33/67	1500	14	106	103	100	101	112	109	106	106	103	100	97
	375UP	25/75	2000	18	112	110	108	108	116	114	111	112	109	106	104
	500UP	20/80	2500	21	117	115	113	113	121	119	117	117	112	110	108
	625UP	17/83	3000	25	119	117	115	116	123	121	120	120	111	109	108
	750UP	14/86	3500	29	117	116	114	115	122	120	119	119	112	110	109
	875UP	13/87	4000	33	118	117	115	116	123	121	120	120	112	111	110
	1000UP	11/89	4500	38	119	118	117	117	124	122	121	121	113	112	111
	1250UP	9/91	5500	47	120	119	118	118	125	124	123	123	—	—	—
250DN	250UP	50/50	2000	18	113	108	104	105	118	112	108	110	110	105	101
	375UP	40/60	2500	22	117	113	109	111	120	116	112	113	114	110	106
	500UP	33/67	3000	25	120	116	113	114	124	120	116	118	116	112	109
	625UP	29/71	3500	29	122	118	115	117	125	122	119	120	115	111	109
	750UP	25/75	4000	33	120	117	114	115	124	121	118	119	115	112	110
	875UP	22/78	4500	37	120	118	115	116	124	122	120	120	115	112	110
	1000UP	20/80	5000	42	121	118	116	117	125	123	121	121	115	113	111
	1250UP	17/83	6000	51	121	119	117	118	126	124	122	123	—	—	—
375DN	250UP	60/40	2500	22	118	108	106	105	122	112	109	109	115	106	103
	375UP	50/50	3000	26	121	112	110	110	123	115	112	112	118	110	107
	500UP	43/57	3500	29	123	115	113	113	126	118	116	116	119	112	110
	625UP	38/62	4000	33	124	117	115	115	127	120	119	118	117	111	110
	750UP	33/67	4500	37	122	116	115	114	126	120	118	118	117	112	110
	875UP	30/70	5000	41	122	117	115	115	126	121	119	119	117	112	111
	1000UP	27/73	5500	46	122	118	116	116	126	122	120	120	117	113	112
	1250UP	23/77	6500	55	122	118	117	117	127	123	122	122	—	—	—
500DN	250UP	67/33	3000	27	120	109	106	106	123	112	109	109	118	107	104
	375UP	57/43	3500	30	122	113	110	110	124	115	112	112	120	110	108
	500UP	50/50	4000	34	124	115	113	113	127	118	115	115	121	112	110
	625UP	44/56	4500	37	125	117	115	114	128	120	117	117	119	112	110
	750UP	40/60	5000	42	123	116	114	114	126	119	117	117	118	112	110
	875UP	36/64	5500	46	123	117	115	115	126	120	118	118	118	112	111
	1000UP	33/67	6000	50	123	117	116	116	127	121	119	119	118	113	111
	1250UP	29/71	7000	59	123	118	117	117	127	122	121	121	—	—	—
625DN	250UP	71/29	3500	32	119	108	104	104	122	110	107	107	117	106	103
	375UP	63/37	4000	36	121	111	108	107	123	112	109	109	119	109	106
	500UP	56/44	4500	39	123	113	110	110	125	115	113	112	120	111	108
	625UP	50/50	5000	42	123	115	112	112	126	117	115	114	118	110	108
	750UP	45/55	5500	47	122	114	112	112	125	117	115	114	118	111	109
	875UP	42/58	6000	51	122	115	113	113	125	118	116	116	118	111	109
	1000UP	38/62	6500	55	122	116	114	114	125	119	117	117	118	112	110
	1250UP	33/67	7500	64	122	117	115	115	126	120	119	118	—	—	—
750DN	250UP	75/25	4000	37	121	109	104	103	123	111	106	105	119	108	102
	375UP	67/33	4500	40	122	112	107	106	124	113	108	108	120	110	105
	500UP	60/40	5000	43	123	114	109	109	125	116	111	111	121	111	107
	625UP	55/45	5500	47	124	115	111	110	126	117	113	113	119	111	107
	750UP	50/50	6000	52	123	115	111	110	125	117	113	113	119	111	108
	875UP	46/54	6500	56	123	115	112	111	125	118	114	114	119	112	108
	1000UP	43/57	7000	60	123	116	112	112	126	119	115	115	119	112	109
	1250UP	38/62	8000	69	123	117	114	114	126	120	117	117	—	—	—
875DN	250UP	78/22	4500	42	119	106	103	102	121	108	105	104	117	105	102
	375UP	70/30	5000	46	120	109	106	105	121	110	107	106	118	107	104
	500UP	64/36	5500	49	121	111	108	107	123	112	110	109	119	109	106
	625UP	58/42	6000	53	122	112	109	109	124	114	111	111	118	109	106
	750UP	54/46	6500	57	121	112	109	109	123	114	112	111	118	109	107
	875UP	50/50	7000	61	121	113	110	110	124	115	113	113	118	109	107
	1000UP	47/53	7500	66	121	113	111	111	124	116	114	114	118	110	108
	1250UP	41/59	8500	75	122	115	113	112	125	118	116	116	—	—	—
1000DN	250UP	80/20	5000	48	118	107	103	103	120	109	105	104	117	106	102
	375UP	73/27	5500	51	120	109	106	105	121	110	107	106	118	108	104
	500UP	67/33	6000	54	121	111	108	107	122	112	109	109	119	109	106
	625UP	62/38	6500	58	122	112	109	109	123	114	111	111	118	109	106
	750UP	57/43	7000	63	121	112	109	109	123	114	111	111	118	109	107
	875UP	53/47	7500	67	121	113	110	110	123	115	112	112	118	110	107
	1000UP	50/50	8000	71	121	113	111	111	124	116	113	113	118	110	108
	1250UP	44/56	9000	80	121	114	112	112	124	117	115	115	—	—	—

*Based on 3500K, 4' lengths. Lumen Multipliers: Delivered lumens may vary +/- 5%. Actual wattage may vary +/- 5%.



Finishes

STANDARD FINISHES



THE NATURALS (25% SCALE)





Ordering Guide

Bidirectional Linear Circuitry, Zones & Factory Options

HOW TO USE THIS GUIDE

Fill out the worksheet on the following page to specify your requirements for circuitry, zones, and factory options.

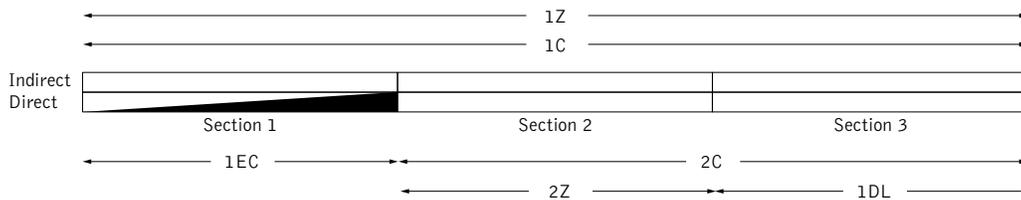
Refer to the run chart for standard run configurations, consult factory for custom configurations.

Complete the Totals / Ordering Codes at the bottom of the worksheet and add to your ordering logic on the cut sheet.

Submit the worksheet along with your order.

TOTAL RUN LENGTH: <u>24ft</u>		JOB NAME: _____				FIXTURE TYPE: _____			
HOUSING SECTION	SECTION LENGTH	LIGHT DISTRIBUTION	SHARED ELECTRICAL FEED, NORMAL POWER			FACTORY OPTIONS			
			SWITCHING CIRCUIT	DIMMING ZONE	DAYLIGHT ZONE	SEPARATE ELECTRICAL FEEDS			EM
			DAYLIGHT CIRCUIT	EMERGENCY CIRCUIT	ECD				
1	8	Indirect	1C	1Z					
		Direct					1EC		
2	8	Indirect	1C	1Z					
		Direct	2C	2Z					
3	8	Indirect	1C	1Z					
		Direct	2C		1DL				
Totals / Ordering Codes			2C	2Z	1DL		1EC		

ORDERING: FSM4BS-FL-625UP-125DN-35K- **2C2Z1DL** -UNV-LD1-C24- **1EC** -WH-24ft



KEY	
C = Switching Circuit Switched Hot / Shared Neutral	DC = Daylight Circuit Switched Hot / Separate Neutral
Z = Dimming Zone Dimming Control Wires	EC = Emergency Circuit Switched Hot / Separate Neutral
DL = Daylight Zone Daylight Dimming Control Wires	ECD = Emergency Control Device Unswitched Hot / Separate Neutral
	EM = Emergency Battery Unswitched Hot / Shared Neutral

DEFAULTS

- Zones and Factory Options illuminate entire sections from 4' to 8' in length.
- EC, EM, and ECD only available for direct distribution.
- One shared or isolated circuit and zone required per housing section.
- Additional electrical feed required for applications greater than three shared circuits and zones.
- Limit of one EM or ECD per housing section.
- Each EC, DC and ECD require an additional electrical feed.
- ECD not available in the same housing section as EC.
- Longer lead times and additional pricing may apply for custom run configurations.

CUSTOM LENGTHS

- If partial illumination of emergency or daylight section is required, indicate in ordering guide and add "partial illumination" in Order Notes. Drawing required.
- Engineering validation required, longer lead times may apply.



Ordering Guide Worksheet

Linear Circuitry, Zones & Factory Options

TOTAL RUN LENGTH: _____		JOB NAME: _____				FIXTURE TYPE: _____			
HOUSING SECTION	SECTION LENGTH	LIGHT DISTRIBUTION	SHARED ELECTRICAL FEED, NORMAL POWER			FACTORY OPTIONS			EM
			SWITCHING CIRCUIT	DIMMING ZONE	DAYLIGHT ZONE	SEPARATE ELECTRICAL FEEDS		ECD	
						DAYLIGHT CIRCUIT	EMERGENCY CIRCUIT		
1		Indirect							
		Direct							
2		Indirect							
		Direct							
3		Indirect							
		Direct							
4		Indirect							
		Direct							
5		Indirect							
		Direct							
6		Indirect							
		Direct							
7		Indirect							
		Direct							
8		Indirect							
		Direct							
9		Indirect							
		Direct							
10		Indirect							
		Direct							
11		Indirect							
		Direct							
12		Indirect							
		Direct							
Totals / Ordering Codes									

WORKSHEET

Combine to create Circuits & Zones ordering code

Enter as individual Factory Options

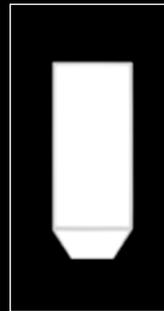
RUN CHART

Run length (ft)	Housing Configuration Section Lengths	Run length (ft)	Housing Configuration Section Lengths	Run length (ft)	Housing Configuration Section Lengths	Run length (ft)	Housing Configuration Section Lengths
9	5 + 4	21	8 + 8 + 5	33	8 + 8 + 8 + 5 + 4	45	8 + 8 + 8 + 8 + 8 + 5
10	6 + 4	22	8 + 8 + 6	34	8 + 8 + 8 + 6 + 4	46	8 + 8 + 8 + 8 + 8 + 6
11	7 + 4	23	8 + 8 + 7	35	8 + 8 + 8 + 7 + 4	47	8 + 8 + 8 + 8 + 8 + 7
12	8 + 4	24	8 + 8 + 8	36	8 + 8 + 8 + 8 + 4	48	8 + 8 + 8 + 8 + 8 + 8
13	8 + 5	25	8 + 8 + 5 + 4	37	8 + 8 + 8 + 8 + 5		
14	8 + 6	26	8 + 8 + 6 + 4	38	8 + 8 + 8 + 8 + 6		
15	8 + 7	27	8 + 8 + 7 + 4	39	8 + 8 + 8 + 8 + 7		
16	8 + 8	28	8 + 8 + 8 + 4	40	8 + 8 + 8 + 8 + 8		
17	8 + 5 + 4	29	8 + 8 + 8 + 5	41	8 + 8 + 8 + 8 + 5 + 4		
18	8 + 6 + 4	30	8 + 8 + 8 + 6	42	8 + 8 + 8 + 8 + 6 + 4		
19	8 + 7 + 4	31	8 + 8 + 8 + 7	43	8 + 8 + 8 + 8 + 7 + 4		
20	8 + 8 + 4	32	8 + 8 + 8 + 8	44	8 + 8 + 8 + 8 + 8 + 4		

Standard run configurations, consult factory for custom configurations.

Seem® 1

VANITY



Lit end detail



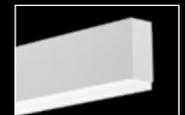
The Naturals collection - Chestnut shown



Lit End

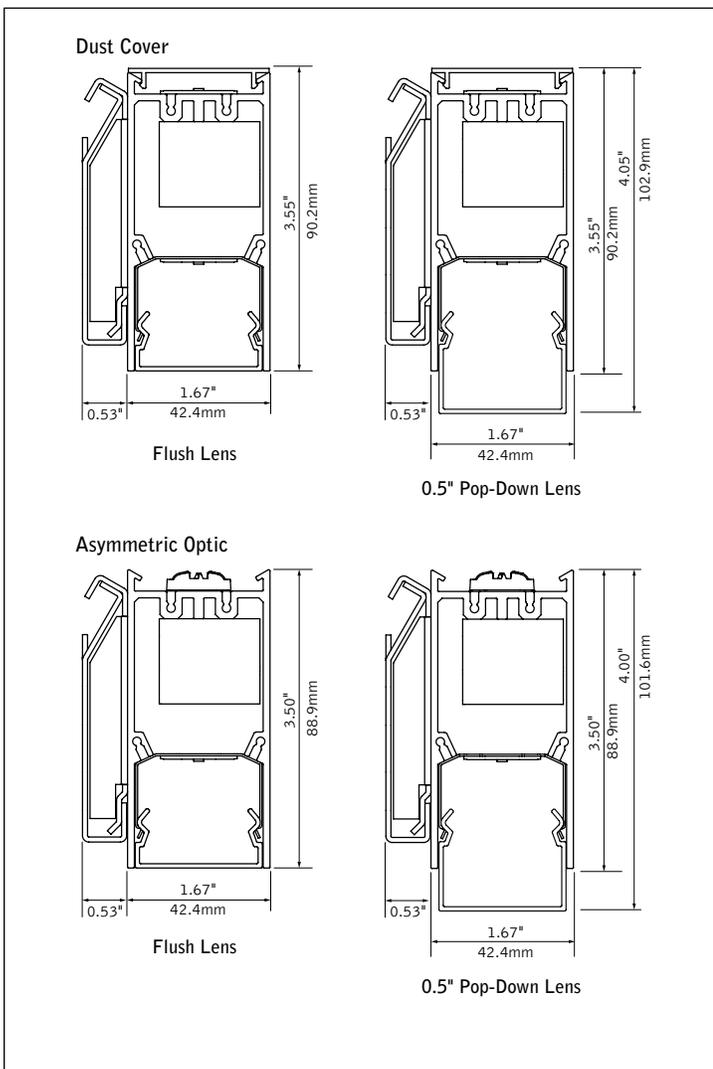


Flush Lens



Pop-Down Lens

DIMENSIONAL DATA



FEATURES

Individual, 2-foot-long, 1.5" aperture, extruded aluminum direct/indirect wall mounted vanity luminaire.

Dust cover option provides easy cleaning ideal for healthcare environments.

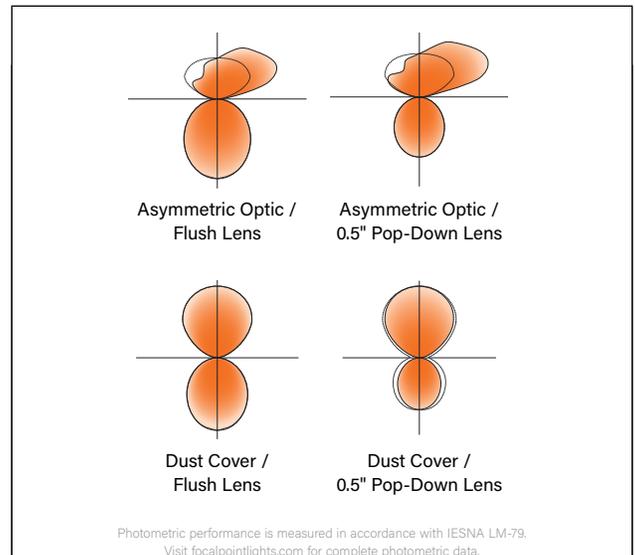
Lit end, Flush lens or 0.5" Pop-Down lens options available with dust cover or asymmetric indirect.

LED position and lens material optimized to provide the perfect blend of high performance and visual comfort.

PoE compatible: Integrates with Power over Ethernet lighting systems via standard, low-voltage wires.

Available with The Naturals, a series of finishes that exude biophilic beauty.

DISTRIBUTIONS





Finishes

STANDARD FINISHES



THE NATURALS (25% SCALE)



Prestige™ Edge-Lit Series

Premium die-cast aluminum exit sign



Construction

- Housing, trim plate, trim ring and canopy made of die-cast aluminum
- U-shaped clear acrylic Legend panel features laser-etched letters and chevrons
- 6 inch EXIT lettering legend, available in red or green
- 8 inch EXIT lettering legend, available in red
- Choice of finishes: white, black or brushed aluminum, polished brass, polished chrome or bronze

Mounting

- Modular design allows for surface or recessed mount
- Canopy included for surface wall, end or ceiling mount applications
- Trim ring included for recessed wall or ceiling mount applications.
- Housing provided with conduit knock-out 1/2", top, back and end
- (C) circular or (A) angular trim plate used for surface or recessed wall or ceiling mount applications
- Hanger bars included for lay-in installation in T-bar grid

Special wording panels

- Available. Contact your sales representative with your design requirements

Electronics

- Optional Advanced Diagnostics
- Optional Nexus® monitoring system
- 120-277 50/60Hz

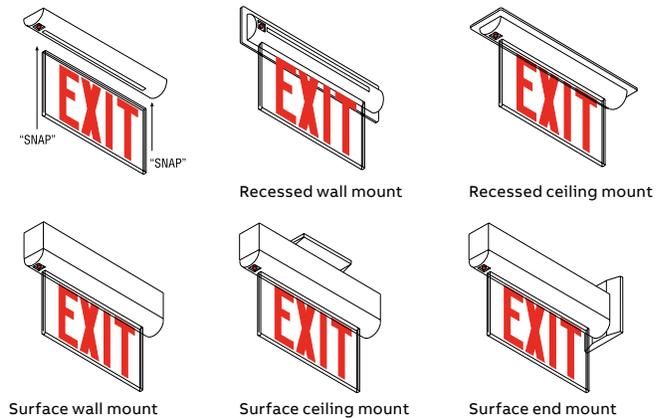
Approvals

- UL 924 listed
- Meets NFPA101 (Life Safety Code), NFPA 70 NEC, OSHA illumination standards
- E-California Energy Commission Title 20

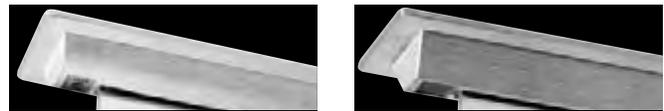
Warranty

- Unit has a five-year limited warranty
Detailed warranty terms located on page 202 or online at:
www.emergi-lite.com/usa/files/EL_Warranty.pdf

Mounting configurations



Trim plates

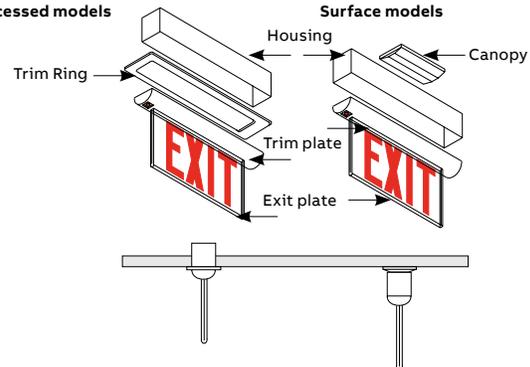


Circular trim plate

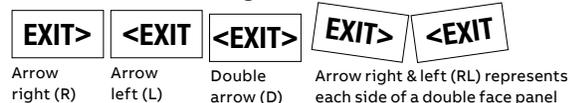
Angular trim plate

Recessed models

Surface models



Arrow (chevron) designation



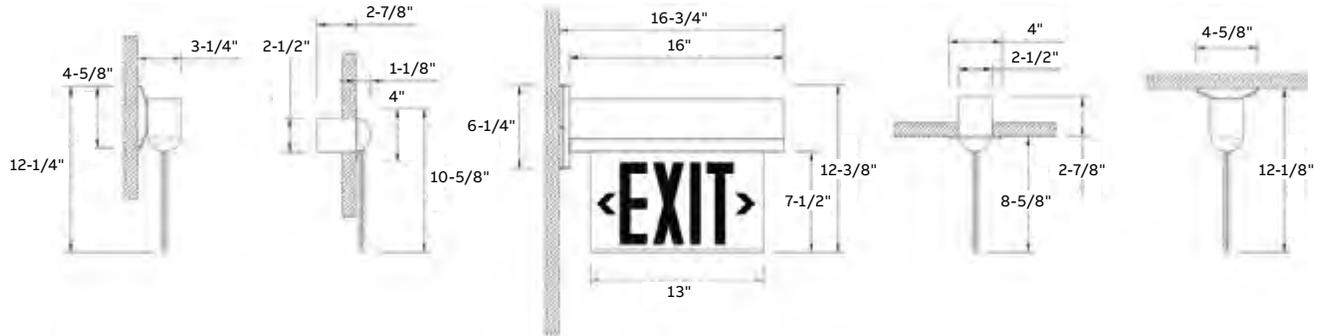
Wording and chevrons not to scale. For illustration purposes only.

Housing color



Dimensions

Dimensions are approximate and subject to change.



Power consumption

Model		AC specs		DC specs
AC-only	120 to 277VAC, 50/60Hz	Less than 1.4W	-	-
AC/DC-remote	120 to 277VAC, 50/60Hz	Less than 1.4W	6 to 24VDC	Less than 1.4W
Self-powered	120 to 277VAC, 50/60Hz	Less than 2.3W	Ni-Cd battery	Min. 90 minutes
Self-powered diagnostic	120/277VAC, 50/60Hz	Less than 2.3W	Ni-Cd battery	Min. 90 minutes

Accessories (order as a separate item)

Description	Suffix ¹
White pendant	P*-WT
Black pendant	P*-BK
Gray pendant	P*-GY

¹Custom pendant lengths and colors available, specify (12", 24", 36", etc.)

How to order

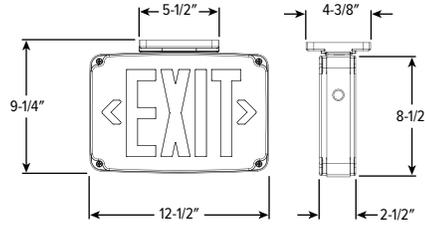
Housing color	Series	Faces	Designation	Legend color	Background color	Arrows
Blank= Brushed aluminum	LX= AC-only LXN= Self-powered	1= Single face 2= Double face	N= New design	R= Red G= Green	C= Clear (single face only) W= White M= Mirror	Blank= No arrow D= Double arrow L= Arrow left R= Arrow right RL= Right & left (double face) UA= Universal field installed arrows
W= White B= Black PB= Polished brass CH= Polished chrome BR= Bronze						
Trim	Mounting	Options	Legend size			
-C= Circular -A= Angular	Blank= Universal mount	Blank= No option -NEX= Nexus® wired ¹ (consult your sales representative) -NEXRF= Nexus® wireless ¹ (consult your sales representative) -D= Self-test and diagnostic ¹ -DC= AC/DC remote 6-24 VDC -FA= Fire alarm ¹ -FZ= Flasher & buzzer ¹ -2CKT= Two circuit, AC only	Blank= 6" EXIT legend -8= 8" EXIT legend (red only) -LP= Panel shipped separately -X= Back box shipped separately			

Example: WLXN2NRWRL-A-D

¹Self-powered only



EXIT/WET/CP LED Compact Wet Location Exit Sign



CATALOG #: _____

Type: _____

PROJECT: _____

FEATURES

- Optional tamper-resistant hardware helps discourage unauthorized access to the unit
- Ideal for schools, hallways, stairwells, dormitories, locker rooms, or vandal prone areas when specified with TP option
- Unique dual color LED indicator light provides battery condition alert on emergency units
- Ultra-bright, energy efficient, long-life LEDs available in red or green
- Wet location listed
- EM unit provides 90 minutes of emergency operation
- Available as full-time AC powered unit or emergency unit with battery backup
- Fully automatic solid-state system on EM units recharges battery in 24 hours
- Corrosion-resistant enclosure with engineering grade silicone gasket
- Removable directional indicators
- Custom messages available, consult factory for details
- Self-diagnostic option performs monthly, biannual, and annual tests to ensure reliable operation and meets electrical and life safety codes

ORDERING EXAMPLE: EXIT/WET/CP - SF - R - WHT - AC - OPTIONS - D

ORDERING INFO

SERIES	NUMBER OF FACES	LETTER COLOR	HOUSING COLOR	POWER OPTIONS
EXIT/WET/CP	SF Single face DF Double face	R Red G Green	BLK Black GRAY Gray with white faceplate WHT Industry-standard white	AC AC operation EM AC operation with emergency battery backup

OPTIONS	VOLTAGE
COPY/SF Custom message, single face ^[1]	D 120V/277V
COPY/DF Custom message, double face ^[2]	120 120V
DC Dual circuit ^[3]	277 277V
SDT Self-diagnostic test ^[4]	
TP Tamper-resistant hardware	
SALIDA Salida faceplate ^[5]	
PC2 Polycarbonate shield ^[6]	
WG Wireguard, white ^[7]	

SPECIFICATIONS

- HOUSING** – 5VA flame retardant, UV-stabilized polycarbonate. High-impact resistant, UV-stabilized polycarbonate clear lens.
- ELECTRICAL** – Dual 120/277 voltage standard. 4.8V long life, maintenance-free, rechargeable NiCd battery when specified with EM power option.
- MOUNTING** – Surface or wall mount. Polycarbonate mounting canopy for top or end mount. Universal knockout pattern on back plate for wall mount.
- LISTINGS** –
 - UL 924 standard as an exit light suitable for wet locations (-20°C - +50°C).
 - Meets NFPA 101 Life Safety Code, NEC, OSHA, Local and State Codes.
 - Certified to CEC under Title 20 Regulations.
- WARRANTY** – 5-year limited warranty.

NOTES

- Consult factory.
- Consult factory.
- AC only. Must specify 120V or 277V.
- EM only.
- Contact factory for options.
- Wall mount only. Ships separately. See page 2 for OPTIONS DETAILS.
- Wall mount only. Ships separately. See page 2 for OPTIONS DETAILS.

EXIT/WET/CP^{LED}

Compact Wet Location Exit Sign

ELECTRICAL INFORMATION

CATALOG NUMBER	INPUT WATTS (W)		INPUT AMPS (A)	
	120V	277V	120V	277V
EXIT/WET/CP	2.7	2.7	0.025	0.011
EXIT/WET/CP-EM-SDT	3.3	3.4	0.030	0.014
EXIT/WET/CP-DC	2.4	2.4	0.023	0.011

OPTIONS DETAILS

Wall mount only. Ships separately.

PC2



DIMENSIONS: 15" x 22" x 7-3/4"

WG



DIMENSIONS: 13-3/4" x 15-1/4" x 6"

HP2 LED (INTEGRAL DRIVER)

IP68 RATED

DATE: PROJECT: TYPE:

CATALOG NUMBER LOGIC:



*Only available with x58-x63

**Only available with x43-x45, x70-x71, & x76

***Select up to 2. Accessory Holder required.

****120V

*****Aluminum only.

CATALOG NUMBER LOGIC

Example: HP2 - LED - TR - x61 - SP - SAP - 10/11 - INC - MT - AH - TC

MATERIAL

(Blank) - Aluminum B - Brass S - Stainless Steel

SERIES

HP2 - In-grade with Flush Mounted Faceplate

OptiLock®

LED - Cold Phosphor Technology

HOUSING

TR - Integral Housing

LED TYPE

x58 - 12W LED/2700K **x62 - 20W LED/3000K** x45 - 34W LED/4000K
 x59 - 12W LED/3000K x63 - 20W LED/4000K x70 - 34W LED/2700K 90CRI
 x60 - 12W LED/4000K x43 - 34W LED/2700K x71 - 34W LED/3000K 90CRI
 x61 - 20W LED/2700K x44 - 34W LED/3000K x76 - 34W LED/3500K 80CRI

OPTICS

SP - Spot (15°)* FL - Flood (35°)*
 NFL - Narrow Flood (25°)** WFL - Wide Flood (60°)

FINISH (See page 2 for full-color swatches)

Standard Finishes (BZP, BZW, BLP, BLW, WHP, WHW, SAP, VER)

Premium Finish (ABP, AMG, AQW, BCM, BGE, BPP, CAP, CMG, CRM, HUG, NBP, OCP, RMG, SDS, SMG, TXF, WCP, WIR)

Also available in RAL Finishes

Brass Finishes (MAC, POL, MIT)

Stainless Steel Finishes (MAC, POL)

ACCESSORY***

10 - Spread Lens

11 - Honeycomb Baffle

12 - Soft Focus Lens

13 - Rectilinear Lens

CONTROL TYPE

ELV - Dimming Driver (For use with Electronic Low Voltage Dimmer)****

INC - Dimming Driver (For use with Incandescent Dimmer)****

010 - 0-10V Dimming Driver (Dimming 1 - 100%)

INPUT VOLTAGE

MT - 120/208/240/277 Multi Tap

OPTIONS

AH - Accessory Holder

TC - Traction Control Lens

GM-R - Round Grout Mask

GM-S - Square Grout Mask

GS - Glare Shield*****

HD - Half Dome*****

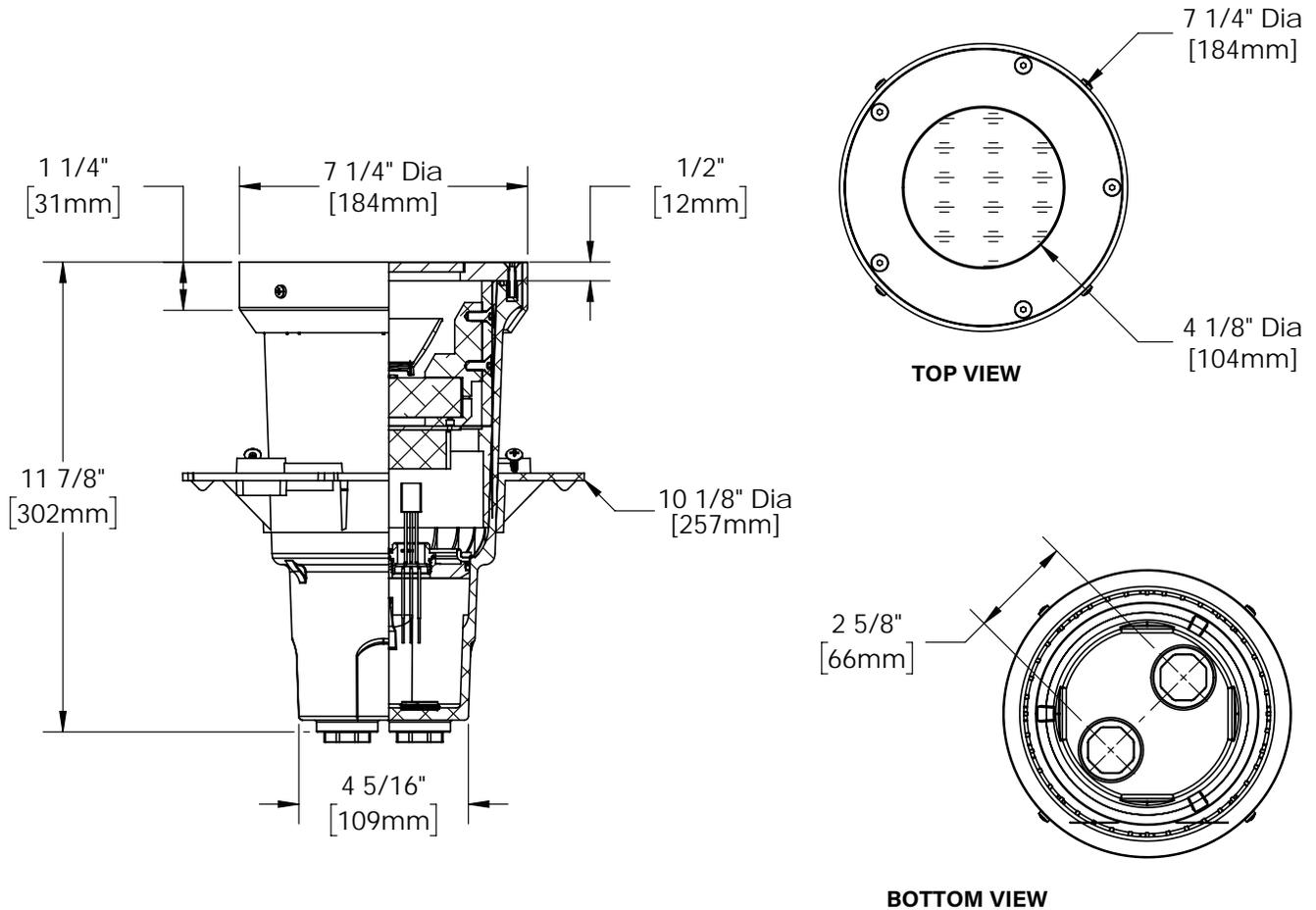
RG - Rock Guard****

RO - Rock Guard with Optical Opening*****

HP2 LED (INTEGRAL DRIVER)

IP68 RATED

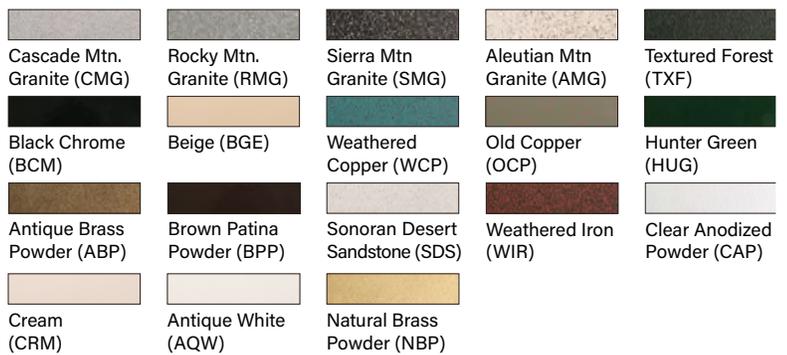
DATE: _____ PROJECT: _____ TYPE: _____



STANDARD FINISHES



PREMIUM FINISHES



[Click Here](#) to view larger, full-color swatches of all available finishes on our website.

B-K LIGHTING

MADE IN THE USA

559.438.5800 | INFO@BKLIGHTING.COM | BKLIGHTING.COM

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11/10/2023 SKU-879
SUB-2405-00

HP2 LED (INTEGRAL DRIVER)

IP68 RATED

DATE: PROJECT: TYPE:

ACCESSORIES (Configure separately)

SPECIFICATIONS

ELECTRICAL	WATTAGE	12W, 20W, or 34W
	WIRING / CONNECTORS	XLPE coated wire, (3)18 gauge and [(2)22 gauge- only included with 0-10V Dimming applications], 300V, 125°C rated and certified to UL3265 standard. Features OptiLock® and gear tray quick disconnects. Patented HydroLock® with three (3) Water-Tight connectors supplied for incoming connection. Maximum (2) #10 & (1) #18. Minimum (1) #12 & (1) #18.
	DRIVER ASSEMBLY	For use with [1] 700mA (12W/20W) / 1.05A (34W), constant current driver. 120-277VAC (nominal) primary input voltage. 50/60Hz. >0.90 Power Factor, <250mA in-rush current, .20%THD (nominal at 120VAC full load), with output over-voltage, over-current, and short circuit protection with auto recovery. Class 2 power supply; FCC47CFR Part 15 Compliant Class B (120VAC)/Class A (277VAC). Incandescent Control Option Driver: Dimming driver for use with standard incandescent dimmers at 120VAC(10-100% range). ELV/0-10 Control Option Driver: Dimming driver for use with standard electronic low voltage (120VAC only - 10-100% dim. range)/0-10V dimmers (1-100% dim. range).
PHYSICAL	FIXTURE HOUSING	Corrosion-free, high strength, flame retardant and UV stabilized, injected molded polycarbonate. Two (2) bottom-entry, 3/4" NPT female conduit entries with knockout plugs and four (4) side flats for 1/2" or 3/4" conduit adapters.
	PATENTED STABILITY FLANGE	Corrosion-free composite flange projects into installation substrate to reinforce housing stability. Integral REBAR saddles simplify installation into concrete form. Four (4) orthogonal bosses permit use of 1/2" PCV conduit or EMT to simplify vertical position and leveling of housing. Preset self-tapping screws anchor housing at proper elevation.
	AIMING	Dual axis heat sink system rotates 360° and provides vertical adjustment up to 15° from nadir. Positive lock action ensures optical orientation.
	COLOR MANAGEMENT	Corrected cold phosphor technology delivers near-perfect natural white light. Long term phosphor maintenance over product life. Exact color point conformity exceeds ANSI C78.377 standard. Provides uniform beam with no color variation over angle. Module exceeds 80 CRI (RA>80, R9>16).
	OPTICS	Interchangeable, color-coded OPTIKIT modules permit field changes to optical distribution.
	INSTALLATION	For direct burial in soil or concrete. Consult Drainage Installation Guide for In-Grade Fixtures (DIG-IT) for compliance with proper soil preparation and drainage requirements prior to installation.
	WATER MANAGEMENT	High temperature silicone 'O' Ring at faceplate. HydroLock® technology provides fail-safe water barrier between junction box and interior components. IP68 rated.
	LENS	High heat, Shock-resistant, 1/4" Tempered Soda Lime glass lens.
	FACEPLATE	Options include solid, 1/2" machined 6061T6 aluminum, brass or stainless steel with five (5) black oxide, captive, stainless steel mounting screws.
	FINISH	StarGuard, our 15-stage chromate-free process cleans and conversion coats aluminum components prior to application of Class 'A' TGIC polyester powder coating and is RoHS compliant.
WARRANTY	5-year limited warranty.	
CERTIFICATION & LISTING	UL Listed. Certified to CAN/CSA/ANSI Standards. IP68 Rated. Made in the USA with sustainable processes.	



B-K LIGHTING | MADE IN THE USA | 559.438.5800 | INFO@BKLIGHTING.COM | BKLIGHTING.COM

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LAMP & DRIVER DATA (x58, x59, x60, x61, x62, x63, x43, x44, x45)

DATE: _____ PROJECT: _____ TYPE: _____

DRIVER ELECTRICAL DATA

Type	AC Input Range	Frequency Hz	Power Factor At Full Load (Efficiency)	THD	Operation Ambient Temperature	Dimmer Type	Dimmer Range
ELV	105-305Vac	50/60	> 0.90	≤20%	-30° C ~ 70°C	Electronic Low Voltage	10-100%
INC	105-305Vac	50/60	> 0.90	≤5%	-30° C ~ 50°C	Incandescent	10-100%
0-10	105-305Vac	50/60	> 0.90	≤20%	-30° C ~ 70°C	0-10	1-100%

LM79 DATA

L70 DATA

OPTICAL DATA

BK No.	CCT (Typ.)	CRI (Typ.)	Input Watts (Typ.)	Minimum Rated Life (hrs.) 70% of initial lumens (L ₇₀)	Angle	CBCP	Delivered Lumens
x58	2700K	80	12W	50,000	15°	3877	724
	2700K	80	12W	50,000	35°	1498	663
	2700K	80	12W	50,000	60°	629	625
x59	3000K	80	12W	50,000	15°	4059	758
	3000K	80	12W	50,000	35°	1568	694
	3000K	80	12W	50,000	60°	659	655
x60	4000K	80	12W	50,000	15°	4561	851
	4000K	80	12W	50,000	35°	1762	780
	4000K	80	12W	50,000	60°	740	736
x61	2700K	80	20W	50,000	15°	7098	1306
	2700K	80	20W	50,000	35°	2621	1124
	2700K	80	20W	50,000	60°	1048	1063
x62	3000K	80	20W	50,000	15°	7488	1378
	3000K	80	20W	50,000	35°	2765	1186
	3000K	80	20W	50,000	60°	1106	1121
x63	4000K	80	20W	50,000	15°	7800	1435
	4000K	80	20W	50,000	35°	2880	1235
	4000K	80	20W	50,000	60°	1152	1168
x43	2700K	80	34W	50,000	25°	5435	1915
	2700K	80	34W	50,000	60°	2697	1860
x44	3000K	80	34W	50,000	25°	5672	1998
	3000K	80	34W	50,000	60°	2814	1941
x45	4000K	80	34W	50,000	25°	5908	2081
	4000K	80	34W	50,000	60°	2931	2022

OPTICS

Optic	Angle
Spot	15°
Narrow Flood	25°
Flood	35°
Wide Flood	60°

LINEA 950

Illuminating Bollard



DESCRIPTION

The simple linear form of LINEA combined with LED illumination provides a synergy of form and function. High-power LEDs provide a wide asymmetric distribution while generating no light above ninety degrees horizontal. Bollard housing and shaft are single-piece and finished in finely textured paint. All hardware is stainless steel.



Date: _____ Type: _____ Catalog Number: _____

Project Name: _____

ORDERING INFORMATION

LUMINAIRE							
MODEL	CONFIGURATION	OUTPUT	CCT	CONTROL	VOLTAGE	FINISH	OPTION
LN950-IF Linea 950 with Internal Flange Mount	S Single Head	SO Standard Output	30K 3000K	DIM 0-10v Dimming	UNV 120-277v	BL Black	GFCI GFCI Receptacle
LN950-EF Linea 950 with External Flange Mount	D Dual Head	HO High Output	40K 4000K			DB Dark Bronze	OCC Occupancy Sensor
			A True Amber ¹ (590-595nm)			DG Dark Grey	TVSS20 20KV Surge Suppressor
			¹ Amber available in Standard Output only.			GG Graphite Grey	BSS Beach-Side Shield ²
						SG Silver Grey	² Available with Single Head Amber Bollard Only
						CC Custom RAL Color	

MOUNTING KIT (Required, Ordered Separately)

MODEL
LN950-IF-MK Mounting Kit for Linea 950 with Internal Flange Mount (Includes (4x) ø0.5" x 15" x 3" Anchor Bolts and Hot-dip Galvanized Steel Mounting Plate)
LN950-EF-MK Mounting Kit for Linea 950 with External Flange Mount (Includes (4x) ø0.375" x 8" x 1.5" Anchor Bolts and Hot-dip Galvanized Steel Mounting Plate)

Consult factory for availability of custom options. Factory assistance is available via phone at (864) 487-3535 ext. 258 or via email at DesignServices@EXP-Brands.com.

LINEA 950

Illuminating Bollard

.hess

SPECIFICATIONS

HOUSING

Single piece bollard consists of one or two integral luminaire heads and shaft fabricated from rectangular 6061 aluminum alloy with radiussed corners. Nominal wall thickness is 0.187" with cross-section of 7.5" x 3.5". LED light engine and driver are housed in self contained weather-proof powerpack enclosure within the bollard and removable with a single fastener. Lens is clear impact-resistant acrylic. LED array is thermally managed using convection and transmission of heat through the use of an aluminum heat sink and the luminaire housing. All hardware is stainless steel.

OPTICS

Each LED light engine consists of five high output multi-chip LED arrays fitted with prismatic lens optics to produce a uniform asymmetric light distribution pattern suitable for pathways and sidewalks. Luminaire emits zero uplight at or above 90 degrees horizontal and qualifies for use in LEED zones LZ1, LZ2, LZ3, and LZ4. Color temperature may be 3000K or 4000K at CRI>80.

ELECTRICAL

Standard Output: Integral dimmable LED driver is housed in luminaire head. Each luminaire head consumes 16 watts at 350 mA. Twin mount bollard with two heads consumes 32 watts. Input voltage range is 120v - 277v AC, 50-60 Hz. LED driver shall be UL recognized.

High Output: Integral dimmable LED driver is housed in luminaire head. Each luminaire head consumes 33 watts at 700 mA. Twin mount bollard with two heads consumes 66 watts. Input voltage range is 120v - 277v AC, 50-60 Hz. LED driver shall be UL recognized.

LED DELIVERED LUMENS / BUG RATING PER LUMINAIRE HEAD

Standard Output: 17 Watts

3000K: 568 Lumens / B0-U0-G1

4000K: 659 Lumens / B0-U0-G1

High Output: 34 Watts

3000K: 1061 Lumens / B0-U0-G2

4000K: 1239 Lumens / B0-U0-G2

NOTE:

Due to rapid and continuous advances in LED technology, LED luminaire data is subject to change without notice and at the discretion of HessAmerica. Consult factory for current technical data.

MOUNTING

Flangeless mounting is standard. Optional external flange mounting available on request.

WEIGHT

20 Pounds

FINISH

Standard finishes are finely textured matte silver grey metallic, dark grey, graphite grey, matte black, or dark bronze. Special colors available on request.

CERTIFICATION

NRTL Certified for Wet Locations

WARRANTY

Limited product warranty period including LEDs is five years. Driver shall carry the manufacturer's limited warranty.

EXPERIENCE
BRANDS

www.HessAmerica.com

For other Experience® Brands companies, please visit www.ExperienceBrandsUSA.com.

In a continuing effort to offer the best product possible, we reserve the right to change, without notice, specifications or materials. Technical specification sheets that appear online are the most recent ones available. Consult the factory to verify current status of BAA/TAA/BABAA compliance.

2/4

Rev 20240926

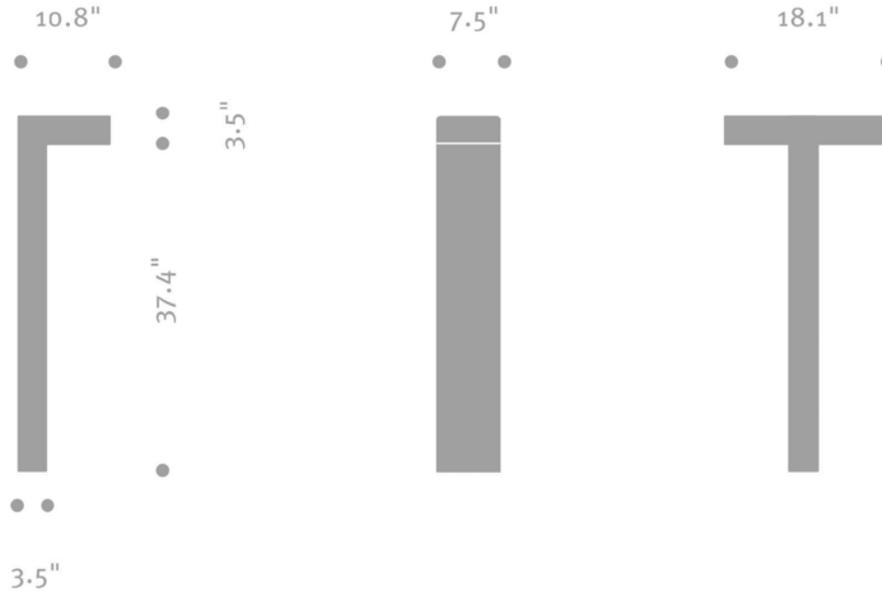
LINEA 950

Illuminating Bollard

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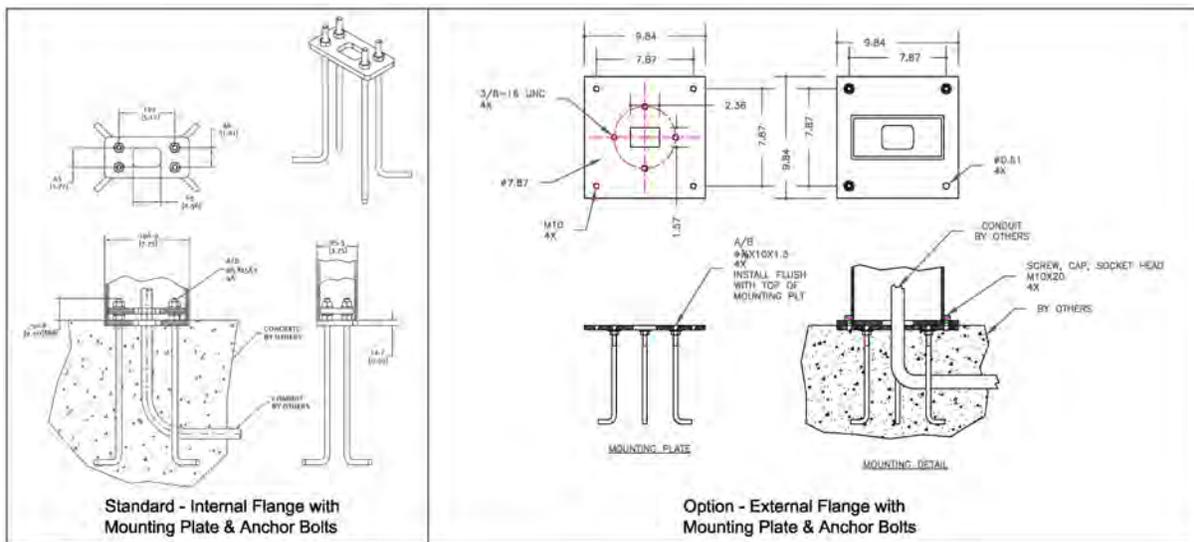
DIMENSIONS

All dimensions are shown in inches unless otherwise noted.



MOUNTING DETAILS

All dimensions are shown in inches unless otherwise noted.



LINEA 950
Illuminating Bollard

.hess

CUSTOMIZE YOUR EXPERIENCE.

At Experience Brands, we believe every space deserves unique lighting elements. We proudly specialize in crafting solutions that reflect your personal vision. Our expert team is here to collaborate with you to design and implement customized features that elevate your environment.

Ready to Get Started? Email us at: DesignServices@exp-brands.com

Day-Brite



by Signify

Industrial

Vaporlume LED DW

4' sealed industrial
4300 to 7000 lm

TYPE ZP1



Control options available

Day-Brite / CFI Vaporlume LED sealed industrial DW is a specialized wet location, IP rated product designed for use in both indoor and outdoor environments. It is a wet location listed, non-corrosive luminaire available in both fluorescent and LED light sources.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lumens: _____ Qty: _____
 Notes: _____

Ordering guide

Example: DWAE51L840-4-UNV-MD360W

Family	Application	Lens	Hubs Installed	Lumen Package	Color Temp.	Length	Voltage	Driver	Options
D	W		E						
D Sealed industrial	W Wet Location	A DR Acrylic P Polycarbonate L Enhanced LED Acrylic	E Ends only	35L 3500 nominal lumens 43L 4300 nominal lumens 51L 5100 nominal lumens (25°C ambient) 51LH 5100 nominal lumens (-35°C to 40°C) 70L 7000 nominal lumens Other lumen packages may be ordered in increments of 100lm up to 7000 lumens.	830 80 CRI, 3000K 835 80 CRI, 3500K 840 80 CRI, 4000K 850 80 CRI, 5000K	4 4'	UNV Universal Voltage, 120-277V 347' 347V 480' 480V	blank 0-10V SDIM ² Step dimming to 40% input power	MD360W ³ Wet location occupancy sensor, external MD360WD ³ Wet location occupancy sensor, (ON/DIM to 10%) WHP Wide beam optic EMLED ³ Integral emergency IP67 Protection against effects of immersion GLR Fusing, fast blow SWZCSH ⁴ Interact Pro scalable high bay sensor with integral daylight & occupancy sensing, advanced grouping with dwell time SNH200 ⁴ Integral EasySense occupancy & daylight sensor, with advanced SpaceWise type wireless grouping SSL Stainless steel latches

Footnotes

- All 347V and 480V models available only for (-20°C to 25°C) ambient. Not available for use with 51LH or SDIM options.
- Step dim (SDIM) option not available on 51LH.
- EMLED option not available on 347V or 480V models.
- High bay motion detector. Motion sensing zone is extremely limited if used below 15' mounting height.
- Not available with SWZCSH or SNH200 option.

Accessories (order separately)

- TBK** - Stainless Steel Top Bracket Kit (pair of brackets plus hardware)
- EBK** - Stainless Steel End Bracket Kit (pair of brackets plus hardware)
- WBK** - Stainless Steel Wraparound Bracket Kit (pair of brackets)
- FKR-126** - Chain Hanger Set (requires TBK)
- V2/DW-4ARL-CS** - 4' Acrylic Replacement Lens
- V2/DW-4PRL** - 4' Polycarbonate Replacement Lens
- V2/DW-4LRA** - 4' LED Frosted Acrylic Replacement Lens



interact ready.

06/13/25

DW Vaporlume LED sealed industrial

4', 3500 to 7000 lumens

Application

- Ideally suited for use in refrigerated cold storage, industrial, parking garage, and canopy applications.
- Acceptable for outdoor as well as indoor installations.
- Can be surface (wall/ceiling) or suspended mounted unless otherwise specified.
- Wet Location – Areas of high humidity, water vapor, rain, incidental water spray, or other non-corrosive or nonflammable liquid.
- Excellent for applications such as garages, stairwells, storage areas, horizontal shelf-mount refrigerated cases, and cold storage.
- Mounting brackets available, order separately.
- IP65 rating standard. IP67 configuration available.
- LED sources provide excellent low temperature performance. This product can replace a fluorescent model in cold environments with significant energy savings.
- 51LH model listed for use in -35°C to 40°C ambient. 50,000 hour L70 lumen maintenance.
- 35L/43L models listed for use in -20°C to 40°C ambient. 100,000 hour L70 lumen maintenance.
- 51L/70L models listed for use in -20°C to 25°C ambient. L70 lumen maintenance is 100,000 hours for 51L model, and 50,000 hours for 70L.
- NSF Certified for Non-Food Zone Installations.
- EMLLED 1100lm nominal in DC mode
- WHP wide optic is an acrylic lens factory installed on the LED arrays, provides compliance to DLC requirements for parking garage luminaires

Construction/Finish

- Non-conductive, non-corrosive housing.
- Smooth exterior surface for easy cleaning.
- White one piece, molded fiberglass reinforced polyester body. No rusting, no oxidation, and no corrosion.
- Standard acrylic lens (A) is stippled sheet of .130" nominal thickness.
- Optional LED lens (L) designed specifically to further reduce pixilated glare from LED's. Linear rib profile.
- Optional polycarbonate lens (P) will not be yellowed by LED sources because they do not produce UV.

- Continuous compressible closed cell gasket provides tight seal between plastic enclosure and luminaire body.
- White ABS cam action latches standard.
- Pre-painted steel lighting channel.
- Two gasketed threaded (½" trade size) wet location hubs installed on ends.

Electrical

- High efficiency LEDs provide up to 100,000 hour rated life (L70, defined as 70% lumen maintenance @ rated maximum ambient).
- Dimming to 5% on 0-10V controls standard. Step dim (SDIM) option available, 100/40% levels.
- Driver and LED boards are accessible from below. LED boards are individually replaceable if required.
- Combinations are available providing as much as 117 delivered lumens per Watt.
- Nominal lumen packages range from 3,500 to 7,000 lumens, providing flexibility to optimize light levels for a specific application.
- LED sources provide full illumination in low temperature applications, unlike fluorescent sources that provide reduced light levels in very cold environments.
- LED sources can be frequently switched with no negative impact on life.
- Minimum 80 CRI provides smooth color rendering that rivals or exceeds performance of fluorescent lamps.
- Light output from the luminaire contains no infrared or ultraviolet energy, so the light won't heat or fade the objects being lit.
- Available motion sensor further increases energy savings in areas where occupancy is not continuous.

Labels

- cETLus listed to UL 1598. Suitable for use in wet locations.
- 5 Year Limited Warranty, www.signify.com/warranties
- Certain luminaire components may be adversely affected by contaminants. If sulfur, chlorine, or petroleum based solutions, or other contaminants will be in the area of operation, please consult factory as damage caused by these contaminants are not covered under our limited warranty.

Interact Pro scalable sensor for Foundation, Advanced & Enterprise tiers (SWZCSH and an evolution of SpaceWise)

- SWZCSH is a connected sensor with integral occupancy and daylight sensing and supports wireless mesh connectivity.

- The sensor works in the Foundation mode (similar to SpaceWise) when configured without a gateway or in an Interact Pro Advanced or Enterprise mode if a compatible gateway is used.
- Interact Pro includes an App, a portal and a broad portfolio of wireless luminaires, lamps and retrofit kits all working on the same system.
- Startup is implemented via Interact Pro App (Android or iPhone) & BlueTooth connectivity. The App provides flexibility to choose between a gateway or non gateway mode for setup.
- Setup with the gateway requires wired internet access to the gateway. It is possible to add a gateway at a later point.
- Prepare project configuration steps remotely and use IRT9015 remote

onsite to identify and group devices together.

- Compatible with:
 - UID8451/10 wireless dimmer switch
 - SWS200 wireless scene switch
 - Battery powered IP42 presence sensor OCC sensor IA CM WH 10/1
 - Battery powered IP42 presence & daylight sensor OCC-DL sensor IA CM IP42 WH
 - LCN3110/05 battery powered IP65 presence sensor OCC sensor IA CM IP65 WH
 - LCN3120/05 battery powered IP65 presence & daylight sensor OCC-DL sensor IA CM IP65 WH
- For more information on Interact Pro visit: www.interact-lighting.com/interactproscalablesystem

SNH200 EasySense

- Philips field apps allow programming of occupancy & daylight sensing parameters and fine-tuning of light levels during installation. It can also be used for grouping of fixtures.
- Download "Philips field apps" from the Google Play Store.
- Register for the commissioning app at <http://registration.componentcloud.philips.com/appregistration/>.
- The app works on certain Android phones with NFC or IR. See Recommended Phones and the EasySense App User Manual in the download section at <http://www.usa.lighting.philips.com/products/lighting-components/easysense> and follow the "View Downloads" link to register for access to the download area. Navigate to Connected-Lighting-Components and then Philips-EasySense-Sensors to find downloads.

DW Vaporlume LED sealed industrial

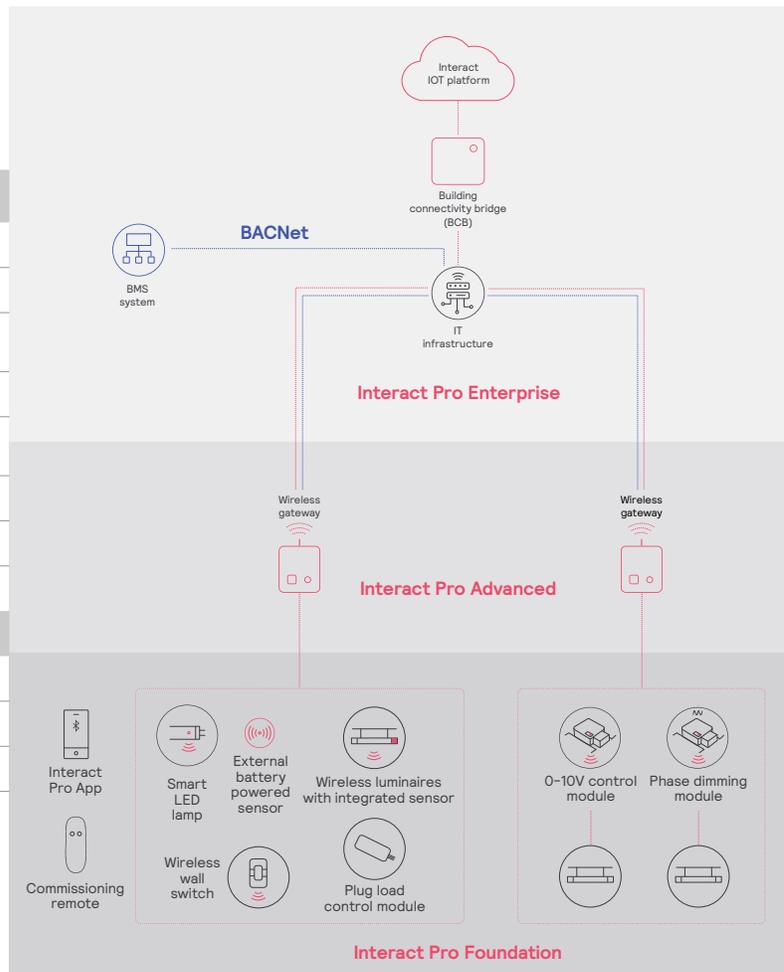
4', 3500 to 7000 lumens

Interact Pro scalable system			
	Foundation	Advanced	Enterprise
Dimming, grouping, and zoning	✓	✓	✓
Bluetooth and ZigBee enabled	✓	✓	✓
Motion sensing and daylight harvesting	✓	✓	✓
Integration with 0-10V and phase dimming fixtures	✓	✓	✓
Code compliance	✓	✓	✓
Granular dimming and dwell time	✓	✓	✓
Energy reporting and monitoring		✓	✓
Scheduling		✓	✓
Demand response		✓	✓
BMS integration (BACnet)			✓
Floor plan visualization			✓
IoT sensors for wellness			✓
IoT Apps for productivity			✓

Currently supported maximum system size

To be able to design the lighting system correctly for the customer, it is important to know the prime characteristics of the system, its possibilities and limitations.

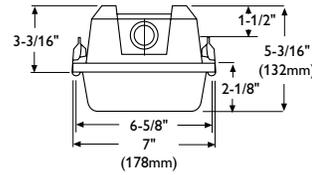
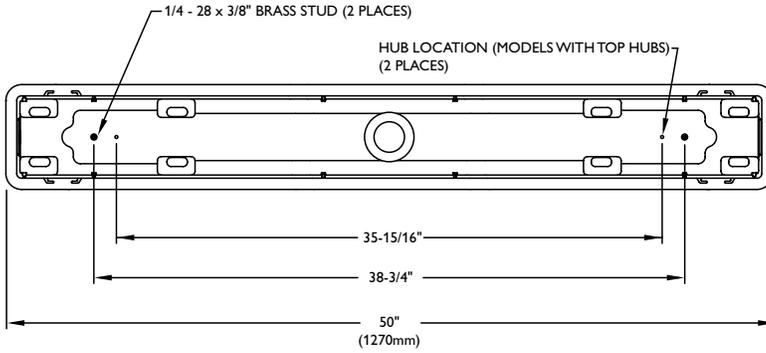
System level	
Total number of gateways	Unlimited
Total number of devices	200 per network
• luminaires with integrated sensors	150
• smart TLEDS	150
Total number of ZGP devices (sensors and switches)	50
• sensors	30
• switches	50
• zones and groups	64
Group level	
Recommended number of lights	40 (recommended 25)
Number of ZGP devices	5
Number of scenes	16



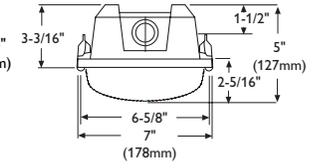
DW Vaporlume LED sealed industrial

4', 3500 to 7000 lumens

Dimensions



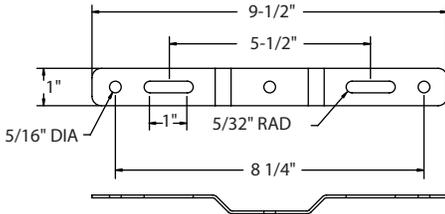
Shallow acrylic (A) and polycarbonate (P) lens



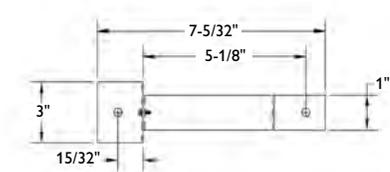
Enhanced LED acrylic lens (L)

Mounting Brackets

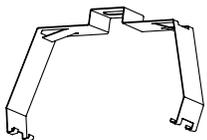
TBK - Top Mounting Bracket



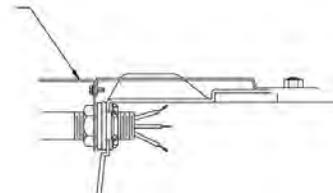
EBK - End Mounting Bracket



WBK - Wraparound Mounting Bracket



EBK - End Mounting Bracket



Acrylic Lens



Polycarbonate Lens



LED Frosted Acrylic Lens

DW Vaporlume LED sealed industrial

4', 3500 to 7000 lumens

4' Vaporlume LED DW, 3500 nominal lumens

LER-117

		Candlepower				
Catalog No.	DWAE35L840-4	Angle	End	45	Cross	Back-45
Test No.	32643	0	1250	1250	1250	1250
S/MH	1.2	5	1244	1239	1243	1239
Source	LED	15	1204	1201	1199	1201
Input Watts	32	25	1112	1114	1106	1114
Delivered Lumens	3699	35	966	964	949	964
		45	778	777	841	777
		55	576	685	708	685
		65	371	509	472	509
		75	193	250	271	250
		85	49	91	96	91
		95	19	36	28	36
		105	17	30	20	30
		115	10	28	20	28
		125	4	19	19	19
		135	2	10	17	10
		145	1	3	9	3
		155	1	1	2	1
		165	1	1	1	1
		175	1	1	1	1

Comparative yearly lighting energy cost per 1000 lumens – \$2.03 based on 3000 hrs. and \$.08 pwr KWH.

Photometric values based upon tests performed in compliance with LM-79.

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)									
pcc	80			70			50		
	70	50	30	70	50	30	50	30	
pw									
RCR									
0	117	117	117	114	114	114	110	110	
1	108	103	97	105	100	95	94	92	
2	97	89	81	94	86	80	82	77	
3	89	78	69	85	76	68	72	66	
4	81	68	59	79	68	58	65	56	
5	75	61	53	71	59	52	57	50	
6	68	55	46	67	54	46	52	45	
7	64	50	40	61	48	40	46	40	
8	58	46	36	57	45	36	42	35	
9	56	41	34	54	40	33	40	33	
10	52	39	30	51	38	30	36	29	

Light Distribution

Degrees	Lumens	% Luminaire
0-30	969	26.1
0-40	1569	42.3
0-60	2772	74.8
0-90	3602	97.1
90-120	81	2.2
90-130	95	2.6
90-150	105	2.8
90-180	106	2.9
0-180	3708	100.0

Average Luminance

Angle	End	45'	Cross
45	5069	4222	4360
55	4543	4228	4105
65	865	3770	3222
75	3096	2402	2333
85	1821	1312	1164

4' Vaporlume LED DW, 4300 nominal lumens

LER-116

		Candlepower				
Catalog No.	DWAE43L840-4	Angle	End	45	Cross	Back-45
Test No.	32642	0	1496	1496	1496	1496
S/MH	1.2	5	1491	1487	1485	1487
Source	LED	15	1443	1439	1441	1439
Input Watts	38	25	1332	1338	1323	1338
Delivered Lumens	4431	35	1158	1151	1132	1151
		45	933	926	1000	926
		55	688	819	854	819
		65	444	611	566	611
		75	231	300	324	300
		85	58	110	118	110
		95	23	43	35	43
		105	20	36	25	36
		115	12	34	24	34
		125	5	24	24	24
		135	3	12	21	12
		145	2	4	11	4
		155	1	1	3	1
		165	1	1	1	1
		175	1	1	1	1

Comparative yearly lighting energy cost per 1000 lumens – \$2.07 based on 3000 hrs. and \$.08 pwr KWH.

Photometric values based upon tests performed in compliance with LM-79.

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)									
pcc	80			70			50		
	70	50	30	70	50	30	50	30	
pw									
RCR									
0	117	117	117	114	114	114	109	109	
1	108	103	97	104	100	95	94	92	
2	97	89	81	94	86	80	82	77	
3	89	78	69	85	76	68	72	66	
4	81	68	59	79	67	58	65	56	
5	75	61	53	71	59	52	57	50	
6	68	55	46	67	54	46	52	45	
7	64	50	40	61	48	40	46	40	
8	58	46	36	57	45	36	42	35	
9	56	41	34	54	40	33	40	33	
10	52	39	30	51	38	30	36	29	

Light Distribution

Degrees	Lumens	% Luminaire
0-30	1161	26.1
0-40	1880	42.3
0-60	3318	74.7
0-90	4313	97.1
90-120	99	2.2
90-130	116	2.6
90-150	128	2.9
90-180	129	2.9
0-180	4442	100.0

Average Luminance

Angle	End	45'	Cross
45	6078	5034	5182
55	5434	5059	4955
65	4626	4531	3867
75	3704	2883	2786
85	2173	1578	1433

DW Vaporlume LED sealed industrial

4', 3500 to 7000 lumens

4' Vaporlume LED DW, 5100 nominal lumens LER-111

Catalog No.	DWAE51L840-4
Test No.	32640
S/MH	1.2
Source	LED
Input Watts	46
Delivered Lumens	5129

Candlepower

Angle	End	45	Cross	Back-45
0	1729	1729	1729	1729
5	1722	1716	1709	1716
15	1666	1651	1632	1651
25	1542	1523	1494	1523
35	1340	1307	1250	1307
45	1091	1039	1117	1039
55	817	909	884	909
65	533	670	574	670
75	280	309	286	309
85	75	107	86	107
95	26	47	34	47
105	24	42	30	42
115	14	39	29	39
125	6	28	28	28
135	4	16	24	16
145	3	5	12	5
155	2	2	3	2
165	2	2	2	2
175	2	2	2	2

Comparative yearly lighting energy cost per 1000 lumens – \$2.16 based on 3000 hrs. and \$.08 pwr KWH.

Photometric values based upon tests performed in compliance with LM-79.

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)

pcc	80			70			50		
	pw	70	50	30	70	50	30	50	30
RCR									
0	117	117	117	114	114	114	110	110	
1	108	103	97	104	100	95	94	92	
2	97	89	81	94	86	80	82	77	
3	89	78	69	85	76	68	72	66	
4	81	68	59	79	68	58	65	56	
5	75	61	53	71	59	52	57	50	
6	68	55	46	67	54	46	52	45	
7	64	50	40	61	48	40	46	40	
8	58	46	36	57	45	36	42	35	
9	56	41	34	54	40	33	40	33	
10	52	39	30	51	38	30	36	29	

Light Distribution

Degrees	Lumens	% Luminaire
0-30	1344	26.1
0-40	2176	42.3
0-60	3842	74.7
0-90	4992	97.1
90-120	114	2.2
90-130	133	2.6
90-150	148	2.9
90-180	149	2.9
0-180	5141	100.0

Average Luminance

Angle	End	45°	Cross
45	7103	5648	5790
55	6447	5616	5126
65	5552	4964	3915
75	4486	2974	2465
85	2784	1530	1043

4' Vaporlume LED DW, 7000 nominal lumens LER-107

Catalog No.	DWAE70L840-4
Test No.	32614
S/MH	1.2
Source	LED
Input Watts	65
Delivered Lumens	6985

Candlepower

Angle	End	45	Cross	Back-45
0	2357	2357	2357	2357
5	2351	2342	2345	2342
15	2274	2271	2270	2271
25	2101	2105	2089	2105
35	1818	1814	1784	1814
45	1467	1462	1586	1462
55	1085	1302	1345	1302
65	701	959	891	959
75	365	469	503	469
85	92	170	176	170
95	36	67	53	67
105	33	57	39	57
115	19	53	39	53
125	8	38	38	38
135	4	20	33	20
145	3	6	18	6
155	2	2	4	2
165	2	2	2	2
175	2	2	2	2

Comparative yearly lighting energy cost per 1000 lumens – \$2.24 based on 3000 hrs. and \$.08 pwr KWH.

Photometric values based upon tests performed in compliance with LM-79.

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)

pcc	80			70			50		
	pw	70	50	30	70	50	30	50	30
RCR									
0	117	117	117	114	114	114	109	109	
1	108	103	97	105	100	95	94	92	
2	97	89	81	94	86	80	82	77	
3	89	78	69	85	76	68	72	66	
4	81	68	59	79	67	58	65	56	
5	75	61	52	71	59	52	57	50	
6	68	55	46	67	54	46	52	45	
7	64	50	40	61	48	40	46	40	
8	58	46	36	57	45	36	42	35	
9	56	41	34	54	40	33	40	33	
10	52	39	30	51	38	30	36	29	

Light Distribution

Degrees	Lumens	% Luminaire
0-30	1830	26.1
0-40	2961	42.3
0-60	5230	74.7
0-90	6798	97.1
90-120	156	2.2
90-130	183	2.6
90-150	203	2.9
90-180	205	2.9
0-180	7003	100.0

Average Luminance

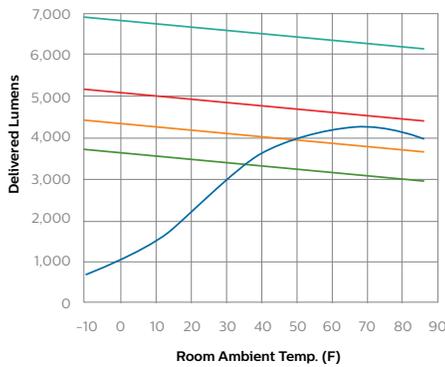
Angle	End	45°	Cross
45	9554	7946	8219
55	8566	8043	7802
65	7304	7108	6080
75	5848	4516	4329
85	3444	2433	2142

DW Vaporlume LED sealed industrial

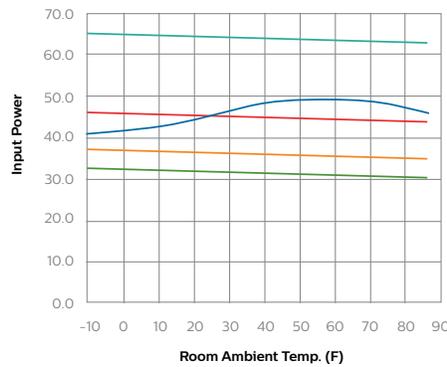
4', 3500 to 7000 lumens

Energy Data

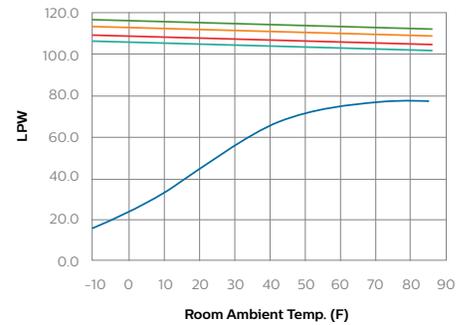
Model	Initial Delivered Lumens @ 25°C Ambient	Input Power	Lumens per Watt	Application notes
DWAE35L840-4-UNV	3,699	32W	117 LPW	<ul style="list-style-type: none"> Slightly less than 2 lamp F32T8 at room temperature, 35% energy savings. Equivalent to 2 lamp F32T8 in refrigerator (40°F), 35% energy savings.
DWAE43L840-4-UNV	4,431	38W	116 LPW	<ul style="list-style-type: none"> Equivalent to 2 lamp F32T8 at room temperature, 15% energy savings. Double the output of 2 lamp F32T8 in freezer (25°F) at the SAME energy use.
DWAE51L840-4-UNV	5,129	46W	111 LPW	<ul style="list-style-type: none"> Equivalent to high ballast factor 2 lamp F32T8 at room temperature, 15% energy savings.
DWAE70L840-4-UNV	6,985	65W	107 LPW	<ul style="list-style-type: none"> Equivalent to 3 lamp F32T8 at room temperature, 30% energy savings.



2-LAMP F32T8 DWAE35L840 DWAE43L840
DWAE51L840 DWAE70L840



2-LAMP F32T8 DWAE35L840 DWAE43L840
DWAE51L840 DWAE70L840



2-LAMP F32T8 DWAE35L840 DWAE43L840
DWAE51L840 DWAE70L840



Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed



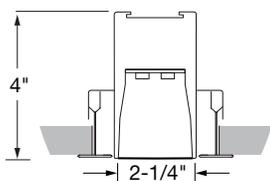
High Performance 2" Aperture is a patented, linear LED luminaire family. HP-2 delivers excellent performance using an advanced optical design and mid-power LEDs. Achieving 90% of initial light output at 100,000+ hours and backed by a 10-year performance-based warranty on all standard components.

This product is enrolled in the International Living Future Institute (ILFI) Declare 2.0 Program and is third-party verified with options achieving **Red List Approved** and **Red List Declared** status.

Note: see page 6 for all aesthetic options

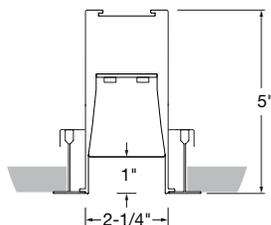
CROSS SECTIONS

Recessed



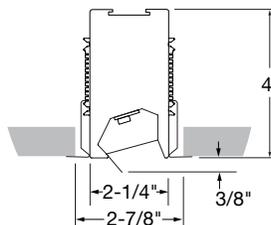
Flush Downlight Diffuser (standard)

Regressed



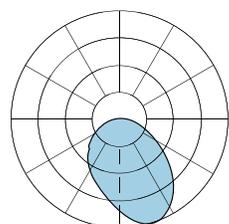
Flat Diffuser with 1" Regressed

Wall Wash Recessed

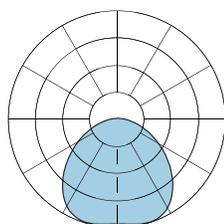


Kicker (standard)

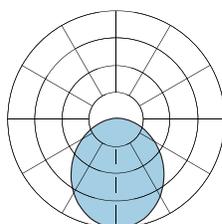
OPTIC OPTIONS



Downlight Asymmetric Optic (DAO)



Downlight Spread Optic (DSO)



Standard Downlight Flush Optic (F)

ALSO AVAILABLE IN



Pendant (D, ID, I)



Wall Mount (WM)



Surface Mount (SM)



Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Ordering Guide Example: HP - 2 - R - D - 36' - S - 835 - F - 96LG - 120 - SC - FC-10% - FA50 - C1 - FE - SW - LGD18W - OBO - CP

BODY TYPE

OUTPUT AND LED TYPE

Platform	Series Name	Luminaire Type	Luminaire Distribution	Total Length of Run	Downlight Output (Flush)	LED CRI/CCT
HP - High Performance	2	R - Recessed R RG - Recessed Regressed (Wall Wash not available)	D - Direct WW-D - Wall Wash Direct	LENGTH PER PLAN Minimum 2' section length. Increments accurate to 1/16" (±1/32"), standard. 12' maximum section length.	S - Standard (336 lm/ft) B - Boosted (423 lm/ft) H - High (639 lm/ft) V - Very High (822 lm/ft) TL - Tailored: _____lm/ft* Lumen provided above are for Flush lens only, see pg. 12 for WW lumens * Specify Tailored lm/ft of outputs between Standard (S) and Very High (V). Consult factory for tailored lumen output outside of this range.	830 - 80 CRI, 3000K 835 - 80 CRI, 3500K 840 - 80 CRI, 4000K 930 - 90 CRI, 3000K 935 - 90 CRI, 3500K 940 - 90 CRI, 4000K 8TW - 80 CRI, Tunable White 9TW - 90 CRI, Tunable White

MECHANICAL/OPTICAL OPTIONS

ELECTRICAL OPTIONS

Downlight	Reflector System	Voltage	Circuiting ²
F - Flush (standard) ^{8,9} DL - 1" Drop Down Lens ⁸ RG-D - Flat Diffuser with 1" Regress ^{1,8} RG-WCB - White Cross Blade Baffle ^{1,8} RG-LHE - Hollowed Ellipse Louver ^{1,8} RG-LHC - Hex Louver ^{1,8}	DAO-L - Downlight Asymmetric Left ^{4,8} DAO-R - Downlight Asymmetric Right ^{4,8} DSO - Downlight Spread Optic ^{4,8} K - Kicker for Wall Wash only (standard) ⁵ FO - Fully Open for Wall Wash only	96LG - 96 Low Gloss White SW - Signal White for Wall Wash only	120 - 120 Voltage 277 - 277 Voltage 347 - 347 Voltage (OTI only)
			SC - Single Circuit* One single circuit in a run MC - Multi-Circuit* More than one switch leg or zone. Factory shop drawings required * Battery, Night Light, and Emergency to Generator circuits are in addition to the normal luminaire circuit(s)

ELECTRICAL OPTIONS

Driver Selection

0-10V Driver Options

- FC-10% - 0-10V 10% (standard)
- FC-1% - 0-10V 1%
- OTI-10% - EldoLED OTI, 0-10V 10%³
- OTI-1% - EldoLED OTI, 0-10V 1%³
- ELD-10V-0% - EldoLED SOLOdrive, 0-10V 0.1%
- 10V-TW-10% - EldoLED OTI, 0-10V 10% (Tunable White)³

DALI Driver Options

- FC-DALI-1% - DALI 1%
- DXL-DALI-1% - EldoLED Dexal, 1%
- ELD-DALI-0% - EldoLED SOLOdrive, 0.1%
- ELD-DALI-TW - EldoLED DUALdrive LightShape, 0.1% (Tunable White)

DMX Driver Options

- ELD-DMX - EldoLED POWERdrive, 0.1%
- ELD-DMX-TW - EldoLED POWERdrive, 0.1% (Tunable White)

Lutron Driver Options

- LUT-ES1 - Lutron, Ecosystem 1%
- LUT-TW - Lutron LD2 Dali-2 1% (Tunable White)

See Page 3 for additional driver options and details

MOUNTING OPTIONS

OTHER OPTIONS

Ceiling Hardware Type	Endcap Style	Finish
C1 - 15/16" T-Bar C1T - 15/16" Tegular C2 - 9/16" T-Bar C2T - 9/16" Tegular C3 - Screw Slot	C3F - Flush Screw Slot SF - Spackle Flange VF - Visible Flange TZ4 - Tech Zone 4" _____ (C1, C2, C2T, C3, C3F)	FE - Flat Endcap (standard) SW - Signal White (standard) FB - Finelite Black SA - Satin Aluminum #### - RAL Color Code ⁷ _____

OTHER OPTIONS

Emergency Style (Optional) <small>See page 5 Backup Battery table</small>	Integrated Sensor (Optional) ⁸	Special Options (Optional)
LGD18W - Legrand 18W Brand Battery Back-up LGD10W - Legrand 10W Brand Battery Back-up EM/GEN - Emergency to Generator NL - Night Light BSL310LP - Bodine Battery Back up Low Profile GTD - Generator Transfer Device ALCR - Automatic Load Control Relay	OBO - Occupancy ⁹ OBD - Daylight ⁹ W601 - Wattstopper Wireless Sensor ¹⁰ OBE - Enlighted ¹¹ REE - Remote Enlighted ¹² CLM - Encelium RF SLM - Encelium Sensor	AOCC-W - Lutron Athena Sensor (Device Color White) ¹³ AOCC-B - Lutron Athena Sensor (Device Color Black) ¹³ ARF-W - Lutron Athena RF (Device Color White) ¹³ ARF-B - Lutron Athena RF (Device Color Black) ¹³ VOCC - Lutron Vive Wireless Sensor (VDO) ¹⁴ VRF - Lutron Vive Radio Only ¹⁴
		CP - Chicago Plenum ¹⁵ FLX - Flex Whip RLA - Red List Approved RLD - Red List Declared

¹ Recessed Regressed straight run only
² Contact factory for switching options
³ Add DTO to gain "Dim to Off" functionality (FC-10% - DTO, FC-1% - DTO)
⁴ Not available with Regressed or Curves
⁵ Kicker standard in Signal White. Customer Custom color kickers have a surcharge

⁶ B & V outputs only
⁷ 20 business days lead time for color
⁸ Minimum fixture length with a sensor is 3ft.
⁹ Not available with Wall Wash
¹⁰ LMFS-601 w/ 0-10V driver(s) and LMFI-111, up to 6 drivers may be connected. LMFS-601 w/ Dali driver, only 1 driver can be connected.
¹¹ Enlighted components installed by Finelite, provided by others

¹² Enlighted for Wall Wash fixtures. Enlighted Control Unit & Sensor Cable installed for Remote mounting sensor.
¹³ 0-10V Drivers - AOCC up to 10 drivers may be connected; ARF up to 40 drivers may be connected DALI Drivers - AOCC & ARF up to 4 drivers can be connected.
¹⁴ Lutron Vive Integrated Sensors require a DALI driver
¹⁵ Only available with C1, C2, and C3 mounting hardware with Finelite Gridbox

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

SUPPLEMENTARY DRIVER PAGE

0-10V Driver Options

FC-10%	Factory Choice, 0-10V 10% Dimming (Linear)
FC-10%-DTO	Factory Choice, 0-10V 10% Dimming, Dim-to-Off (Linear)
FC-1%	Factory Choice, 0-10V 1% Dimming (Linear)
FC-1%-DTO	Factory Choice, 0-10V 1% Dimming, Dim-to-Off (Linear)
ELD-10V-0%	EldoLED SOLOdrive, 0-10V 0.1% Dimming (Linear)
ELD-10V-1%	EldoLED ECOdrive, 0-10V 1% Dimming (Linear)
10V-TW-10%	EldoLED OTi, 0-10V 10% Dimming, Tunable White (Linear)
10V-TW-10%-DTO	EldoLED OTi, 0-10V 10% Dimming, Dim-to-Off, Tunable White (Linear)
OTi-10%	EldoLED OTi, 0-10V 10% Dimming (Linear)
OTi-10%-DTO	EldoLED OTi, 0-10V 10% Dimming, Dim-to-Off (Linear)
OTi-1%	EldoLED OTi, 0-10V 1% Dimming (Linear)
OTi-1%-DTO	EldoLED OTi, 0-10V 1% Dimming, Dim-to-Off (Linear)

DALI Driver Options

FC-DALI-1%	Factory Choice, DALI 1% Dimming (Logarithmic)
DXL-DALI-1%	EldoLED Dexal, DALI 1% Dimming (Logarithmic)
ELD-DALI-0%	EldoLED SOLOdrive, DALI 0.1% Dimming (Logarithmic)
ELD-DALI-1%	EldoLED ECOdrive, DALI 1% Dimming (Logarithmic)
ELD-DALI-TW	EldoLED DUALdrive Light Shape, DALI 0.1% Dimming, Tunable White (Logarithmic Dimming, Linear CCT Control)

DMX Driver Options

ELD-DMX	EldoLED POWERdrive, DMX 0.1% Dimming (8 Bit, 1CH) (Linear)
ELD-DMX-16	EldoLED POWERdrive, DMX 0.1% Dimming (16 Bit, 2CH) (Linear)
ELD-DMX-TW	EldoLED POWERdrive, DMX 0.1% Dimming, Tunable White (8 Bit, 2CH - CH1 Warm / CH2 Cool) (Linear)
ELD-DMX-TW16	EldoLED POWERdrive, DMX 0.1% Dimming, Tunable White (16 Bit, 4CH - CH1, 2 Warm / CH3, 4 Cool) (Linear)

Lutron Driver Options

LUT-ES1	Lutron, Ecosystem 1% Dimming
LUT-TW	Lutron LD2 Dali-2 1%, Tunable White

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

SPECIFICATIONS

BODY TYPE

CONSTRUCTION: Precision-cut 6063-T6 extruded aluminum body. Internal joiner system and plug-together wiring are standard.

LENGTHS: Any length, 2' minimum, in increments down to 1/16th" ($\pm 1/32"$). 12' maximum section length. Hollowed Ellipse Louver (**LHE**), Hex Louver (**LHC**), and White Cross Blade Baffle (**WCB**) are available in 1' increments.

MITERED CORNERS ¹ : Illuminated corners of greater than 60° and less than 180° in a single plane, available with Flush Diffuser, Bottom Glow Diffuser, Regressed Diffuser, or White Cross Blade Baffle ². Corners not available with Wall Wash (**WW-D**), Hollowed Ellipse Louver (**LHE**), Hex Louver (**LHC**) or 1" Drop Down Lens. Contact factory for Double miters using the White Cross Blade Baffle. Consult factory for tailored lighting options.

OUTPUT AND LED TYPE

LIGHT OUTPUT: Four lumen packages available, Standard (**S**), Boosted Standard (**B**), High (**H**), and Very High (**V**). For lengths 3' and greater, the uplight and downlight can be specified with different lumen packages and dual controls. For Tailored Outputs outside of range from Standard (**S**) to Very High (**V**), consult factory. Light engines are replaceable.

MECHANICAL/OPTICAL OPTIONS

DOWNLIGHT OPTION: 12' maximum diffuser length. Flush frost white snap-in diffuser standard, 73% transmissive, 99% diffusion. Internal secondary diffusers at corners ensure visually seamless, uniform, continuous illumination. Available with Flush (**F**), Bottom Glow (**BG**), 1" Drop Down Lens (**DL**), White Cross Blade Baffle (**WCB**) ^{3,4}, Ellipse Louver (**LHE**) ³, Hex Louver (**LHC**) ³, Downlight Asymmetric Optic (**DAO**) ⁵, Downlight Spread Optic (**DSO**) ⁵, and Regressed downlight diffusers (**RG**) ³. 1" Drop Down Lens made of highly efficient acrylic. Available with a solid endcap or an endcap with a diffuse filler to continue the luminous aesthetic. Downlight Spread & Downlight Asymmetric Optics are extruded lenses with a subtle ribbed appearance providing a batwing or asymmetric distribution for improved optical performance. Consult factory for more tailored lumen outputs.

LUMEN MAINTENANCE: 90% of initial light output (L90) at 100,000+ hours; 70% of initial light output (L70) at 200,000+ hours.

REFLECTORS: Die-formed 20-gauge cold-rolled steel reflectors finished in 96LG High Reflectance white powder coat paint. The standard Semi-Specular Aluminum (**SSA**) Kicker (**K**) reflector delivers light high on the vertical surface. The Kicker reflector can be easily removed for open distribution (**FO**).

ELECTRICAL OPTIONS

STATIC WHITE FEED: Standard with one 18-gauge/5-conductor single-circuit feed wire controlling uplight and downlight together (power and dimming). Specify dual feed wires for independent control of uplight and downlight. 14-gauge feed wire used when luminaire current exceeds 5 amps.

TUNABLE WHITE FEED: Standard with one 18-gauge/5-conductor single-circuit feed. 14-gauge feed used when luminaire current exceeds 5 amps. DMX feeds cannot be cut or spliced. DMX feeds should be ordered based on fixed lengths.

0-10V:

- One 18-gauge / 3-conductor power
- One 18-gauge / 4-conductor for dimming and controls

Dali:

- One 18-gauge / 5-conductor power and controls

DMX:

- One 18-gauge / 3-conductor power
- One DMX feed

STATIC WHITE DRIVER: Replaceable 120V, 277V, and 347V constant current reduction dimming driver standard. Can be wired dimming or non-dimming. 0-10V dimming controls with a range of 10%- 100% standard. Dimming to 1% available. Separate dimming for uplight and downlight available. Driver is fully accessible from below the ceiling.

– **Power Factor:** ≥ 0.9

– **Total Harmonic Distortion (THD):** <20%

– **Expected driver lifetime:** 100,000 hours

LUTRON DRIVER OPTIONS:

LUT-ES1 - Hi-lume 1% EcoSystem with Soft-On, Fade-to-Black dimming (LDE1 series).

TUNABLE WHITE DRIVER: Replaceable LED driver. Driver is accessible from below the ceiling. 120V and 277V.

– **Power factor:** ≥ 0.90

– **Total Harmonic Distortion (THD):** <20%

– **Dimming Range:** 100%-10%

– **Expected driver lifetime:** 100,000 hours

LUTRON TUNABLE WHITE DRIVER OPTION:

LUT-TW - Lutron LD2 Dali-2 1%, Tunable White.

¹ Not available with Wall Wash

² White Cross Blade (WCB) baffles not available with custom angles. Available in 90 degrees only

³ Recessed Regressed straight run only

⁴ White Cross Blade Baffle (WCB) currently not advisable for drywall

⁵ Not available with Regressed or Curves

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

SPECIFICATIONS

MOUNTING OPTIONS

HANGING HARDWARE:

- **Recessed T-Bar:** Standard bracket design works with most lay-in ceiling types. Brackets secure luminaire to the ceiling grid from above. Tie-in T-Bar brackets connect the luminaire to the T-Bar for securing to structure. Consult local codes for tie-wire recommendations.
- **Recessed Spackle Flange:** Drywall surfaces (walls or ceilings): 1/4" - 20 stud and nut (provided by others). Mounted with three equidistant suspension points.

TUNABLE WHITE DMX HANGING HARDWARE: For grid ceiling applications the dual GridBox™ mounting is supplied (standard). For hard ceiling applications the ceiling mounting box is supplied (standard). DMX feeds cannot be cut or spliced. DMX feeds should be ordered based on fixed lengths. Available DMX pendant feed lengths are 5' (standard), 12', and 30'.

TUNABLE WHITE DMX INTERCONNECTION CABLES: Luminaires are prewired with plug-and-play interconnected cables to support easy plug-together joining of fixture runs. DMX to RJ45 adapters and an RJ45 terminator for every 32 DMX drivers are included.

OTHER OPTIONS

ENDCAPS: Flat endcaps (**FE**) at each end of run add 1/16" to each end of luminaire. Drop Down Lens Illuminated Endcap (**DE**) includes diffuse element to continue luminance of drop lens.

EMERGENCY STYLE: Optional emergency to generator/inverter wiring, internal generator transfer switch, nightlight wiring, step-dimming driver, backup battery.

Backup Battery		
	Legrand 18W	Legrand 10W / Bodine BSL310LP
HP2-R-D		
Min. Housing Length	8*	4**
EM Lumen Output	1608	956
EM Section Illuminated	2'	2' or 4'
HP2-R-WW-D		
Min. Housing Length	8*	4**
EM Lumen Output	1500	891
EM Section Illuminated	4'	4'

* Minimum fixture housing length for battery pack approved without sensor. ** Exception: 5' not available, 6'+ okay. The lumens are based on 835. For other CCT/CRI, refer to the Lumen Adjustment Factor table on page 11.

Bodine GTD and Legrand ALCR Min. Length	
Configuration	Min Length
Generator	6'
Generator + OCC	8'
Daylight	6'
Generator + Daylight	8'

TUNABLE WHITE ELECTRICAL OPTIONS ⁶:

TW Driver Options

- **0-10V:** EM/GEN, GTD or Battery BackUp
- **DMX:** Battery Back Up
- **DALI:** EM/GEN, GTD or Battery Back Up
- **LUTRON:** EM/GEN, GTD or Battery Back Up

INTEGRATED SENSORS: Integrated PIR (Passive Infrared) Occupancy (**OBO**) or Daylight Sensors (**OBD**) available with Flush and Bottom Glow downlight diffusers. PIR sensors not recommended for stairwell applications. Refer to Occupancy Sensor & Daylight Sensor tech sheet and the Embedded Intelligence landing page for more information and additional sensor options. Minimum fixture length with a sensor is 3ft. The default location for the Connected Lighting Module (**CLM**) will be on the topside of the fixture for all mounting types except for Surface Mount (**SM**). In SM fixtures the CLM will be located on the direct side of fixture housed in a bracket that is flush with the direct lens.

FINISHES: Finelite Signal White (**SW**) powder coat, Finelite Black (RAL 9005) with semi gloss fine texture (**FB**), and Satin Aluminum (**SA**) are standard. Optional Adder: 179 RAL colors ⁷ are available.

LABELS: Luminaire and electrical components are ETL-listed conforming to UL 1598 in the U.S.A. and CAN/CSA C22.2 No. 250.0 in Canada. In accordance with NEC Code 410.130 (G), this luminaire contains an internal driver disconnect. UL 924 and UL 2108 - PoE options available on request. These fixtures are rated for Damp Location. IC Rated. HP-2 can be used to comply with 2016 Title 24, Part 6 (JA8); high efficacy LED light source requirements. Finelite products use electronic components that are RoHS compliant, and the mechanical components of the luminaire have been verified to not knowingly contain any restricted substances listed per RoHS Directive 2015/863. Consult factory for tailored lighting options. Finelite makes the specification process easy when putting healthier products on your projects. Simply add - **RLA** (Red List Approved) or - **RLD** (Red List Declared) to your part number.

WEIGHT ⁸: R - 2.3 lb/ft; WW-R - 2.9 lb/ft

WARRANTY: 10-year performance-based warranty on all standard components. Optional accessories such as emergency battery packs are covered by their individual manufacturer warranties.

⁶ Consult Finelite for Generator Transfer Device and Battery Backup fit

⁷ 20 business days lead time for color

⁸ Excludes Battery Backup and Generator Transfer Device weight

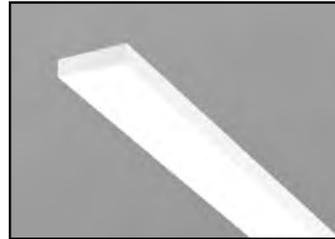
Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

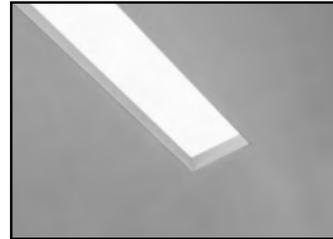
AESTHETIC OPTIONS



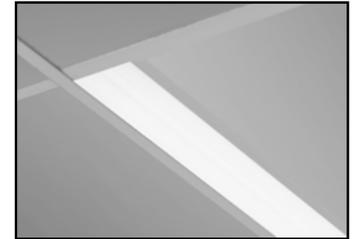
Flush Diffuser (**F**)



1" Drop Down Lens (**DL**)



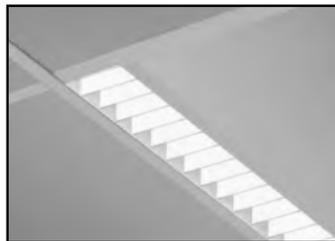
Flat Diffuser with 1" Regressed (**RG-D**)



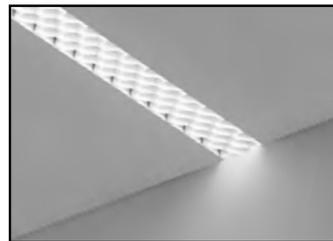
Downlight Asymmetric Optic (**DAO**)¹
Externally flush



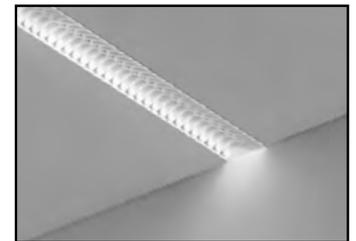
Downlight Spread Optic (**DSO**)¹
Externally flush



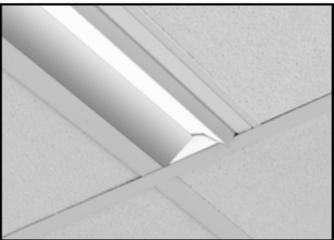
White Cross Blade Baffle² (**RG-WCB**)



Hex Louver² (**RG-LHC**)



Hollowed Ellipse Louver² (**RG-LHE**)



Kicker (**K**) - Wall Wash only

¹ With a subtle ribbed appearance providing specialized distribution
² Regressed only. Not available with Wall Wash

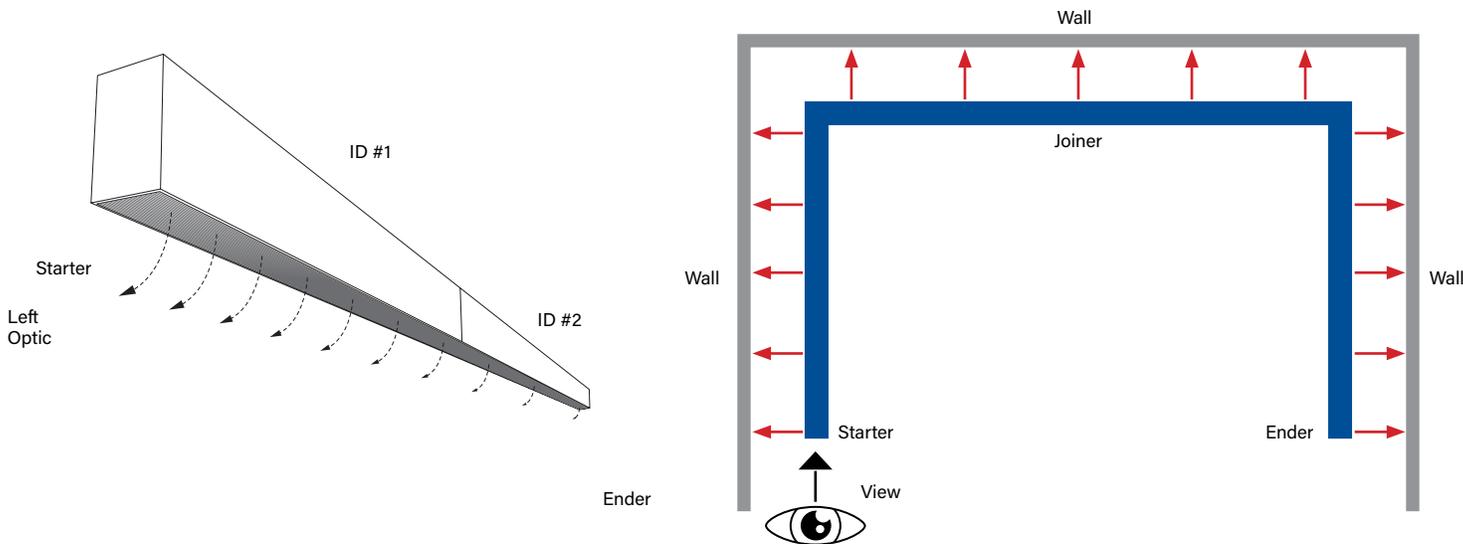
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Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

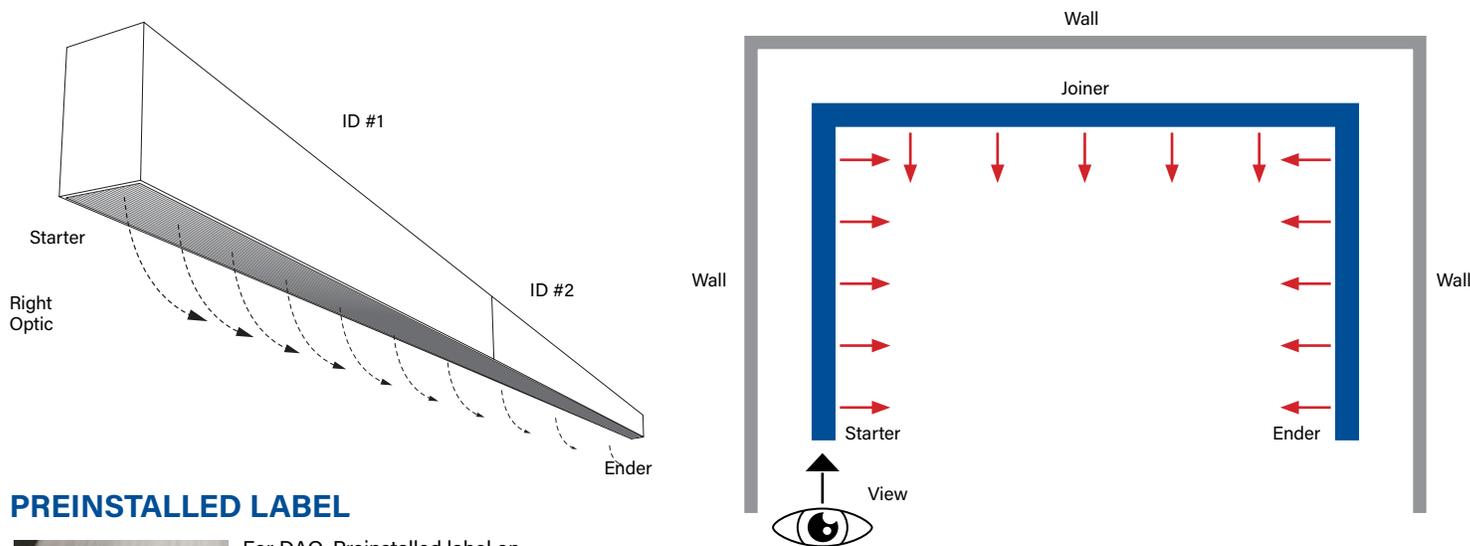
DOWNLIGHT ASYMMETRIC OPTIONS

The diagrams below show a linear run from power feed to ender. Specifying DAO-L distributes light to the left or DAO-R distributes light to the right. For proper orientation: view luminaire from starter end when specifying the direction of the Downlight Asymmetric optic.

Downlight Asymmetric Optic Left (DAO-L)



Downlight Asymmetric Optic Right (DAO-R)



PREINSTALLED LABEL



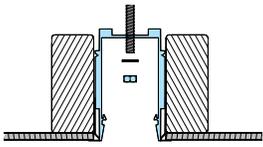
For DAO, Preinstalled label on diffuser shows direction of light. Remove after installation.

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

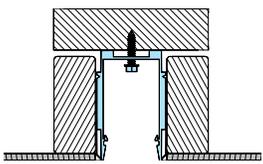
High Performance 2" Aperture (HP-2) Recessed

HARD CEILING MOUNTING OPTIONS

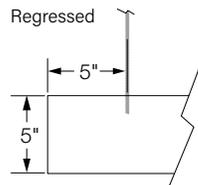
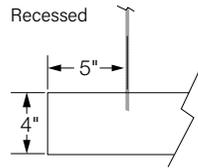
Threaded Rod Option



Screw Mount Option

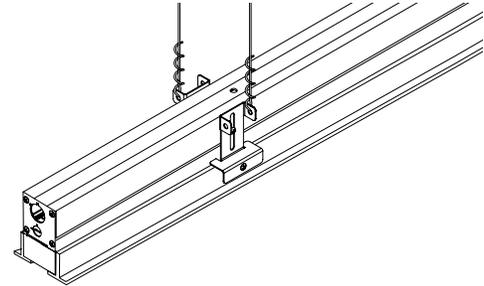


Mounting Location for Securing to Structure



Two mounting options: threaded rod and screw mounting options. Mounting locations are located on each end of the luminaire. Mounting location is 5" away from each end of luminaire.

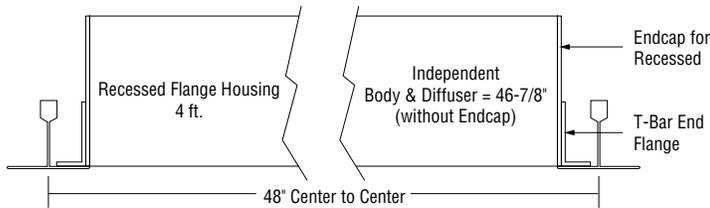
T-BAR INSTALLATION



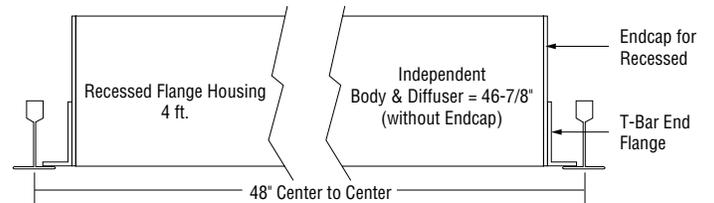
HP-2 R for T-Bar installations comes standard with a splice plate at the end of the luminaire. Mounting brackets (supplied) secure the luminaire to T-Bar and provide support to structure location. All even foot length (2, 4, 6, ...) luminaire runs are reduced in length by an appropriate amount to fit within typical 2x2 and 2x4 T-Bar grid systems. For uncommon T-Bar systems please consult factory.

GRID LENGTH DETAIL - 4' EXAMPLE

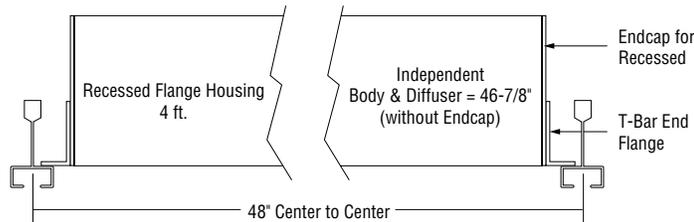
15/16" T-Bar



9/16" T-Bar

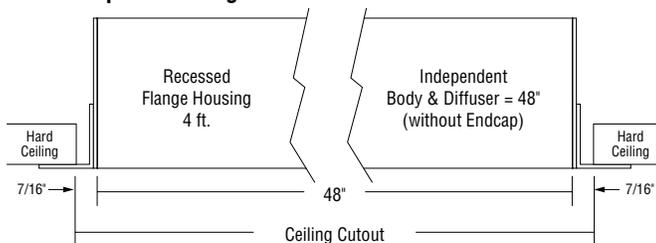


9/16" Screw Slot

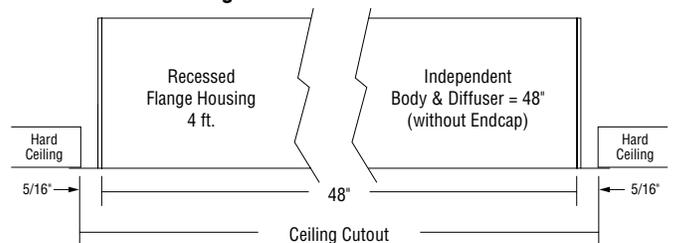


HARD CEILING LENGTH DETAIL - 4' EXAMPLE

Spackle Flange



Visible Flange

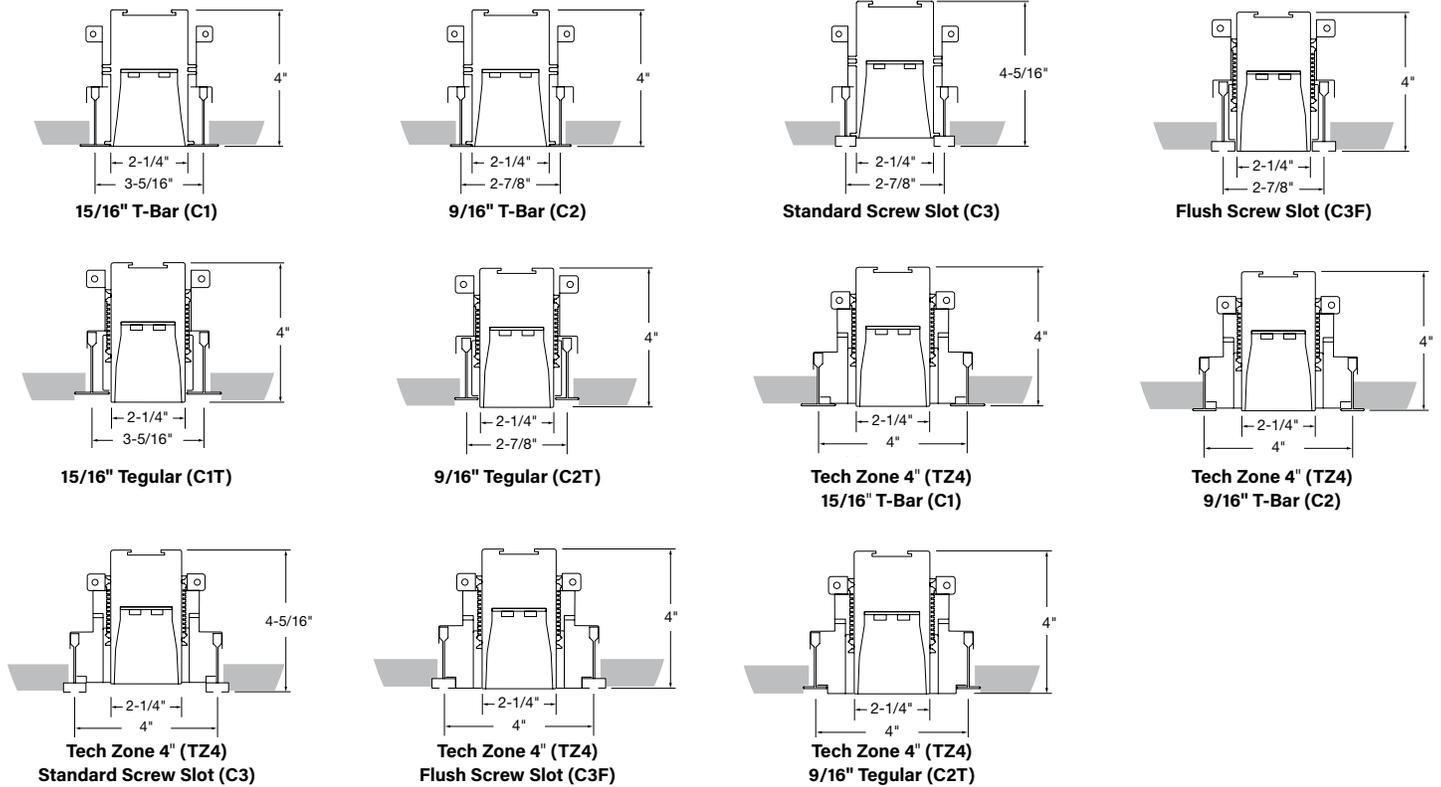


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Ordering Info:		

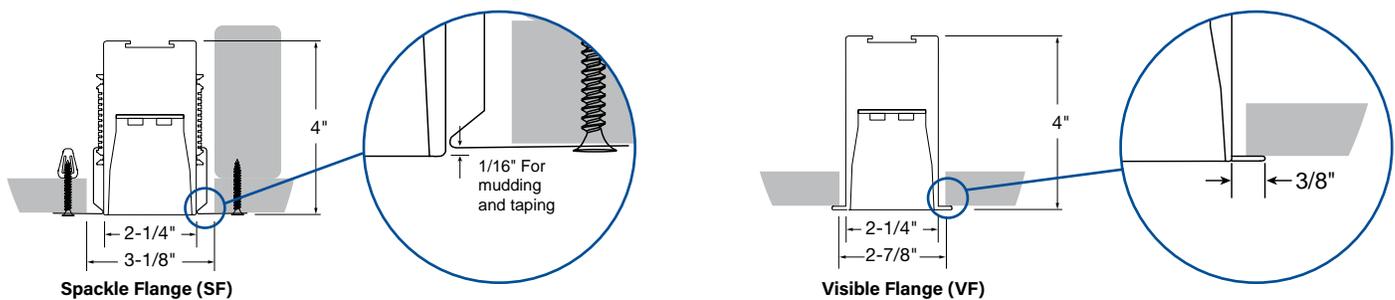
High Performance 2" Aperture (HP-2) Recessed

RECESSED MOUNTING TYPES - T-BAR

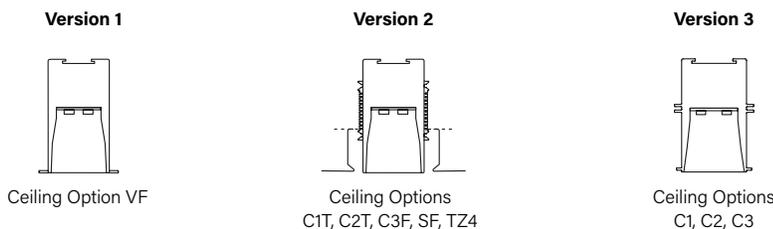
Rough-In Dimensions



RECESSED MOUNTING TYPES - CUTOUT DIMENSIONS



HOUSING



Note: +/- 1/16"

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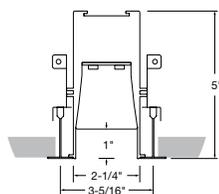
A brand of **legrand**

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

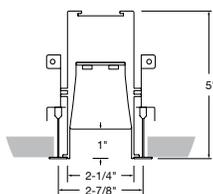
High Performance 2" Aperture (HP-2) Recessed

REGRESSED MOUNTING TYPES - T-BAR

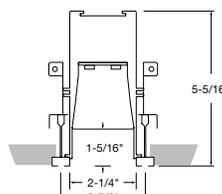
Rough-In Dimensions



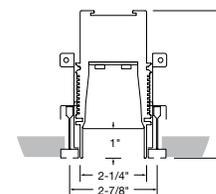
15/16" T-Bar (C1)



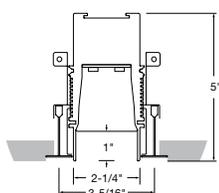
9/16" T-Bar (C2)



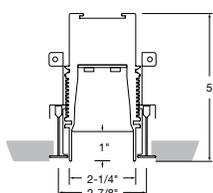
Standard Screw Slot (C3)



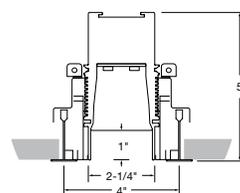
Flush Screw Slot (C3F)



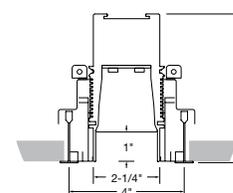
15/16" Tegular (C1T)



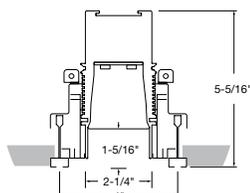
9/16" Tegular (C2T)



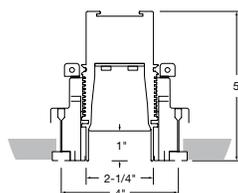
Tech Zone 4" (TZ4)
15/16" T-Bar (C1)



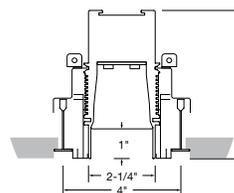
Tech Zone 4" (TZ4)
9/16" T-Bar (C2)



Tech Zone 4" (TZ4)
Standard Screw Slot (C3)

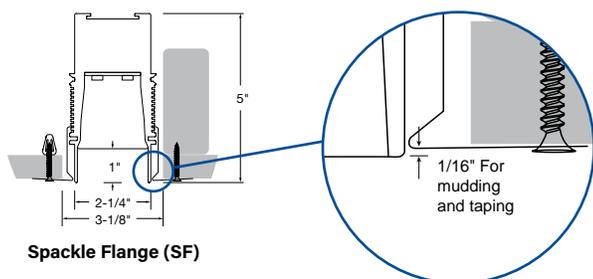


Tech Zone 4" (TZ4)
Flush Screw Slot (C3F)

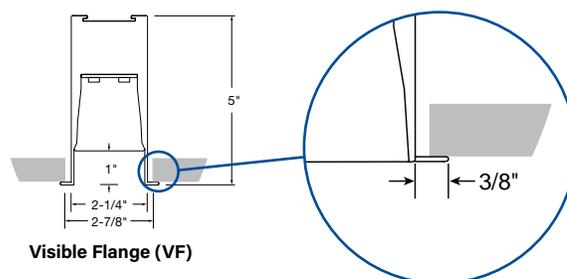


Tech Zone 4" (TZ4)
9/16" Tegular (C2T)

REGRESSED MOUNTING TYPES - CUTOUT DIMENSIONS



Spackle Flange (SF)

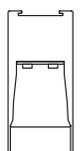


Visible Flange (VF)

Regressed Lens: Regressed lens version is 5" tall with a lens that is regressed 1" from ceiling line.

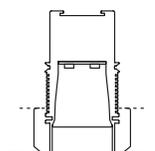
HOUSING

Version 1



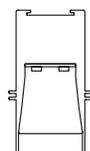
Ceiling Option VF

Version 2



Ceiling Options
C1T, C2T, C3F, SF, TZ4

Version 3



Ceiling Options
C1, C2, C3

Note: +/- 1/16"

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Recessed Photometry - 4' Luminaire 3500K

HP2-R-D-4'-V-835-DAO

Downlight: Downlight Asymmetric Optic - Right

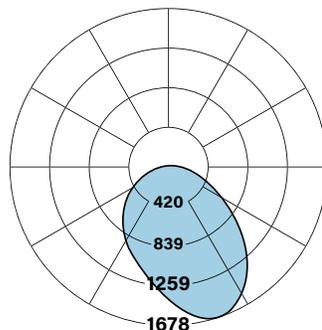
Efficacy: 105 lm/W

Total luminaire output: 3741 lumens (935 lm/ft)
35.5 watts (8.9 W/ft)

Peak Candela Value: 1670 @ 0°

CRI: 80 / CCT: 3500K

ITL LM79 Report REP-051921-01



HP2-R-D-4'-V-835-DSO

Downlight: Downlight Spread Optic

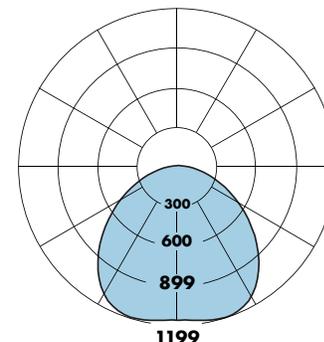
Efficacy: 92 lm/W

Total luminaire output: 3273 lumens (818 lm/ft)
35.7 watts (8.9 W/ft)

Peak Candela Value: 1197 @ 0°

CRI: 80 / CCT: 3500K

ITL LM79 Report 94139



Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1531	1925	2910	3741

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
383	481	727	935

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.5	4.4	6.8	8.9

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
110	109	107	105

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.

² Based on ITL report: REP-051921-01

Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1340	1684	2546	3273

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
335	421	636	818

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.5	4.4	6.8	8.9

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
96	95	93	92

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.

² Based on ITL report: 94139

Wattage is Real Power. If you would like additional details to calculate Apparent Power, please contact your local Finelite representative.

Sample Lumen Adjustment Calculation

Lumen Adjustment Factors 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

High Output (H) / 4000K, 90 CRI

Lumen Adjustment Factor: 0.789

Total Light Output: 2910 lm x 0.789 = 2296 lm

Total Light Output per Foot: 707 lm/ft x 0.789 = 574 lm/ft.

watts/foot: 6.8 W/ft.

$$\text{Efficacy} = \frac{574 \frac{\text{lm}}{\text{ft.}}}{6.8 \frac{\text{W}}{\text{ft.}}} = 84 \text{ lm/W}$$

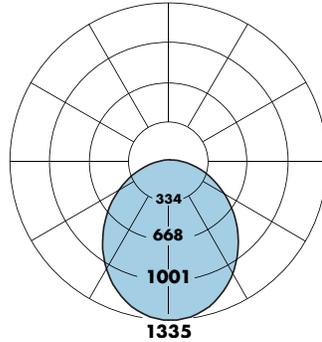
Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Recessed Photometry - 4' Luminaire 3500K

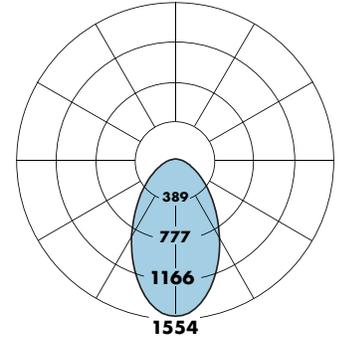
HP2-R-D-4'-V-835
Downlight: Flush Diffuser

Efficacy: 89 lm/W
Total luminaire output: 3287 lumens (822 lm/ft)
36.9 watts (9.2 W/ft)
Peak Candela Value: 1335 @ 0°
CRI: 80 / CCT: 3500K
ITL LM79 Report 85135



HP2-R RG-D-4'-V-835
Downlight: Regressed Diffuser

Efficacy: 79 lm/W
Total luminaire output: 2907 lumens (727 lm/ft)
37 watts (9.3 W/ft)
Peak Candela Value: 1554 @ 0°
CRI: 80 / CCT: 3500K
ITL LM79 Report 90351



Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1346	1692	2557	3287

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
336	423	639	822

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.6	4.6	7.1	9.2

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
93	92	90	89

Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
1190	1496	2261	2907

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
298	374	565	727

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
3.6	4.6	7.1	9.3

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
82	81	80	79

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.
² Based on ITL report: 85135

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.
² Based on ITL report: 90351

Wattage is Real Power. If you would like additional details to calculate Apparent Power, please contact your local Finelite representative.

Sample Lumen Adjustment Calculation

Lumen Adjustment Factors 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

High Output (H) / 4000K, 90 CRI
Lumen Adjustment Factor: 0.789
Total Light Output: 2557 lm x 0.789 = 2017 lm
Total Light Output per Foot: 639 lm/ft x 0.789 = 504 lm/ft.
watts/foot: 71 W/ft.

$$\text{Efficacy} = \frac{504 \frac{\text{lm}}{\text{ft.}}}{7.1 \frac{\text{W}}{\text{ft.}}} = 71 \text{ lm/W}$$

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

Wall Wash Recessed - 4' Luminaire 3500K

HP2-R-WW-D-K-4'-V-835

Downlight: With Kicker

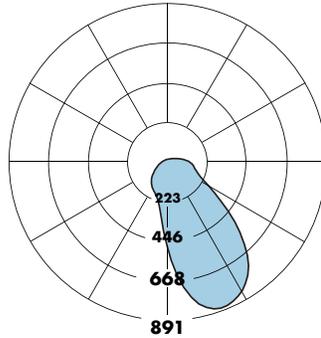
Efficacy: 76 lm/W

Total luminaire output: 1500 lumens (375 lm/ft)
19.6 watts (4.9 W/ft)

Peak Candela Value: 882 @ 25°

CRI: 80 / CCT: 3500K

ITL LM79 Report 85137



Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire

S ¹	B ¹	H ¹	V ²
614	772	1167	1500

Light Output, 3500K, 80 CRI (Lumens Per Foot)

S ¹	B ¹	H ¹	V ²
154	193	292	375

Power, 3500K (Watts Per Foot)

S ¹	B ¹	H ¹	V ²
2.0	2.5	3.8	4.9

Efficacy, 3500K, 80 CRI (Lumens Per Watt)

S ¹	B ¹	H ¹	V ²
76	77	77	77

S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

¹ Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.

² Based on ITL report: 85137

Wattage is Real Power. If you would like additional details to calculate Apparent Power, please contact your local Finelite representative.

Sample Lumen Adjustment Calculation

Lumen Adjustment Factors 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

High Output (H) / 4000K, 90 CRI
Lumen Adjustment Factor: 0.789
Total Light Output: 1167 lm x 0.789 = 921 lm
Total Light Output per Foot: 292 lm/ft x 0.789 = 230 lm/ft.
watts/foot: 3.8 W/ft.

$$\text{Efficacy} = \frac{292 \frac{\text{lm}}{\text{ft.}}}{3.8 \frac{\text{W}}{\text{ft.}}} = 61 \text{ lm/W}$$

Submitted by:		Date:
Type:	Project:	
Ordering Info:		

High Performance 2" Aperture (HP-2) Recessed

WALL WASH RECESSED - SETBACK INFO AND APPLICATION DATA

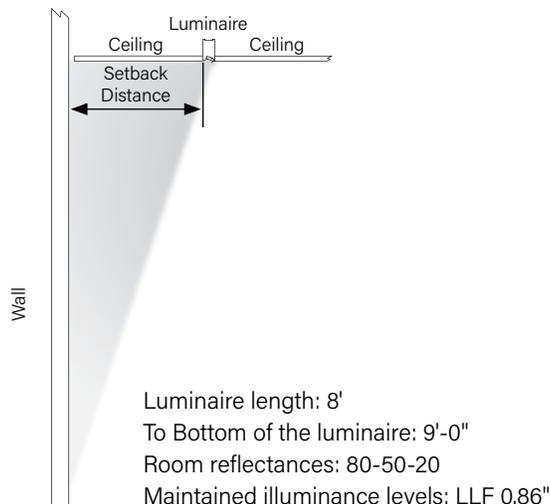
HP2-R-WW-D-K-4'-V-835

Downlight: With Kicker

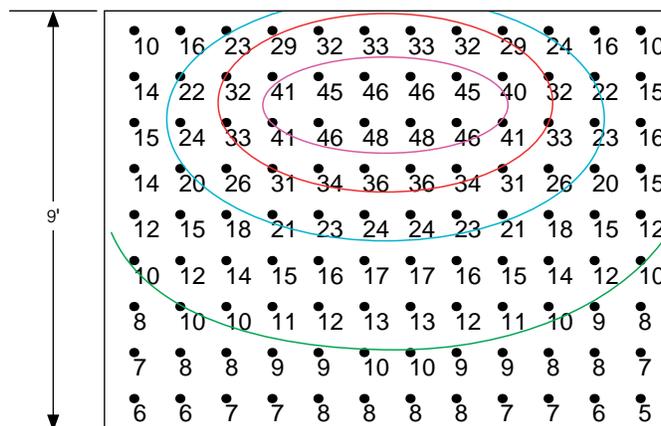
Total luminaire output: 1500 lumens (375 lm/ft)

19.6 watts (4.9 W/ft)

CRI: 80 / CCT: 3500K



Setback Distance - 2'



DOWNLIGHT ASYMMETRIC OPTIC - SETBACK INFO AND APPLICATION DATA

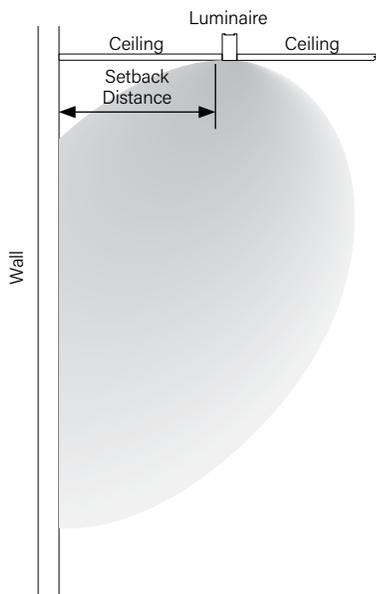
HP2-R-D-4ft-V-835-DAO

Downlight: DAO

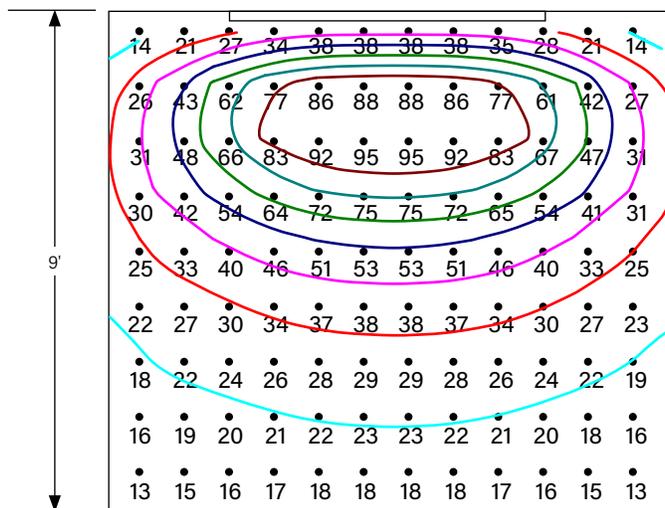
Total luminaire output: 3742 lumens (936 lm/ft)

35.6 watts (8.9 W/ft)

CRI: 80 / CCT: 3500K



Setback Distance - 2'



Submitted by:		Date:
Type:	Project:	
Ordering Info:		

0-10V Tunable White

Finelite's contractor friendly Tunable White luminaires are available at low cost, with powerful and simple 0-10V tuning and intensity controls.

TUNABLE WHITE FEATURES

- CCT range: 2700K - 6500K
- Dimming Range: 100% to 10%
- CRI Options: 80 CRI or 90 CRI

Note:

Dim to Off options available.

LUMINAIRE FAMILY MODIFICATIONS/RESTRICTIONS

Recessed Direct	Section Lengths											
	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	
Output S,B,H,V Single Circuit	Rows can be comprised of 2'-12' sections. Tailored lengths available.											
Integral Battery Backup (BSL310LP)							✓		✓		✓	

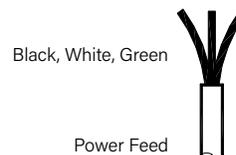
PHOTOMETRY

Apply a power adjustment factor to calculate wattage usage

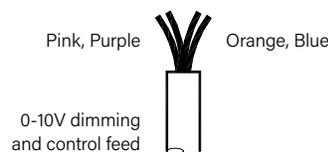
POWER	CONVERSION FACTOR
	1.1X

(Example: a 50 watt luminaire in static white would draw 55 watts using 0-10V Tunable White)

DUAL FEED DETAIL



WIRING LEGEND		
Black	Hot	Line Voltage
White	Neutral	Line Voltage
Green	Ground	



WIRING LEGEND		
Pink	Dimming	0-10V DC
Purple	Dimming	0-10V DC
Orange	TW	0-10V DC
Blue	TW	0-10V DC



Wall washer · Symmetric

Application

Designed for indirect or direct lighting effects for interior and exterior locations. This wall luminaire is for illuminating wall surfaces, with the mounting surface also acting as the reflection surface. DarkSky Approved when installed facing down (2700K and 3000K only)

Materials

Clear safety glass with white ceramic coating
 Marine grade, copper free (≤0.3% copper content) A360.0 aluminum alloy
 High temperature silicone gasket
 Mechanically captive stainless steel fasteners
 Galvanized zinc-plated mounting bracket
 Pure anodized aluminum reflector

NRTL listed to North American Standards, suitable for wet locations
 Protection class IP 65

Weight: 4.9 lbs.

Electrical

Operating voltage 120, 220-240 OR 277 VAC
 Minimum start temperature -30° C
 LED module wattage 17.9 W
 System wattage 21.0 W
 Controllability 0-10V dimmable
 Color rendering index Ra > 90
 Luminaire lumens 2030 lm
 LED service life (L70) 60000 hrs

LED color temperature

- 4000K (K4)
- 3500K (K35)
- 3000K (K3) (DarkSky Approved)**
- 2700K (K27) (DarkSky Approved)

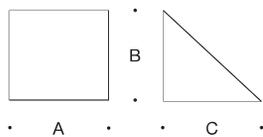
BEGA can supply you with suitable LED replacement modules for up to 20 years after the purchase of LED luminaires - see website for details

Finish

All BEGA standard finishes are matte, textured powder coat with minimum 3 mil thickness. BEGA Unidure® finish provides superior fade protection in Black, Bronze, and Silver. BEGA standard White is a super durable polyester powder. Optionally available RAL and custom color finishes provided in either polyester powder or liquid paint.

Available colors

- Black (BLK)
- Silver (SLV)**
- RAL:
- Bronze (BRZ)
- White (WHT)
- CUS:



	LED	A	B	C
B22449	17.9W	6 1/2	6 5/8	7 1/8

BEGA 1000 BEGA Way, Carpinteria, CA 93013 (805) 684-0533 info@bega-us.com

Due to the dynamic nature of lighting products and the associated technologies, luminaire data on this sheet is subject to change at the discretion of BEGA North America. For the most current technical data, please refer to bega-us.com
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Type:

BEGA Product:

Project:

Modified:

Available options

- CUS Custom finish
- MGU Marine grade undercoat
- NTB Natural bronze (premium finish)
- RAL RAL finish

Included (available for pre-shipment)

- B19538 Small opening wiring box



Day-Brite



by Signify

Industrial

Vaporlume LED DW

4' sealed industrial
4300 to 7000 lm

TYPE ZW2



Control options available

Day-Brite / CFI Vaporlume LED sealed industrial DW is a specialized wet location, IP rated product designed for use in both indoor and outdoor environments. It is a wet location listed, non-corrosive luminaire available in both fluorescent and LED light sources.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lumens: _____ Qty: _____
 Notes: _____

Ordering guide

Example: DWAE51L840-4-UNV-MD360W

Family	Application	Lens	Hubs Installed	Lumen Package	Color Temp.	Length	Voltage	Driver	Options
<input type="checkbox"/> D	<input type="checkbox"/> W		<input type="checkbox"/> E						
D Sealed industrial	W Wet Location	A DR Acrylic P Polycarbonate L Enhanced LED Acrylic	E Ends only	35L 3500 nominal lumens 43L 4300 nominal lumens 51L 5100 nominal lumens (25°C ambient) 51LH 5100 nominal lumens (-35°C to 40°C) 70L 7000 nominal lumens Other lumen packages may be ordered in increments of 100lm up to 7000 lumens.	830 80 CRI, 3000K 835 80 CRI, 3500K 840 80 CRI, 4000K 850 80 CRI, 5000K	4 4'	UNV Universal Voltage, 120-277V 347' 347V 480' 480V	blank 0-10V SDIM ² Step dimming to 40% input power	MD360W ³ Wet location occupancy sensor, external MD360WD ³ Wet location occupancy sensor, (ON/DIM to 10%) WHP Wide beam optic EMLED ³ Integral emergency IP67 Protection against effects of immersion GLR Fusing, fast blow SWZCSH ⁴ Interact Pro scalable high bay sensor with integral daylight & occupancy sensing, advanced grouping with dwell time SNH200 ⁴ Integral EasySense occupancy & daylight sensor, with advanced SpaceWise type wireless grouping SSL Stainless steel latches

Footnotes

- All 347V and 480V models available only for (-20°C to 25°C) ambient. Not available for use with 51LH or SDIM options.
- Step dim (SDIM) option not available on 51LH.
- EMLED option not available on 347V or 480V models.
- High bay motion detector. Motion sensing zone is extremely limited if used below 15' mounting height.
- Not available with SWZCSH or SNH200 option.

Accessories (order separately)

- TBK - Stainless Steel Top Bracket Kit (pair of brackets plus hardware)
- EBK - Stainless Steel End Bracket Kit (pair of brackets plus hardware)
- WBK - Stainless Steel Wraparound Bracket Kit (pair of brackets)
- FKR-126 - Chain Hanger Set (requires TBK)
- V2/DW-4ARL-CS - 4' Acrylic Replacement Lens
- V2/DW-4PRL - 4' Polycarbonate Replacement Lens
- V2/DW-4LRA - 4' LED Frosted Acrylic Replacement Lens



interact ready.

DW Vaporlume LED sealed industrial

4', 3500 to 7000 lumens

Application

- Ideally suited for use in refrigerated cold storage, industrial, parking garage, and canopy applications.
- Acceptable for outdoor as well as indoor installations.
- Can be surface (wall/ceiling) or suspended mounted unless otherwise specified.
- Wet Location – Areas of high humidity, water vapor, rain, incidental water spray, or other non-corrosive or nonflammable liquid.
- Excellent for applications such as garages, stairwells, storage areas, horizontal shelf-mount refrigerated cases, and cold storage.
- Mounting brackets available, order separately.
- IP65 rating standard. IP67 configuration available.
- LED sources provide excellent low temperature performance. This product can replace a fluorescent model in cold environments with significant energy savings.
- 51LH model listed for use in -35°C to 40°C ambient. 50,000 hour L70 lumen maintenance.
- 35L/43L models listed for use in -20°C to 40°C ambient. 100,000 hour L70 lumen maintenance.
- 51L/70L models listed for use in -20°C to 25°C ambient. L70 lumen maintenance is 100,000 hours for 51L model, and 50,000 hours for 70L.
- NSF Certified for Non-Food Zone Installations.
- EMLLED 1100lm nominal in DC mode
- WHP wide optic is an acrylic lens factory installed on the LED arrays, provides compliance to DLC requirements for parking garage luminaires

Construction/Finish

- Non-conductive, non-corrosive housing.
- Smooth exterior surface for easy cleaning.
- White one piece, molded fiberglass reinforced polyester body. No rusting, no oxidation, and no corrosion.
- Standard acrylic lens (A) is stippled sheet of .130" nominal thickness.
- Optional LED lens (L) designed specifically to further reduce pixilated glare from LED's. Linear rib profile.
- Optional polycarbonate lens (P) will not be yellowed by LED sources because they do not produce UV.

- Continuous compressible closed cell gasket provides tight seal between plastic enclosure and luminaire body.
- White ABS cam action latches standard.
- Pre-painted steel lighting channel.
- Two gasketed threaded (½" trade size) wet location hubs installed on ends.

Electrical

- High efficiency LEDs provide up to 100,000 hour rated life (L70, defined as 70% lumen maintenance @ rated maximum ambient).
- Dimming to 5% on 0-10V controls standard. Step dim (SDIM) option available, 100/40% levels.
- Driver and LED boards are accessible from below. LED boards are individually replaceable if required.
- Combinations are available providing as much as 117 delivered lumens per Watt.
- Nominal lumen packages range from 3,500 to 7,000 lumens, providing flexibility to optimize light levels for a specific application.
- LED sources provide full illumination in low temperature applications, unlike fluorescent sources that provide reduced light levels in very cold environments.
- LED sources can be frequently switched with no negative impact on life.
- Minimum 80 CRI provides smooth color rendering that rivals or exceeds performance of fluorescent lamps.
- Light output from the luminaire contains no infrared or ultraviolet energy, so the light won't heat or fade the objects being lit.
- Available motion sensor further increases energy savings in areas where occupancy is not continuous.

Labels

- cETLus listed to UL 1598. Suitable for use in wet locations.
- 5 Year Limited Warranty, www.signify.com/warranties
- Certain luminaire components may be adversely affected by contaminants. If sulfur, chlorine, or petroleum based solutions, or other contaminants will be in the area of operation, please consult factory as damage caused by these contaminants are not covered under our limited warranty.

Interact Pro scalable sensor for Foundation, Advanced & Enterprise tiers (SWZCSH and an evolution of SpaceWise)

- SWZCSH is a connected sensor with integral occupancy and daylight sensing and supports wireless mesh connectivity.

- The sensor works in the Foundation mode (similar to SpaceWise) when configured without a gateway or in an Interact Pro Advanced or Enterprise mode if a compatible gateway is used.
- Interact Pro includes an App, a portal and a broad portfolio of wireless luminaires, lamps and retrofit kits all working on the same system.
- Startup is implemented via Interact Pro App (Android or iPhone) & BlueTooth connectivity. The App provides flexibility to choose between a gateway or non gateway mode for setup.
- Setup with the gateway requires wired internet access to the gateway. It is possible to add a gateway at a later point.
- Prepare project configuration steps remotely and use IRT9015 remote

onsite to identify and group devices together.

- Compatible with:
 - UID8451/10 wireless dimmer switch
 - SWS200 wireless scene switch
 - Battery powered IP42 presence sensor OCC sensor IA CM WH 10/1
 - Battery powered IP42 presence & daylight sensor OCC-DL sensor IA CM IP42 WH
 - LCN3110/05 battery powered IP65 presence sensor OCC sensor IA CM IP65 WH
 - LCN3120/05 battery powered IP65 presence & daylight sensor OCC-DL sensor IA CM IP65 WH
- For more information on Interact Pro visit: www.interact-lighting.com/interactproscalablesystem

SNH200 EasySense

- Philips field apps allow programming of occupancy & daylight sensing parameters and fine-tuning of light levels during installation. It can also be used for grouping of fixtures.
- Download "Philips field apps" from the Google Play Store.
- Register for the commissioning app at <http://registration.componentcloud.philips.com/appregistration/>.
- The app works on certain Android phones with NFC or IR. See Recommended Phones and the EasySense App User Manual in the download section at <http://www.usa.lighting.philips.com/products/lighting-components/easysense> and follow the "View Downloads" link to register for access to the download area. Navigate to Connected-Lighting-Components and then Philips-EasySense-Sensors to find downloads.

DW Vaporlume LED sealed industrial

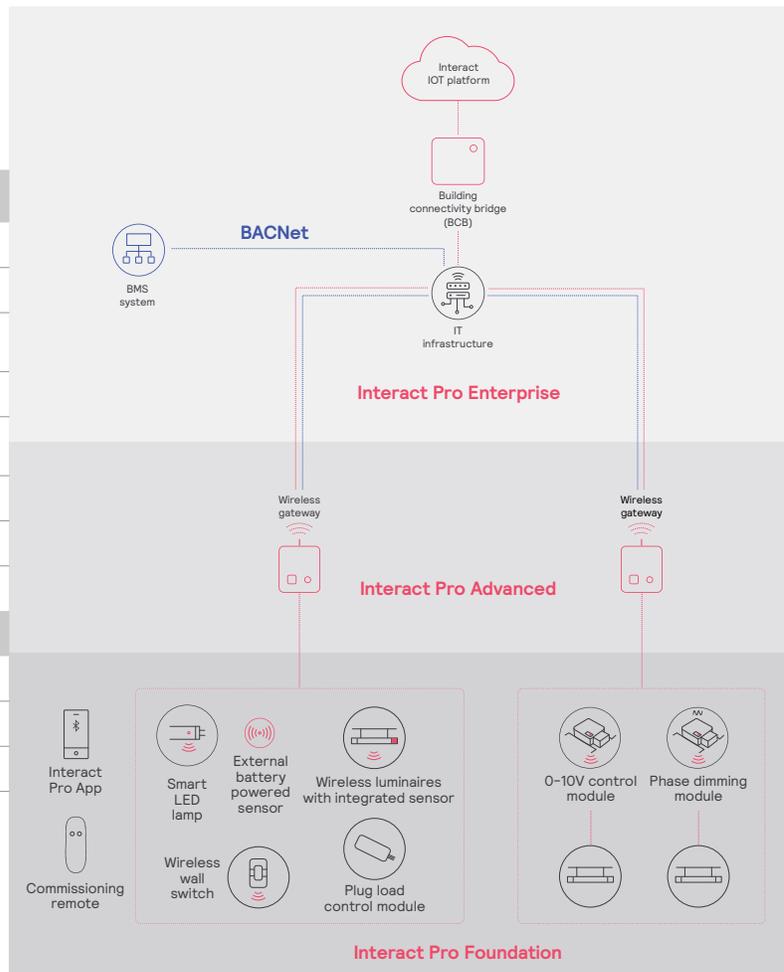
4', 3500 to 7000 lumens

Interact Pro scalable system			
	Foundation	Advanced	Enterprise
Dimming, grouping, and zoning	✓	✓	✓
Bluetooth and ZigBee enabled	✓	✓	✓
Motion sensing and daylight harvesting	✓	✓	✓
Integration with 0-10V and phase dimming fixtures	✓	✓	✓
Code compliance	✓	✓	✓
Granular dimming and dwell time	✓	✓	✓
Energy reporting and monitoring		✓	✓
Scheduling		✓	✓
Demand response		✓	✓
BMS integration (BACnet)			✓
Floor plan visualization			✓
IoT sensors for wellness			✓
IoT Apps for productivity			✓

Currently supported maximum system size

To be able to design the lighting system correctly for the customer, it is important to know the prime characteristics of the system, its possibilities and limitations.

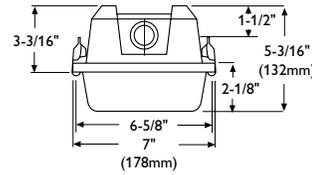
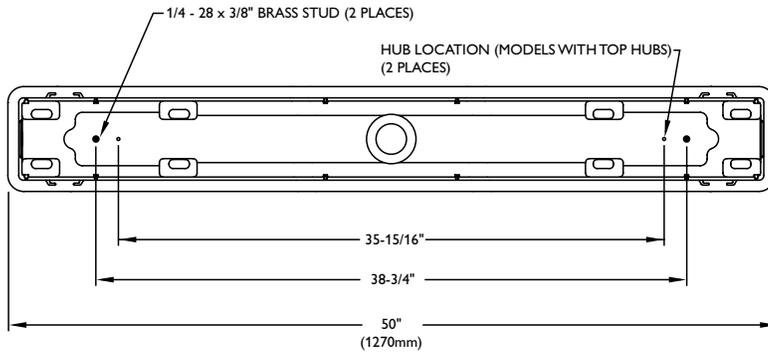
System level	
Total number of gateways	Unlimited
Total number of devices	200 per network
• luminaires with integrated sensors	150
• smart TLEDS	150
Total number of ZGP devices (sensors and switches)	50
• sensors	30
• switches	50
• zones and groups	64
Group level	
Recommended number of lights	40 (recommended 25)
Number of ZGP devices	5
Number of scenes	16



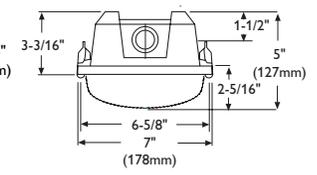
DW Vaporlume LED sealed industrial

4', 3500 to 7000 lumens

Dimensions



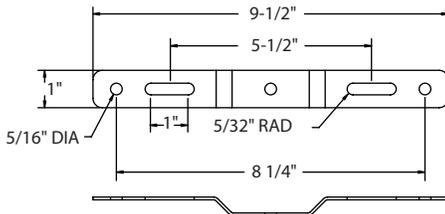
Shallow acrylic (A) and polycarbonate (P) lens



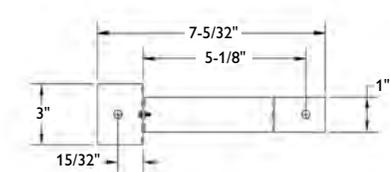
Enhanced LED acrylic lens (L)

Mounting Brackets

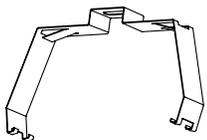
TBK - Top Mounting Bracket



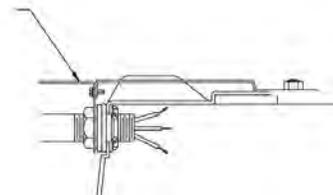
EBK - End Mounting Bracket



WBK - Wraparound Mounting Bracket



EBK - End Mounting Bracket



Acrylic Lens



Polycarbonate Lens



LED Frosted Acrylic Lens

DW Vaporlume LED sealed industrial

4', 3500 to 7000 lumens

4' Vaporlume LED DW, 3500 nominal lumens

LER-117

Catalog No.	DWAE35L840-4
Test No.	32643
S/MH	1.2
Source	LED
Input Watts	32
Delivered Lumens	3699

Candlepower

Angle	End	45	Cross	Back-45
0	1250	1250	1250	1250
5	1244	1239	1243	1239
15	1204	1201	1199	1201
25	1112	1114	1106	1114
35	966	964	949	964
45	778	777	841	777
55	576	685	708	685
65	371	509	472	509
75	193	250	271	250
85	49	91	96	91
95	19	36	28	36
105	17	30	20	30
115	10	28	20	28
125	4	19	19	19
135	2	10	17	10
145	1	3	9	3
155	1	1	2	1
165	1	1	1	1
175	1	1	1	1

Comparative yearly lighting energy cost per 1000 lumens – \$2.03 based on 3000 hrs. and \$.08 pwr KWH.

Photometric values based upon tests performed in compliance with LM-79.

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)

pcc	80			70			50		
	70	50	30	70	50	30	50	30	
pw									
RCR									
0	117	117	117	114	114	114	110	110	
1	108	103	97	105	100	95	94	92	
2	97	89	81	94	86	80	82	77	
3	89	78	69	85	76	68	72	66	
4	81	68	59	79	68	58	65	56	
5	75	61	53	71	59	52	57	50	
6	68	55	46	67	54	46	52	45	
7	64	50	40	61	48	40	46	40	
8	58	46	36	57	45	36	42	35	
9	56	41	34	54	40	33	40	33	
10	52	39	30	51	38	30	36	29	

Light Distribution

Degrees	Lumens	% Luminaire
0-30	969	26.1
0-40	1569	42.3
0-60	2772	74.8
0-90	3602	97.1
90-120	81	2.2
90-130	95	2.6
90-150	105	2.8
90-180	106	2.9
0-180	3708	100.0

Average Luminance

Angle	End	45'	Cross
45	5069	4222	4360
55	4543	4228	4105
65	865	3770	3222
75	3096	2402	2333
85	1821	1312	1164

4' Vaporlume LED DW, 4300 nominal lumens

LER-116

Catalog No.	DWAE43L840-4
Test No.	32642
S/MH	1.2
Source	LED
Input Watts	38
Delivered Lumens	4431

Candlepower

Angle	End	45	Cross	Back-45
0	1496	1496	1496	1496
5	1491	1487	1485	1487
15	1443	1439	1441	1439
25	1332	1338	1323	1338
35	1158	1151	1132	1151
45	933	926	1000	926
55	688	819	854	819
65	444	611	566	611
75	231	300	324	300
85	58	110	118	110
95	23	43	35	43
105	20	36	25	36
115	12	34	24	34
125	5	24	24	24
135	3	12	21	12
145	2	4	11	4
155	1	1	3	1
165	1	1	1	1
175	1	1	1	1

Comparative yearly lighting energy cost per 1000 lumens – \$2.07 based on 3000 hrs. and \$.08 pwr KWH.

Photometric values based upon tests performed in compliance with LM-79.

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)

pcc	80			70			50		
	70	50	30	70	50	30	50	30	
pw									
RCR									
0	117	117	117	114	114	114	109	109	
1	108	103	97	104	100	95	94	92	
2	97	89	81	94	86	80	82	77	
3	89	78	69	85	76	68	72	66	
4	81	68	59	79	67	58	65	56	
5	75	61	53	71	59	52	57	50	
6	68	55	46	67	54	46	52	45	
7	64	50	40	61	48	40	46	40	
8	58	46	36	57	45	36	42	35	
9	56	41	34	54	40	33	40	33	
10	52	39	30	51	38	30	36	29	

Light Distribution

Degrees	Lumens	% Luminaire
0-30	1161	26.1
0-40	1880	42.3
0-60	3318	74.7
0-90	4313	97.1
90-120	99	2.2
90-130	116	2.6
90-150	128	2.9
90-180	129	2.9
0-180	4442	100.0

Average Luminance

Angle	End	45'	Cross
45	6078	5034	5182
55	5434	5059	4955
65	4626	4531	3867
75	3704	2883	2786
85	2173	1578	1433

DW Vaporlume LED sealed industrial

4', 3500 to 7000 lumens

4' Vaporlume LED DW, 5100 nominal lumens LER-111

Catalog No.	DWA51L840-4	Candlepower			
		Angle	End	45	Cross
Test No.	32640	0	1729	1729	1729
S/MH	1.2	5	1722	1716	1709
Source	LED	15	1666	1651	1632
Input Watts	46	25	1542	1523	1494
Delivered Lumens	5129	35	1340	1307	1250
		45	1091	1039	1039
		55	817	909	884
		65	533	670	574
		75	280	309	286
		85	75	107	86
		95	26	47	34
		105	24	42	30
		115	14	39	29
		125	6	28	28
		135	4	16	24
		145	3	5	12
		155	2	2	3
		165	2	2	2
		175	2	2	2

Comparative yearly lighting energy cost per 1000 lumens - \$2.16 based on 3000 hrs. and \$.08 pwr KWH.

Photometric values based upon tests performed in compliance with LM-79.

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)	pcc					
	80			70		
	70	50	30	70	50	30
pw						
RCR						
0	117	117	117	114	114	114
1	108	103	97	104	100	95
2	97	89	81	94	86	80
3	89	78	69	85	76	68
4	81	68	59	79	68	58
5	75	61	53	71	59	52
6	68	55	46	67	54	46
7	64	50	40	61	48	40
8	58	46	36	57	45	36
9	56	41	34	54	40	33
10	52	39	30	51	38	30

Light Distribution

Degrees	Lumens	% Luminaire
0-30	1344	26.1
0-40	2176	42.3
0-60	3842	74.7
0-90	4992	97.1
90-120	114	2.2
90-130	133	2.6
90-150	148	2.9
90-180	149	2.9
0-180	5141	100.0

Average Luminance

Angle	End	45°	Cross
45	7103	5648	5790
55	6447	5616	5126
65	5552	4964	3915
75	4486	2974	2465
85	2784	1530	1043

4' Vaporlume LED DW, 7000 nominal lumens LER-107

Catalog No.	DWA70L840-4	Candlepower			
		Angle	End	45	Cross
Test No.	32614	0	2357	2357	2357
S/MH	1.2	5	2351	2342	2345
Source	LED	15	2274	2271	2270
Input Watts	65	25	2101	2105	2089
Delivered Lumens	6985	35	1818	1814	1784
		45	1467	1462	1586
		55	1085	1302	1345
		65	701	959	891
		75	365	469	503
		85	92	170	176
		95	36	67	53
		105	33	57	39
		115	19	53	39
		125	8	38	38
		135	4	20	33
		145	3	6	18
		155	2	2	4
		165	2	2	2
		175	2	2	2

Comparative yearly lighting energy cost per 1000 lumens - \$2.24 based on 3000 hrs. and \$.08 pwr KWH.

Photometric values based upon tests performed in compliance with LM-79.

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)	pcc					
	80			70		
	70	50	30	70	50	30
pw						
RCR						
0	117	117	117	114	114	114
1	108	103	97	105	100	95
2	97	89	81	94	86	80
3	89	78	69	85	76	68
4	81	68	59	79	67	58
5	75	61	52	71	59	52
6	68	55	46	67	54	46
7	64	50	40	61	48	40
8	58	46	36	57	45	36
9	56	41	34	54	40	33
10	52	39	30	51	38	30

Light Distribution

Degrees	Lumens	% Luminaire
0-30	1830	26.1
0-40	2961	42.3
0-60	5230	74.7
0-90	6798	97.1
90-120	156	2.2
90-130	183	2.6
90-150	203	2.9
90-180	205	2.9
0-180	7003	100.0

Average Luminance

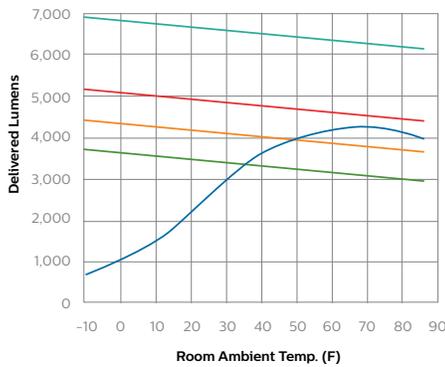
Angle	End	45°	Cross
45	9554	7946	8219
55	8566	8043	7802
65	7304	7108	6080
75	5848	4516	4329
85	3444	2433	2142

DW Vaporlume LED sealed industrial

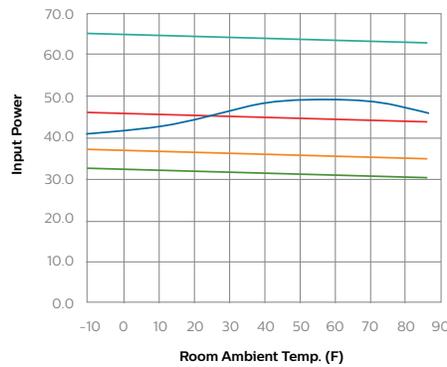
4', 3500 to 7000 lumens

Energy Data

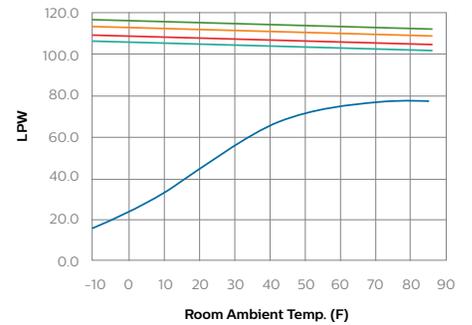
Model	Initial Delivered Lumens @ 25°C Ambient	Input Power	Lumens per Watt	Application notes
DWAE35L840-4-UNV	3,699	32W	117 LPW	<ul style="list-style-type: none"> Slightly less than 2 lamp F32T8 at room temperature, 35% energy savings. Equivalent to 2 lamp F32T8 in refrigerator (40°F), 35% energy savings.
DWAE43L840-4-UNV	4,431	38W	116 LPW	<ul style="list-style-type: none"> Equivalent to 2 lamp F32T8 at room temperature, 15% energy savings. Double the output of 2 lamp F32T8 in freezer (25°F) at the SAME energy use.
DWAE51L840-4-UNV	5,129	46W	111 LPW	<ul style="list-style-type: none"> Equivalent to high ballast factor 2 lamp F32T8 at room temperature, 15% energy savings.
DWAE70L840-4-UNV	6,985	65W	107 LPW	<ul style="list-style-type: none"> Equivalent to 3 lamp F32T8 at room temperature, 30% energy savings.



2-LAMP F32T8 DWAE35L840 DWAE43L840
DWAE51L840 DWAE70L840



2-LAMP F32T8 DWAE35L840 DWAE43L840
DWAE51L840 DWAE70L840



2-LAMP F32T8 DWAE35L840 DWAE43L840
DWAE51L840 DWAE70L840





Floodlighting

PowerForm

PFF floodlight



Gardco PowerForm LED floodlights provide over 1,500W HID replacement while significantly reducing energy and maintenance costs. PowerForm features a modular housing design available in four different sizes for a range of commercial, retail, industrial, airport, and other outdoor floodlighting applications. PowerForm is available with multiple lumen packages delivering approximately 42,300 to 138,600 lumens.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lamps: _____ Qty: _____
 Notes: _____

Ordering guide

example: PFF-184L-900-NW-G2-YK-SP-120-PCB-F1-BZ

Prefix	Number of LEDs	Drive Current	Color Temperature	Mounting	Distribution	Voltage
PFF						
PFF PowerForm flood	138L 138 LEDs (3 modules) 184L 184LEDs (4 modules) 230L 230 LEDs (5 modules) 276L⁶ 276 LEDs (6 modules)	700 700mA 900 900mA 1A 1 Amp 1.2A^{6,10} 1.2 Amp	WW-G2 Warm White 3000K, 70 CRI Generation 2 NW-G2 Neutral White 4000K, 70 CRI Generation 2	SF Slip Fitter Mount (fits on 2-3/8" O.D. tenon, wires through slip fitter) YK Yoke Mount (9' or 2.74m cord exits luminaire)	A33 Asymmetric 33° Flood (NEMA 6x5) RM Rectangular Medium Flood (NEMA 7x4) SP Spot (12° round) (NEMA 2x2) AIRP Airport Apron Flood (NEMA 7x5)	120 120V 208 208V 240 240V 277 277V 347 347V 480 480V UNV 120-277V HVU 347-480V
	Note: 46 LEDs per module					

Options									
Dimming Controls ^{1,2}	Fusing	Surge Protection	Other Options	Side Rails	Finish				
none leave blank (0-10V dimming driver standard) DD^{1,2,3,8} 0-10V dimming external wires (controls by others) FAWS^{1,2,8,10} Field Adjustable Wattage Selector	none leave blank Fusing F1⁷ Single (120, 277, 347VAC) F2⁷ Double (208, 240, 480VAC) F3⁷ Canadian Double Pole (208, 240, 480VAC) Pole Mount Fusing FP1⁷ Single (120, 277, 347VAC) FP2⁷ Double (208, 240, 480VAC) FP3⁷ Canadian Double Pole (208, 240, 480VAC)	blank Surge Protector 10kV / 10kA (standard) SP2 Surge Protector 20kV / 10kA (option)	none leave blank PCB^{2,8,9} Photocontrol Button TLRD7^{2,4} Twist Lock Receptacle 7-pin TLRPC^{2,4,7,9} Twist Lock 5-pin Receptacle w/ 3-pin Photocell BAC^{11,12} Meets the requirements of the Buy American Act of 1933 (BAA)	blank standard anodized, no finish PSR Painted Side Rails, painted same finish to match luminaire finish	BK Black WH White BZ Bronze DGY Dark Gray MGY Medium Gray RAL⁵ Optional Color (specify optional color or RAL) CC⁵ Custom Color (must supply color chip, requires factory quote)				

- Choose only 1 of the following Dimming Controls options: either DD or FAWS.
- 0-10V dimming driver standard.
- Luminaire has 0-10V dimming wires exiting the luminaire for dimming controls by others.
- TLRD7 and TLRPC max aiming angle 45°. TLRD7 works with 3, 5 or 7 pin NEMA photocell/dimming, use of photocell (by others) or shorting cap (by others) is required to ensure proper illumination. TLRD7 and TLRPC receptacle pins 4 & 5 are capped off when ordered with any of the Dimming Controls DD or FAWS.
- Must contact factory prior to ordering - these items are ETO Specials.
- 276L with 1.2A only available as ETO Special - must contact factory prior to ordering.
- Must specify specific input voltage, not available with UNV or HVU.
- PCB can be used with DD and FAWS.
- PCB and TLRPC available in 120V, 208V, 240V, or 277V only.
- FAWS not available with 1.2A (switch has lower current limit).
- Extended lead times apply. Contact factory for details.
- Failure to properly select the "BAC" suffix could result in you receiving product that is not BAA compliant product with no recourse for an RMA or refund. This BAC designation hereunder does not address (i) the applicability of, or availability of a waiver under, the Trade Agreements Act, or (ii) the "Buy America" domestic content requirements imposed on states, localities, and other non-federal entities as a condition of receiving funds administered by the Department of Transportation or other federal agencies.

Connected lighting

Interact City connector node provides the plug and play wireless communications technology to connect your floodlight to the Interact City lighting management system.



Accessory Ordering Code	Description
LLC	Interact City cellular technology connector node

Contact Signify for additional support when connected lighting or additional services are desired.
 For more details visit: <https://www.interact-lighting.com/en-us/what-is-possible/interact-city>



PFF PowerForm

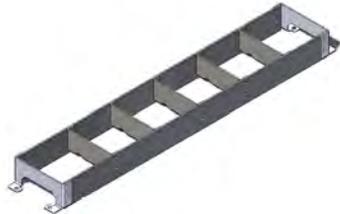
Floodlight

PowerForm Accessories (ordered separately, field installed, specify finish at placeholder F)

Shielding Accessories

Glare shield (black finish)

GS-PFF-138	138 LEDs (3 modules)
GS-PFF-184	184 LEDs (4 modules)
GS-PFF-230	230 LEDs (5 modules)
GS-PFF-276	276 LEDs (6 modules)



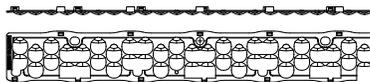
GS louvered glare shields are ordered as an accessory only and can be used with A33, RM, and AIRP optics; can not be used with SP optics due to fit restriction - if required, must contact factory prior to ordering since it is an ETO Special.

Glare shields are aluminum sheet metal louvers painted in a smooth black power coat finish. Each set includes a mounting kit that fastens to the front face of the LED light engine and includes stainless steel hardware.

One glare shield attaches to each 46 LED module. The total number of glare shields is determined by total number of modules per luminaire where required.

Internal house side shield

HIS-PFF-138	138 LEDs (3 modules)
HIS-PFF-184	184 LEDs (4 modules)
HIS-PFF-230	230 LEDs (5 modules)
HIS-PFF-276	276 LEDs (6 modules)



HIS internal house side shields are ordered as an accessory only and can be used with A33 and RM optics; can not be used with SP or AIRP optics due to fit restriction.

Internal shields are injection molded black polymer that snap fit on each 46 LED module. The total number of internal shields is determined by the total number of modules per luminaire where required.

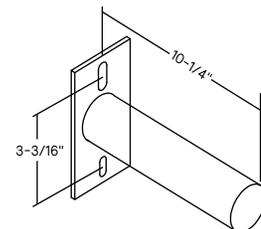
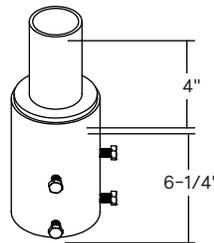
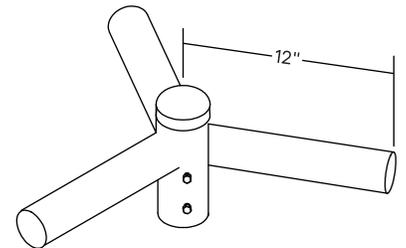
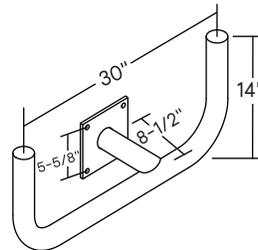
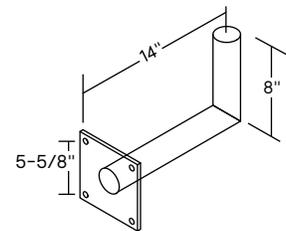
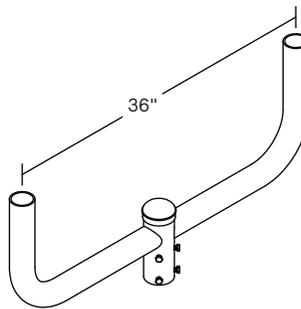
Mounting Accessories

For wall and pole brackets, bullhorns, etc. see <https://www.signify.com/en-us/products/outdoor-luminaires/poles-brackets/site-and-area-brackets/bull-horn-brackets#downloads> for details.

Exception: All UPS Upsweep - contact factory to confirm compatibility.

Exception: SBRKT-SAB-NA-4-WA-(F) Side Angle Flat bracket cannot be used with any PFF versions due to only single mounting hole that is too small for required mounting bolts.

Exception: PFF-276L 6 module version cannot be used with any brackets, etc. due to its weight - too heavy.



Examples shown are not to scale - see SBRKT spec sheet for all available brackets

PFF PowerForm

Floodlight

LED Wattage and Lumen Values – 3000K

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33		RM		SP		AIRP	
						Lumen Output	Efficacy (LPW)						
PFF-138L-700-WW-G2	138	3	700	3000	289	43,048	149	42,433	147	43,619	151	42,284	146
PFF-138L-900-WW-G2	138	3	900	3000	397	51,974	131	51,231	129	52,663	133	51,051	128
PFF-138L-1A-WW-G2	138	3	1050	3000	455	58,940	130	58,098	128	59,721	131	57,894	127
PFF-138L-1.2A-WW-G2	138	3	1200	3000	511	65,101	127	64,170	126	65,962	129	62,793	123
PFF-184L-700-WW-G2	184	4	700	3000	386	57,398	149	56,577	147	58,159	151	56,379	146
PFF-184L-900-WW-G2	184	4	900	3000	530	69,299	131	68,308	129	70,217	133	68,068	128
PFF-184L-1A-WW-G2	184	4	1050	3000	606	78,587	130	77,463	128	79,628	131	77,191	127
PFF-184L-1.2A-WW-G2	184	4	1200	3000	681	86,801	127	85,559	126	87,950	129	83,724	123
PFF-230L-700-WW-G2	230	5	700	3000	482	71,747	149	70,722	147	72,698	151	70,474	146
PFF-230L-900-WW-G2	230	5	900	3000	662	86,623	131	85,385	129	87,771	133	85,085	128
PFF-230L-1A-WW-G2	230	5	1050	3000	758	98,234	130	96,829	128	99,534	131	96,489	127
PFF-230L-1.2A-WW-G2	230	5	1200	3000	852	108,500	127	106,949	126	109,937	129	106,574	125
PFF-276L-700-WW-G2	276	6	700	3000	579	86,097	149	84,866	147	87,237	151	84,568	146
PFF-276L-900-WW-G2	276	6	900	3000	795	103,948	131	102,462	129	105,325	133	103,975	131
PFF-276L-1A-WW-G2	276	6	1050	3000	909	117,880	130	116,194	128	119,442	131	117,911	130
PFF-276L-1.2A-WW-G2	276	6	1200	3000	1022	130,200	127	128,338	126	131,924	129	127,888	125

LED Wattage and Lumen Values – 4000K

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33		RM		SP		AIRP	
						Lumen Output	Efficacy (LPW)						
PFF-138L-700-NW-G2	138	3	700	4000	289	45,219	156	44,573	154	45,818	158	44,416	154
PFF-138L-900-NW-G2	138	3	900	4000	397	54,595	137	53,814	135	55,318	139	53,625	135
PFF-138L-1A-NW-G2	138	3	1050	4000	455	61,912	136	61,027	134	62,732	138	60,813	134
PFF-138L-1.2A-NW-G2	138	3	1200	4000	511	68,383	134	67,405	132	69,288	136	65,959	129
PFF-184L-700-NW-G2	184	4	700	4000	386	60,292	156	59,430	154	61,091	158	59,222	154
PFF-184L-900-NW-G2	184	4	900	4000	530	72,793	137	71,752	135	73,757	139	71,500	135
PFF-184L-1A-NW-G2	184	4	1050	4000	606	82,549	136	81,369	134	83,643	138	81,083	134
PFF-184L-1.2A-NW-G2	184	4	1200	4000	681	91,177	134	89,873	132	92,384	136	87,945	129
PFF-230L-700-NW-G2	230	5	700	4000	482	75,365	156	74,288	154	76,363	158	74,027	154
PFF-230L-900-NW-G2	230	5	900	4000	662	90,991	137	89,690	135	92,196	139	89,375	135
PFF-230L-1A-NW-G2	230	5	1050	4000	758	103,187	136	101,711	134	104,553	138	101,354	134
PFF-230L-1.2A-NW-G2	230	5	1200	4000	852	113,971	134	112,341	132	115,480	136	111,947	131
PFF-276L-700-NW-G2	276	6	700	4000	579	90,438	156	89,145	154	91,636	158	88,832	154
PFF-276L-900-NW-G2	276	6	900	4000	795	109,189	137	107,628	135	110,635	139	109,217	137
PFF-276L-1A-NW-G2	276	6	1050	4000	909	123,824	136	122,053	134	125,464	138	123,856	136
PFF-276L-1.2A-NW-G2	276	6	1200	4000	1022	136,765	134	134,809	132	138,576	136	134,336	131

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown. Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.

NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires. Contact factory for configurations not shown.

Field Adjustable Wattage Selector (FAWS) Multiplier Chart

FAWS Position	Typical Lumens and System Wattage Multiplier	
	138L/184L	230L/276L
1	10%	15%
2	20%	35%
3	30%	45%
4	40%	60%
5	45%	70%
6	55%	85%
7	60%	100%
8	70%	100%
9	80%	100%
10	100%	100%

Note: Actual performance may vary due to LED and driver tolerances

PFF PowerForm

Floodlight

LED Wattage and Lumen Values – 3000K with glare shield

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33-GS		RM-GS		AIRP-GS	
						Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)
PFF-138L-700-WW-G2-GS	138	3	700	3000	289	33,280	115	32,884	114	22,022	76
PFF-138L-900-WW-G2-GS	138	3	900	3000	397	40,180	101	39,701	100	26,587	67
PFF-138L-1A-WW-G2-GS	138	3	1050	3000	455	45,566	100	45,023	99	30,151	66
PFF-138L-1.2A-WW-G2-GS	138	3	1200	3000	511	49,421	97	48,833	96	32,702	64
PFF-184L-700-WW-G2-GS	184	4	700	3000	386	44,374	115	43,844	114	29,363	76
PFF-184L-900-WW-G2-GS	184	4	900	3000	530	53,574	101	52,935	100	35,450	67
PFF-184L-1A-WW-G2-GS	184	4	1050	3000	606	60,754	100	60,030	99	40,201	66
PFF-184L-1.2A-WW-G2-GS	184	4	1200	3000	681	65,895	97	65,110	96	43,604	64
PFF-230L-700-WW-G2-GS	230	5	700	3000	482	55,466	115	54,806	114	36,702	76
PFF-230L-900-WW-G2-GS	230	5	900	3000	662	66,967	101	66,169	100	44,313	67
PFF-230L-1A-WW-G2-GS	230	5	1050	3000	758	75,942	100	75,038	99	50,251	66
PFF-230L-1.2A-WW-G2-GS	230	5	1200	3000	852	83,879	98	82,880	97	55,504	65
PFF-276L-700-WW-G2-GS	276	6	700	3000	579	66,560	115	65,767	114	44,043	76
PFF-276L-900-WW-G2-GS	276	6	900	3000	795	81,834	103	80,859	102	54,150	68
PFF-276L-1A-WW-G2-GS	276	6	1050	3000	909	92,802	102	91,697	101	61,408	68
PFF-276L-1.2A-WW-G2-GS	276	6	1200	3000	1022	100,655	98	99,456	97	66,604	65

LED Wattage and Lumen Values – 4000K with glare shield

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33-GS		RM-GS		AIRP-GS	
						Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)
PFF-138L-700-NW-G2-GS	138	3	700	4000	289	34,958	121	34,542	119	23,132	80
PFF-138L-900-NW-G2-GS	138	3	900	4000	397	42,206	106	41,703	105	27,928	70
PFF-138L-1A-NW-G2-GS	138	3	1050	4000	455	47,863	105	47,293	104	31,671	70
PFF-138L-1.2A-NW-G2-GS	138	3	1200	4000	511	51,913	102	51,295	100	34,351	67
PFF-184L-700-NW-G2-GS	184	4	700	4000	386	46,611	121	46,055	119	30,843	80
PFF-184L-900-NW-G2-GS	184	4	900	4000	530	56,275	106	55,604	105	37,237	70
PFF-184L-1A-NW-G2-GS	184	4	1050	4000	606	63,817	105	63,057	104	42,228	70
PFF-184L-1.2A-NW-G2-GS	184	4	1200	4000	681	69,217	102	68,393	100	45,802	67
PFF-230L-700-NW-G2-GS	230	5	700	4000	482	58,263	121	57,569	119	38,553	80
PFF-230L-900-NW-G2-GS	230	5	900	4000	662	70,343	106	69,505	105	46,547	70
PFF-230L-1A-NW-G2-GS	230	5	1050	4000	758	79,771	105	78,821	104	52,785	70
PFF-230L-1.2A-NW-G2-GS	230	5	1200	4000	852	88,108	103	87,059	102	58,302	68
PFF-276L-700-NW-G2-GS	276	6	700	4000	579	69,916	121	69,083	119	46,264	80
PFF-276L-900-NW-G2-GS	276	6	900	4000	795	85,960	108	84,936	107	56,880	72
PFF-276L-1A-NW-G2-GS	276	6	1050	4000	909	97,481	107	96,320	106	64,504	71
PFF-276L-1.2A-NW-G2-GS	276	6	1200	4000	1022	105,730	103	104,471	102	69,962	68

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown. Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.

NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires.

Predicted Lumen Depreciation Data

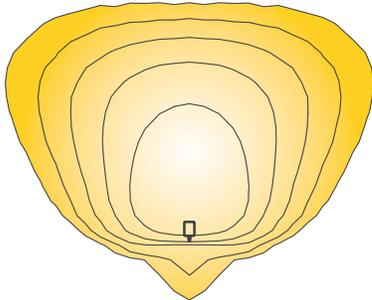
Ambient Temperature (°C)	Driver Current	Calculated L70 hours	L70 per TM-21	Lumen Maintenance % @ 60,000 hours
25°C	up to 1200 mA	>100,000	>60,000	98%

Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions. L70 is the predicted time when LED performance depreciates to 70% of initial lumen output. Calculated per IESNA TM21-11. Published L70 hours limited to 6 times actual LED test hours.

PFF PowerForm Floodlight

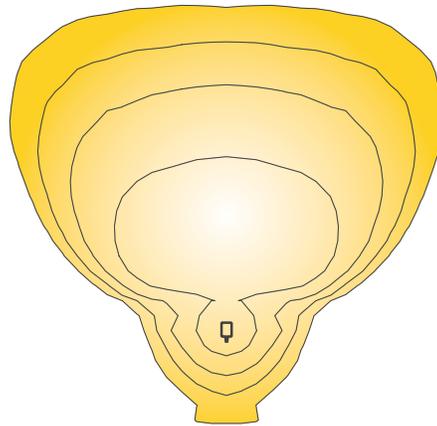
Optical Distribution Diagrams

A33 Asymmetric 33° Flood (NEMA 6x5)



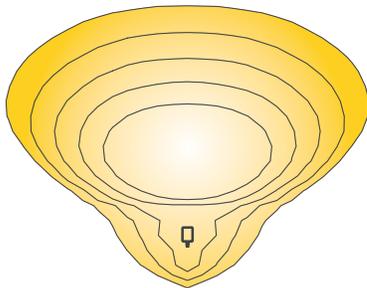
30' or 9.14m mounting height, 30° tilt
 Applications include: large area lighting, storage yards, transportation terminals, ports, utility sub-stations, security lighting, large facades, large wall washing, tall structures / monuments / statues

AIRP Airport Apron Flood



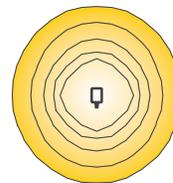
30' or 9.14m mounting height, 25° tilt
 Applications: airport aprons

RM Rectangular Medium Flood (NEMA 7x4)



30' or 9.14m setback, 50° tilt
 Applications include: building entrances and exits, security lighting, perimeter fences, checkpoints and inspection stations, large and wide wall grazing, large signs

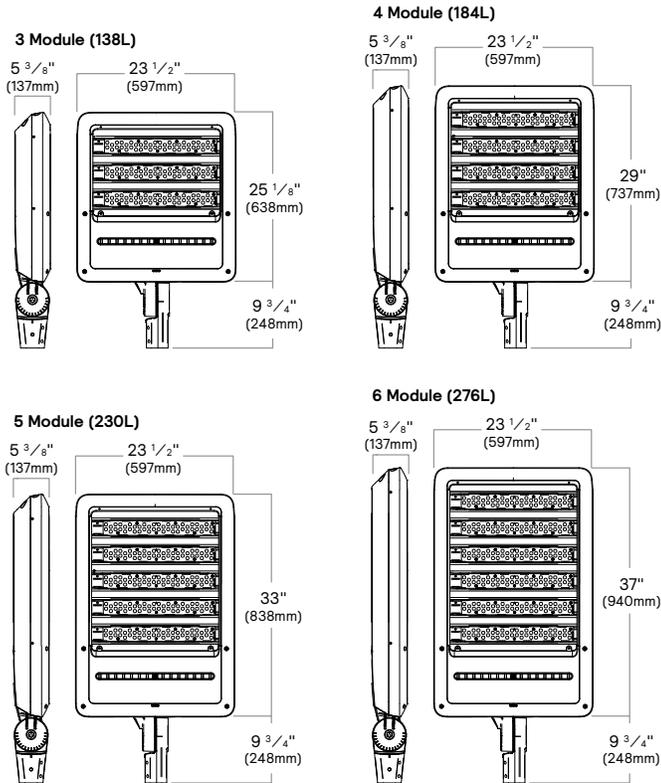
SP Spot 12° Round (NEMA 2x2)



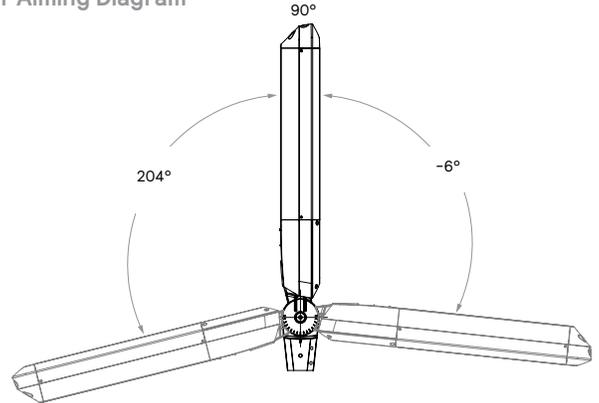
30' or 9.14m setback, 0° tilt
 Applications include: spotlighting, accenting, tall columns, tall structures / monuments / statues

PFF PowerForm Floodlight

Dimensions – Slipfitter Mount (SF)



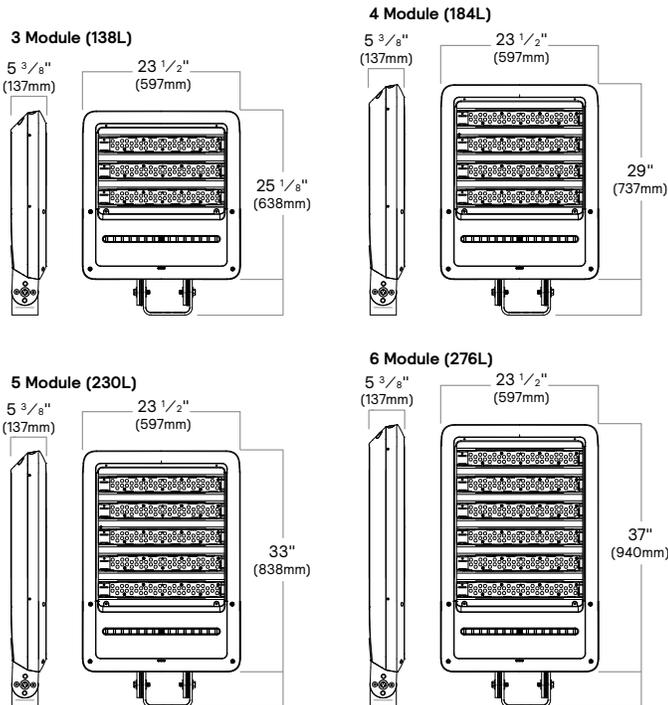
Slipfitter Aiming Diagram



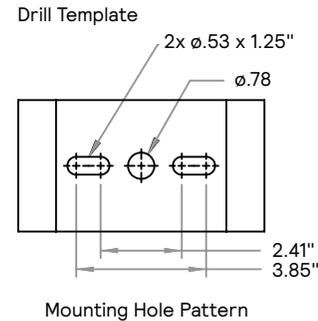
No. of Modules	Effective Projected Area (EPA-ft ²)			Weight of single luminaire PFF SF
	Single: 0° Aim	Single: 45° Aim	Single: 90° Aim	
3	0.647	2.311	3.269	62 lbs (28.1 kg)
4	0.739	2.681	3.792	72 lbs (32.7 kg)
5	0.836	3.021	4.273	81 lbs (36.7 kg)
6	0.938	3.337	4.720	91 lbs (41.3 kg)

Note: Applies to single PFF luminaire with (SF) Slipfitter mount at the following angles: 0° is horizontal to ground, 90° is perpendicular to the ground as shown in drawings.

Dimensions – Yoke Mount (YK)



Yoke Mount Drill Template



No. of Modules	Effective Projected Area (EPA-ft ²)			Weight of single luminaire PFF YK
	Single: 0° Aim	Single: 45° Aim	Single: 90° Aim	
3	0.596	2.232	3.156	66 lbs (29.9 kg)
4	0.688	2.601	3.679	76 lbs (34.5 kg)
5	0.786	2.942	4.161	86 lbs (39 kg)
6	0.887	3.257	4.607	94 lbs (42.6 kg)

Note: Applies to single PFF luminaire with (YK) Yoke mount at the following angles: 0° is horizontal to ground, 90° is perpendicular to the ground as shown in drawings.

PFF PowerForm

Floodlight

Controls options

DD: 0-10V dimming driver with dimming wires externally accessible for connecting dimming controls by others.

PCB: Photocell button (a.k.a. button photoeye).

TLRD7*: Twist Lock Receptacle with 7 pins enabling dimming and additional functionality (by others), can be used with an Interact City node, a twistlock photoelectric cell or a shorting cap. Can also be used with Signify or third party control system. Pins 6 and 7 are capped off (not connected) unless used with SR driver - ETO Specials, contact factory. Receptacle located on top of luminaire housing.

* Use of photoelectric cell or shorting cap is required to ensure proper illumination. Note: Additional hardware will be required to utilize the additional 2 pins on this receptacle.

TLRPC*: Twist Lock Receptacle with 5 pins and includes 3 pin twistlock photoelectric cell (must specify voltage). Receptacle located on top of luminaire housing.

*Note: Maximum aiming angle is 45° with TLRD7 and TLRPC in order to maintain IP66 rating around the Twist Lock Receptacle; Light Engines and the rest of the luminaire maintain IP66 rating at all aiming angles. UL Wet Location rating is also maintained at all aiming angles. Use of photoelectric cell or shorting cap is required to ensure proper illumination. TLRD7 and TLRPC receptacle pins 4 & 5 are connected to dimming driver's dimming leads whenever no Dimming Controls are selected; if Dimming Controls are selected then receptacle pins 4 & 5 are capped off because driver's dimming leads are used with Dimming Controls.

FAWS: Field Adjustable Wattage Selector, pre-set to the highest position, can be easily switched in the field to the required position. This reduces total luminaire wattage consumption and reduces the light level - see the FAWS multiplier chart for more details.

Note: It is not recommended to use FAWS with other dimming or controls; if you do, set the switch to position 10 (maximum output) to enable the other dimming or controls. Switching FAWS to any position other than 10 will disable the other dimming or controls.

Connected Lighting

Interact City connector node provides the plug and play wireless communications technology to connect your floodlight to the Interact City lighting management system. With Interact you can remotely manage, monitor and control all city lighting, from roads and streets, to parks and plazas, and bridges from one single system. Connected lighting enables capabilities including, accurate on/off switching, dimming control, fault reporting and integration with other systems to enable condition-based lighting. Interact provides you with a robust and scalable infrastructure to further reduce energy consumption, improve operations, and turn lighting into a connected network for your smart city journey.

For more details visit: <https://www.interact-lighting.com/en-us/what-is-possible/interact-city>

Luminaire options

F1: Fusing Single (for 120, 277 or 347VAC)

F2: Fusing Double (for 208, 240 or 480VAC)

F3: Fusing Canadian Double Pole (for 208, 240 or 480VAC)

FP1: Fusing Pole Single (pole mounted near handhole, for 120, 277 or 347VAC)

FP2: Fusing Pole Double (pole mounted near handhole, for 208, 240 or 480VAC).

FP3: Fusing Pole Canadian Double Pole (pole mounted near handhole, for 208, 240 or 480VAC)

SP2: Surge Protection, 20kV/10kA. Surge protection device wired in parallel so that if it fails open the luminaire will remain lit/powerd on.

PFF PowerForm

Floodlight

Specifications

Housing

Main body castings made of a low copper die cast Aluminum alloy (A360) for a high resistance to corrosion, 0.100" (2.5mm) minimum thickness. Side rail extrusions made of corrosion resistant low copper extruded anodized aluminum alloy (Anodized 6063-T5).

Mounting

Up tilt aiming and down tilt aiming possible with all of the mounting options.

cULus Listed as suitable for mounting within 4' or 1.2m of the ground

SF: Adjustable Slip Fitter with AWG 16-3 wires (or AWG 16-5 if DD external control options are selected) exiting through the Slip Fitter. Integral splice compartment for field wiring with cULus Wet Location rated access cover with seal around entire perimeter. Slip Fitter made of low copper die cast Aluminum alloy (A360) for a high resistance to corrosion, adjustable knuckle has 4 degree aiming increments with integral interlocking teeth and bolt to secure aiming in place, integral cast-in aiming marks. Fits on a 2-3/8" O.D. tenon.

YK: Adjustable Yoke with 9' (2.74m) of AWG 16-3 SEOWW cord (or AWG 16-5 if DD external control options are selected) exiting the luminaire through IP66 rated cord seal. Customer-specified length or different cord type available - must contact factory prior to ordering, this is an ETO Special. Yoke made of high strength steel, galvanized and painted for high resistance to corrosion, 5 degree aiming increments with bolts to secure aiming in place.

Driver/Electrical Door

Removable die cast aluminum door made of a low copper die cast aluminum alloy (A360) for a high resistance to corrosion. Provides access to electronic components/LED drivers. Door secured with two captive screws outside of gasket perimeter. Includes a lanyard to prevent accidental dropping if access is required.

IP Rating

IP66 rated driver/electrical compartment and light engines in all aiming positions including up tilt aiming per ANSI C136.37 with seals around entire perimeter of the lenses and seal around entire perimeter of the driver/electrical compartment. IP66 rating including when PCB option is installed.

Light Engine

Composed of 4 main components: Heat Sink / LED Module / Optical System / Driver. Electrical components are RoHS compliant. LEDs tested by ISO 17025-2005 accredited lab in accordance with IESNA LM-80 guidelines, extrapolations in accordance with IESNA TM-21. Metal core board ensures greater heat transfer and longer lifespan.

Heat Sinks: Heat sinks that are part of LED Modules are anodized 6063-T5 Aluminum for a high resistance to corrosion. Housing acts as heat sink for drivers, designed to ensure high efficacy and superior cooling by natural vertical convection. Air flow pattern always

close to LEDs and driver optimizing their efficiency and life. Product does not use any cooling device with moving parts (only passive cooling).

LED Module: Composed of high performance white LEDs. Color temperature as per ANSI/NEMA bin 3000K nominal (3045K +/- 175K) or 4000K nominal (3985K +/- 275K), both CRI 70 min.

Optical System: Choice of four distributions including Spot (SP), Asymmetric 33° Flood (A33), Rectangular Medium Flood (RM) distributions and a specialty distribution designed for Airport Apron (AIRP) applications featuring a wide 87° horizontal and narrow 16° vertical beam. Composed of high performance UV stabilized optical grade polymer refractor lenses to achieve desired distribution optimized to get maximum spacing, target lumens and a superior lighting uniformity. Performance shall be tested per LM-63, LM-79 and TM-15 (IESNA) certifying its photometric performance.

IK Rating: IK10 highest impact resistance rating for LED Module lenses.

Driver: High power factor of 90% min. Electronic driver, operating range 50/60 Hz. Auto adjusting universal voltage input from 120 to 277 VAC or 347 to 480 VAC rated for both application line to line or line to neutral, Class I, THD of 20% max. The current supplying the LEDs will be reduced by the driver if the driver experiences internal overheating as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction. Standard built in driver surge protection of 2.5kV (min). Driver enables setting LED drive current to meet your specific total wattage consumption, lumen output and/or efficacy needs - ETO Specials, contact factory.

Integrated Features

Please note that these integrated features always come with this luminaire standard at no additional cost.

0-10V dimming driver included as standard, dimming leads pre-wired to Dimming Controls option except when DD external controls options are selected.

SP1: Surge protection device tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line-Ground, Line-Neutral and Neutral-Ground. Enhanced surge protection device SP2 20kV/10kA available as an option. Surge protection device wired in parallel so that if it fails open the luminaire will remain lit/power on.

Wiring

#2 - #14 AWG wires from the primary circuit, located inside the housing. Due to the inrush current that occurs with electronic drivers, recommend using a time delay or slow blow fuse to avoid unnecessary and unwanted fuse blowing (false tripping) that can occur with fast acting fuses.

Hardware and Seals

All exposed screws shall be stainless and/or corrosion resistant and captive. All seals and sealing devices are made and/or lined with EPDM and/or silicone and/or rubber.

Finish

Five standard textured colors: white, bronze, black, dark gray and medium gray. RAL and custom color matching available - must contact factory prior to ordering, these are ETO Specials. Color in accordance with the AAMA 2604 standard. Application of polyester powder coat paint (2.5 mils/62.5 microns) with ± 1 mils/24 microns of tolerance. The thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard.

LED Products Manufacturing Standard

The electronic components sensitive to electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with EC61340-5-1 and ANSI/ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product.

Luminaire Useful Life

Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, exclusive Signify System Reliability Tool, Advance driver data and LED manufacturer LM-80/TM-21 data, expected to reach 100,000 + hours with L70 lumen maintenance @ 25°C. Luminaire Useful Life accounts for LED lumen maintenance AND all of these additional factors including: LED color shift, LED life, driver life, PCB substrate, solder joints, on/off cycles, burning hours and corrosion.

Vibration Resistance

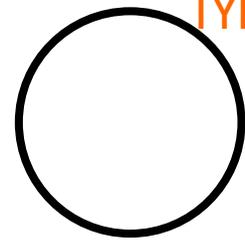
Luminaire meets the ANSI C136.31-2018 specifications, tested by independent lab over 100,000 cycles in all three axes: Bridge/Overpass for 138L 3 modules, 184L 4 modules, 230L 5 modules; Normal for 276L 6 modules.

Certifications and Compliance

cULus Listed for Canada and USA, per UL1598 and UL8750, including suitable for mounting within 4' or 1.2m of the ground. Configurations are DesignLights Consortium qualified, consult DLC QPL Qualified Products List for more details. Luminaire complies with or exceeds the following ANSI C136 standards: .2, .3, .10, .15, .21, .22, .24, .25, .31, .32, .37, .41. Entire luminaire is rated for operation in ambient temperature of -40°C (-40°F) up to +40°C (+104°F).

Limited Warranty

5-year limited warranty. See signify.com/warranties for details and restrictions.



The Gardco RA straight aluminum pole consists of a one-piece round extruded aluminum lighting standard mounted to a structural quality carbon galvanized steel base tenon. This construction offers the corrosion resistance and flexibility of aluminum with the strength and integrity of steel. The poles are finished with either Architectural Class 1 anodizing or electrostatically applied TGIC polyester powdercoat.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lamps: _____ Qty: _____
 Notes: _____

Order Guide

example: RA4-STB-15-D1-BRP

Prefix	Base	Height	Wind Factor Code*	Drilling	Finish	Options
	STB					
RA4	STB	10	-	D1 1 Way	BRP Bronze Paint BLP Black Paint WP White Paint NP Natural OC Aluminum Paint Optional Color Paint (Specify RAL designation ex: OC-RAL7024) SC Special Color Paint (Specify. Must supply color chip.)	DR Duplex Receptacle GFCI Ground Fault Receptacle VDA Vibration Dampener Nipples and Couplings NL Nipple - External thread CL Coupling - Internal thread Indicate size (1/2", 3/4", 1", 1 1/4", 1 1/2".) Indicate height above base and orientation to hand hole. See Pole Orientation Information on Page 4. Single Mount Bullhorn Brackets* A15BH-19 Single - 1.9" OD A15BH-24 Single - 2.4" OD A215BH-19 2-Tenon - 1.9" OD A215BH-24 2-Tenon - 2.4" OD Indicate height above base and orientation to hand hole. See Pole Orientation Information on Page 4.
		12	-	D2 2 Way		
		15	L	D2@90 2 Way at 90°		
		20	M	D3 3 Way		
RA4.5	STB	10	-	D3@120 3 Way at 120°		
		12	-	D4 4 Way		
		15	-	T2 2 3/8" OD Tenon		
		18	-	T4 4" OD Tenon		
RA5	STB	15	-			
		18	-			
		20	L			
		25	M			
		28	H			
		30	L			

*Refers to relative strength based on wind load factors. L = Light M = Medium H = Heavy

Poles Straight Round Aluminum - Tenon Base

Pole Data

Poles Specs					Normal Wind Conditions			Anchor Bolts ²		
					100 MPH	90 MPH	80 MPH			
Product Catalog Number	Height (ft)	Base Tenon Height (ft.)	Pole Diameter (inches)	Wall Thickness (inches)	EPA ft ²	EPA ft ²	EPA ft ²	Bolt Circle (inches)	Bolt Size (inches)	Max Proj. (inches)
RA4-STB-10	10.00	1.25	4	0.135	7.1	9.1	11.9	7	5/8 x 18 x 3	3
RA4-STB-12	11.67	1.25	4	0.135	5.2	6.8	9.1	7	5/8 x 18 x 3	3
RA4-STB-15	14.92	2	4	0.135	3.1	4.3	6	7	5/8 x 18 x 3	3
RA4-STB-20L	19.92	2	4	0.135	-	1.2	1.2	7	5/8 x 18 x 3	3
RA4-STB-20M	19.92	4	4	0.135	-	2.1	3.4	7	5/8 x 18 x 3	3
RA4-STB-20H	19.92	6	4	0.135	2.2	3.3	4.8	7	3/4 x 17 x 3	3
RA4.5-STB-10	9.67	1.5	4.5	0.15	12.6	15.7	20.2	7	3/4 x 17 x 3	3
RA4.5-STB-12	11.67	1.5	4.5	0.15	9.2	11.6	15	7	3/4 x 17 x 3	3
RA4.5-STB-15	14.75	1.5	4.5	0.15	5.8	7.4	9.9	7	3/4 x 17 x 3	3
RA4.5-STB-18	17.75	1.5	4.5	0.15	3.6	4.7	6.5	7	3/4 x 17 x 3	3
RA4.5-STB-20	19.75	1.5	4.5	0.15	2.4	3.2	4.7	7	3/4 x 17 x 3	3
RA5-STB-15	14.83	2.5	5	0.175	10.6	13.3	17.1	9	3/4 x 17 x 3	3
RA5-STB-18	17.75	2.5	5	0.175	7.4	9.4	12.1	9	3/4 x 17 x 3	3
RA5-STB-20	19.83	2.5	5	0.175	5.7	7.3	9.5	9	3/4 x 17 x 3	3
RA5-STB-25L	24.83	2.5	5	0.175	2.6	3.5	4.9	9	3/4 x 17 x 3	3
RA5-STB-25M	24.83	4	5	0.175	3.3	4.4	6	9	3/4 x 17 x 3	3
RA5-STB-25H	24.83	7	5	0.175	5.1	6.5	8.6	9	1 x 36 x 4.5	3
RA5-STB-28L	27.92	2.5	5	0.175	-	1.8	2.8	9	3/4 x 17 x 3	3
RA5-STB-28M	27.92	4	5	0.175	1.7	2.5	3.7	9	3/4 x 17 x 3	3
RA5-STB-28H	27.92	7	5	0.175	3.2	4.2	5.7	9	1 x 36 x 4.5	3
RA5-STB-30L	29.83	2.5	5	0.175	-	-	1.6	9	3/4 x 17 x 3	3
RA5-STB-30M	29.83	4	5	0.175	-	1.5	3	9	3/4 x 17 x 3	3
RA5-STB-30H	29.83	7	5	0.175	2.2	3	4.2	9	1 x 36 x 4.5	3

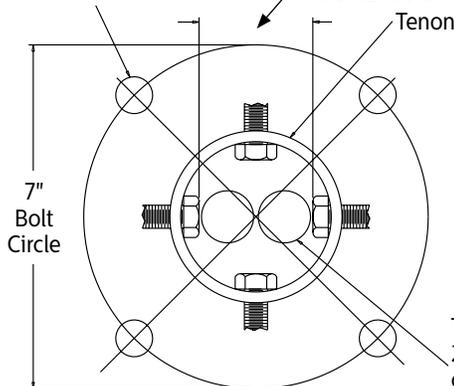
* **Warning:** Additional wind loading, in terms of EPA, from banners, cameras, floodlights and other accessories attached to the pole, must be added to the luminaire(s) EPA before selecting the pole with the appropriate wind load capability.

** Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement resulting from failure to use factory supplied templates.

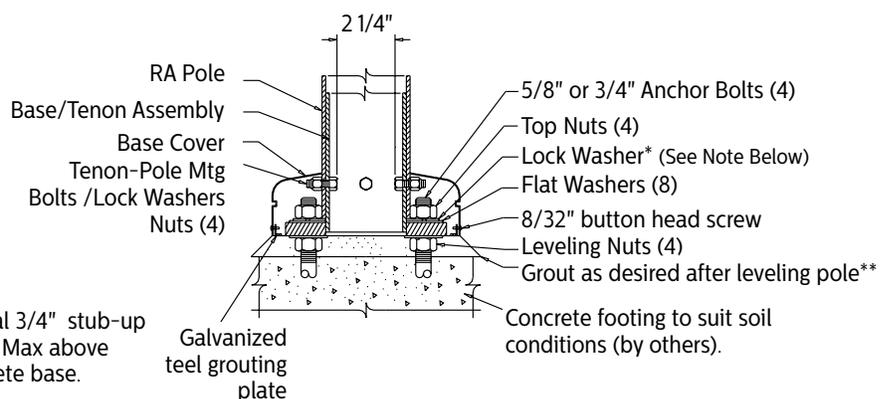
Dimensions

Cut hole in template 1/16" larger than diameter of anchor bolts used.

Conduit Opening
 RA4: ID 3.063" OD 2.25"
 RA4.5: ID 3.25" OD 2.75"
 RA5: ID 4.618" OD 3.25"



Typical 3/4" stub-up 2 1/2" Max above concrete base.



NOTE: Internal clearance of tenon/pole mounting bolts dictates allowable area for stub-ups.

* Anchor Bolt Lock Washers are not normally required and are not included in standard anchor bolt sets. They are available upon request at additional cost.

** Grouting should include a drainage slot or tube (by others) to permit water to drain from the base of the pole. Failure to provide drainage may weaken the pole base structure over time and may result in pole base failure, for which Gardco is not responsible.

NOTE: Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement from failure to use factory supplied templates.

Poles Straight Round Aluminum – Tenon Base

Specifications

POLE SHAFT

The pole shaft is a one-piece, seamless 6000 series extruded aluminum cylindrical tubing and is heat-treated to achieve a T6 temper with a guaranteed minimum yield strength of 31 KSI.

BASE TENON ASSEMBLY

The tenon anchor base assembly consists of structural quality carbon steel tubing with a minimum 46 KSI yield strength welded to a structural steel base with a guaranteed minimum yield strength of 50 KSI. The base plate telescopes the pole shaft and is circumferentially welded on both top and bottom. The base is provided with slotted

bolt holes to accommodate a $\pm .5$ " variation in the rotational flexibility. The entire assembly is hot-dipped galvanized. Four (4) mechanically galvanized fasteners secure the aluminum pole shaft to the base tenon assembly.

ANCHOR BOLTS

Anchor bolts are fabricated from a commercial quality hot rolled carbon steel bar that meets or exceeds a minimum guaranteed yield strength of 50,000 psi. Bolts have an "L" bend on one end and threaded on the opposite end. Anchor bolts are completely hot dipped galvanized. Four (4) properly sized bolts, each furnished with two (2) regular hex nuts and two

(2) flat washers, are provided per pole (priced separately), unless otherwise specified.

BASE COVER

A one-piece, heavy wall spun aluminum cover completely conceals the entire base plate and anchorage. The base cover is secured to the base assembly with two (2) stainless steel fasteners.

HAND HOLE

The hand hole has a nominal rectangular 2" x 4" or 2 5/8" x 5" inside opening in the pole shaft and tenon assembly. Included is an aluminum cover plate with attachment screws. The hand hole is located 18" – 20" above the base and 180° clockwise

with respect to the luminaire arm when viewed from the top of the pole for one arm. For two arms the hand hole is located directly under one arm.

POLE TOP CAP

Each RA pole assembly is provided with a removable composite friction-fit pole top cap.

FINISH

Poles are available with bronze, natural or black Aluminum Association Architectural Class 1 anodized finish. Electrostatically applied, thermally cured TGIC polyester powdercoat finish or liquid polyurethane is also available.

General Pole Information

DESIGN

The poles as charted are designed to withstand dead loads and predicted dynamic loads developed by variable wind speeds with an additional 30% gust factor under the following conditions: The charted weights include luminaire(s) and/or mounting bracket(s). The wind velocities are based on 10 mph increments from 80 mph through 100 mph. Poles to be located in areas of known abnormal conditions may require special consideration. For example: coastal areas, airports and areas of special winds.

Poles are designed for ground mounted applications. Poles mounted on structures (such as buildings and bridges) may also necessitate special consideration requiring Gardco's recommendation. Height correction factors and drag coefficients are applied to the entire structure. An appropriate safety factor is maintained based on the minimum yield strength of the material incorporated in the pole.

WARNING

This design information is intended as a general guideline only. The customer is solely

responsible for proper selection of pole, luminaire, accessory and foundation under the given site conditions and intended usage. The addition of any items to the pole, in addition to the luminaire, will dramatically impact the EPA load on that pole. It is strongly recommended that a qualified professional be consulted to analyze the loads given the user's specific needs to ensure proper selection of the pole, luminaire, accessories, and foundation. Gardco assumes no responsibility for such proper analysis or product selections. Failure to insure proper site analysis, pole selection, loads and installation can result in

pole failure, leading to serious injury or property damage.

GENERAL INFORMATION

Mounting height is the vertical distance from the base of the lighting pole to the center of the luminaire arm at the point of luminaire attachment. Twin arms as charted are oriented at 180° with respect to each other. For applications of two (2) arms at 90° or other multiple arm applications, consult the factory.

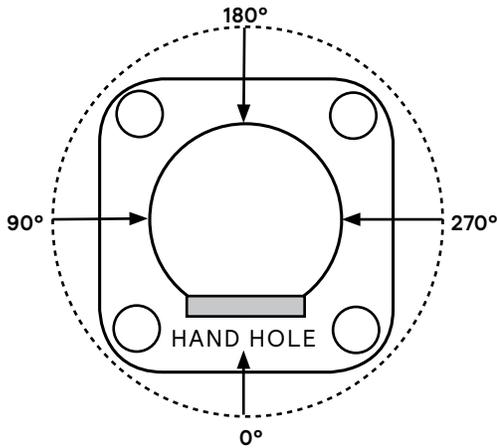
WARRANTY

Gardco poles feature a 1 year limited warranty. See Warranty Information on www.signify.com/warranties for complete details and exclusions.

Poles Straight Round Aluminum - Tenon Base

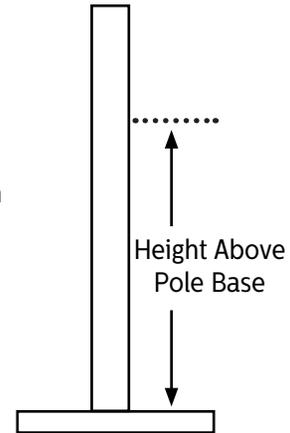
Orientation Information

Factory installed options and accessories



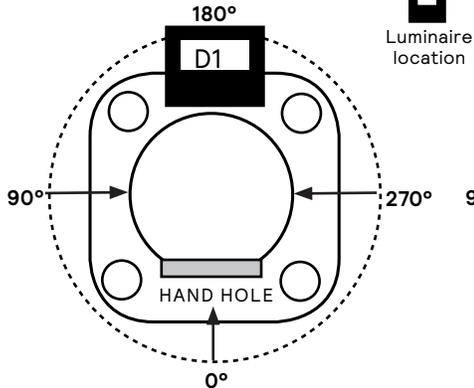
Orientation is measured clockwise from the Hand Hole Center.

For Factory Installed Options and Accessories, Specify Orientation from Hand Hole and Height Above Pole Base Where Required.

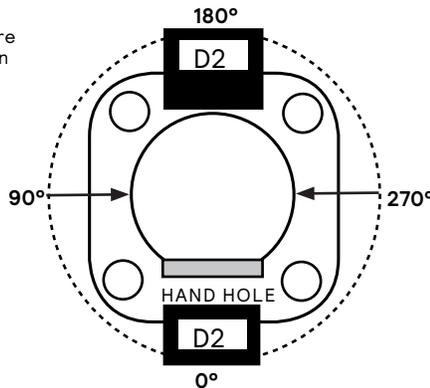


Standard arm mount luminaire orientation

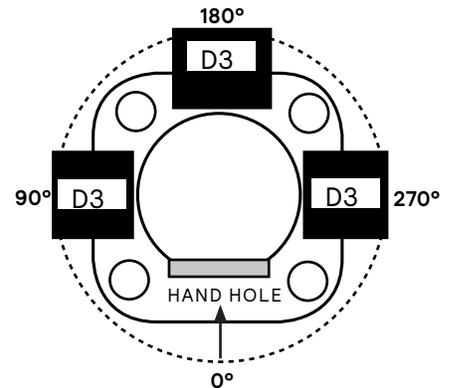
D1 Drilled for Single Luminaire



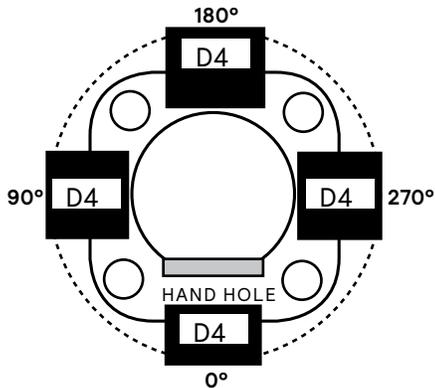
D2 Drilled for 2 Luminaires at 180°



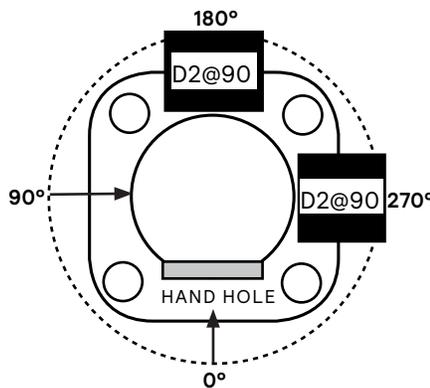
D3 Drilled for 3 Luminaires @ 90°



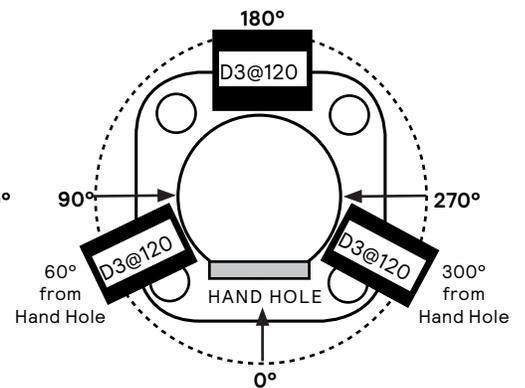
D4 Drilled for 4 Luminaires at 90°



D2@90 Drilled for 2 Luminaires at 90°



D3@120 Drilled for 3 Luminaires at 120°





Floodlighting

PowerForm

PFF floodlight



Gardco PowerForm LED floodlights provide over 1,500W HID replacement while significantly reducing energy and maintenance costs. PowerForm features a modular housing design available in four different sizes for a range of commercial, retail, industrial, airport, and other outdoor floodlighting applications. PowerForm is available with multiple lumen packages delivering approximately 42,300 to 138,600 lumens.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lamps: _____ Qty: _____
 Notes: _____

Ordering guide

example: PFF-184L-900-NW-G2-YK-SP-120-PCB-F1-BZ

Prefix	Number of LEDs	Drive Current	Color Temperature	Mounting	Distribution	Voltage
PFF						
PFF PowerForm flood	138L 138 LEDs (3 modules) 184L 184LEDs (4 modules) 230L 230 LEDs (5 modules) 276L⁶ 276 LEDs (6 modules)	700 700mA 900 900mA 1A 1 Amp 1.2A^{6,10} 1.2 Amp	WW-G2 Warm White 3000K, 70 CRI Generation 2 NW-G2 Neutral White 4000K, 70 CRI Generation 2	SF Slip Fitter Mount (fits on 2-3/8" O.D. tenon, wires through slip fitter) YK Yoke Mount (9' or 2.74m cord exits luminaire)	A33 Asymmetric 33° Flood (NEMA 6x5) RM Rectangular Medium Flood (NEMA 7x4) SP Spot (12° round) (NEMA 2x2) AIRP Airport Apron Flood (NEMA 7x5)	120 120V 208 208V 240 240V 277 277V 347 347V 480 480V UNV 120-277V HVU 347-480V

Note: 46 LEDs per module

HEAD 2
 HEAD 1

Dimming Controls ^{1,2}		Fusing	Surge Protection	Other Options	Side Rails	Finish
none	leave blank (0-10V dimming driver standard)	none	leave blank	none	leave blank	BK Black
DD^{1,2,3,8}	0-10V dimming external wires (controls by others)	Fusing	blank	PCB^{2,8,9}	Photocontrol Button	WH White
FAWS^{1,2,8,10}	Field Adjustable Wattage Selector	F1⁷	SP2	TLRD7^{2,4}	Twist Lock Receptacle 7-pin	BZ Bronze
		F2⁷	Surge Protector 10kV / 10kA (standard)	TLRPC^{2,4,7,9}	Twist Lock Receptacle w/ 3-pin Photocell	DRY Dark Gray
		F3⁷	Surge Protector 20kV / 10kA (option)	BAC^{11,12}	Meets the requirements of the Buy American Act of 1933 (BAA)	MGY Medium Gray
		Pole Mount Fusing				RAL⁵ Optional Color (specify optional color or RAL)
		FP1⁷				CC⁵ Custom Color (must supply color chip, requires factory quote)
		FP2⁷				
		FP3⁷				

- Choose only 1 of the following Dimming Controls options: either DD or FAWS.
- 0-10V dimming driver standard.
- Luminaire has 0-10V dimming wires exiting the luminaire for dimming controls by others.
- TLDR7 and TLRPC max aiming angle 45°. TLRD7 works with 3, 5 or 7 pin NEMA photocell/dimming, use of photocell (by others) or shorting cap (by others) is required to ensure proper illumination. TLRD7 and TLRPC receptacle pins 4 & 5 are capped off when ordered with any of the Dimming Controls DD or FAWS.
- Must contact factory prior to ordering - these items are ETO Specials.
- 276L with 1.2A only available as ETO Special - must contact factory prior to ordering.
- Must specify specific input voltage, not available with UNV or HVU.
- PCB can be used with DD and FAWS.
- PCB and TLRPC available in 120V, 208V, 240V, or 277V only.
- FAWS not available with 1.2A (switch has lower current limit).
- Extended lead times apply. Contact factory for details.
- Failure to properly select the "BAC" suffix could result in you receiving product that is not BAA compliant product with no recourse for an RMA or refund. This BAC designation hereunder does not address (i) the applicability of, or availability of a waiver under, the Trade Agreements Act, or (ii) the "Buy America" domestic content requirements imposed on states, localities, and other non-federal entities as a condition of receiving funds administered by the Department of Transportation or other federal agencies.

Connected lighting

Interact City connector node provides the plug and play wireless communications technology to connect your floodlight to the Interact City lighting management system.



Accessory Ordering Code	Description
LLC	Interact City cellular technology connector node

Contact Signify for additional support when connected lighting or additional services are desired.
 For more details visit: <https://www.interact-lighting.com/en-us/what-is-possible/interact-city>



PFF PowerForm

Floodlight

PowerForm Accessories (ordered separately, field installed, specify finish at placeholder F)

Shielding Accessories

Glare shield (black finish)

GS-PFF-138	138 LEDs (3 modules)
GS-PFF-184	184 LEDs (4 modules)
GS-PFF-230	230 LEDs (5 modules)
GS-PFF-276	276 LEDs (6 modules)



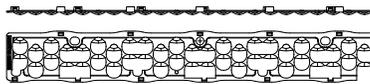
GS louvered glare shields are ordered as an accessory only and can be used with A33, RM, and AIRP optics; can not be used with SP optics due to fit restriction - if required, must contact factory prior to ordering since it is an ETO Special.

Glare shields are aluminum sheet metal louvers painted in a smooth black powder coat finish. Each set includes a mounting kit that fastens to the front face of the LED light engine and includes stainless steel hardware.

One glare shield attaches to each 46 LED module. The total number of glare shields is determined by total number of modules per luminaire where required.

Internal house side shield

HIS-PFF-138	138 LEDs (3 modules)
HIS-PFF-184	184 LEDs (4 modules)
HIS-PFF-230	230 LEDs (5 modules)
HIS-PFF-276	276 LEDs (6 modules)



HIS internal house side shields are ordered as an accessory only and can be used with A33 and RM optics; can not be used with SP or AIRP optics due to fit restriction.

Internal shields are injection molded black polymer that snap fit on each 46 LED module. The total number of internal shields is determined by the total number of modules per luminaire where required.

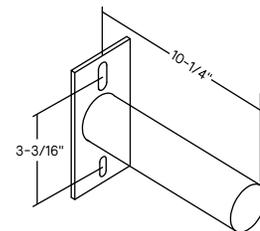
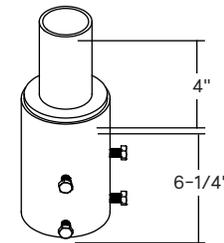
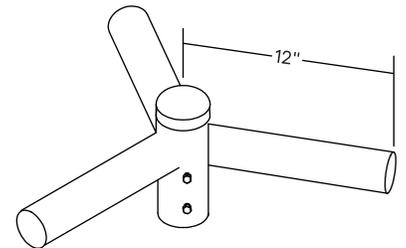
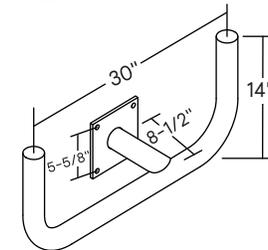
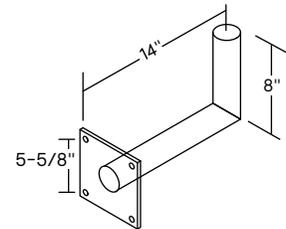
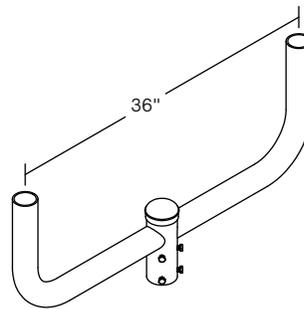
Mounting Accessories

For wall and pole brackets, bullhorns, etc. see <https://www.signify.com/en-us/products/outdoor-luminaires/poles-brackets/site-and-area-brackets/bull-horn-brackets#downloads> for details.

Exception: All UPS Upsweep - contact factory to confirm compatibility.

Exception: SBRKT-SAB-NA-4-WA-(F) Side Angle Flat bracket cannot be used with any PFF versions due to only single mounting hole that is too small for required mounting bolts.

Exception: PFF-276L 6 module version cannot be used with any brackets, etc. due to its weight - too heavy.



Examples shown are not to scale - see SBRKT spec sheet for all available brackets

PFF PowerForm

Floodlight

LED Wattage and Lumen Values - 3000K

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33		RM		SP		AIRP	
						Lumen Output	Efficacy (LPW)						
PFF-138L-700-WW-G2	138	3	700	3000	289	43,048	149	42,433	147	43,619	151	42,284	146
PFF-138L-900-WW-G2	138	3	900	3000	397	51,974	131	51,231	129	52,663	133	51,051	128
PFF-138L-1A-WW-G2	138	3	1050	3000	455	58,940	130	58,098	128	59,721	131	57,894	127
PFF-138L-1.2A-WW-G2	138	3	1200	3000	511	65,101	127	64,170	126	65,962	129	62,793	123
PFF-184L-700-WW-G2	184	4	700	3000	386	57,398	149	56,577	147	58,159	151	56,379	146
PFF-184L-900-WW-G2	184	4	900	3000	530	69,299	131	68,308	129	70,217	133	68,068	128
PFF-184L-1A-WW-G2	184	4	1050	3000	606	78,587	130	77,463	128	79,628	131	77,191	127
PFF-184L-1.2A-WW-G2	184	4	1200	3000	681	86,801	127	85,559	126	87,950	129	83,724	123
PFF-230L-700-WW-G2	230	5	700	3000	482	71,747	149	70,722	147	72,698	151	70,474	146
PFF-230L-900-WW-G2	230	5	900	3000	662	86,623	131	85,385	129	87,771	133	85,085	128
PFF-230L-1A-WW-G2	230	5	1050	3000	758	98,234	130	96,829	128	99,534	131	96,489	127
PFF-230L-1.2A-WW-G2	230	5	1200	3000	852	108,500	127	106,949	126	109,937	129	106,574	125
PFF-276L-700-WW-G2	276	6	700	3000	579	86,097	149	84,866	147	87,237	151	84,568	146
PFF-276L-900-WW-G2	276	6	900	3000	795	103,948	131	102,462	129	105,325	133	103,975	131
PFF-276L-1A-WW-G2	276	6	1050	3000	909	117,880	130	116,194	128	119,442	131	117,911	130
PFF-276L-1.2A-WW-G2	276	6	1200	3000	1022	130,200	127	128,338	126	131,924	129	127,888	125

LED Wattage and Lumen Values - 4000K

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33		RM		SP		AIRP	
						Lumen Output	Efficacy (LPW)						
PFF-138L-700-NW-G2	138	3	700	4000	289	45,219	156	44,573	154	45,818	158	44,416	154
PFF-138L-900-NW-G2	138	3	900	4000	397	54,595	137	53,814	135	55,318	139	53,625	135
PFF-138L-1A-NW-G2	138	3	1050	4000	455	61,912	136	61,027	134	62,732	138	60,813	134
PFF-138L-1.2A-NW-G2	138	3	1200	4000	511	68,383	134	67,405	132	69,288	136	65,959	129
PFF-184L-700-NW-G2	184	4	700	4000	386	60,292	156	59,430	154	61,091	158	59,222	154
PFF-184L-900-NW-G2	184	4	900	4000	530	72,793	137	71,752	135	73,757	139	71,500	135
PFF-184L-1A-NW-G2	184	4	1050	4000	606	82,549	136	81,369	134	83,643	138	81,083	134
PFF-184L-1.2A-NW-G2	184	4	1200	4000	681	91,177	134	89,873	132	92,384	136	87,945	129
PFF-230L-700-NW-G2	230	5	700	4000	482	75,365	156	74,288	154	76,363	158	74,027	154
PFF-230L-900-NW-G2	230	5	900	4000	662	90,991	137	89,690	135	92,196	139	89,375	135
PFF-230L-1A-NW-G2	230	5	1050	4000	758	103,187	136	101,711	134	104,553	138	101,354	134
PFF-230L-1.2A-NW-G2	230	5	1200	4000	852	113,971	134	112,341	132	115,480	136	111,947	131
PFF-276L-700-NW-G2	276	6	700	4000	579	90,438	156	89,145	154	91,636	158	88,832	154
PFF-276L-900-NW-G2	276	6	900	4000	795	109,189	137	107,628	135	110,635	139	109,217	137
PFF-276L-1A-NW-G2	276	6	1050	4000	909	123,824	136	122,053	134	125,464	138	123,856	136
PFF-276L-1.2A-NW-G2	276	6	1200	4000	1022	136,765	134	134,809	132	138,576	136	134,336	131

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown. Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.

NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires. Contact factory for configurations not shown.

Field Adjustable Wattage Selector (FAWS) Multiplier Chart

FAWS Position	Typical Lumens and System Wattage Multiplier	
	138L/184L	230L/276L
1	10%	15%
2	20%	35%
3	30%	45%
4	40%	60%
5	45%	70%
6	55%	85%
7	60%	100%
8	70%	100%
9	80%	100%
10	100%	100%

Note: Actual performance may vary due to LED and driver tolerances

PFF PowerForm

Floodlight

LED Wattage and Lumen Values – 3000K with glare shield

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33-GS		RM-GS		AIRP-GS	
						Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)
PFF-138L-700-WW-G2-GS	138	3	700	3000	289	33,280	115	32,884	114	22,022	76
PFF-138L-900-WW-G2-GS	138	3	900	3000	397	40,180	101	39,701	100	26,587	67
PFF-138L-1A-WW-G2-GS	138	3	1050	3000	455	45,566	100	45,023	99	30,151	66
PFF-138L-1.2A-WW-G2-GS	138	3	1200	3000	511	49,421	97	48,833	96	32,702	64
PFF-184L-700-WW-G2-GS	184	4	700	3000	386	44,374	115	43,844	114	29,363	76
PFF-184L-900-WW-G2-GS	184	4	900	3000	530	53,574	101	52,935	100	35,450	67
PFF-184L-1A-WW-G2-GS	184	4	1050	3000	606	60,754	100	60,030	99	40,201	66
PFF-184L-1.2A-WW-G2-GS	184	4	1200	3000	681	65,895	97	65,110	96	43,604	64
PFF-230L-700-WW-G2-GS	230	5	700	3000	482	55,466	115	54,806	114	36,702	76
PFF-230L-900-WW-G2-GS	230	5	900	3000	662	66,967	101	66,169	100	44,313	67
PFF-230L-1A-WW-G2-GS	230	5	1050	3000	758	75,942	100	75,038	99	50,251	66
PFF-230L-1.2A-WW-G2-GS	230	5	1200	3000	852	83,879	98	82,880	97	55,504	65
PFF-276L-700-WW-G2-GS	276	6	700	3000	579	66,560	115	65,767	114	44,043	76
PFF-276L-900-WW-G2-GS	276	6	900	3000	795	81,834	103	80,859	102	54,150	68
PFF-276L-1A-WW-G2-GS	276	6	1050	3000	909	92,802	102	91,697	101	61,408	68
PFF-276L-1.2A-WW-G2-GS	276	6	1200	3000	1022	100,655	98	99,456	97	66,604	65

LED Wattage and Lumen Values – 4000K with glare shield

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33-GS		RM-GS		AIRP-GS	
						Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)
PFF-138L-700-NW-G2-GS	138	3	700	4000	289	34,958	121	34,542	119	23,132	80
PFF-138L-900-NW-G2-GS	138	3	900	4000	397	42,206	106	41,703	105	27,928	70
PFF-138L-1A-NW-G2-GS	138	3	1050	4000	455	47,863	105	47,293	104	31,671	70
PFF-138L-1.2A-NW-G2-GS	138	3	1200	4000	511	51,913	102	51,295	100	34,351	67
PFF-184L-700-NW-G2-GS	184	4	700	4000	386	46,611	121	46,055	119	30,843	80
PFF-184L-900-NW-G2-GS	184	4	900	4000	530	56,275	106	55,604	105	37,237	70
PFF-184L-1A-NW-G2-GS	184	4	1050	4000	606	63,817	105	63,057	104	42,228	70
PFF-184L-1.2A-NW-G2-GS	184	4	1200	4000	681	69,217	102	68,393	100	45,802	67
PFF-230L-700-NW-G2-GS	230	5	700	4000	482	58,263	121	57,569	119	38,553	80
PFF-230L-900-NW-G2-GS	230	5	900	4000	662	70,343	106	69,505	105	46,547	70
PFF-230L-1A-NW-G2-GS	230	5	1050	4000	758	79,771	105	78,821	104	52,785	70
PFF-230L-1.2A-NW-G2-GS	230	5	1200	4000	852	88,108	103	87,059	102	58,302	68
PFF-276L-700-NW-G2-GS	276	6	700	4000	579	69,916	121	69,083	119	46,264	80
PFF-276L-900-NW-G2-GS	276	6	900	4000	795	85,960	108	84,936	107	56,880	72
PFF-276L-1A-NW-G2-GS	276	6	1050	4000	909	97,481	107	96,320	106	64,504	71
PFF-276L-1.2A-NW-G2-GS	276	6	1200	4000	1022	105,730	103	104,471	102	69,962	68

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown. Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.

NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires.

Predicted Lumen Depreciation Data

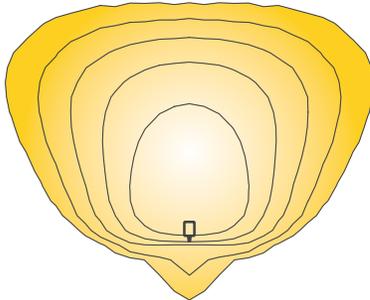
Ambient Temperature (°C)	Driver Current	Calculated L70 hours	L70 per TM-21	Lumen Maintenance % @ 60,000 hours
25°C	up to 1200 mA	>100,000	>60,000	98%

Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions. L70 is the predicted time when LED performance depreciates to 70% of initial lumen output. Calculated per IESNA TM21-11. Published L70 hours limited to 6 times actual LED test hours.

PFF PowerForm Floodlight

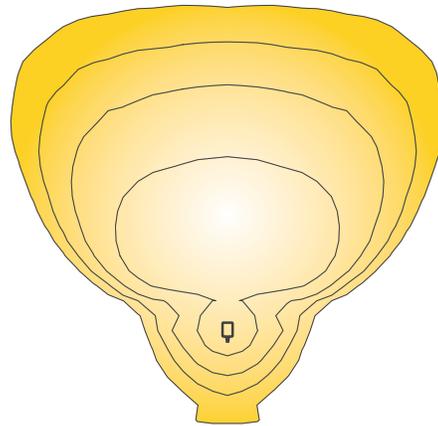
Optical Distribution Diagrams

A33 Asymmetric 33° Flood (NEMA 6x5)



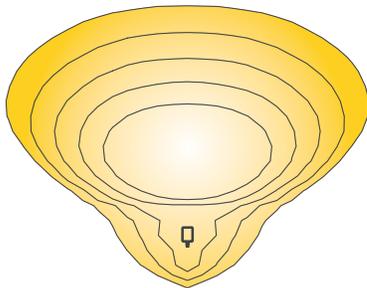
30' or 9.14m mounting height, 30° tilt
 Applications include: large area lighting, storage yards, transportation terminals, ports, utility sub-stations, security lighting, large facades, large wall washing, tall structures / monuments / statues

AIRP Airport Apron Flood



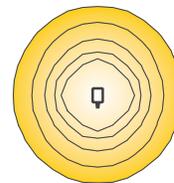
30' or 9.14m mounting height, 25° tilt
 Applications: airport aprons

RM Rectangular Medium Flood (NEMA 7x4)



30' or 9.14m setback, 50° tilt
 Applications include: building entrances and exits, security lighting, perimeter fences, checkpoints and inspection stations, large and wide wall grazing, large signs

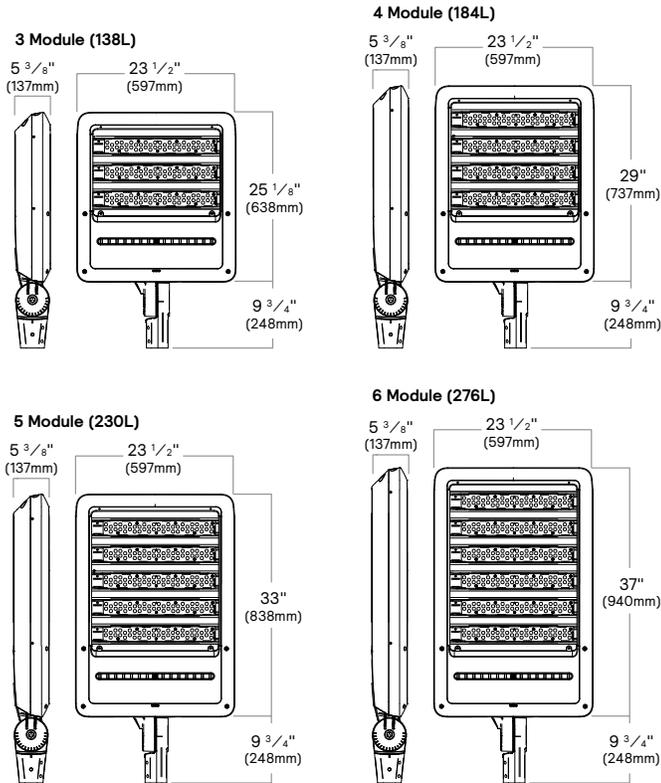
SP Spot 12° Round (NEMA 2x2)



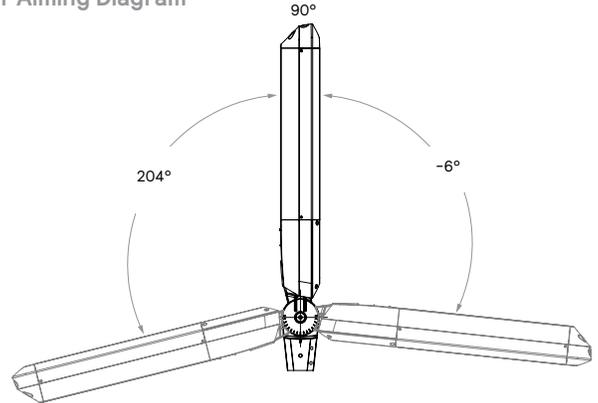
30' or 9.14m setback, 0° tilt
 Applications include: spotlighting, accenting, tall columns, tall structures / monuments / statues

PFF PowerForm Floodlight

Dimensions – Slipfitter Mount (SF)



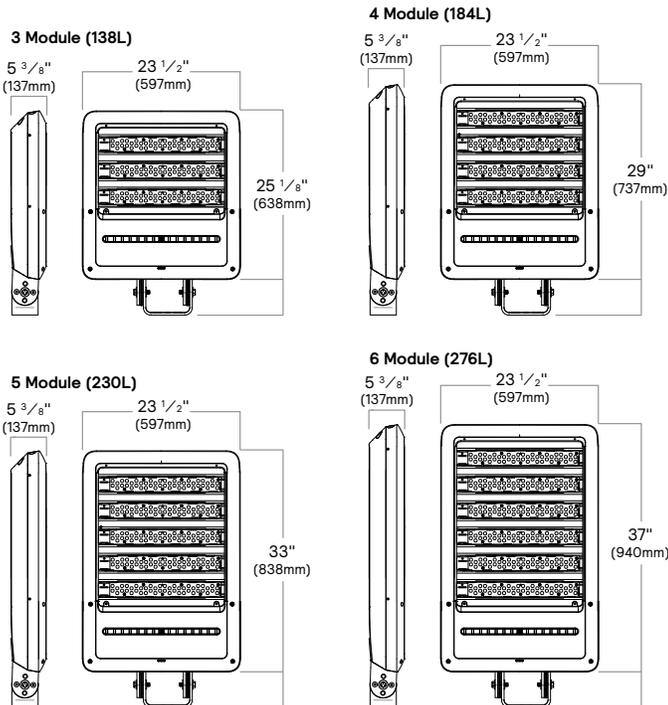
Slipfitter Aiming Diagram



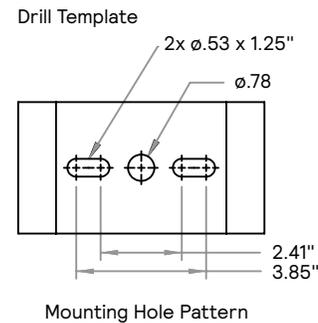
No. of Modules	Effective Projected Area (EPA-ft ²)			Weight of single luminaire PFF SF
	Single: 0° Aim	Single: 45° Aim	Single: 90° Aim	
3	0.647	2.311	3.269	62 lbs (28.1 kg)
4	0.739	2.681	3.792	72 lbs (32.7 kg)
5	0.836	3.021	4.273	81 lbs (36.7 kg)
6	0.938	3.337	4.720	91 lbs (41.3 kg)

Note: Applies to single PFF luminaire with (SF) Slipfitter mount at the following angles: 0° is horizontal to ground, 90° is perpendicular to the ground as shown in drawings.

Dimensions – Yoke Mount (YK)



Yoke Mount Drill Template



No. of Modules	Effective Projected Area (EPA-ft ²)			Weight of single luminaire PFF YK
	Single: 0° Aim	Single: 45° Aim	Single: 90° Aim	
3	0.596	2.232	3.156	66 lbs (29.9 kg)
4	0.688	2.601	3.679	76 lbs (34.5 kg)
5	0.786	2.942	4.161	86 lbs (39 kg)
6	0.887	3.257	4.607	94 lbs (42.6 kg)

Note: Applies to single PFF luminaire with (YK) Yoke mount at the following angles: 0° is horizontal to ground, 90° is perpendicular to the ground as shown in drawings.

PFF PowerForm

Floodlight

Controls options

DD: 0-10V dimming driver with dimming wires externally accessible for connecting dimming controls by others.

PCB: Photocell button (a.k.a. button photoeye).

TLRD7*: Twist Lock Receptacle with 7 pins enabling dimming and additional functionality (by others), can be used with an Interact City node, a twistlock photoelectric cell or a shorting cap. Can also be used with Signify or third party control system. Pins 6 and 7 are capped off (not connected) unless used with SR driver - ETO Specials, contact factory. Receptacle located on top of luminaire housing.

* Use of photoelectric cell or shorting cap is required to ensure proper illumination. Note: Additional hardware will be required to utilize the additional 2 pins on this receptacle.

TLRPC*: Twist Lock Receptacle with 5 pins and includes 3 pin twistlock photoelectric cell (must specify voltage). Receptacle located on top of luminaire housing.

*Note: Maximum aiming angle is 45° with TLRD7 and TLRPC in order to maintain IP66 rating around the Twist Lock Receptacle; Light Engines and the rest of the luminaire maintain IP66 rating at all aiming angles. UL Wet Location rating is also maintained at all aiming angles. Use of photoelectric cell or shorting cap is required to ensure proper illumination. TLRD7 and TLRPC receptacle pins 4 & 5 are connected to dimming driver's dimming leads whenever no Dimming Controls are selected; if Dimming Controls are selected then receptacle pins 4 & 5 are capped off because driver's dimming leads are used with Dimming Controls.

FAWS: Field Adjustable Wattage Selector, pre-set to the highest position, can be easily switched in the field to the required position. This reduces total luminaire wattage consumption and reduces the light level - see the FAWS multiplier chart for more details.

Note: It is not recommended to use FAWS with other dimming or controls; if you do, set the switch to position 10 (maximum output) to enable the other dimming or controls. Switching FAWS to any position other than 10 will disable the other dimming or controls.

Connected Lighting

Interact City connector node provides the plug and play wireless communications technology to connect your floodlight to the Interact City lighting management system. With Interact you can remotely manage, monitor and control all city lighting, from roads and streets, to parks and plazas, and bridges from one single system. Connected lighting enables capabilities including, accurate on/off switching, dimming control, fault reporting and integration with other systems to enable condition-based lighting. Interact provides you with a robust and scalable infrastructure to further reduce energy consumption, improve operations, and turn lighting into a connected network for your smart city journey.

For more details visit: <https://www.interact-lighting.com/en-us/what-is-possible/interact-city>

Luminaire options

F1: Fusing Single (for 120, 277 or 347VAC)

F2: Fusing Double (for 208, 240 or 480VAC)

F3: Fusing Canadian Double Pole (for 208, 240 or 480VAC)

FP1: Fusing Pole Single (pole mounted near handhole, for 120, 277 or 347VAC)

FP2: Fusing Pole Double (pole mounted near handhole, for 208, 240 or 480VAC).

FP3: Fusing Pole Canadian Double Pole (pole mounted near handhole, for 208, 240 or 480VAC)

SP2: Surge Protection, 20kV/10kA. Surge protection device wired in parallel so that if it fails open the luminaire will remain lit/powerd on.

PFF PowerForm

Floodlight

Specifications

Housing

Main body castings made of a low copper die cast Aluminum alloy (A360) for a high resistance to corrosion, 0.100" (2.5mm) minimum thickness. Side rail extrusions made of corrosion resistant low copper extruded anodized aluminum alloy (Anodized 6063-T5).

Mounting

Up tilt aiming and down tilt aiming possible with all of the mounting options.

cULus Listed as suitable for mounting within 4' or 1.2m of the ground

SF: Adjustable Slip Fitter with AWG 16-3 wires (or AWG 16-5 if DD external control options are selected) exiting through the Slip Fitter. Integral splice compartment for field wiring with cULus Wet Location rated access cover with seal around entire perimeter. Slip Fitter made of low copper die cast Aluminum alloy (A360) for a high resistance to corrosion, adjustable knuckle has 4 degree aiming increments with integral interlocking teeth and bolt to secure aiming in place, integral cast-in aiming marks. Fits on a 2-3/8" O.D. tenon.

YK: Adjustable Yoke with 9' (2.74m) of AWG 16-3 SEOWW cord (or AWG 16-5 if DD external control options are selected) exiting the luminaire through IP66 rated cord seal. Customer-specified length or different cord type available - must contact factory prior to ordering, this is an ETO Special. Yoke made of high strength steel, galvanized and painted for high resistance to corrosion, 5 degree aiming increments with bolts to secure aiming in place.

Driver/Electrical Door

Removable die cast aluminum door made of a low copper die cast aluminum alloy (A360) for a high resistance to corrosion. Provides access to electronic components/LED drivers. Door secured with two captive screws outside of gasket perimeter. Includes a lanyard to prevent accidental dropping if access is required.

IP Rating

IP66 rated driver/electrical compartment and light engines in all aiming positions including up tilt aiming per ANSI C136.37 with seals around entire perimeter of the lenses and seal around entire perimeter of the driver/electrical compartment. IP66 rating including when PCB option is installed.

Light Engine

Composed of 4 main components: Heat Sink / LED Module / Optical System / Driver. Electrical components are RoHS compliant. LEDs tested by ISO 17025-2005 accredited lab in accordance with IESNA LM-80 guidelines, extrapolations in accordance with IESNA TM-21. Metal core board ensures greater heat transfer and longer lifespan.

Heat Sinks: Heat sinks that are part of LED Modules are anodized 6063-T5 Aluminum for a high resistance to corrosion. Housing acts as heat sink for drivers, designed to ensure high efficacy and superior cooling by natural vertical convection. Air flow pattern always

close to LEDs and driver optimizing their efficiency and life. Product does not use any cooling device with moving parts (only passive cooling).

LED Module: Composed of high performance white LEDs. Color temperature as per ANSI/NEMA bin 3000K nominal (3045K +/- 175K) or 4000K nominal (3985K +/- 275K), both CRI 70 min.

Optical System: Choice of four distributions including Spot (SP), Asymmetric 33° Flood (A33), Rectangular Medium Flood (RM) distributions and a specialty distribution designed for Airport Apron (AIRP) applications featuring a wide 87° horizontal and narrow 16° vertical beam. Composed of high performance UV stabilized optical grade polymer refractor lenses to achieve desired distribution optimized to get maximum spacing, target lumens and a superior lighting uniformity. Performance shall be tested per LM-63, LM-79 and TM-15 (IESNA) certifying its photometric performance.

IK Rating: IK10 highest impact resistance rating for LED Module lenses.

Driver: High power factor of 90% min. Electronic driver, operating range 50/60 Hz. Auto adjusting universal voltage input from 120 to 277 VAC or 347 to 480 VAC rated for both application line to line or line to neutral, Class I, THD of 20% max. The current supplying the LEDs will be reduced by the driver if the driver experiences internal overheating as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction. Standard built in driver surge protection of 2.5kV (min). Driver enables setting LED drive current to meet your specific total wattage consumption, lumen output and/or efficacy needs - ETO Specials, contact factory.

Integrated Features

Please note that these integrated features always come with this luminaire standard at no additional cost.

0-10V dimming driver included as standard, dimming leads pre-wired to Dimming Controls option except when DD external controls options are selected.

SP1: Surge protection device tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line-Ground, Line-Neutral and Neutral-Ground. Enhanced surge protection device SP2 20kV/10kA available as an option. Surge protection device wired in parallel so that if it fails open the luminaire will remain lit/power on.

Wiring

#2 - #14 AWG wires from the primary circuit, located inside the housing. Due to the inrush current that occurs with electronic drivers, recommend using a time delay or slow blow fuse to avoid unnecessary and unwanted fuse blowing (false tripping) that can occur with fast acting fuses.

Hardware and Seals

All exposed screws shall be stainless and/or corrosion resistant and captive. All seals and sealing devices are made and/or lined with EPDM and/or silicone and/or rubber.

Finish

Five standard textured colors: white, bronze, black, dark gray and medium gray. RAL and custom color matching available - must contact factory prior to ordering, these are ETO Specials. Color in accordance with the AAMA 2604 standard. Application of polyester powder coat paint (2.5 mils/62.5 microns) with ± 1 mils/24 microns of tolerance. The thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard.

LED Products Manufacturing Standard

The electronic components sensitive to electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with EC61340-5-1 and ANSI/ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product.

Luminaire Useful Life

Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, exclusive Signify System Reliability Tool, Advance driver data and LED manufacturer LM-80/TM-21 data, expected to reach 100,000 + hours with L70 lumen maintenance @ 25°C. Luminaire Useful Life accounts for LED lumen maintenance AND all of these additional factors including: LED color shift, LED life, driver life, PCB substrate, solder joints, on/off cycles, burning hours and corrosion.

Vibration Resistance

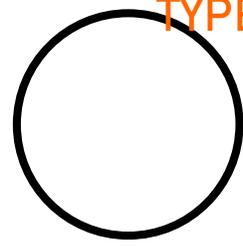
Luminaire meets the ANSI C136.31-2018 specifications, tested by independent lab over 100,000 cycles in all three axes: Bridge/Overpass for 138L 3 modules, 184L 4 modules, 230L 5 modules; Normal for 276L 6 modules.

Certifications and Compliance

cULus Listed for Canada and USA, per UL1598 and UL8750, including suitable for mounting within 4' or 1.2m of the ground. Configurations are DesignLights Consortium qualified, consult DLC QPL Qualified Products List for more details. Luminaire complies with or exceeds the following ANSI C136 standards: .2, .3, .10, .15, .21, .22, .24, .25, .31, .32, .37, .41. Entire luminaire is rated for operation in ambient temperature of -40°C (-40°F) up to +40°C (+104°F).

Limited Warranty

5-year limited warranty. See signify.com/warranties for details and restrictions.



The Gardco RA straight aluminum pole consists of a one-piece round extruded aluminum lighting standard mounted to a structural quality carbon galvanized steel base tenon. This construction offers the corrosion resistance and flexibility of aluminum with the strength and integrity of steel. The poles are finished with either Architectural Class 1 anodizing or electrostatically applied TGIC polyester powdercoat.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lamps: _____ Qty: _____
 Notes: _____

Order Guide

example: RA4-STB-15-D1-BRP

Prefix	Base	Height	Wind Factor Code*	Drilling	Finish	Options
	STB					
RA4	STB	10	-	D1 1 Way	BRP Bronze Paint BLP Black Paint WP White Paint NP Natural OC Aluminum Paint Optional Color Paint (Specify RAL designation ex: OC-RAL7024) SC Special Color Paint (Specify. Must supply color chip.)	DR Duplex Receptacle GFCI Ground Fault Receptacle VDA Vibration Dampener Nipples and Couplings NL Nipple - External thread CL Coupling - Internal thread Indicate size (1/2", 3/4", 1", 1 1/4", 1 1/2".) Indicate height above base and orientation to hand hole. See Pole Orientation Information on Page 4. Single Mount Bullhorn Brackets* A15BH-19 Single - 1.9" OD A15BH-24 Single - 2.4" OD A215BH-19 2-Tenon - 1.9" OD A215BH-24 2-Tenon - 2.4" OD Indicate height above base and orientation to hand hole. See Pole Orientation Information on Page 4.
		12		D2 2 Way		
		15	L	D2@90 2 Way at 90°		
		20	M H	D3 3 Way D3@120 3 Way at 120° D4 4 Way T2 2 3/8" OD Tenon T4 4" OD Tenon		
RA4.5		10	-			
		12				
		15				
		18 20				
RA5		15	-			
		18				
		20	L			
		25	M H			
		28	L M H			
		30	L M H			

*Refers to relative strength based on wind load factors. L = Light M = Medium H = Heavy

Poles Straight Round Aluminum - Tenon Base

Pole Data

Poles Specs					Normal Wind Conditions			Anchor Bolts ²		
					100 MPH	90 MPH	80 MPH			
Product Catalog Number	Height (ft)	Base Tenon Height (ft.)	Pole Diameter (inches)	Wall Thickness (inches)	EPA ft ²	EPA ft ²	EPA ft ²	Bolt Circle (inches)	Bolt Size (inches)	Max Proj. (inches)
RA4-STB-10	10.00	1.25	4	0.135	7.1	9.1	11.9	7	5/8 x 18 x 3	3
RA4-STB-12	11.67	1.25	4	0.135	5.2	6.8	9.1	7	5/8 x 18 x 3	3
RA4-STB-15	14.92	2	4	0.135	3.1	4.3	6	7	5/8 x 18 x 3	3
RA4-STB-20L	19.92	2	4	0.135	-	1.2	1.2	7	5/8 x 18 x 3	3
RA4-STB-20M	19.92	4	4	0.135	-	2.1	3.4	7	5/8 x 18 x 3	3
RA4-STB-20H	19.92	6	4	0.135	2.2	3.3	4.8	7	3/4 x 17 x 3	3
RA4.5-STB-10	9.67	1.5	4.5	0.15	12.6	15.7	20.2	7	3/4 x 17 x 3	3
RA4.5-STB-12	11.67	1.5	4.5	0.15	9.2	11.6	15	7	3/4 x 17 x 3	3
RA4.5-STB-15	14.75	1.5	4.5	0.15	5.8	7.4	9.9	7	3/4 x 17 x 3	3
RA4.5-STB-18	17.75	1.5	4.5	0.15	3.6	4.7	6.5	7	3/4 x 17 x 3	3
RA4.5-STB-20	19.75	1.5	4.5	0.15	2.4	3.2	4.7	7	3/4 x 17 x 3	3
RA5-STB-15	14.83	2.5	5	0.175	10.6	13.3	17.1	9	3/4 x 17 x 3	3
RA5-STB-18	17.75	2.5	5	0.175	7.4	9.4	12.1	9	3/4 x 17 x 3	3
RA5-STB-20	19.83	2.5	5	0.175	5.7	7.3	9.5	9	3/4 x 17 x 3	3
RA5-STB-25L	24.83	2.5	5	0.175	2.6	3.5	4.9	9	3/4 x 17 x 3	3
RA5-STB-25M	24.83	4	5	0.175	3.3	4.4	6	9	3/4 x 17 x 3	3
RA5-STB-25H	24.83	7	5	0.175	5.1	6.5	8.6	9	1 x 36 x 4.5	3
RA5-STB-28L	27.92	2.5	5	0.175	-	1.8	2.8	9	3/4 x 17 x 3	3
RA5-STB-28M	27.92	4	5	0.175	1.7	2.5	3.7	9	3/4 x 17 x 3	3
RA5-STB-28H	27.92	7	5	0.175	3.2	4.2	5.7	9	1 x 36 x 4.5	3
RA5-STB-30L	29.83	2.5	5	0.175	-	-	1.6	9	3/4 x 17 x 3	3
RA5-STB-30M	29.83	4	5	0.175	-	1.5	3	9	3/4 x 17 x 3	3
RA5-STB-30H	29.83	7	5	0.175	2.2	3	4.2	9	1 x 36 x 4.5	3

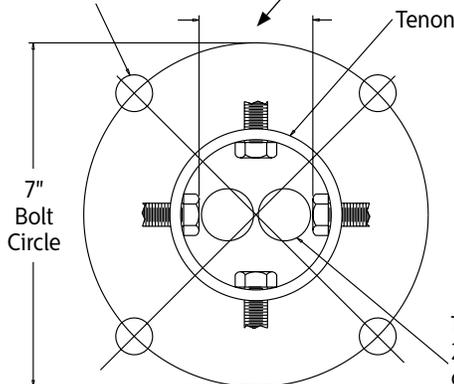
* **Warning:** Additional wind loading, in terms of EPA, from banners, cameras, floodlights and other accessories attached to the pole, must be added to the luminaire(s) EPA before selecting the pole with the appropriate wind load capability.

** Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement resulting from failure to use factory supplied templates.

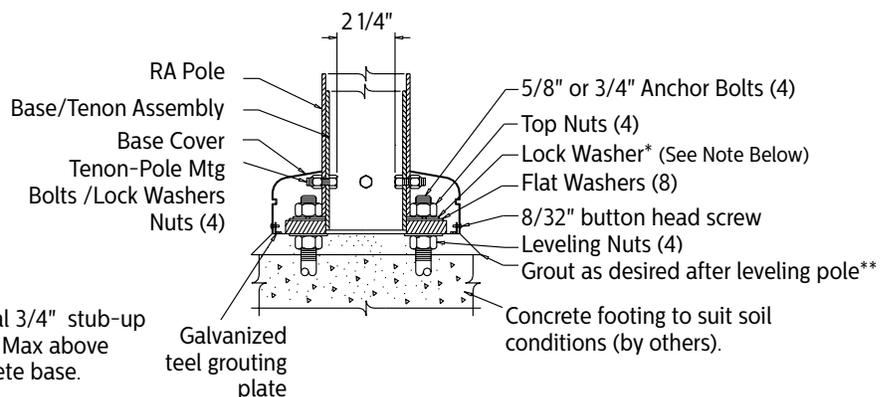
Dimensions

Cut hole in template 1/16" larger than diameter of anchor bolts used.

Conduit Opening
 RA4: ID 3.063" OD 2.25"
 RA4.5: ID 3.25" OD 2.75"
 RA5: ID 4.618" OD 3.25"



Typical 3/4" stub-up 2 1/2" Max above concrete base.



NOTE: Internal clearance of tenon/pole mounting bolts dictates allowable area for stub-ups.

* Anchor Bolt Lock Washers are not normally required and are not included in standard anchor bolt sets. They are available upon request at additional cost.

** Grouting should include a drainage slot or tube (by others) to permit water to drain from the base of the pole. Failure to provide drainage may weaken the pole base structure over time and may result in pole base failure, for which Gardco is not responsible.

NOTE: Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement from failure to use factory supplied templates.

Poles Straight Round Aluminum – Tenon Base

Specifications

POLE SHAFT

The pole shaft is a one-piece, seamless 6000 series extruded aluminum cylindrical tubing and is heat-treated to achieve a T6 temper with a guaranteed minimum yield strength of 31 KSI.

BASE TENON ASSEMBLY

The tenon anchor base assembly consists of structural quality carbon steel tubing with a minimum 46 KSI yield strength welded to a structural steel base with a guaranteed minimum yield strength of 50 KSI. The base plate telescopes the pole shaft and is circumferentially welded on both top and bottom. The base is provided with slotted

bolt holes to accommodate a $\pm .5$ " variation in the rotational flexibility. The entire assembly is hot-dipped galvanized. Four (4) mechanically galvanized fasteners secure the aluminum pole shaft to the base tenon assembly.

ANCHOR BOLTS

Anchor bolts are fabricated from a commercial quality hot rolled carbon steel bar that meets or exceeds a minimum guaranteed yield strength of 50,000 psi. Bolts have an "L" bend on one end and threaded on the opposite end. Anchor bolts are completely hot dipped galvanized. Four (4) properly sized bolts, each furnished with two (2) regular hex nuts and two

(2) flat washers, are provided per pole (priced separately), unless otherwise specified.

BASE COVER

A one-piece, heavy wall spun aluminum cover completely conceals the entire base plate and anchorage. The base cover is secured to the base assembly with two (2) stainless steel fasteners.

HAND HOLE

The hand hole has a nominal rectangular 2" x 4" or 2 5/8" x 5" inside opening in the pole shaft and tenon assembly. Included is an aluminum cover plate with attachment screws. The hand hole is located 18" – 20" above the base and 180° clockwise

with respect to the luminaire arm when viewed from the top of the pole for one arm. For two arms the hand hole is located directly under one arm.

POLE TOP CAP

Each RA pole assembly is provided with a removable composite friction-fit pole top cap.

FINISH

Poles are available with bronze, natural or black Aluminum Association Architectural Class 1 anodized finish. Electrostatically applied, thermally cured TGIC polyester powdercoat finish or liquid polyurethane is also available.

General Pole Information

DESIGN

The poles as charted are designed to withstand dead loads and predicted dynamic loads developed by variable wind speeds with an additional 30% gust factor under the following conditions: The charted weights include luminaire(s) and/or mounting bracket(s). The wind velocities are based on 10 mph increments from 80 mph through 100 mph. Poles to be located in areas of known abnormal conditions may require special consideration. For example: coastal areas, airports and areas of special winds.

Poles are designed for ground mounted applications. Poles mounted on structures (such as buildings and bridges) may also necessitate special consideration requiring Gardco's recommendation. Height correction factors and drag coefficients are applied to the entire structure. An appropriate safety factor is maintained based on the minimum yield strength of the material incorporated in the pole.

WARNING

This design information is intended as a general guideline only. The customer is solely

responsible for proper selection of pole, luminaire, accessory and foundation under the given site conditions and intended usage. The addition of any items to the pole, in addition to the luminaire, will dramatically impact the EPA load on that pole. It is strongly recommended that a qualified professional be consulted to analyze the loads given the user's specific needs to ensure proper selection of the pole, luminaire, accessories, and foundation. Gardco assumes no responsibility for such proper analysis or product selections. Failure to insure proper site analysis, pole selection, loads and installation can result in

pole failure, leading to serious injury or property damage.

GENERAL INFORMATION

Mounting height is the vertical distance from the base of the lighting pole to the center of the luminaire arm at the point of luminaire attachment. Twin arms as charted are oriented at 180° with respect to each other. For applications of two (2) arms at 90° or other multiple arm applications, consult the factory.

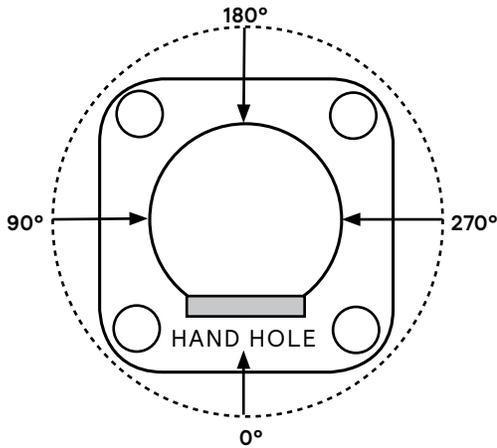
WARRANTY

Gardco poles feature a 1 year limited warranty. See Warranty Information on www.signify.com/warranties for complete details and exclusions.

Poles Straight Round Aluminum - Tenon Base

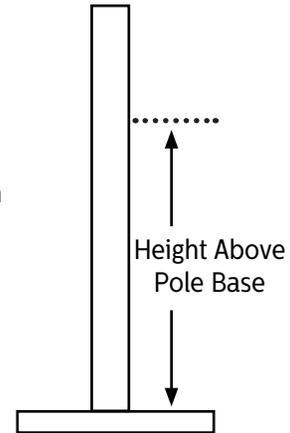
Orientation Information

Factory installed options and accessories



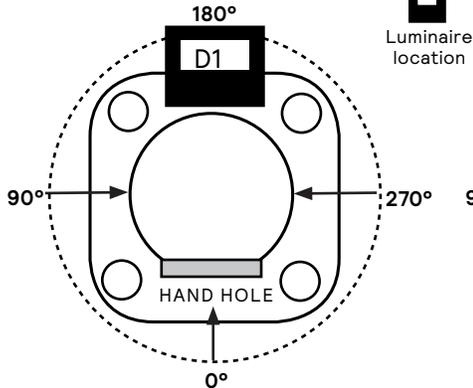
Orientation is measured clockwise from the Hand Hole Center.

For Factory Installed Options and Accessories, Specify Orientation from Hand Hole and Height Above Pole Base Where Required.

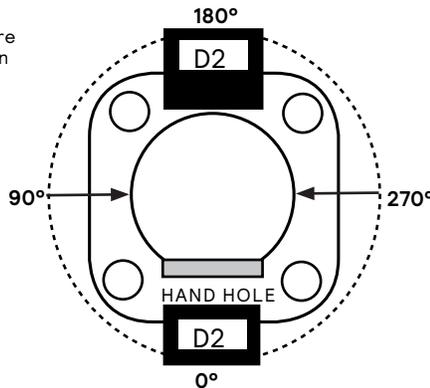


Standard arm mount luminaire orientation

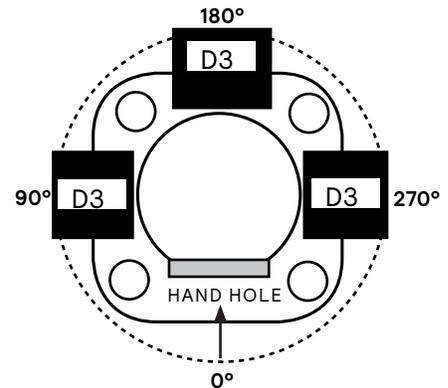
D1 Drilled for Single Luminaire



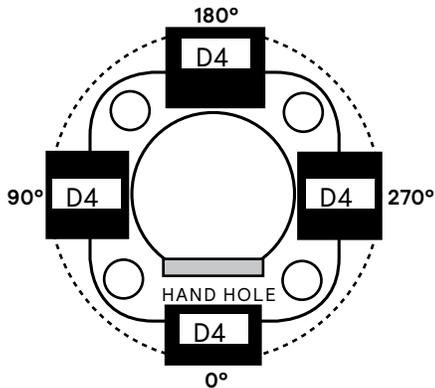
D2 Drilled for 2 Luminaires at 180°



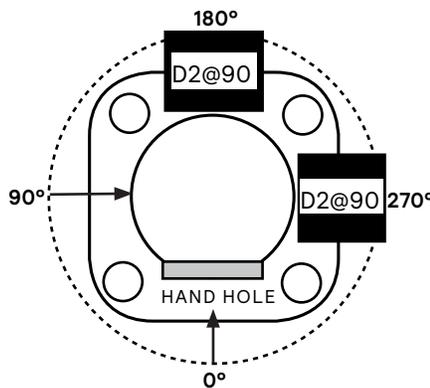
D3 Drilled for 3 Luminaires @ 90°



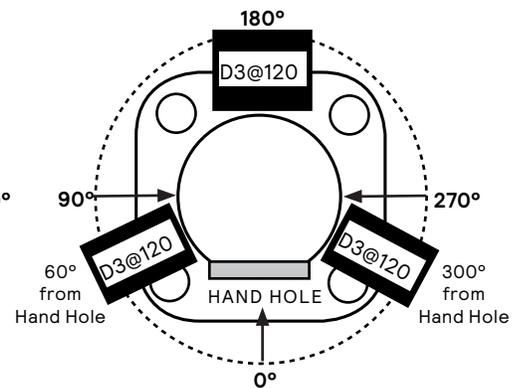
D4 Drilled for 4 Luminaires at 90°



D2@90 Drilled for 2 Luminaires at 90°



D3@120 Drilled for 3 Luminaires at 120°





Floodlighting

PowerForm

PFF floodlight



Gardco PowerForm LED floodlights provide over 1,500W HID replacement while significantly reducing energy and maintenance costs. PowerForm features a modular housing design available in four different sizes for a range of commercial, retail, industrial, airport, and other outdoor floodlighting applications. PowerForm is available with multiple lumen packages delivering approximately 42,300 to 138,600 lumens.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lamps: _____ Qty: _____
 Notes: _____

Ordering guide

example: PFF-184L-900-NW-G2-YK-SP-120-PCB-F1-BZ

Prefix	Number of LEDs	Drive Current	Color Temperature	Mounting	Distribution	Voltage
PFF						
PFF PowerForm flood	138L 138 LEDs (3 modules) 184L 184LEDs (4 modules) 230L 230 LEDs (5 modules) 276L⁶ 276 LEDs (6 modules)	700 700mA 900 900mA 1A 1 Amp 1.2A^{6,10} 1.2 Amp	WW-G2 Warm White 3000K, 70 CRI Generation 2 NW-G2 Neutral White 4000K, 70 CRI Generation 2	SF Slip Fitter Mount (fits on 2-3/8" O.D. tenon, wires through slip fitter) YK Yoke Mount (9' or 2.74m cord exits luminaire)	A33 Asymmetric 33° Flood (NEMA 6x5) RM Rectangular Medium Flood (NEMA 7x4) SP Spot (12° round) (NEMA 2x2) AIRP Airport Apron Flood (NEMA 7x5)	120 120V 208 208V 240 240V 277 277V 347 347V 480 480V UNV 120-277V HVU 347-480V
	Note: 46 LEDs per module					

Options		Fusing		Surge Protection		Other Options		Side Rails		Finish	
none	leave blank (0-10V dimming driver standard)	none	leave blank	blank	Surge Protector 10kV / 10kA (standard)	none	leave blank	blank	standard anodized, no finish	BK	Black
DD^{1,2,3,8}	0-10V dimming external wires (controls by others)	Fusing		SP2	Surge Protector 20kV / 10kA (option)	PCB^{2,8,9}	Photocontrol Button	PSR	Painted Side Rails, painted same finish to match luminaire finish	WH	White
FAWS^{1,2,8,10}	Field Adjustable Wattage Selector	F1⁷	Single (120, 277, 347VAC)			TLRD7^{2,4}	Twist Lock Receptacle 7-pin			BZ	Bronze
		F2⁷	Double (208, 240, 480VAC)			TLRPC^{2,4,7,9}	Twist Lock Receptacle w/ 3-pin Photocell			DKY	Dark Gray
		F3⁷	Canadian Double Pole (208, 240, 480VAC)			BAC^{11,12}	Meets the requirements of the Buy American Act of 1933 (BAA)			MGY	Medium Gray
		Pole Mount Fusing								RAL⁵	Optional Color (specify optional color or RAL)
		FP1⁷	Single (120, 277, 347VAC)							CC⁵	Custom Color (must supply color chip, requires factory quote)
		FP2⁷	Double (208, 240, 480VAC)								
		FP3⁷	Canadian Double Pole (208, 240, 480VAC)								

- Choose only 1 of the following Dimming Controls options: either DD or FAWS.
- 0-10V dimming driver standard.
- Luminaire has 0-10V dimming wires exiting the luminaire for dimming controls by others.
- TLRD7 and TLRPC max aiming angle 45°. TLRD7 works with 3, 5 or 7 pin NEMA photocell/dimming, use of photocell (by others) or shorting cap (by others) is required to ensure proper illumination. TLRD7 and TLRPC receptacle pins 4 & 5 are capped off when ordered with any of the Dimming Controls DD or FAWS.
- Must contact factory prior to ordering - these items are ETO Specials.
- 276L with 1.2A only available as ETO Special - must contact factory prior to ordering.
- Must specify specific input voltage, not available with UNV or HVU.
- PCB can be used with DD and FAWS.
- PCB and TLRPC available in 120V, 208V, 240V, or 277V only.
- FAWS not available with 1.2A (switch has lower current limit).
- Extended lead times apply. Contact factory for details.
- Failure to properly select the "BAC" suffix could result in you receiving product that is not BAA compliant product with no recourse for an RMA or refund. This BAC designation hereunder does not address (i) the applicability of, or availability of a waiver under, the Trade Agreements Act, or (ii) the "Buy America" domestic content requirements imposed on states, localities, and other non-federal entities as a condition of receiving funds administered by the Department of Transportation or other federal agencies.

Connected lighting

Interact City connector node provides the plug and play wireless communications technology to connect your floodlight to the Interact City lighting management system.



Accessory Ordering Code	Description
LLC	Interact City cellular technology connector node

Contact Signify for additional support when connected lighting or additional services are desired. For more details visit: <https://www.interact-lighting.com/en-us/what-is-possible/interact-city>



PFF PowerForm

Floodlight

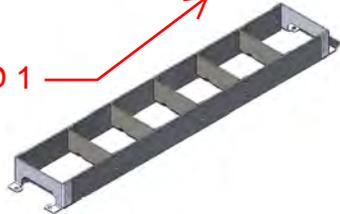
PowerForm Accessories (ordered separately, field installed, specify finish at placeholder F)

Shielding Accessories

Glare shield (black finish)

GS-PFF-138	138 LEDs (3 modules)
GS-PFF-184	184 LEDs (4 modules)
GS-PFF-230	230 LEDs (5 modules)
GS-PFF-276	276 LEDs (6 modules)

HEAD 1



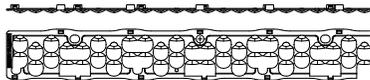
GS louvered glare shields are ordered as an accessory only and can be used with A33, RM, and AIRP optics; can not be used with SP optics due to fit restriction - if required, must contact factory prior to ordering since it is an ETO Special.

Glare shields are aluminum sheet metal louvers painted in a smooth black power coat finish. Each set includes a mounting kit that fastens to the front face of the LED light engine and includes stainless steel hardware.

One glare shield attaches to each 46 LED module. The total number of glare shields is determined by total number of modules per luminaire where required.

Internal house side shield

HIS-PFF-138	138 LEDs (3 modules)
HIS-PFF-184	184 LEDs (4 modules)
HIS-PFF-230	230 LEDs (5 modules)
HIS-PFF-276	276 LEDs (6 modules)



HIS internal house side shields are ordered as an accessory only and can be used with A33 and RM optics; can not be used with SP or AIRP optics due to fit restriction.

Internal shields are injection molded black polymer that snap fit on each 46 LED module. The total number of internal shields is determined by the total number of modules per luminaire where required.

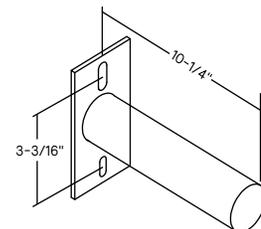
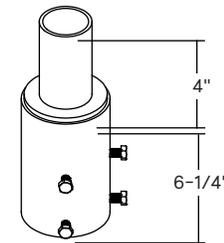
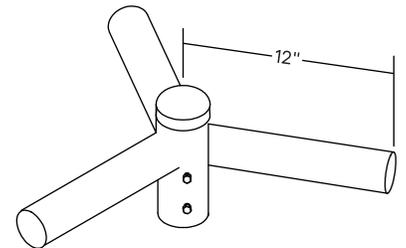
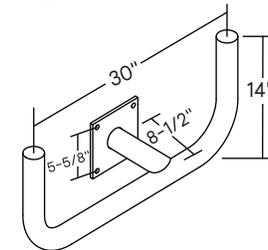
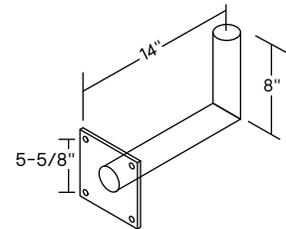
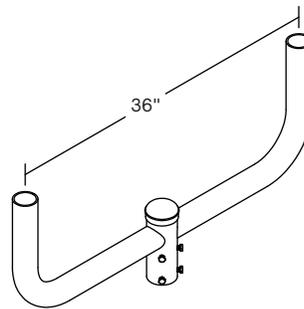
Mounting Accessories

For wall and pole brackets, bullhorns, etc. see <https://www.signify.com/en-us/products/outdoor-luminaires/poles-brackets/site-and-area-brackets/bull-horn-brackets#downloads> for details.

Exception: All UPS Upsweep - contact factory to confirm compatibility.

Exception: SBRKT-SAB-NA-4-WA-(F) Side Angle Flat bracket cannot be used with any PFF versions due to only single mounting hole that is too small for required mounting bolts.

Exception: PFF-276L 6 module version cannot be used with any brackets, etc. due to its weight - too heavy.



Examples shown are not to scale - see SBRKT spec sheet for all available brackets

PFF PowerForm

Floodlight

LED Wattage and Lumen Values – 3000K

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33		RM		SP		AIRP	
						Lumen Output	Efficacy (LPW)						
PFF-138L-700-WW-G2	138	3	700	3000	289	43,048	149	42,433	147	43,619	151	42,284	146
PFF-138L-900-WW-G2	138	3	900	3000	397	51,974	131	51,231	129	52,663	133	51,051	128
PFF-138L-1A-WW-G2	138	3	1050	3000	455	58,940	130	58,098	128	59,721	131	57,894	127
PFF-138L-1.2A-WW-G2	138	3	1200	3000	511	65,101	127	64,170	126	65,962	129	62,793	123
PFF-184L-700-WW-G2	184	4	700	3000	386	57,398	149	56,577	147	58,159	151	56,379	146
PFF-184L-900-WW-G2	184	4	900	3000	530	69,299	131	68,308	129	70,217	133	68,068	128
PFF-184L-1A-WW-G2	184	4	1050	3000	606	78,587	130	77,463	128	79,628	131	77,191	127
PFF-184L-1.2A-WW-G2	184	4	1200	3000	681	86,801	127	85,559	126	87,950	129	83,724	123
PFF-230L-700-WW-G2	230	5	700	3000	482	71,747	149	70,722	147	72,698	151	70,474	146
PFF-230L-900-WW-G2	230	5	900	3000	662	86,623	131	85,385	129	87,771	133	85,085	128
PFF-230L-1A-WW-G2	230	5	1050	3000	758	98,234	130	96,829	128	99,534	131	96,489	127
PFF-230L-1.2A-WW-G2	230	5	1200	3000	852	108,500	127	106,949	126	109,937	129	106,574	125
PFF-276L-700-WW-G2	276	6	700	3000	579	86,097	149	84,866	147	87,237	151	84,568	146
PFF-276L-900-WW-G2	276	6	900	3000	795	103,948	131	102,462	129	105,325	133	103,975	131
PFF-276L-1A-WW-G2	276	6	1050	3000	909	117,880	130	116,194	128	119,442	131	117,911	130
PFF-276L-1.2A-WW-G2	276	6	1200	3000	1022	130,200	127	128,338	126	131,924	129	127,888	125

LED Wattage and Lumen Values – 4000K

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33		RM		SP		AIRP	
						Lumen Output	Efficacy (LPW)						
PFF-138L-700-NW-G2	138	3	700	4000	289	45,219	156	44,573	154	45,818	158	44,416	154
PFF-138L-900-NW-G2	138	3	900	4000	397	54,595	137	53,814	135	55,318	139	53,625	135
PFF-138L-1A-NW-G2	138	3	1050	4000	455	61,912	136	61,027	134	62,732	138	60,813	134
PFF-138L-1.2A-NW-G2	138	3	1200	4000	511	68,383	134	67,405	132	69,288	136	65,959	129
PFF-184L-700-NW-G2	184	4	700	4000	386	60,292	156	59,430	154	61,091	158	59,222	154
PFF-184L-900-NW-G2	184	4	900	4000	530	72,793	137	71,752	135	73,757	139	71,500	135
PFF-184L-1A-NW-G2	184	4	1050	4000	606	82,549	136	81,369	134	83,643	138	81,083	134
PFF-184L-1.2A-NW-G2	184	4	1200	4000	681	91,177	134	89,873	132	92,384	136	87,945	129
PFF-230L-700-NW-G2	230	5	700	4000	482	75,365	156	74,288	154	76,363	158	74,027	154
PFF-230L-900-NW-G2	230	5	900	4000	662	90,991	137	89,690	135	92,196	139	89,375	135
PFF-230L-1A-NW-G2	230	5	1050	4000	758	103,187	136	101,711	134	104,553	138	101,354	134
PFF-230L-1.2A-NW-G2	230	5	1200	4000	852	113,971	134	112,341	132	115,480	136	111,947	131
PFF-276L-700-NW-G2	276	6	700	4000	579	90,438	156	89,145	154	91,636	158	88,832	154
PFF-276L-900-NW-G2	276	6	900	4000	795	109,189	137	107,628	135	110,635	139	109,217	137
PFF-276L-1A-NW-G2	276	6	1050	4000	909	123,824	136	122,053	134	125,464	138	123,856	136
PFF-276L-1.2A-NW-G2	276	6	1200	4000	1022	136,765	134	134,809	132	138,576	136	134,336	131

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown. Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.

NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires. Contact factory for configurations not shown.

HEAD 2

Field Adjustable Wattage Selector (FAWS) Multiplier Chart

FAWS Position	Typical Lumens and System Wattage Multiplier	
	138L/184L	230L/276L
1	10%	15%
2	20%	35%
3	30%	45%
4	40%	60%
5	45%	70%
6	55%	85%
7	60%	100%
8	70%	100%
9	80%	100%
10	100%	100%

Note: Actual performance may vary due to LED and driver tolerances

PFF PowerForm

Floodlight

LED Wattage and Lumen Values – 3000K with glare shield

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33-GS		RM-GS		AIRP-GS	
						Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)
PFF-138L-700-WW-G2-GS	138	3	700	3000	289	33,280	115	32,884	114	22,022	76
PFF-138L-900-WW-G2-GS	138	3	900	3000	397	40,180	101	39,701	100	26,587	67
PFF-138L-1A-WW-G2-GS	138	3	1050	3000	455	45,566	100	45,023	99	30,151	66
PFF-138L-1.2A-WW-G2-GS	138	3	1200	3000	511	49,421	97	48,833	96	32,702	64
PFF-184L-700-WW-G2-GS	184	4	700	3000	386	44,374	115	43,844	114	29,363	76
PFF-184L-900-WW-G2-GS	184	4	900	3000	530	53,574	101	52,935	100	35,450	67
PFF-184L-1A-WW-G2-GS	184	4	1050	3000	606	60,754	100	60,030	99	40,201	66
PFF-184L-1.2A-WW-G2-GS	184	4	1200	3000	681	65,895	97	65,110	96	43,604	64
PFF-230L-700-WW-G2-GS	230	5	700	3000	482	55,466	115	54,806	114	36,702	76
PFF-230L-900-WW-G2-GS	230	5	900	3000	662	66,967	101	66,169	100	44,313	67
PFF-230L-1A-WW-G2-GS	230	5	1050	3000	758	75,942	100	75,038	99	50,251	66
PFF-230L-1.2A-WW-G2-GS	230	5	1200	3000	852	83,879	98	82,880	97	55,504	65
PFF-276L-700-WW-G2-GS	276	6	700	3000	579	66,560	115	65,767	114	44,043	76
PFF-276L-900-WW-G2-GS	276	6	900	3000	795	81,834	103	80,859	102	54,150	68
PFF-276L-1A-WW-G2-GS	276	6	1050	3000	909	92,802	102	91,697	101	61,408	68
PFF-276L-1.2A-WW-G2-GS	276	6	1200	3000	1022	100,655	98	99,456	97	66,604	65

LED Wattage and Lumen Values – 4000K with glare shield

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33-GS		RM-GS		AIRP-GS	
						Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)
PFF-138L-700-NW-G2-GS	138	3	700	4000	289	34,958	121	34,542	119	23,132	80
PFF-138L-900-NW-G2-GS	138	3	900	4000	397	42,206	106	41,703	105	27,928	70
PFF-138L-1A-NW-G2-GS	138	3	1050	4000	455	47,863	105	47,293	104	31,671	70
PFF-138L-1.2A-NW-G2-GS	138	3	1200	4000	511	51,913	102	51,295	100	34,351	67
PFF-184L-700-NW-G2-GS	184	4	700	4000	386	46,611	121	46,055	119	30,843	80
PFF-184L-900-NW-G2-GS	184	4	900	4000	530	56,275	106	55,604	105	37,237	70
PFF-184L-1A-NW-G2-GS	184	4	1050	4000	606	63,817	105	63,057	104	42,228	70
PFF-184L-1.2A-NW-G2-GS	184	4	1200	4000	681	69,217	102	68,393	100	45,802	67
PFF-230L-700-NW-G2-GS	230	5	700	4000	482	58,263	121	57,569	119	38,553	80
PFF-230L-900-NW-G2-GS	230	5	900	4000	662	70,343	106	69,505	105	46,547	70
PFF-230L-1A-NW-G2-GS	230	5	1050	4000	758	79,771	105	78,821	104	52,785	70
PFF-230L-1.2A-NW-G2-GS	230	5	1200	4000	852	88,108	103	87,059	102	58,302	68
PFF-276L-700-NW-G2-GS	276	6	700	4000	579	69,916	121	69,083	119	46,264	80
PFF-276L-900-NW-G2-GS	276	6	900	4000	795	85,960	108	84,936	107	56,880	72
PFF-276L-1A-NW-G2-GS	276	6	1050	4000	909	97,481	107	96,320	106	64,504	71
PFF-276L-1.2A-NW-G2-GS	276	6	1200	4000	1022	105,730	103	104,471	102	69,962	68

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown. Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.

NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires.

HEAD 1

Predicted Lumen Depreciation Data

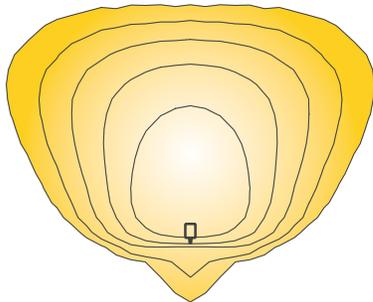
Ambient Temperature (°C)	Driver Current	Calculated L70 hours	L70 per TM-21	Lumen Maintenance % @ 60,000 hours
25°C	up to 1200 mA	>100,000	>60,000	98%

Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions. L70 is the predicted time when LED performance depreciates to 70% of initial lumen output. Calculated per IESNA TM21-11. Published L70 hours limited to 6 times actual LED test hours.

PFF PowerForm Floodlight

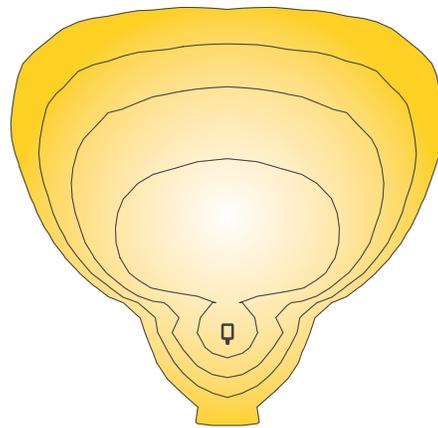
Optical Distribution Diagrams

A33 Asymmetric 33° Flood (NEMA 6x5)



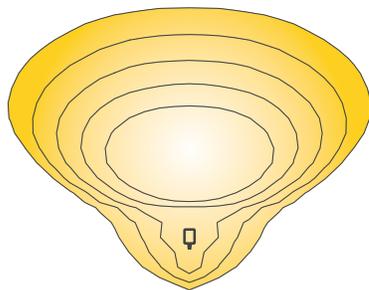
30' or 9.14m mounting height, 30° tilt
Applications include: large area lighting, storage yards, transportation terminals, ports, utility sub-stations, security lighting, large facades, large wall washing, tall structures / monuments / statues

AIRP Airport Apron Flood



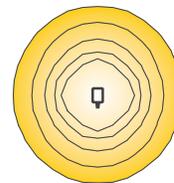
30' or 9.14m mounting height, 25° tilt
Applications: airport aprons

RM Rectangular Medium Flood (NEMA 7x4)



30' or 9.14m setback, 50° tilt
Applications include: building entrances and exits, security lighting, perimeter fences, checkpoints and inspection stations, large and wide wall grazing, large signs

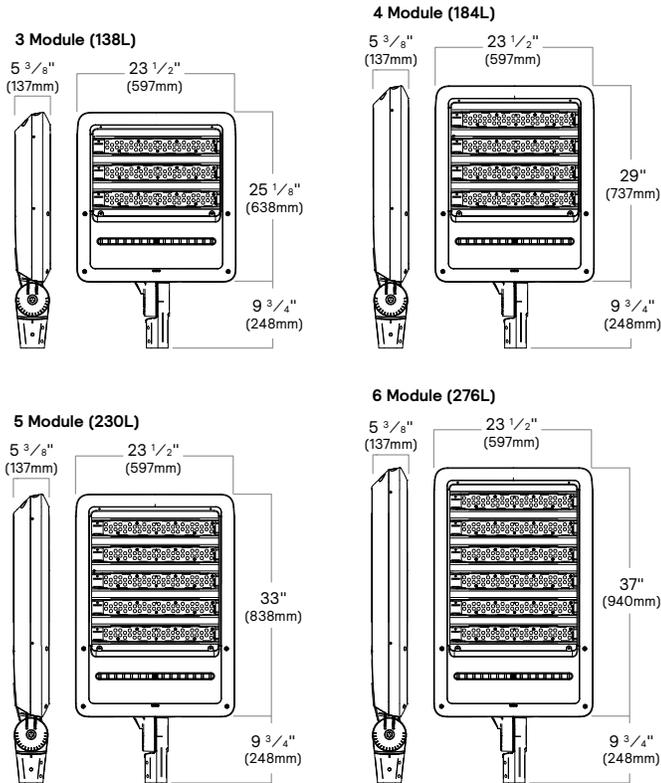
SP Spot 12° Round (NEMA 2x2)



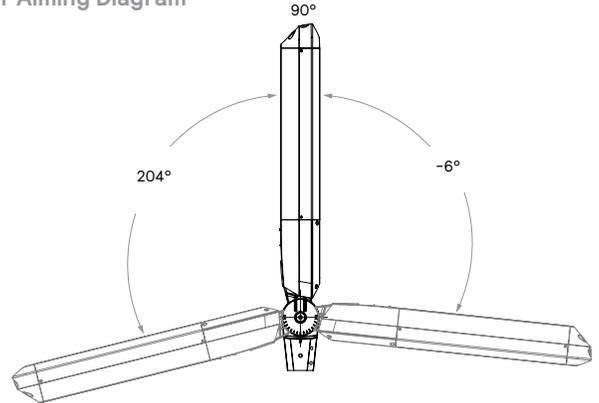
30' or 9.14m setback, 0° tilt
Applications include: spotlighting, accenting, tall columns, tall structures / monuments / statues

PFF PowerForm Floodlight

Dimensions – Slipfitter Mount (SF)



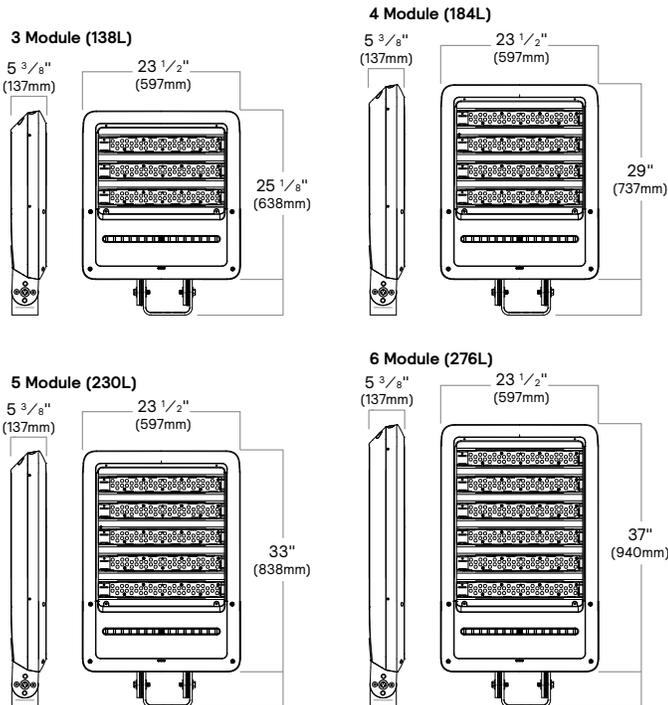
Slipfitter Aiming Diagram



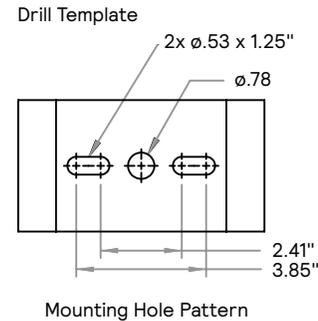
No. of Modules	Effective Projected Area (EPA-ft ²)			Weight of single luminaire PFF SF
	Single: 0° Aim	Single: 45° Aim	Single: 90° Aim	
3	0.647	2.311	3.269	62 lbs (28.1 kg)
4	0.739	2.681	3.792	72 lbs (32.7 kg)
5	0.836	3.021	4.273	81 lbs (36.7 kg)
6	0.938	3.337	4.720	91 lbs (41.3 kg)

Note: Applies to single PFF luminaire with (SF) Slipfitter mount at the following angles: 0° is horizontal to ground, 90° is perpendicular to the ground as shown in drawings.

Dimensions – Yoke Mount (YK)



Yoke Mount Drill Template



No. of Modules	Effective Projected Area (EPA-ft ²)			Weight of single luminaire PFF YK
	Single: 0° Aim	Single: 45° Aim	Single: 90° Aim	
3	0.596	2.232	3.156	66 lbs (29.9 kg)
4	0.688	2.601	3.679	76 lbs (34.5 kg)
5	0.786	2.942	4.161	86 lbs (39 kg)
6	0.887	3.257	4.607	94 lbs (42.6 kg)

Note: Applies to single PFF luminaire with (YK) Yoke mount at the following angles: 0° is horizontal to ground, 90° is perpendicular to the ground as shown in drawings.

PFF PowerForm

Floodlight

Controls options

DD: 0-10V dimming driver with dimming wires externally accessible for connecting dimming controls by others.

PCB: Photocell button (a.k.a. button photoeye).

TLRD7*: Twist Lock Receptacle with 7 pins enabling dimming and additional functionality (by others), can be used with an Interact City node, a twistlock photoelectric cell or a shorting cap. Can also be used with Signify or third party control system. Pins 6 and 7 are capped off (not connected) unless used with SR driver - ETO Specials, contact factory. Receptacle located on top of luminaire housing.

* Use of photoelectric cell or shorting cap is required to ensure proper illumination. Note: Additional hardware will be required to utilize the additional 2 pins on this receptacle.

TLRPC*: Twist Lock Receptacle with 5 pins and includes 3 pin twistlock photoelectric cell (must specify voltage). Receptacle located on top of luminaire housing.

*Note: Maximum aiming angle is 45° with TLRD7 and TLRPC in order to maintain IP66 rating around the Twist Lock Receptacle; Light Engines and the rest of the luminaire maintain IP66 rating at all aiming angles. UL Wet Location rating is also maintained at all aiming angles. Use of photoelectric cell or shorting cap is required to ensure proper illumination. TLRD7 and TLRPC receptacle pins 4 & 5 are connected to dimming driver's dimming leads whenever no Dimming Controls are selected; if Dimming Controls are selected then receptacle pins 4 & 5 are capped off because driver's dimming leads are used with Dimming Controls.

FAWS: Field Adjustable Wattage Selector, pre-set to the highest position, can be easily switched in the field to the required position. This reduces total luminaire wattage consumption and reduces the light level - see the FAWS multiplier chart for more details.

Note: It is not recommended to use FAWS with other dimming or controls; if you do, set the switch to position 10 (maximum output) to enable the other dimming or controls. Switching FAWS to any position other than 10 will disable the other dimming or controls.

Connected Lighting

Interact City connector node provides the plug and play wireless communications technology to connect your floodlight to the Interact City lighting management system. With Interact you can remotely manage, monitor and control all city lighting, from roads and streets, to parks and plazas, and bridges from one single system. Connected lighting enables capabilities including, accurate on/off switching, dimming control, fault reporting and integration with other systems to enable condition-based lighting. Interact provides you with a robust and scalable infrastructure to further reduce energy consumption, improve operations, and turn lighting into a connected network for your smart city journey.

For more details visit: <https://www.interact-lighting.com/en-us/what-is-possible/interact-city>

Luminaire options

F1: Fusing Single (for 120, 277 or 347VAC)

F2: Fusing Double (for 208, 240 or 480VAC)

F3: Fusing Canadian Double Pole (for 208, 240 or 480VAC)

FP1: Fusing Pole Single (pole mounted near handhole, for 120, 277 or 347VAC)

FP2: Fusing Pole Double (pole mounted near handhole, for 208, 240 or 480VAC).

FP3: Fusing Pole Canadian Double Pole (pole mounted near handhole, for 208, 240 or 480VAC)

SP2: Surge Protection, 20kV/10kA. Surge protection device wired in parallel so that if it fails open the luminaire will remain lit/powerd on.

PFF PowerForm

Floodlight

Specifications

Housing

Main body castings made of a low copper die cast Aluminum alloy (A360) for a high resistance to corrosion, 0.100" (2.5mm) minimum thickness. Side rail extrusions made of corrosion resistant low copper extruded anodized aluminum alloy (Anodized 6063-T5).

Mounting

Up tilt aiming and down tilt aiming possible with all of the mounting options.

cULus Listed as suitable for mounting within 4' or 1.2m of the ground

SF: Adjustable Slip Fitter with AWG 16-3 wires (or AWG 16-5 if DD external control options are selected) exiting through the Slip Fitter. Integral splice compartment for field wiring with cULus Wet Location rated access cover with seal around entire perimeter. Slip Fitter made of low copper die cast Aluminum alloy (A360) for a high resistance to corrosion, adjustable knuckle has 4 degree aiming increments with integral interlocking teeth and bolt to secure aiming in place, integral cast-in aiming marks. Fits on a 2-3/8" O.D. tenon.

YK: Adjustable Yoke with 9' (2.74m) of AWG 16-3 SEOWW cord (or AWG 16-5 if DD external control options are selected) exiting the luminaire through IP66 rated cord seal. Customer-specified length or different cord type available - must contact factory prior to ordering, this is an ETO Special. Yoke made of high strength steel, galvanized and painted for high resistance to corrosion, 5 degree aiming increments with bolts to secure aiming in place.

Driver/Electrical Door

Removable die cast aluminum door made of a low copper die cast aluminum alloy (A360) for a high resistance to corrosion. Provides access to electronic components/LED drivers. Door secured with two captive screws outside of gasket perimeter. Includes a lanyard to prevent accidental dropping if access is required.

IP Rating

IP66 rated driver/electrical compartment and light engines in all aiming positions including up tilt aiming per ANSI C136.37 with seals around entire perimeter of the lenses and seal around entire perimeter of the driver/electrical compartment. IP66 rating including when PCB option is installed.

Light Engine

Composed of 4 main components: Heat Sink / LED Module / Optical System / Driver. Electrical components are RoHS compliant. LEDs tested by ISO 17025-2005 accredited lab in accordance with IESNA LM-80 guidelines, extrapolations in accordance with IESNA TM-21. Metal core board ensures greater heat transfer and longer lifespan.

Heat Sinks: Heat sinks that are part of LED Modules are anodized 6063-T5 Aluminum for a high resistance to corrosion. Housing acts as heat sink for drivers, designed to ensure high efficacy and superior cooling by natural vertical convection. Air flow pattern always

close to LEDs and driver optimizing their efficiency and life. Product does not use any cooling device with moving parts (only passive cooling).

LED Module: Composed of high performance white LEDs. Color temperature as per ANSI/NEMA bin 3000K nominal (3045K +/- 175K) or 4000K nominal (3985K +/- 275K), both CRI 70 min.

Optical System: Choice of four distributions including Spot (SP), Asymmetric 33° Flood (A33), Rectangular Medium Flood (RM) distributions and a specialty distribution designed for Airport Apron (AIRP) applications featuring a wide 87° horizontal and narrow 16° vertical beam. Composed of high performance UV stabilized optical grade polymer refractor lenses to achieve desired distribution optimized to get maximum spacing, target lumens and a superior lighting uniformity. Performance shall be tested per LM-63, LM-79 and TM-15 (IESNA) certifying its photometric performance.

IK Rating: IK10 highest impact resistance rating for LED Module lenses.

Driver: High power factor of 90% min. Electronic driver, operating range 50/60 Hz. Auto adjusting universal voltage input from 120 to 277 VAC or 347 to 480 VAC rated for both application line to line or line to neutral, Class I, THD of 20% max. The current supplying the LEDs will be reduced by the driver if the driver experiences internal overheating as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction. Standard built in driver surge protection of 2.5kV (min). Driver enables setting LED drive current to meet your specific total wattage consumption, lumen output and/or efficacy needs - ETO Specials, contact factory.

Integrated Features

Please note that these integrated features always come with this luminaire standard at no additional cost.

0-10V dimming driver included as standard, dimming leads pre-wired to Dimming Controls option except when DD external controls options are selected.

SP1: Surge protection device tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line-Ground, Line-Neutral and Neutral-Ground. Enhanced surge protection device SP2 20kV/10kA available as an option. Surge protection device wired in parallel so that if it fails open the luminaire will remain lit/power on.

Wiring

#2 - #14 AWG wires from the primary circuit, located inside the housing. Due to the inrush current that occurs with electronic drivers, recommend using a time delay or slow blow fuse to avoid unnecessary and unwanted fuse blowing (false tripping) that can occur with fast acting fuses.

Hardware and Seals

All exposed screws shall be stainless and/or corrosion resistant and captive. All seals and sealing devices are made and/or lined with EPDM and/or silicone and/or rubber.

Finish

Five standard textured colors: white, bronze, black, dark gray and medium gray. RAL and custom color matching available - must contact factory prior to ordering, these are ETO Specials. Color in accordance with the AAMA 2604 standard. Application of polyester powder coat paint (2.5 mils/62.5 microns) with ± 1 mils/24 microns of tolerance. The thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard.

LED Products Manufacturing Standard

The electronic components sensitive to electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with EC61340-5-1 and ANSI/ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product.

Luminaire Useful Life

Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, exclusive Signify System Reliability Tool, Advance driver data and LED manufacturer LM-80/TM-21 data, expected to reach 100,000 + hours with L70 lumen maintenance @ 25°C. Luminaire Useful Life accounts for LED lumen maintenance AND all of these additional factors including: LED color shift, LED life, driver life, PCB substrate, solder joints, on/off cycles, burning hours and corrosion.

Vibration Resistance

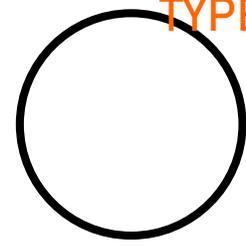
Luminaire meets the ANSI C136.31-2018 specifications, tested by independent lab over 100,000 cycles in all three axes: Bridge/Overpass for 138L 3 modules, 184L 4 modules, 230L 5 modules; Normal for 276L 6 modules.

Certifications and Compliance

cULus Listed for Canada and USA, per UL1598 and UL8750, including suitable for mounting within 4' or 1.2m of the ground. Configurations are DesignLights Consortium qualified, consult DLC QPL Qualified Products List for more details. Luminaire complies with or exceeds the following ANSI C136 standards: .2, .3, .10, .15, .21, .22, .24, .25, .31, .32, .37, .41. Entire luminaire is rated for operation in ambient temperature of -40°C (-40°F) up to +40°C (+104°F).

Limited Warranty

5-year limited warranty. See signify.com/warranties for details and restrictions.



The Gardco RA straight aluminum pole consists of a one-piece round extruded aluminum lighting standard mounted to a structural quality carbon galvanized steel base tenon. This construction offers the corrosion resistance and flexibility of aluminum with the strength and integrity of steel. The poles are finished with either Architectural Class 1 anodizing or electrostatically applied TGIC polyester powdercoat.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lamps: _____ Qty: _____
 Notes: _____

Order Guide

example: RA4-STB-15-D1-BRP

Prefix	Base	Height	Wind Factor Code*	Drilling	Finish	Options
	STB					
RA4	STB	10	-	D1 1 Way	BRP Bronze Paint BLP Black Paint WP White Paint NP Natural OC Aluminum Paint Optional Color Paint (Specify RAL designation ex: OC-RAL7024) SC Special Color Paint (Specify. Must supply color chip.)	DR Duplex Receptacle
		12		D2 2 Way		GFCI Ground Fault Receptacle
		15		D2@90 2 Way at 90°		VDA Vibration Dampener
		20		D3 3 Way		Nipples and Couplings
RA4.5	STB	10	-	D3@120 3 Way at 120°		NL Nipple - External thread
		12		D4 4 Way		CL Coupling - Internal thread
		15		T2 2 3/8" OD Tenon		Indicate size (1/2", 3/4", 1", 1 1/4", 1 1/2".) Indicate height above base and orientation to hand hole. See Pole Orientation Information on Page 4.
		18		T4 4" OD Tenon		
RA5	STB	20	-			Single Mount Bullhorn Brackets*
		25		L		A15BH-19 Single - 1.9" OD
		28		M		A15BH-24 Single - 2.4" OD
				H		A215BH-19 2-Tenon - 1.9" OD
				L		A215BH-24 2-Tenon - 2.4" OD
				M		Indicate height above base and orientation to hand hole. See Pole Orientation Information on Page 4.
	30	L				
			H			

*Refers to relative strength based on wind load factors. L = Light M = Medium H = Heavy

Poles Straight Round Aluminum - Tenon Base

Pole Data

Poles Specs					Normal Wind Conditions			Anchor Bolts ²		
					100 MPH	90 MPH	80 MPH			
Product Catalog Number	Height (ft)	Base Tenon Height (ft.)	Pole Diameter (inches)	Wall Thickness (inches)	EPA ft ²	EPA ft ²	EPA ft ²	Bolt Circle (inches)	Bolt Size (inches)	Max Proj. (inches)
RA4-STB-10	10.00	1.25	4	0.135	7.1	9.1	11.9	7	5/8 x 18 x 3	3
RA4-STB-12	11.67	1.25	4	0.135	5.2	6.8	9.1	7	5/8 x 18 x 3	3
RA4-STB-15	14.92	2	4	0.135	3.1	4.3	6	7	5/8 x 18 x 3	3
RA4-STB-20L	19.92	2	4	0.135	-	1.2	1.2	7	5/8 x 18 x 3	3
RA4-STB-20M	19.92	4	4	0.135	-	2.1	3.4	7	5/8 x 18 x 3	3
RA4-STB-20H	19.92	6	4	0.135	2.2	3.3	4.8	7	3/4 x 17 x 3	3
RA4.5-STB-10	9.67	1.5	4.5	0.15	12.6	15.7	20.2	7	3/4 x 17 x 3	3
RA4.5-STB-12	11.67	1.5	4.5	0.15	9.2	11.6	15	7	3/4 x 17 x 3	3
RA4.5-STB-15	14.75	1.5	4.5	0.15	5.8	7.4	9.9	7	3/4 x 17 x 3	3
RA4.5-STB-18	17.75	1.5	4.5	0.15	3.6	4.7	6.5	7	3/4 x 17 x 3	3
RA4.5-STB-20	19.75	1.5	4.5	0.15	2.4	3.2	4.7	7	3/4 x 17 x 3	3
RA5-STB-15	14.83	2.5	5	0.175	10.6	13.3	17.1	9	3/4 x 17 x 3	3
RA5-STB-18	17.75	2.5	5	0.175	7.4	9.4	12.1	9	3/4 x 17 x 3	3
RA5-STB-20	19.83	2.5	5	0.175	5.7	7.3	9.5	9	3/4 x 17 x 3	3
RA5-STB-25L	24.83	2.5	5	0.175	2.6	3.5	4.9	9	3/4 x 17 x 3	3
RA5-STB-25M	24.83	4	5	0.175	3.3	4.4	6	9	3/4 x 17 x 3	3
RA5-STB-25H	24.83	7	5	0.175	5.1	6.5	8.6	9	1 x 36 x 4.5	3
RA5-STB-28L	27.92	2.5	5	0.175	-	1.8	2.8	9	3/4 x 17 x 3	3
RA5-STB-28M	27.92	4	5	0.175	1.7	2.5	3.7	9	3/4 x 17 x 3	3
RA5-STB-28H	27.92	7	5	0.175	3.2	4.2	5.7	9	1 x 36 x 4.5	3
RA5-STB-30L	29.83	2.5	5	0.175	-	-	1.6	9	3/4 x 17 x 3	3
RA5-STB-30M	29.83	4	5	0.175	-	1.5	3	9	3/4 x 17 x 3	3
RA5-STB-30H	29.83	7	5	0.175	2.2	3	4.2	9	1 x 36 x 4.5	3

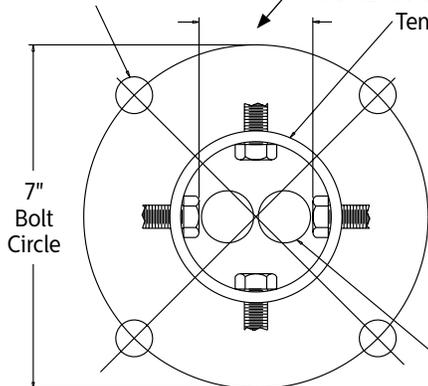
* **Warning:** Additional wind loading, in terms of EPA, from banners, cameras, floodlights and other accessories attached to the pole, must be added to the luminaire(s) EPA before selecting the pole with the appropriate wind load capability.

** Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement resulting from failure to use factory supplied templates.

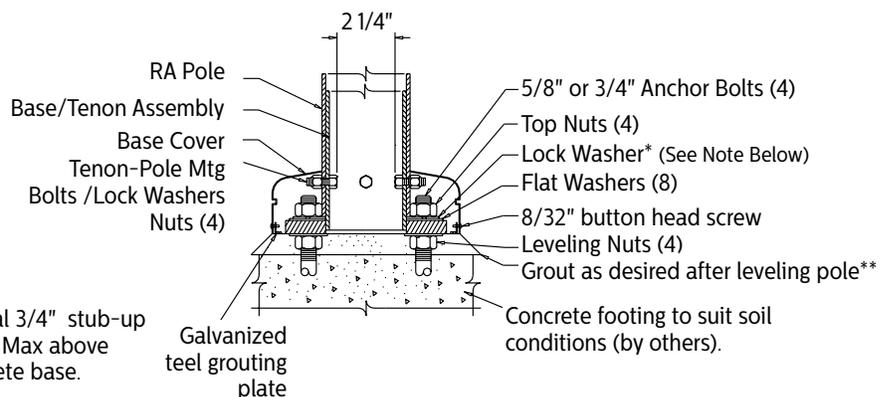
Dimensions

Cut hole in template 1/16" larger than diameter of anchor bolts used.

Conduit Opening
 RA4: ID 3.063" OD 2.25"
 RA4.5: ID 3.25" OD 2.75"
 RA5: ID 4.618" OD 3.25"



Typical 3/4" stub-up 2 1/2" Max above concrete base.



NOTE: Internal clearance of tenon/pole mounting bolts dictates allowable area for stub-ups.

* Anchor Bolt Lock Washers are not normally required and are not included in standard anchor bolt sets. They are available upon request at additional cost.

** Grouting should include a drainage slot or tube (by others) to permit water to drain from the base of the pole. Failure to provide drainage may weaken the pole base structure over time and may result in pole base failure, for which Gardco is not responsible.

NOTE: Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement from failure to use factory supplied templates.

Poles Straight Round Aluminum – Tenon Base

Specifications

POLE SHAFT

The pole shaft is a one-piece, seamless 6000 series extruded aluminum cylindrical tubing and is heat-treated to achieve a T6 temper with a guaranteed minimum yield strength of 31 KSI.

BASE TENON ASSEMBLY

The tenon anchor base assembly consists of structural quality carbon steel tubing with a minimum 46 KSI yield strength welded to a structural steel base with a guaranteed minimum yield strength of 50 KSI. The base plate telescopes the pole shaft and is circumferentially welded on both top and bottom. The base is provided with slotted

bolt holes to accommodate a $\pm .5$ " variation in the rotational flexibility. The entire assembly is hot-dipped galvanized. Four (4) mechanically galvanized fasteners secure the aluminum pole shaft to the base tenon assembly.

ANCHOR BOLTS

Anchor bolts are fabricated from a commercial quality hot rolled carbon steel bar that meets or exceeds a minimum guaranteed yield strength of 50,000 psi. Bolts have an "L" bend on one end and threaded on the opposite end. Anchor bolts are completely hot dipped galvanized. Four (4) properly sized bolts, each furnished with two (2) regular hex nuts and two

(2) flat washers, are provided per pole (priced separately), unless otherwise specified.

BASE COVER

A one-piece, heavy wall spun aluminum cover completely conceals the entire base plate and anchorage. The base cover is secured to the base assembly with two (2) stainless steel fasteners.

HAND HOLE

The hand hole has a nominal rectangular 2" x 4" or 2 5/8" x 5" inside opening in the pole shaft and tenon assembly. Included is an aluminum cover plate with attachment screws. The hand hole is located 18" – 20" above the base and 180° clockwise

with respect to the luminaire arm when viewed from the top of the pole for one arm. For two arms the hand hole is located directly under one arm.

POLE TOP CAP

Each RA pole assembly is provided with a removable composite friction-fit pole top cap.

FINISH

Poles are available with bronze, natural or black Aluminum Association Architectural Class 1 anodized finish. Electrostatically applied, thermally cured TGIC polyester powdercoat finish or liquid polyurethane is also available.

General Pole Information

DESIGN

The poles as charted are designed to withstand dead loads and predicted dynamic loads developed by variable wind speeds with an additional 30% gust factor under the following conditions: The charted weights include luminaire(s) and/or mounting bracket(s). The wind velocities are based on 10 mph increments from 80 mph through 100 mph. Poles to be located in areas of known abnormal conditions may require special consideration. For example: coastal areas, airports and areas of special winds.

Poles are designed for ground mounted applications. Poles mounted on structures (such as buildings and bridges) may also necessitate special consideration requiring Gardco's recommendation. Height correction factors and drag coefficients are applied to the entire structure. An appropriate safety factor is maintained based on the minimum yield strength of the material incorporated in the pole.

WARNING

This design information is intended as a general guideline only. The customer is solely

responsible for proper selection of pole, luminaire, accessory and foundation under the given site conditions and intended usage. The addition of any items to the pole, in addition to the luminaire, will dramatically impact the EPA load on that pole. It is strongly recommended that a qualified professional be consulted to analyze the loads given the user's specific needs to ensure proper selection of the pole, luminaire, accessories, and foundation. Gardco assumes no responsibility for such proper analysis or product selections. Failure to insure proper site analysis, pole selection, loads and installation can result in

pole failure, leading to serious injury or property damage.

GENERAL INFORMATION

Mounting height is the vertical distance from the base of the lighting pole to the center of the luminaire arm at the point of luminaire attachment. Twin arms as charted are oriented at 180° with respect to each other. For applications of two (2) arms at 90° or other multiple arm applications, consult the factory.

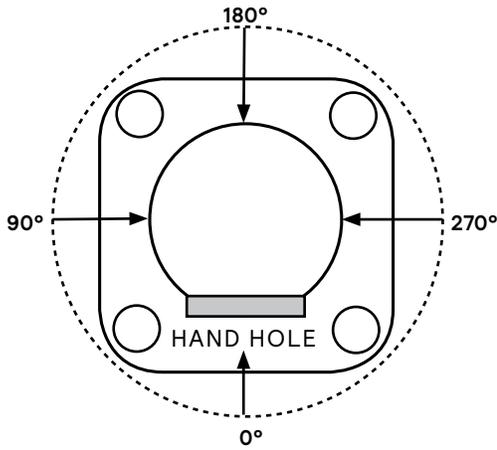
WARRANTY

Gardco poles feature a 1 year limited warranty. See Warranty Information on www.signify.com/warranties for complete details and exclusions.

Poles Straight Round Aluminum - Tenon Base

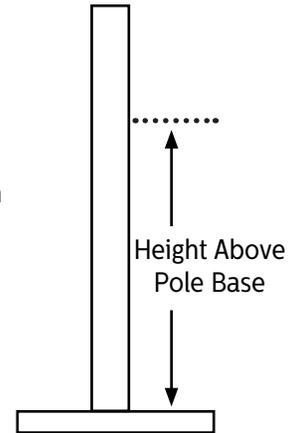
Orientation Information

Factory installed options and accessories



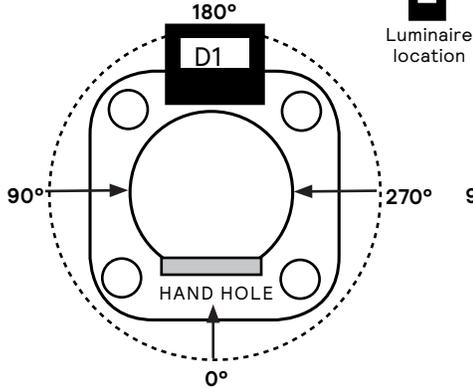
Orientation is measured clockwise from the Hand Hole Center.

For Factory Installed Options and Accessories, Specify Orientation from Hand Hole and Height Above Pole Base Where Required.

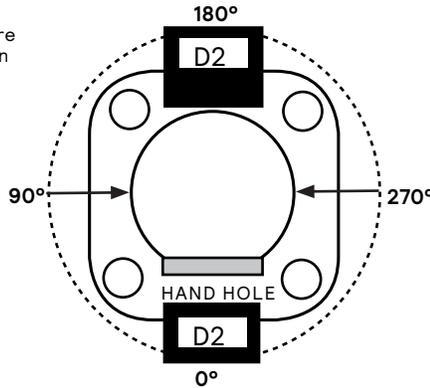


Standard arm mount luminaire orientation

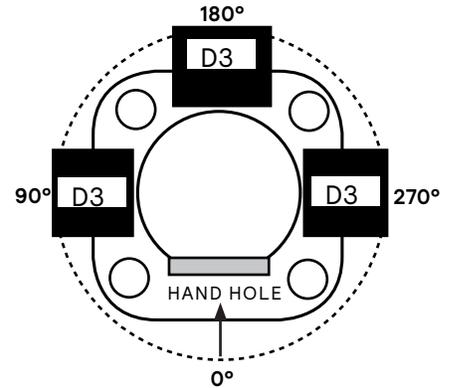
D1 Drilled for Single Luminaire



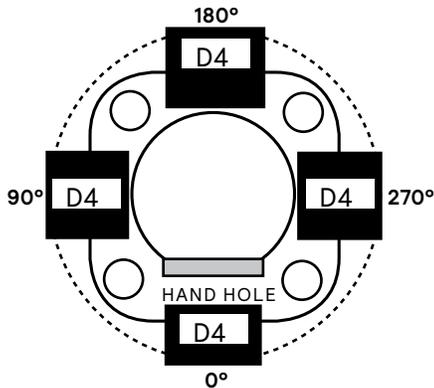
D2 Drilled for 2 Luminaires at 180°



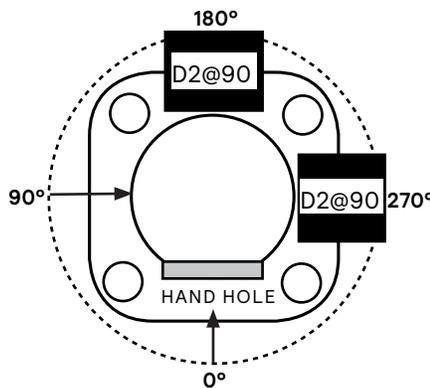
D3 Drilled for 3 Luminaires @ 90°



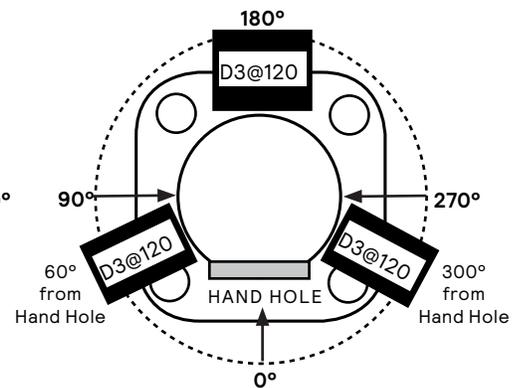
D4 Drilled for 4 Luminaires at 90°



D2@90 Drilled for 2 Luminaires at 90°



D3@120 Drilled for 3 Luminaires at 120°





Floodlighting

PowerForm

PFF floodlight



Gardco PowerForm LED floodlights provide over 1,500W HID replacement while significantly reducing energy and maintenance costs. PowerForm features a modular housing design available in four different sizes for a range of commercial, retail, industrial, airport, and other outdoor floodlighting applications. PowerForm is available with multiple lumen packages delivering approximately 42,300 to 138,600 lumens.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lamps: _____ Qty: _____
 Notes: _____

Ordering guide

example: PFF-184L-900-NW-G2-YK-SP-120-PCB-F1-BZ

Prefix	Number of LEDs	Drive Current	Color Temperature	Mounting	Distribution	Voltage
PFF						
PFF PowerForm flood	138L 138 LEDs (3 modules) 184L 184LEDs (4 modules) 230L 230 LEDs (5 modules) 276L⁶ 276 LEDs (6 modules)	700 700mA 900 900mA 1A 1 Amp 1.2A^{6,10} 1.2 Amp	WW-G2 Warm White 3000K, 70 CRI Generation 2 NW-G2 Neutral White 4000K, 70 CRI Generation 2	SF Slip Fitter Mount (fits on 2-3/8" O.D. tenon, wires through slip fitter) YK Yoke Mount (9' or 2.74m cord exits luminaire)	A33 Asymmetric 33° Flood (NEMA 6x5) RM Rectangular Medium Flood (NEMA 7x4) SP Spot (12° round) (NEMA 2x2) AIRP Airport Apron Flood (NEMA 7x5)	120 120V 208 208V 240 240V 277 277V 347 347V 480 480V UNV 120-277V HVU 347-480V
	Note: 46 LEDs per module					

Options		Fusing		Surge Protection		Other Options		Side Rails		Finish	
none	leave blank (0-10V dimming driver standard)	none	leave blank	blank	Surge Protector 10kV / 10kA (standard)	none	leave blank	blank	standard anodized, no finish	BK	Black
DD^{1,2,3,8}	0-10V dimming external wires (controls by others)	Fusing		SP2	Surge Protector 20kV / 10kA (option)	PCB^{2,8,9}	Photocontrol Button	PSR	Painted Side Rails, painted same finish to match luminaire finish	WH	White
FAWS^{1,2,8,10}	Field Adjustable Wattage Selector	F1⁷	Single (120, 277, 347VAC)			TLRD7^{2,4}	Twist Lock Receptacle 7-pin			BZ	Bronze
		F2⁷	Double (208, 240, 480VAC)			TLRPC^{2,4,7,9}	Twist Lock Receptacle w/ 3-pin Photocell			DKY	Dark Gray
		F3⁷	Canadian Double Pole (208, 240, 480VAC)			BAC^{11,12}	Meets the requirements of the Buy American Act of 1933 (BAA)			MGY	Medium Gray
		Pole Mount Fusing								RAL⁵	Optional Color (specify optional color or RAL)
		FP1⁷	Single (120, 277, 347VAC)							CC⁵	Custom Color (must supply color chip, requires factory quote)
		FP2⁷	Double (208, 240, 480VAC)								
		FP3⁷	Canadian Double Pole (208, 240, 480VAC)								

- Choose only 1 of the following Dimming Controls options: either DD or FAWS.
- 0-10V dimming driver standard.
- Luminaire has 0-10V dimming wires exiting the luminaire for dimming controls by others.
- TLDR7 and TLRPC max aiming angle 45°. TLRD7 works with 3, 5 or 7 pin NEMA photocell/dimming, use of photocell (by others) or shorting cap (by others) is required to ensure proper illumination. TLRD7 and TLRPC receptacle pins 4 & 5 are capped off when ordered with any of the Dimming Controls DD or FAWS.
- Must contact factory prior to ordering - these items are ETO Specials.
- 276L with 1.2A only available as ETO Special - must contact factory prior to ordering.
- Must specify specific input voltage, not available with UNV or HVU.
- PCB can be used with DD and FAWS.
- PCB and TLRPC available in 120V, 208V, 240V, or 277V only.
- FAWS not available with 1.2A (switch has lower current limit).
- Extended lead times apply. Contact factory for details.
- Failure to properly select the "BAC" suffix could result in you receiving product that is not BAA compliant product with no recourse for an RMA or refund. This BAC designation hereunder does not address (i) the applicability of, or availability of a waiver under, the Trade Agreements Act, or (ii) the "Buy America" domestic content requirements imposed on states, localities, and other non-federal entities as a condition of receiving funds administered by the Department of Transportation or other federal agencies.

Connected lighting

Interact City connector node provides the plug and play wireless communications technology to connect your floodlight to the Interact City lighting management system.



Accessory Ordering Code	Description
LLC	Interact City cellular technology connector node

Contact Signify for additional support when connected lighting or additional services are desired.
 For more details visit: <https://www.interact-lighting.com/en-us/what-is-possible/interact-city>



PFF PowerForm

Floodlight

PowerForm Accessories (ordered separately, field installed, specify finish at placeholder F)

Shielding Accessories

Glare shield (black finish)

GS-PFF-138	138 LEDs (3 modules)
GS-PFF-184	184 LEDs (4 modules)
GS-PFF-230	230 LEDs (5 modules)
GS-PFF-276	276 LEDs (6 modules)



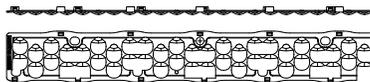
GS louvered glare shields are ordered as an accessory only and can be used with A33, RM, and AIRP optics; can not be used with SP optics due to fit restriction - if required, must contact factory prior to ordering since it is an ETO Special.

Glare shields are aluminum sheet metal louvers painted in a smooth black power coat finish. Each set includes a mounting kit that fastens to the front face of the LED light engine and includes stainless steel hardware.

One glare shield attaches to each 46 LED module. The total number of glare shields is determined by total number of modules per luminaire where required.

Internal house side shield

HIS-PFF-138	138 LEDs (3 modules)
HIS-PFF-184	184 LEDs (4 modules)
HIS-PFF-230	230 LEDs (5 modules)
HIS-PFF-276	276 LEDs (6 modules)



HIS internal house side shields are ordered as an accessory only and can be used with A33 and RM optics; can not be used with SP or AIRP optics due to fit restriction.

Internal shields are injection molded black polymer that snap fit on each 46 LED module. The total number of internal shields is determined by the total number of modules per luminaire where required.

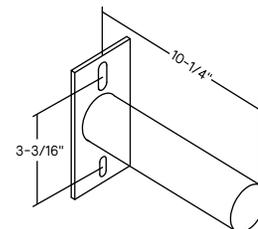
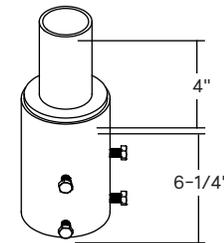
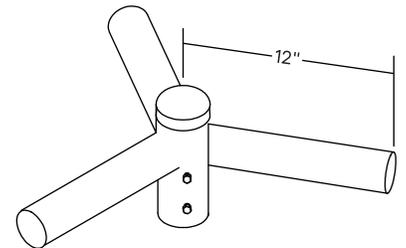
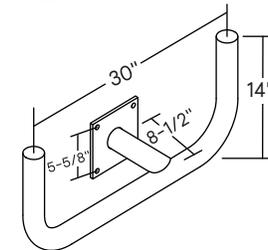
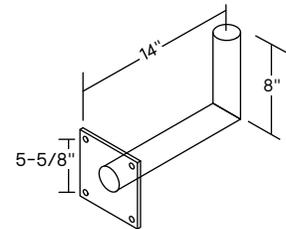
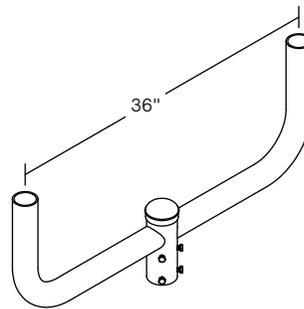
Mounting Accessories

For wall and pole brackets, bullhorns, etc. see <https://www.signify.com/en-us/products/outdoor-luminaires/poles-brackets/site-and-area-brackets/bull-horn-brackets#downloads> for details.

Exception: All UPS Upsweep - contact factory to confirm compatibility.

Exception: SBRKT-SAB-NA-4-WA-(F) Side Angle Flat bracket cannot be used with any PFF versions due to only single mounting hole that is too small for required mounting bolts.

Exception: PFF-276L 6 module version cannot be used with any brackets, etc. due to its weight - too heavy.



Examples shown are not to scale - see SBRKT spec sheet for all available brackets

PFF PowerForm

Floodlight

LED Wattage and Lumen Values – 3000K

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33		RM		SP		AIRP	
						Lumen Output	Efficacy (LPW)						
PFF-138L-700-WW-G2	138	3	700	3000	289	43,048	149	42,433	147	43,619	151	42,284	146
PFF-138L-900-WW-G2	138	3	900	3000	397	51,974	131	51,231	129	52,663	133	51,051	128
PFF-138L-1A-WW-G2	138	3	1050	3000	455	58,940	130	58,098	128	59,721	131	57,894	127
PFF-138L-1.2A-WW-G2	138	3	1200	3000	511	65,101	127	64,170	126	65,962	129	62,793	123
PFF-184L-700-WW-G2	184	4	700	3000	386	57,398	149	56,577	147	58,159	151	56,379	146
PFF-184L-900-WW-G2	184	4	900	3000	530	69,299	131	68,308	129	70,217	133	68,068	128
PFF-184L-1A-WW-G2	184	4	1050	3000	606	78,587	130	77,463	128	79,628	131	77,191	127
PFF-184L-1.2A-WW-G2	184	4	1200	3000	681	86,801	127	85,559	126	87,950	129	83,724	123
PFF-230L-700-WW-G2	230	5	700	3000	482	71,747	149	70,722	147	72,698	151	70,474	146
PFF-230L-900-WW-G2	230	5	900	3000	662	86,623	131	85,385	129	87,771	133	85,085	128
PFF-230L-1A-WW-G2	230	5	1050	3000	758	98,234	130	96,829	128	99,534	131	96,489	127
PFF-230L-1.2A-WW-G2	230	5	1200	3000	852	108,500	127	106,949	126	109,937	129	106,574	125
PFF-276L-700-WW-G2	276	6	700	3000	579	86,097	149	84,866	147	87,237	151	84,568	146
PFF-276L-900-WW-G2	276	6	900	3000	795	103,948	131	102,462	129	105,325	133	103,975	131
PFF-276L-1A-WW-G2	276	6	1050	3000	909	117,880	130	116,194	128	119,442	131	117,911	130
PFF-276L-1.2A-WW-G2	276	6	1200	3000	1022	130,200	127	128,338	126	131,924	129	127,888	125

LED Wattage and Lumen Values – 4000K

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33		RM		SP		AIRP	
						Lumen Output	Efficacy (LPW)						
PFF-138L-700-NW-G2	138	3	700	4000	289	45,219	156	44,573	154	45,818	158	44,416	154
PFF-138L-900-NW-G2	138	3	900	4000	397	54,595	137	53,814	135	55,318	139	53,625	135
PFF-138L-1A-NW-G2	138	3	1050	4000	455	61,912	136	61,027	134	62,732	138	60,813	134
PFF-138L-1.2A-NW-G2	138	3	1200	4000	511	68,383	134	67,405	132	69,288	136	65,959	129
PFF-184L-700-NW-G2	184	4	700	4000	386	60,292	156	59,430	154	61,091	158	59,222	154
PFF-184L-900-NW-G2	184	4	900	4000	530	72,793	137	71,752	135	73,757	139	71,500	135
PFF-184L-1A-NW-G2	184	4	1050	4000	606	82,549	136	81,369	134	83,643	138	81,083	134
PFF-184L-1.2A-NW-G2	184	4	1200	4000	681	91,177	134	89,873	132	92,384	136	87,945	129
PFF-230L-700-NW-G2	230	5	700	4000	482	75,365	156	74,288	154	76,363	158	74,027	154
PFF-230L-900-NW-G2	230	5	900	4000	662	90,991	137	89,690	135	92,196	139	89,375	135
PFF-230L-1A-NW-G2	230	5	1050	4000	758	103,187	136	101,711	134	104,553	138	101,354	134
PFF-230L-1.2A-NW-G2	230	5	1200	4000	852	113,971	134	112,341	132	115,480	136	111,947	131
PFF-276L-700-NW-G2	276	6	700	4000	579	90,438	156	89,145	154	91,636	158	88,832	154
PFF-276L-900-NW-G2	276	6	900	4000	795	109,189	137	107,628	135	110,635	139	109,217	137
PFF-276L-1A-NW-G2	276	6	1050	4000	909	123,824	136	122,053	134	125,464	138	123,856	136
PFF-276L-1.2A-NW-G2	276	6	1200	4000	1022	136,765	134	134,809	132	138,576	136	134,336	131

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown. Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.

NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires. Contact factory for configurations not shown.

Field Adjustable Wattage Selector (FAWS) Multiplier Chart

FAWS Position	Typical Lumens and System Wattage Multiplier	
	138L/184L	230L/276L
1	10%	15%
2	20%	35%
3	30%	45%
4	40%	60%
5	45%	70%
6	55%	85%
7	60%	100%
8	70%	100%
9	80%	100%
10	100%	100%

Note: Actual performance may vary due to LED and driver tolerances

PFF PowerForm

Floodlight

LED Wattage and Lumen Values – 3000K with glare shield

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33-GS		RM-GS		AIRP-GS	
						Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)
PFF-138L-700-WW-G2-GS	138	3	700	3000	289	33,280	115	32,884	114	22,022	76
PFF-138L-900-WW-G2-GS	138	3	900	3000	397	40,180	101	39,701	100	26,587	67
PFF-138L-1A-WW-G2-GS	138	3	1050	3000	455	45,566	100	45,023	99	30,151	66
PFF-138L-1.2A-WW-G2-GS	138	3	1200	3000	511	49,421	97	48,833	96	32,702	64
PFF-184L-700-WW-G2-GS	184	4	700	3000	386	44,374	115	43,844	114	29,363	76
PFF-184L-900-WW-G2-GS	184	4	900	3000	530	53,574	101	52,935	100	35,450	67
PFF-184L-1A-WW-G2-GS	184	4	1050	3000	606	60,754	100	60,030	99	40,201	66
PFF-184L-1.2A-WW-G2-GS	184	4	1200	3000	681	65,895	97	65,110	96	43,604	64
PFF-230L-700-WW-G2-GS	230	5	700	3000	482	55,466	115	54,806	114	36,702	76
PFF-230L-900-WW-G2-GS	230	5	900	3000	662	66,967	101	66,169	100	44,313	67
PFF-230L-1A-WW-G2-GS	230	5	1050	3000	758	75,942	100	75,038	99	50,251	66
PFF-230L-1.2A-WW-G2-GS	230	5	1200	3000	852	83,879	98	82,880	97	55,504	65
PFF-276L-700-WW-G2-GS	276	6	700	3000	579	66,560	115	65,767	114	44,043	76
PFF-276L-900-WW-G2-GS	276	6	900	3000	795	81,834	103	80,859	102	54,150	68
PFF-276L-1A-WW-G2-GS	276	6	1050	3000	909	92,802	102	91,697	101	61,408	68
PFF-276L-1.2A-WW-G2-GS	276	6	1200	3000	1022	100,655	98	99,456	97	66,604	65

LED Wattage and Lumen Values – 4000K with glare shield

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33-GS		RM-GS		AIRP-GS	
						Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)
PFF-138L-700-NW-G2-GS	138	3	700	4000	289	34,958	121	34,542	119	23,132	80
PFF-138L-900-NW-G2-GS	138	3	900	4000	397	42,206	106	41,703	105	27,928	70
PFF-138L-1A-NW-G2-GS	138	3	1050	4000	455	47,863	105	47,293	104	31,671	70
PFF-138L-1.2A-NW-G2-GS	138	3	1200	4000	511	51,913	102	51,295	100	34,351	67
PFF-184L-700-NW-G2-GS	184	4	700	4000	386	46,611	121	46,055	119	30,843	80
PFF-184L-900-NW-G2-GS	184	4	900	4000	530	56,275	106	55,604	105	37,237	70
PFF-184L-1A-NW-G2-GS	184	4	1050	4000	606	63,817	105	63,057	104	42,228	70
PFF-184L-1.2A-NW-G2-GS	184	4	1200	4000	681	69,217	102	68,393	100	45,802	67
PFF-230L-700-NW-G2-GS	230	5	700	4000	482	58,263	121	57,569	119	38,553	80
PFF-230L-900-NW-G2-GS	230	5	900	4000	662	70,343	106	69,505	105	46,547	70
PFF-230L-1A-NW-G2-GS	230	5	1050	4000	758	79,771	105	78,821	104	52,785	70
PFF-230L-1.2A-NW-G2-GS	230	5	1200	4000	852	88,108	103	87,059	102	58,302	68
PFF-276L-700-NW-G2-GS	276	6	700	4000	579	69,916	121	69,083	119	46,264	80
PFF-276L-900-NW-G2-GS	276	6	900	4000	795	85,960	108	84,936	107	56,880	72
PFF-276L-1A-NW-G2-GS	276	6	1050	4000	909	97,481	107	96,320	106	64,504	71
PFF-276L-1.2A-NW-G2-GS	276	6	1200	4000	1022	105,730	103	104,471	102	69,962	68

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown. Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.

NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires.

Predicted Lumen Depreciation Data

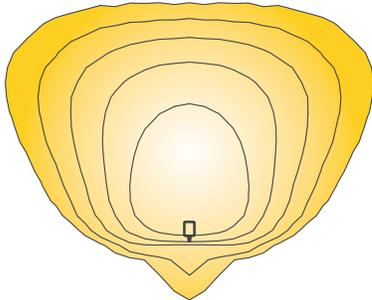
Ambient Temperature (°C)	Driver Current	Calculated L70 hours	L70 per TM-21	Lumen Maintenance % @ 60,000 hours
25°C	up to 1200 mA	>100,000	>60,000	98%

Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions. L70 is the predicted time when LED performance depreciates to 70% of initial lumen output. Calculated per IESNA TM21-11. Published L70 hours limited to 6 times actual LED test hours.

PFF PowerForm Floodlight

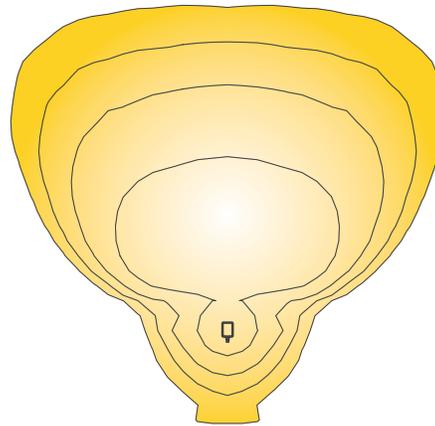
Optical Distribution Diagrams

A33 Asymmetric 33° Flood (NEMA 6x5)



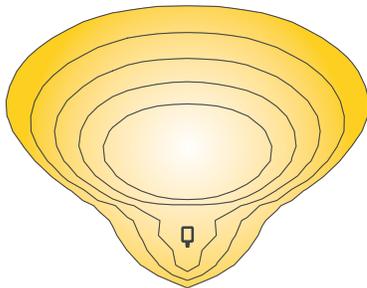
30' or 9.14m mounting height, 30° tilt
 Applications include: large area lighting, storage yards, transportation terminals, ports, utility sub-stations, security lighting, large facades, large wall washing, tall structures / monuments / statues

AIRP Airport Apron Flood



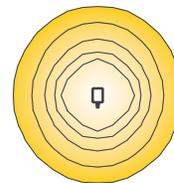
30' or 9.14m mounting height, 25° tilt
 Applications: airport aprons

RM Rectangular Medium Flood (NEMA 7x4)



30' or 9.14m setback, 50° tilt
 Applications include: building entrances and exits, security lighting, perimeter fences, checkpoints and inspection stations, large and wide wall grazing, large signs

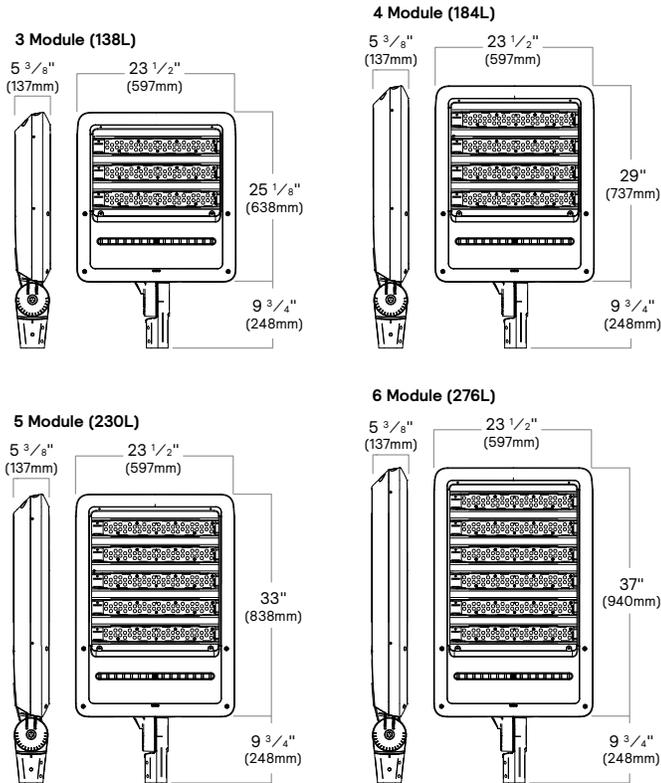
SP Spot 12° Round (NEMA 2x2)



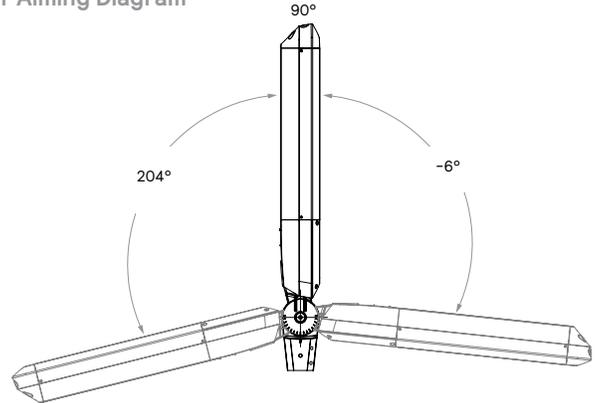
30' or 9.14m setback, 0° tilt
 Applications include: spotlighting, accenting, tall columns, tall structures / monuments / statues

PFF PowerForm Floodlight

Dimensions – Slipfitter Mount (SF)



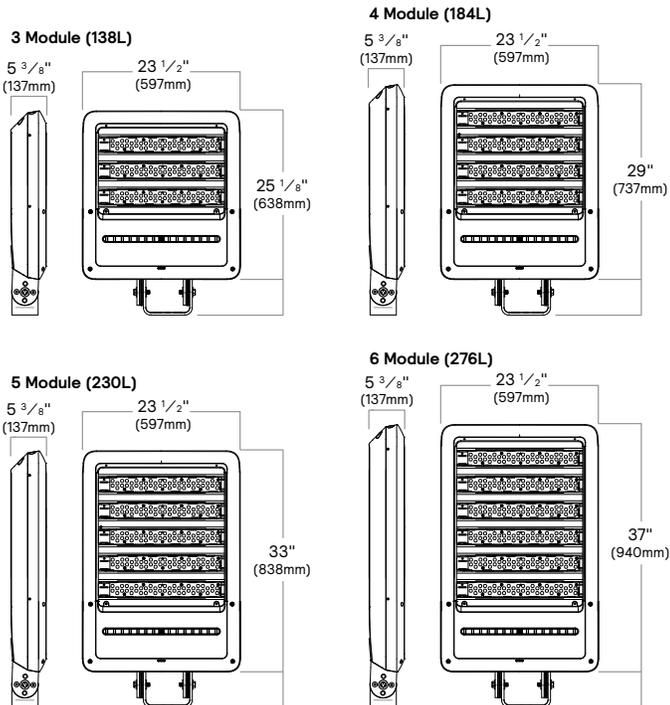
Slipfitter Aiming Diagram



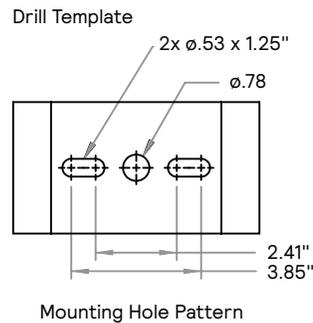
No. of Modules	Effective Projected Area (EPA-ft ²)			Weight of single luminaire PFF SF
	Single: 0° Aim	Single: 45° Aim	Single: 90° Aim	
3	0.647	2.311	3.269	62 lbs (28.1 kg)
4	0.739	2.681	3.792	72 lbs (32.7 kg)
5	0.836	3.021	4.273	81 lbs (36.7 kg)
6	0.938	3.337	4.720	91 lbs (41.3 kg)

Note: Applies to single PFF luminaire with (SF) Slipfitter mount at the following angles: 0° is horizontal to ground, 90° is perpendicular to the ground as shown in drawings.

Dimensions – Yoke Mount (YK)



Yoke Mount Drill Template



No. of Modules	Effective Projected Area (EPA-ft ²)			Weight of single luminaire PFF YK
	Single: 0° Aim	Single: 45° Aim	Single: 90° Aim	
3	0.596	2.232	3.156	66 lbs (29.9 kg)
4	0.688	2.601	3.679	76 lbs (34.5 kg)
5	0.786	2.942	4.161	86 lbs (39 kg)
6	0.887	3.257	4.607	94 lbs (42.6 kg)

Note: Applies to single PFF luminaire with (YK) Yoke mount at the following angles: 0° is horizontal to ground, 90° is perpendicular to the ground as shown in drawings.

PFF PowerForm

Floodlight

Controls options

DD: 0-10V dimming driver with dimming wires externally accessible for connecting dimming controls by others.

PCB: Photocell button (a.k.a. button photoeye).

TLRD7*: Twist Lock Receptacle with 7 pins enabling dimming and additional functionality (by others), can be used with an Interact City node, a twistlock photoelectric cell or a shorting cap. Can also be used with Signify or third party control system. Pins 6 and 7 are capped off (not connected) unless used with SR driver - ETO Specials, contact factory. Receptacle located on top of luminaire housing.

* Use of photoelectric cell or shorting cap is required to ensure proper illumination. Note: Additional hardware will be required to utilize the additional 2 pins on this receptacle.

TLRPC*: Twist Lock Receptacle with 5 pins and includes 3 pin twistlock photoelectric cell (must specify voltage). Receptacle located on top of luminaire housing.

*Note: Maximum aiming angle is 45° with TLRD7 and TLRPC in order to maintain IP66 rating around the Twist Lock Receptacle; Light Engines and the rest of the luminaire maintain IP66 rating at all aiming angles. UL Wet Location rating is also maintained at all aiming angles. Use of photoelectric cell or shorting cap is required to ensure proper illumination. TLRD7 and TLRPC receptacle pins 4 & 5 are connected to dimming driver's dimming leads whenever no Dimming Controls are selected; if Dimming Controls are selected then receptacle pins 4 & 5 are capped off because driver's dimming leads are used with Dimming Controls.

FAWS: Field Adjustable Wattage Selector, pre-set to the highest position, can be easily switched in the field to the required position. This reduces total luminaire wattage consumption and reduces the light level - see the FAWS multiplier chart for more details.

Note: It is not recommended to use FAWS with other dimming or controls; if you do, set the switch to position 10 (maximum output) to enable the other dimming or controls. Switching FAWS to any position other than 10 will disable the other dimming or controls.

Connected Lighting

Interact City connector node provides the plug and play wireless communications technology to connect your floodlight to the Interact City lighting management system. With Interact you can remotely manage, monitor and control all city lighting, from roads and streets, to parks and plazas, and bridges from one single system. Connected lighting enables capabilities including, accurate on/off switching, dimming control, fault reporting and integration with other systems to enable condition-based lighting. Interact provides you with a robust and scalable infrastructure to further reduce energy consumption, improve operations, and turn lighting into a connected network for your smart city journey.

For more details visit: <https://www.interact-lighting.com/en-us/what-is-possible/interact-city>

Luminaire options

F1: Fusing Single (for 120, 277 or 347VAC)

F2: Fusing Double (for 208, 240 or 480VAC)

F3: Fusing Canadian Double Pole (for 208, 240 or 480VAC)

FP1: Fusing Pole Single (pole mounted near handhole, for 120, 277 or 347VAC)

FP2: Fusing Pole Double (pole mounted near handhole, for 208, 240 or 480VAC).

FP3: Fusing Pole Canadian Double Pole (pole mounted near handhole, for 208, 240 or 480VAC)

SP2: Surge Protection, 20kV/10kA. Surge protection device wired in parallel so that if it fails open the luminaire will remain lit/powerd on.

PFF PowerForm

Floodlight

Specifications

Housing

Main body castings made of a low copper die cast Aluminum alloy (A360) for a high resistance to corrosion, 0.100" (2.5mm) minimum thickness. Side rail extrusions made of corrosion resistant low copper extruded anodized aluminum alloy (Anodized 6063-T5).

Mounting

Up tilt aiming and down tilt aiming possible with all of the mounting options.

cULus Listed as suitable for mounting within 4' or 1.2m of the ground

SF: Adjustable Slip Fitter with AWG 16-3 wires (or AWG 16-5 if DD external control options are selected) exiting through the Slip Fitter. Integral splice compartment for field wiring with cULus Wet Location rated access cover with seal around entire perimeter. Slip Fitter made of low copper die cast Aluminum alloy (A360) for a high resistance to corrosion, adjustable knuckle has 4 degree aiming increments with integral interlocking teeth and bolt to secure aiming in place, integral cast-in aiming marks. Fits on a 2-3/8" O.D. tenon.

YK: Adjustable Yoke with 9' (2.74m) of AWG 16-3 SEOW cord (or AWG 16-5 if DD external control options are selected) exiting the luminaire through IP66 rated cord seal. Customer-specified length or different cord type available - must contact factory prior to ordering, this is an ETO Special. Yoke made of high strength steel, galvanized and painted for high resistance to corrosion, 5 degree aiming increments with bolts to secure aiming in place.

Driver/Electrical Door

Removable die cast aluminum door made of a low copper die cast aluminum alloy (A360) for a high resistance to corrosion. Provides access to electronic components/LED drivers. Door secured with two captive screws outside of gasket perimeter. Includes a lanyard to prevent accidental dropping if access is required.

IP Rating

IP66 rated driver/electrical compartment and light engines in all aiming positions including up tilt aiming per ANSI C136.37 with seals around entire perimeter of the lenses and seal around entire perimeter of the driver/electrical compartment. IP66 rating including when PCB option is installed.

Light Engine

Composed of 4 main components: Heat Sink / LED Module / Optical System / Driver. Electrical components are RoHS compliant. LEDs tested by ISO 17025-2005 accredited lab in accordance with IESNA LM-80 guidelines, extrapolations in accordance with IESNA TM-21. Metal core board ensures greater heat transfer and longer lifespan.

Heat Sinks: Heat sinks that are part of LED Modules are anodized 6063-T5 Aluminum for a high resistance to corrosion. Housing acts as heat sink for drivers, designed to ensure high efficacy and superior cooling by natural vertical convection. Air flow pattern always

close to LEDs and driver optimizing their efficiency and life. Product does not use any cooling device with moving parts (only passive cooling).

LED Module: Composed of high performance white LEDs. Color temperature as per ANSI/NEMA bin 3000K nominal (3045K +/- 175K) or 4000K nominal (3985K +/- 275K), both CRI 70 min.

Optical System: Choice of four distributions including Spot (SP), Asymmetric 33° Flood (A33), Rectangular Medium Flood (RM) distributions and a specialty distribution designed for Airport Apron (AIRP) applications featuring a wide 87° horizontal and narrow 16° vertical beam. Composed of high performance UV stabilized optical grade polymer refractor lenses to achieve desired distribution optimized to get maximum spacing, target lumens and a superior lighting uniformity. Performance shall be tested per LM-63, LM-79 and TM-15 (IESNA) certifying its photometric performance.

IK Rating: IK10 highest impact resistance rating for LED Module lenses.

Driver: High power factor of 90% min. Electronic driver, operating range 50/60 Hz. Auto adjusting universal voltage input from 120 to 277 VAC or 347 to 480 VAC rated for both application line to line or line to neutral, Class I, THD of 20% max. The current supplying the LEDs will be reduced by the driver if the driver experiences internal overheating as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction. Standard built in driver surge protection of 2.5kV (min). Driver enables setting LED drive current to meet your specific total wattage consumption, lumen output and/or efficacy needs - ETO Specials, contact factory.

Integrated Features

Please note that these integrated features always come with this luminaire standard at no additional cost.

0-10V dimming driver included as standard, dimming leads pre-wired to Dimming Controls option except when DD external controls options are selected.

SP1: Surge protection device tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line-Ground, Line-Neutral and Neutral-Ground. Enhanced surge protection device SP2 20kV/10kA available as an option. Surge protection device wired in parallel so that if it fails open the luminaire will remain lit/power on.

Wiring

#2 - #14 AWG wires from the primary circuit, located inside the housing. Due to the inrush current that occurs with electronic drivers, recommend using a time delay or slow blow fuse to avoid unnecessary and unwanted fuse blowing (false tripping) that can occur with fast acting fuses.

Hardware and Seals

All exposed screws shall be stainless and/or corrosion resistant and captive. All seals and sealing devices are made and/or lined with EPDM and/or silicone and/or rubber.

Finish

Five standard textured colors: white, bronze, black, dark gray and medium gray. RAL and custom color matching available - must contact factory prior to ordering, these are ETO Specials. Color in accordance with the AAMA 2604 standard. Application of polyester powder coat paint (2.5 mils/62.5 microns) with ± 1 mils/24 microns of tolerance. The thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard.

LED Products Manufacturing Standard

The electronic components sensitive to electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with EC61340-5-1 and ANSI/ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product.

Luminaire Useful Life

Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, exclusive Signify System Reliability Tool, Advance driver data and LED manufacturer LM-80/TM-21 data, expected to reach 100,000 + hours with L70 lumen maintenance @ 25°C. Luminaire Useful Life accounts for LED lumen maintenance AND all of these additional factors including: LED color shift, LED life, driver life, PCB substrate, solder joints, on/off cycles, burning hours and corrosion.

Vibration Resistance

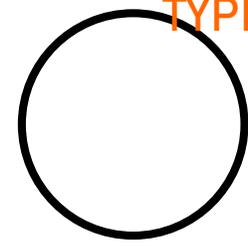
Luminaire meets the ANSI C136.31-2018 specifications, tested by independent lab over 100,000 cycles in all three axes: Bridge/Overpass for 138L 3 modules, 184L 4 modules, 230L 5 modules; Normal for 276L 6 modules.

Certifications and Compliance

cULus Listed for Canada and USA, per UL1598 and UL8750, including suitable for mounting within 4' or 1.2m of the ground. Configurations are DesignLights Consortium qualified, consult DLC QPL Qualified Products List for more details. Luminaire complies with or exceeds the following ANSI C136 standards: .2, .3, .10, .15, .21, .22, .24, .25, .31, .32, .37, .41. Entire luminaire is rated for operation in ambient temperature of -40°C (-40°F) up to +40°C (+104°F).

Limited Warranty

5-year limited warranty. See signify.com/warranties for details and restrictions.



The Gardco RA straight aluminum pole consists of a one-piece round extruded aluminum lighting standard mounted to a structural quality carbon galvanized steel base tenon. This construction offers the corrosion resistance and flexibility of aluminum with the strength and integrity of steel. The poles are finished with either Architectural Class 1 anodizing or electrostatically applied TGIC polyester powdercoat.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lamps: _____ Qty: _____
 Notes: _____

Order Guide

example: RA4-STB-15-D1-BRP

Prefix	Base	Height	Wind Factor Code*	Drilling	Finish	Options
	STB					
RA4	STB	10	-	D1 1 Way	BRP Bronze Paint BLP Black Paint WP White Paint NP Natural OC Aluminum Paint Optional Color Paint (Specify RAL designation ex: OC-RAL7024) SC Special Color Paint (Specify. Must supply color chip.)	DR Duplex Receptacle GFCI Ground Fault Receptacle VDA Vibration Dampener Nipples and Couplings NL Nipple - External thread CL Coupling - Internal thread Indicate size (1/2", 3/4", 1", 1 1/4", 1 1/2".) Indicate height above base and orientation to hand hole. See Pole Orientation Information on Page 4. Single Mount Bullhorn Brackets* A15BH-19 Single - 1.9" OD A15BH-24 Single - 2.4" OD A215BH-19 2-Tenon - 1.9" OD A215BH-24 2-Tenon - 2.4" OD Indicate height above base and orientation to hand hole. See Pole Orientation Information on Page 4.
		12	-	D2 2 Way		
		15	L	D2@90 2 Way at 90°		
		20	M H	D3 3 Way D3@120 3 Way at 120°		
RA4.5	STB	10	-	D4 4 Way		
		12	-	T2 2 3/8" OD Tenon		
		15	-	T4 4" OD Tenon		
		18	-			
RA5	STB	20	-			
		25	L M H			
		28	L M H			
		30	L M H			

*Refers to relative strength based on wind load factors. L = Light M = Medium H = Heavy

Poles Straight Round Aluminum - Tenon Base

Pole Data

Poles Specs					Normal Wind Conditions			Anchor Bolts ²		
					100 MPH	90 MPH	80 MPH			
Product Catalog Number	Height (ft)	Base Tenon Height (ft.)	Pole Diameter (inches)	Wall Thickness (inches)	EPA ft ²	EPA ft ²	EPA ft ²	Bolt Circle (inches)	Bolt Size (inches)	Max Proj. (inches)
RA4-STB-10	10.00	1.25	4	0.135	7.1	9.1	11.9	7	5/8 x 18 x 3	3
RA4-STB-12	11.67	1.25	4	0.135	5.2	6.8	9.1	7	5/8 x 18 x 3	3
RA4-STB-15	14.92	2	4	0.135	3.1	4.3	6	7	5/8 x 18 x 3	3
RA4-STB-20L	19.92	2	4	0.135	-	1.2	1.2	7	5/8 x 18 x 3	3
RA4-STB-20M	19.92	4	4	0.135	-	2.1	3.4	7	5/8 x 18 x 3	3
RA4-STB-20H	19.92	6	4	0.135	2.2	3.3	4.8	7	3/4 x 17 x 3	3
RA4.5-STB-10	9.67	1.5	4.5	0.15	12.6	15.7	20.2	7	3/4 x 17 x 3	3
RA4.5-STB-12	11.67	1.5	4.5	0.15	9.2	11.6	15	7	3/4 x 17 x 3	3
RA4.5-STB-15	14.75	1.5	4.5	0.15	5.8	7.4	9.9	7	3/4 x 17 x 3	3
RA4.5-STB-18	17.75	1.5	4.5	0.15	3.6	4.7	6.5	7	3/4 x 17 x 3	3
RA4.5-STB-20	19.75	1.5	4.5	0.15	2.4	3.2	4.7	7	3/4 x 17 x 3	3
RA5-STB-15	14.83	2.5	5	0.175	10.6	13.3	17.1	9	3/4 x 17 x 3	3
RA5-STB-18	17.75	2.5	5	0.175	7.4	9.4	12.1	9	3/4 x 17 x 3	3
RA5-STB-20	19.83	2.5	5	0.175	5.7	7.3	9.5	9	3/4 x 17 x 3	3
RA5-STB-25L	24.83	2.5	5	0.175	2.6	3.5	4.9	9	3/4 x 17 x 3	3
RA5-STB-25M	24.83	4	5	0.175	3.3	4.4	6	9	3/4 x 17 x 3	3
RA5-STB-25H	24.83	7	5	0.175	5.1	6.5	8.6	9	1 x 36 x 4.5	3
RA5-STB-28L	27.92	2.5	5	0.175	-	1.8	2.8	9	3/4 x 17 x 3	3
RA5-STB-28M	27.92	4	5	0.175	1.7	2.5	3.7	9	3/4 x 17 x 3	3
RA5-STB-28H	27.92	7	5	0.175	3.2	4.2	5.7	9	1 x 36 x 4.5	3
RA5-STB-30L	29.83	2.5	5	0.175	-	-	1.6	9	3/4 x 17 x 3	3
RA5-STB-30M	29.83	4	5	0.175	-	1.5	3	9	3/4 x 17 x 3	3
RA5-STB-30H	29.83	7	5	0.175	2.2	3	4.2	9	1 x 36 x 4.5	3

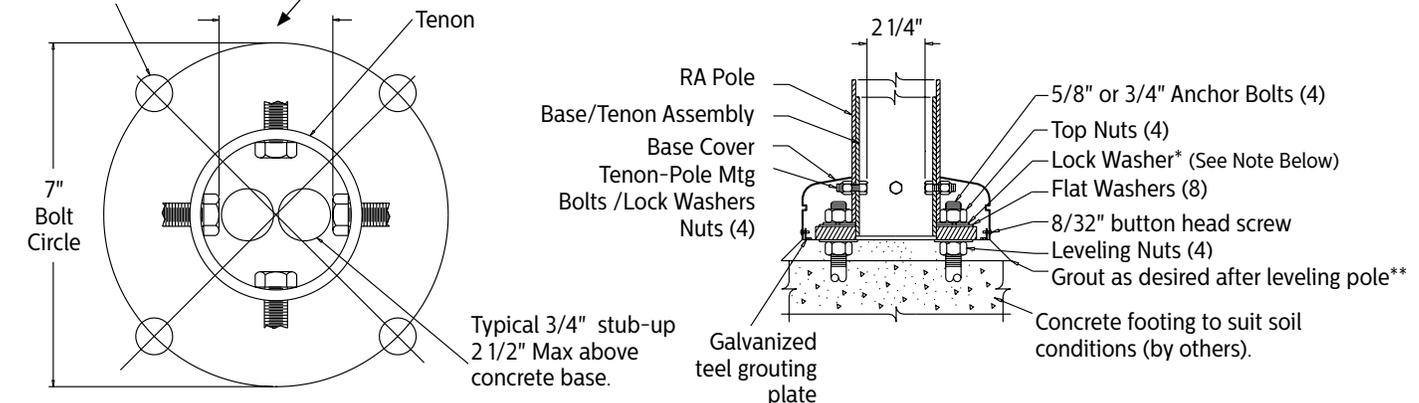
* **Warning:** Additional wind loading, in terms of EPA, from banners, cameras, floodlights and other accessories attached to the pole, must be added to the luminaire(s) EPA before selecting the pole with the appropriate wind load capability.

** Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement resulting from failure to use factory supplied templates.

Dimensions

Cut hole in template 1/16" larger than diameter of anchor bolts used.

Conduit Opening
 RA4: ID 3.063" OD 2.25"
 RA4.5: ID 3.25" OD 2.75"
 RA5: ID 4.618" OD 3.25"



NOTE: Internal clearance of tenon/pole mounting bolts dictates allowable area for stub-ups.

* Anchor Bolt Lock Washers are not normally required and are not included in standard anchor bolt sets. They are available upon request at additional cost.

** Grouting should include a drainage slot or tube (by others) to permit water to drain from the base of the pole. Failure to provide drainage may weaken the pole base structure over time and may result in pole base failure, for which Gardco is not responsible.

NOTE: Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement from failure to use factory supplied templates.

Poles Straight Round Aluminum – Tenon Base

Specifications

POLE SHAFT

The pole shaft is a one-piece, seamless 6000 series extruded aluminum cylindrical tubing and is heat-treated to achieve a T6 temper with a guaranteed minimum yield strength of 31 KSI.

BASE TENON ASSEMBLY

The tenon anchor base assembly consists of structural quality carbon steel tubing with a minimum 46 KSI yield strength welded to a structural steel base with a guaranteed minimum yield strength of 50 KSI. The base plate telescopes the pole shaft and is circumferentially welded on both top and bottom. The base is provided with slotted

bolt holes to accommodate a $\pm .5$ " variation in the rotational flexibility. The entire assembly is hot-dipped galvanized. Four (4) mechanically galvanized fasteners secure the aluminum pole shaft to the base tenon assembly.

ANCHOR BOLTS

Anchor bolts are fabricated from a commercial quality hot rolled carbon steel bar that meets or exceeds a minimum guaranteed yield strength of 50,000 psi. Bolts have an "L" bend on one end and threaded on the opposite end. Anchor bolts are completely hot dipped galvanized. Four (4) properly sized bolts, each furnished with two (2) regular hex nuts and two

(2) flat washers, are provided per pole (priced separately), unless otherwise specified.

BASE COVER

A one-piece, heavy wall spun aluminum cover completely conceals the entire base plate and anchorage. The base cover is secured to the base assembly with two (2) stainless steel fasteners.

HAND HOLE

The hand hole has a nominal rectangular 2" x 4" or 2 5/8" x 5" inside opening in the pole shaft and tenon assembly. Included is an aluminum cover plate with attachment screws. The hand hole is located 18" – 20" above the base and 180° clockwise

with respect to the luminaire arm when viewed from the top of the pole for one arm. For two arms the hand hole is located directly under one arm.

POLE TOP CAP

Each RA pole assembly is provided with a removable composite friction-fit pole top cap.

FINISH

Poles are available with bronze, natural or black Aluminum Association Architectural Class 1 anodized finish. Electrostatically applied, thermally cured TGIC polyester powdercoat finish or liquid polyurethane is also available.

General Pole Information

DESIGN

The poles as charted are designed to withstand dead loads and predicted dynamic loads developed by variable wind speeds with an additional 30% gust factor under the following conditions: The charted weights include luminaire(s) and/or mounting bracket(s). The wind velocities are based on 10 mph increments from 80 mph through 100 mph. Poles to be located in areas of known abnormal conditions may require special consideration. For example: coastal areas, airports and areas of special winds.

Poles are designed for ground mounted applications. Poles mounted on structures (such as buildings and bridges) may also necessitate special consideration requiring Gardco's recommendation. Height correction factors and drag coefficients are applied to the entire structure. An appropriate safety factor is maintained based on the minimum yield strength of the material incorporated in the pole.

WARNING

This design information is intended as a general guideline only. The customer is solely

responsible for proper selection of pole, luminaire, accessory and foundation under the given site conditions and intended usage. The addition of any items to the pole, in addition to the luminaire, will dramatically impact the EPA load on that pole. It is strongly recommended that a qualified professional be consulted to analyze the loads given the user's specific needs to ensure proper selection of the pole, luminaire, accessories, and foundation. Gardco assumes no responsibility for such proper analysis or product selections. Failure to insure proper site analysis, pole selection, loads and installation can result in

pole failure, leading to serious injury or property damage.

GENERAL INFORMATION

Mounting height is the vertical distance from the base of the lighting pole to the center of the luminaire arm at the point of luminaire attachment. Twin arms as charted are oriented at 180° with respect to each other. For applications of two (2) arms at 90° or other multiple arm applications, consult the factory.

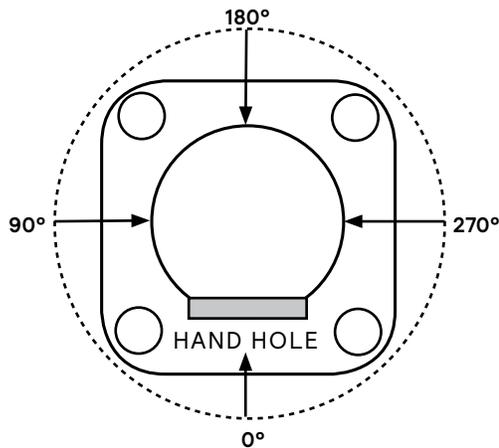
WARRANTY

Gardco poles feature a 1 year limited warranty. See Warranty Information on www.signify.com/warranties for complete details and exclusions.

Poles Straight Round Aluminum - Tenon Base

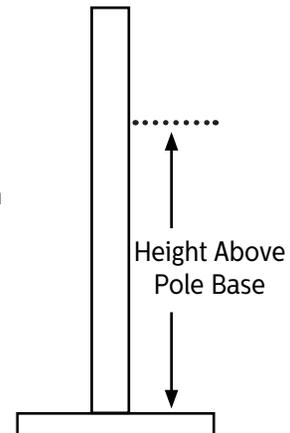
Orientation Information

Factory installed options and accessories



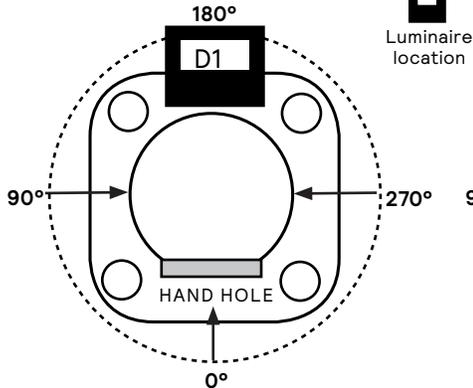
Orientation is measured clockwise from the Hand Hole Center.

For Factory Installed Options and Accessories, Specify Orientation from Hand Hole and Height Above Pole Base Where Required.

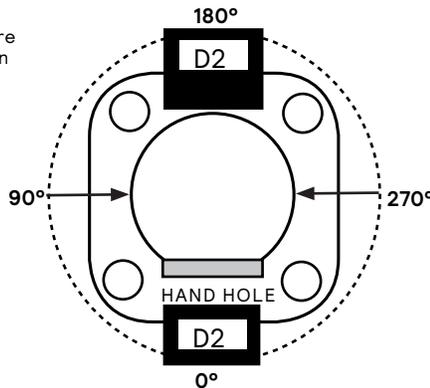


Standard arm mount luminaire orientation

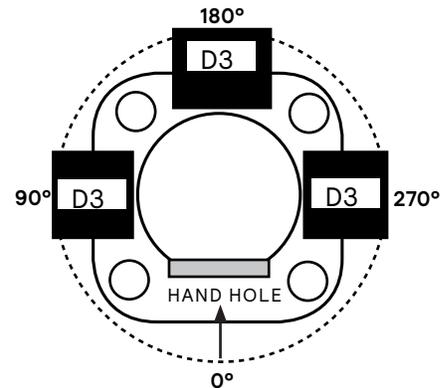
D1 Drilled for Single Luminaire



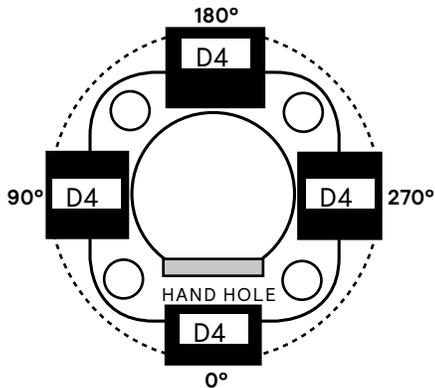
D2 Drilled for 2 Luminaires at 180°



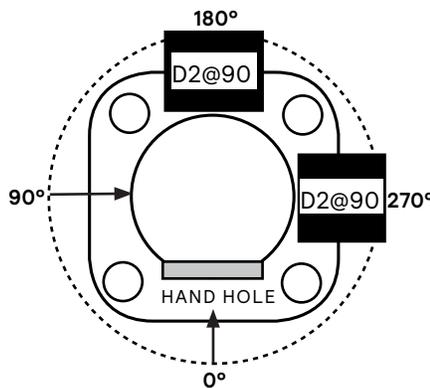
D3 Drilled for 3 Luminaires @ 90°



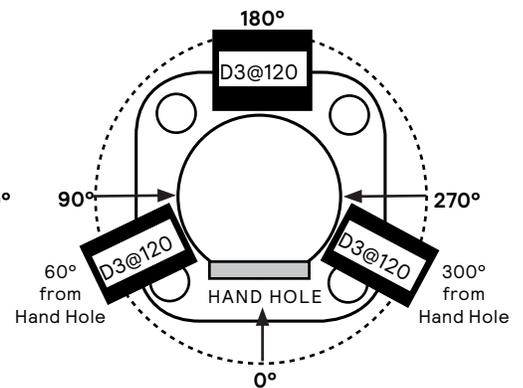
D4 Drilled for 4 Luminaires at 90°



D2@90 Drilled for 2 Luminaires at 90°



D3@120 Drilled for 3 Luminaires at 120°





Floodlighting

PowerForm

PFF floodlight



Gardco PowerForm LED floodlights provide over 1,500W HID replacement while significantly reducing energy and maintenance costs. PowerForm features a modular housing design available in four different sizes for a range of commercial, retail, industrial, airport, and other outdoor floodlighting applications. PowerForm is available with multiple lumen packages delivering approximately 42,300 to 138,600 lumens.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lamps: _____ Qty: _____
 Notes: _____

Ordering guide

example: PFF-184L-900-NW-G2-YK-SP-120-PCB-F1-BZ

Prefix	Number of LEDs	Drive Current	Color Temperature	Mounting	Distribution	Voltage
PFF						
PFF PowerForm flood	138L 138 LEDs (3 modules) 184L 184LEDs (4 modules) 230L 230 LEDs (5 modules) 276L⁶ 276 LEDs (6 modules)	700 700mA 900 900mA 1A 1 Amp 1.2A^{6,10} 1.2 Amp	WW-G2 Warm White 3000K, 70 CRI Generation 2 NW-G2 Neutral White 4000K, 70 CRI Generation 2	SF Slip Fitter Mount (fits on 2-3/8" O.D. tenon, wires through slip fitter) YK Yoke Mount (9' or 2.74m cord exits luminaire)	A33 Asymmetric 33° Flood (NEMA 6x5) RM Rectangular Medium Flood (NEMA 7x4) SP Spot (12° round) (NEMA 2x2) AIRP Airport Apron Flood (NEMA 7x5)	120 120V 208 208V 240 240V 277 277V 347 347V 480 480V UNV 120-277V HVU 347-480V
	Note: 46 LEDs per module					

Options									
Dimming Controls ^{1,2}	Fusing	Surge Protection	Other Options	Side Rails	Finish				
none leave blank (0-10V dimming driver standard) DD^{1,2,3,8} 0-10V dimming external wires (controls by others) FAWS^{1,2,8,10} Field Adjustable Wattage Selector	none leave blank Fusing F1⁷ Single (120, 277, 347VAC) F2⁷ Double (208, 240, 480VAC) F3⁷ Canadian Double Pole (208, 240, 480VAC) Pole Mount Fusing FP1⁷ Single (120, 277, 347VAC) FP2⁷ Double (208, 240, 480VAC) FP3⁷ Canadian Double Pole (208, 240, 480VAC)	blank Surge Protector 10kV / 10kA (standard) SP2 Surge Protector 20kV / 10kA (option)	none leave blank PCB^{2,8,9} Photocontrol Button TLRD7^{2,4} Twist Lock Receptacle 7-pin TLRPC^{2,4,7,9} Twist Lock 5-pin Receptacle w/ 3-pin Photocell BAC^{11,12} Meets the requirements of the Buy American Act of 1933 (BAA)	blank standard anodized, no finish PSR Painted Side Rails, painted same finish to match luminaire finish	BK Black WH White BZ Bronze DGY Dark Gray MGY Medium Gray RAL⁵ Optional Color (specify optional color or RAL) CC⁵ Custom Color (must supply color chip, requires factory quote)				

- Choose only 1 of the following Dimming Controls options: either DD or FAWS.
- 0-10V dimming driver standard.
- Luminaire has 0-10V dimming wires exiting the luminaire for dimming controls by others.
- TLRD7 and TLRPC max aiming angle 45°. TLRD7 works with 3, 5 or 7 pin NEMA photocell/dimming, use of photocell (by others) or shorting cap (by others) is required to ensure proper illumination. TLRD7 and TLRPC receptacle pins 4 & 5 are capped off when ordered with any of the Dimming Controls DD or FAWS.
- Must contact factory prior to ordering - these items are ETO Specials.
- 276L with 1.2A only available as ETO Special - must contact factory prior to ordering.
- Must specify specific input voltage, not available with UNV or HVU.
- PCB can be used with DD and FAWS.
- PCB and TLRPC available in 120V, 208V, 240V, or 277V only.
- FAWS not available with 1.2A (switch has lower current limit).
- Extended lead times apply. Contact factory for details.
- Failure to properly select the "BAC" suffix could result in you receiving product that is not BAA compliant product with no recourse for an RMA or refund. This BAC designation hereunder does not address (i) the applicability of, or availability of a waiver under, the Trade Agreements Act, or (ii) the "Buy America" domestic content requirements imposed on states, localities, and other non-federal entities as a condition of receiving funds administered by the Department of Transportation or other federal agencies.

Connected lighting

Interact City connector node provides the plug and play wireless communications technology to connect your floodlight to the Interact City lighting management system.



Accessory Ordering Code	Description
LLC	Interact City cellular technology connector node

Contact Signify for additional support when connected lighting or additional services are desired.
 For more details visit: <https://www.interact-lighting.com/en-us/what-is-possible/interact-city>



PFF PowerForm

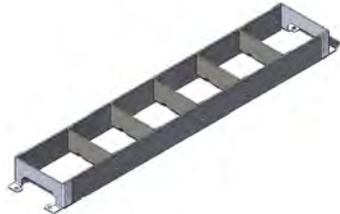
Floodlight

PowerForm Accessories (ordered separately, field installed, specify finish at placeholder F)

Shielding Accessories

Glare shield (black finish)

GS-PFF-138	138 LEDs (3 modules)
GS-PFF-184	184 LEDs (4 modules)
GS-PFF-230	230 LEDs (5 modules)
GS-PFF-276	276 LEDs (6 modules)



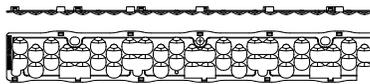
GS louvered glare shields are ordered as an accessory only and can be used with A33, RM, and AIRP optics; can not be used with SP optics due to fit restriction - if required, must contact factory prior to ordering since it is an ETO Special.

Glare shields are aluminum sheet metal louvers painted in a smooth black power coat finish. Each set includes a mounting kit that fastens to the front face of the LED light engine and includes stainless steel hardware.

One glare shield attaches to each 46 LED module. The total number of glare shields is determined by total number of modules per luminaire where required.

Internal house side shield

HIS-PFF-138	138 LEDs (3 modules)
HIS-PFF-184	184 LEDs (4 modules)
HIS-PFF-230	230 LEDs (5 modules)
HIS-PFF-276	276 LEDs (6 modules)



HIS internal house side shields are ordered as an accessory only and can be used with A33 and RM optics; can not be used with SP or AIRP optics due to fit restriction.

Internal shields are injection molded black polymer that snap fit on each 46 LED module. The total number of internal shields is determined by the total number of modules per luminaire where required.

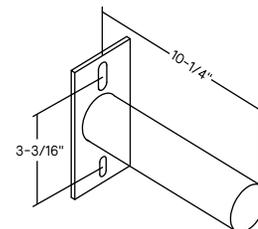
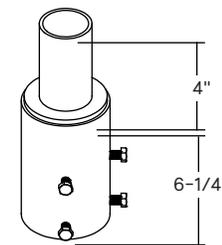
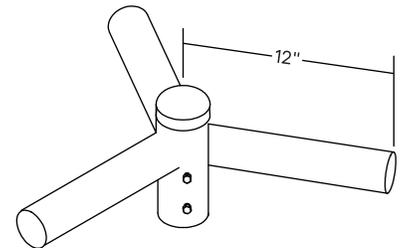
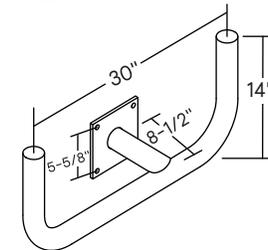
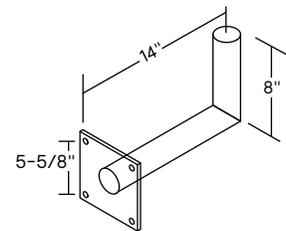
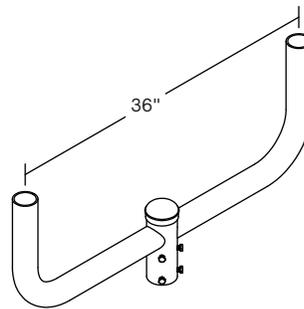
Mounting Accessories

For wall and pole brackets, bullhorns, etc. see <https://www.signify.com/en-us/products/outdoor-luminaires/poles-brackets/site-and-area-brackets/bull-horn-brackets#downloads> for details.

Exception: All UPS Upsweep - contact factory to confirm compatibility.

Exception: SBRKT-SAB-NA-4-WA-(F) Side Angle Flat bracket cannot be used with any PFF versions due to only single mounting hole that is too small for required mounting bolts.

Exception: PFF-276L 6 module version cannot be used with any brackets, etc. due to its weight - too heavy.



Examples shown are not to scale - see SBRKT spec sheet for all available brackets

PFF PowerForm

Floodlight

LED Wattage and Lumen Values – 3000K

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33		RM		SP		AIRP	
						Lumen Output	Efficacy (LPW)						
PFF-138L-700-WW-G2	138	3	700	3000	289	43,048	149	42,433	147	43,619	151	42,284	146
PFF-138L-900-WW-G2	138	3	900	3000	397	51,974	131	51,231	129	52,663	133	51,051	128
PFF-138L-1A-WW-G2	138	3	1050	3000	455	58,940	130	58,098	128	59,721	131	57,894	127
PFF-138L-1.2A-WW-G2	138	3	1200	3000	511	65,101	127	64,170	126	65,962	129	62,793	123
PFF-184L-700-WW-G2	184	4	700	3000	386	57,398	149	56,577	147	58,159	151	56,379	146
PFF-184L-900-WW-G2	184	4	900	3000	530	69,299	131	68,308	129	70,217	133	68,068	128
PFF-184L-1A-WW-G2	184	4	1050	3000	606	78,587	130	77,463	128	79,628	131	77,191	127
PFF-184L-1.2A-WW-G2	184	4	1200	3000	681	86,801	127	85,559	126	87,950	129	83,724	123
PFF-230L-700-WW-G2	230	5	700	3000	482	71,747	149	70,722	147	72,698	151	70,474	146
PFF-230L-900-WW-G2	230	5	900	3000	662	86,623	131	85,385	129	87,771	133	85,085	128
PFF-230L-1A-WW-G2	230	5	1050	3000	758	98,234	130	96,829	128	99,534	131	96,489	127
PFF-230L-1.2A-WW-G2	230	5	1200	3000	852	108,500	127	106,949	126	109,937	129	106,574	125
PFF-276L-700-WW-G2	276	6	700	3000	579	86,097	149	84,866	147	87,237	151	84,568	146
PFF-276L-900-WW-G2	276	6	900	3000	795	103,948	131	102,462	129	105,325	133	103,975	131
PFF-276L-1A-WW-G2	276	6	1050	3000	909	117,880	130	116,194	128	119,442	131	117,911	130
PFF-276L-1.2A-WW-G2	276	6	1200	3000	1022	130,200	127	128,338	126	131,924	129	127,888	125

LED Wattage and Lumen Values – 4000K

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33		RM		SP		AIRP	
						Lumen Output	Efficacy (LPW)						
PFF-138L-700-NW-G2	138	3	700	4000	289	45,219	156	44,573	154	45,818	158	44,416	154
PFF-138L-900-NW-G2	138	3	900	4000	397	54,595	137	53,814	135	55,318	139	53,625	135
PFF-138L-1A-NW-G2	138	3	1050	4000	455	61,912	136	61,027	134	62,732	138	60,813	134
PFF-138L-1.2A-NW-G2	138	3	1200	4000	511	68,383	134	67,405	132	69,288	136	65,959	129
PFF-184L-700-NW-G2	184	4	700	4000	386	60,292	156	59,430	154	61,091	158	59,222	154
PFF-184L-900-NW-G2	184	4	900	4000	530	72,793	137	71,752	135	73,757	139	71,500	135
PFF-184L-1A-NW-G2	184	4	1050	4000	606	82,549	136	81,369	134	83,643	138	81,083	134
PFF-184L-1.2A-NW-G2	184	4	1200	4000	681	91,177	134	89,873	132	92,384	136	87,945	129
PFF-230L-700-NW-G2	230	5	700	4000	482	75,365	156	74,288	154	76,363	158	74,027	154
PFF-230L-900-NW-G2	230	5	900	4000	662	90,991	137	89,690	135	92,196	139	89,375	135
PFF-230L-1A-NW-G2	230	5	1050	4000	758	103,187	136	101,711	134	104,553	138	101,354	134
PFF-230L-1.2A-NW-G2	230	5	1200	4000	852	113,971	134	112,341	132	115,480	136	111,947	131
PFF-276L-700-NW-G2	276	6	700	4000	579	90,438	156	89,145	154	91,636	158	88,832	154
PFF-276L-900-NW-G2	276	6	900	4000	795	109,189	137	107,628	135	110,635	139	109,217	137
PFF-276L-1A-NW-G2	276	6	1050	4000	909	123,824	136	122,053	134	125,464	138	123,856	136
PFF-276L-1.2A-NW-G2	276	6	1200	4000	1022	136,765	134	134,809	132	138,576	136	134,336	131

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown. Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.

NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires. Contact factory for configurations not shown.

Field Adjustable Wattage Selector (FAWS) Multiplier Chart

FAWS Position	Typical Lumens and System Wattage Multiplier	
	138L/184L	230L/276L
1	10%	15%
2	20%	35%
3	30%	45%
4	40%	60%
5	45%	70%
6	55%	85%
7	60%	100%
8	70%	100%
9	80%	100%
10	100%	100%

Note: Actual performance may vary due to LED and driver tolerances

PFF PowerForm

Floodlight

LED Wattage and Lumen Values – 3000K with glare shield

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33-GS		RM-GS		AIRP-GS	
						Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)
PFF-138L-700-WW-G2-GS	138	3	700	3000	289	33,280	115	32,884	114	22,022	76
PFF-138L-900-WW-G2-GS	138	3	900	3000	397	40,180	101	39,701	100	26,587	67
PFF-138L-1A-WW-G2-GS	138	3	1050	3000	455	45,566	100	45,023	99	30,151	66
PFF-138L-1.2A-WW-G2-GS	138	3	1200	3000	511	49,421	97	48,833	96	32,702	64
PFF-184L-700-WW-G2-GS	184	4	700	3000	386	44,374	115	43,844	114	29,363	76
PFF-184L-900-WW-G2-GS	184	4	900	3000	530	53,574	101	52,935	100	35,450	67
PFF-184L-1A-WW-G2-GS	184	4	1050	3000	606	60,754	100	60,030	99	40,201	66
PFF-184L-1.2A-WW-G2-GS	184	4	1200	3000	681	65,895	97	65,110	96	43,604	64
PFF-230L-700-WW-G2-GS	230	5	700	3000	482	55,466	115	54,806	114	36,702	76
PFF-230L-900-WW-G2-GS	230	5	900	3000	662	66,967	101	66,169	100	44,313	67
PFF-230L-1A-WW-G2-GS	230	5	1050	3000	758	75,942	100	75,038	99	50,251	66
PFF-230L-1.2A-WW-G2-GS	230	5	1200	3000	852	83,879	98	82,880	97	55,504	65
PFF-276L-700-WW-G2-GS	276	6	700	3000	579	66,560	115	65,767	114	44,043	76
PFF-276L-900-WW-G2-GS	276	6	900	3000	795	81,834	103	80,859	102	54,150	68
PFF-276L-1A-WW-G2-GS	276	6	1050	3000	909	92,802	102	91,697	101	61,408	68
PFF-276L-1.2A-WW-G2-GS	276	6	1200	3000	1022	100,655	98	99,456	97	66,604	65

LED Wattage and Lumen Values – 4000K with glare shield

Ordering Code	Total LEDs	Module Qty	LED Current (mA)	Color Temp.	Average System Watts	A33-GS		RM-GS		AIRP-GS	
						Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)	Lumen Output	Efficacy (LPW)
PFF-138L-700-NW-G2-GS	138	3	700	4000	289	34,958	121	34,542	119	23,132	80
PFF-138L-900-NW-G2-GS	138	3	900	4000	397	42,206	106	41,703	105	27,928	70
PFF-138L-1A-NW-G2-GS	138	3	1050	4000	455	47,863	105	47,293	104	31,671	70
PFF-138L-1.2A-NW-G2-GS	138	3	1200	4000	511	51,913	102	51,295	100	34,351	67
PFF-184L-700-NW-G2-GS	184	4	700	4000	386	46,611	121	46,055	119	30,843	80
PFF-184L-900-NW-G2-GS	184	4	900	4000	530	56,275	106	55,604	105	37,237	70
PFF-184L-1A-NW-G2-GS	184	4	1050	4000	606	63,817	105	63,057	104	42,228	70
PFF-184L-1.2A-NW-G2-GS	184	4	1200	4000	681	69,217	102	68,393	100	45,802	67
PFF-230L-700-NW-G2-GS	230	5	700	4000	482	58,263	121	57,569	119	38,553	80
PFF-230L-900-NW-G2-GS	230	5	900	4000	662	70,343	106	69,505	105	46,547	70
PFF-230L-1A-NW-G2-GS	230	5	1050	4000	758	79,771	105	78,821	104	52,785	70
PFF-230L-1.2A-NW-G2-GS	230	5	1200	4000	852	88,108	103	87,059	102	58,302	68
PFF-276L-700-NW-G2-GS	276	6	700	4000	579	69,916	121	69,083	119	46,264	80
PFF-276L-900-NW-G2-GS	276	6	900	4000	795	85,960	108	84,936	107	56,880	72
PFF-276L-1A-NW-G2-GS	276	6	1050	4000	909	97,481	107	96,320	106	64,504	71
PFF-276L-1.2A-NW-G2-GS	276	6	1200	4000	1022	105,730	103	104,471	102	69,962	68

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown. Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.

NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires.

Predicted Lumen Depreciation Data

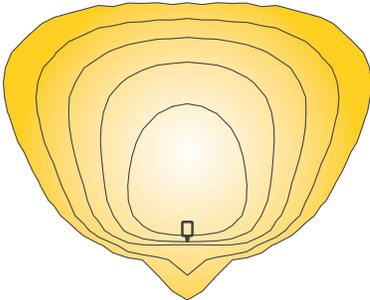
Ambient Temperature (°C)	Driver Current	Calculated L70 hours	L70 per TM-21	Lumen Maintenance % @ 60,000 hours
25°C	up to 1200 mA	>100,000	>60,000	98%

Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions. L70 is the predicted time when LED performance depreciates to 70% of initial lumen output. Calculated per IESNA TM21-11. Published L70 hours limited to 6 times actual LED test hours.

PFF PowerForm Floodlight

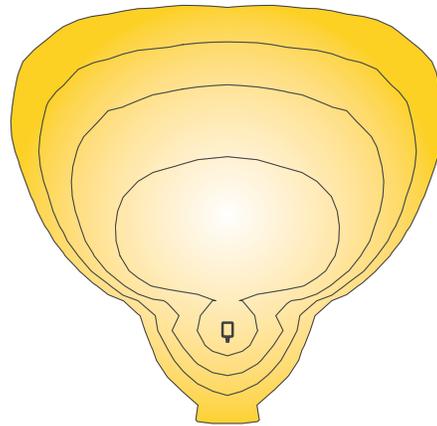
Optical Distribution Diagrams

A33 Asymmetric 33° Flood (NEMA 6x5)



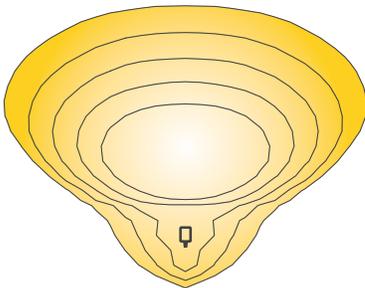
30' or 9.14m mounting height, 30° tilt
 Applications include: large area lighting, storage yards, transportation terminals, ports, utility sub-stations, security lighting, large facades, large wall washing, tall structures / monuments / statues

AIRP Airport Apron Flood



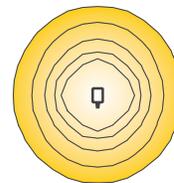
30' or 9.14m mounting height, 25° tilt
 Applications: airport aprons

RM Rectangular Medium Flood (NEMA 7x4)



30' or 9.14m setback, 50° tilt
 Applications include: building entrances and exits, security lighting, perimeter fences, checkpoints and inspection stations, large and wide wall grazing, large signs

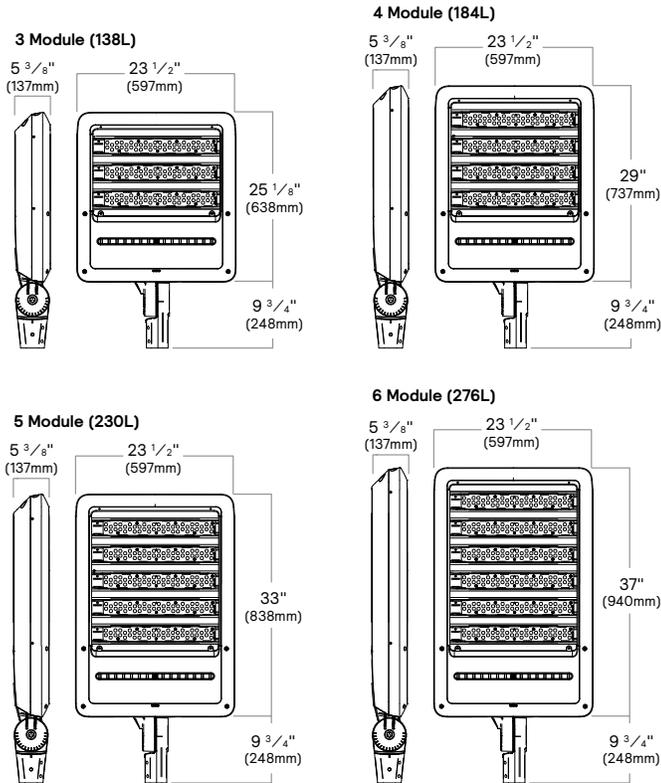
SP Spot 12° Round (NEMA 2x2)



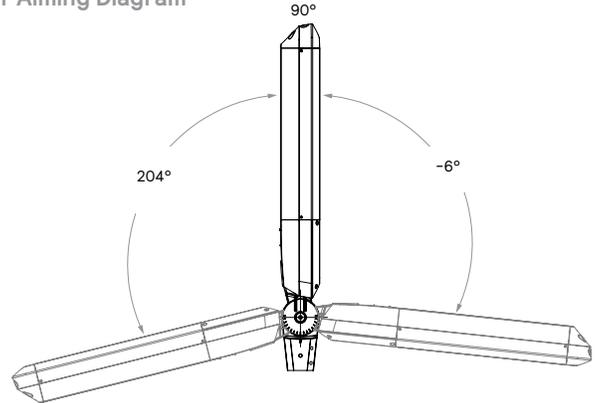
30' or 9.14m setback, 0° tilt
 Applications include: spotlighting, accenting, tall columns, tall structures / monuments / statues

PFF PowerForm Floodlight

Dimensions – Slipfitter Mount (SF)



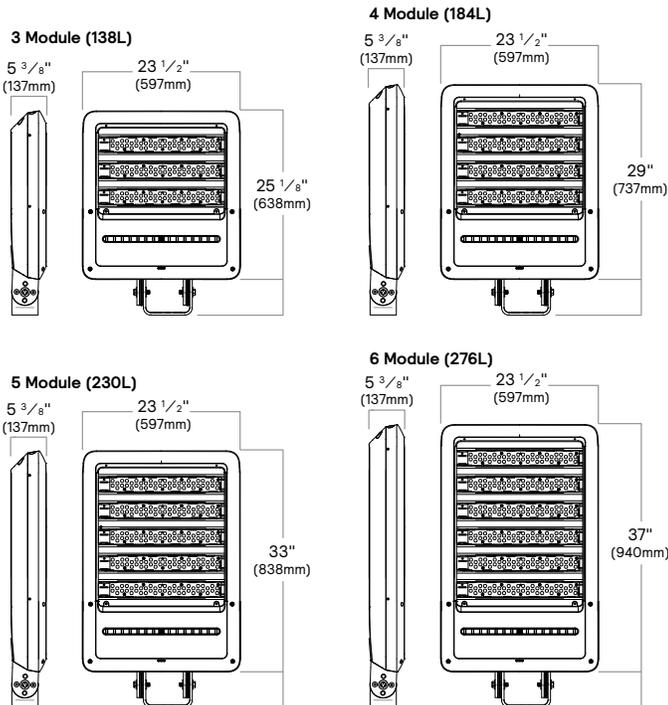
Slipfitter Aiming Diagram



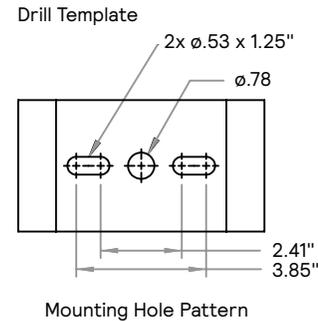
No. of Modules	Effective Projected Area (EPA-ft ²)			Weight of single luminaire PFF SF
	Single: 0° Aim	Single: 45° Aim	Single: 90° Aim	
3	0.647	2.311	3.269	62 lbs (28.1 kg)
4	0.739	2.681	3.792	72 lbs (32.7 kg)
5	0.836	3.021	4.273	81 lbs (36.7 kg)
6	0.938	3.337	4.720	91 lbs (41.3 kg)

Note: Applies to single PFF luminaire with (SF) Slipfitter mount at the following angles: 0° is horizontal to ground, 90° is perpendicular to the ground as shown in drawings.

Dimensions – Yoke Mount (YK)



Yoke Mount Drill Template



No. of Modules	Effective Projected Area (EPA-ft ²)			Weight of single luminaire PFF YK
	Single: 0° Aim	Single: 45° Aim	Single: 90° Aim	
3	0.596	2.232	3.156	66 lbs (29.9 kg)
4	0.688	2.601	3.679	76 lbs (34.5 kg)
5	0.786	2.942	4.161	86 lbs (39 kg)
6	0.887	3.257	4.607	94 lbs (42.6 kg)

Note: Applies to single PFF luminaire with (YK) Yoke mount at the following angles: 0° is horizontal to ground, 90° is perpendicular to the ground as shown in drawings.

PFF PowerForm

Floodlight

Controls options

DD: 0-10V dimming driver with dimming wires externally accessible for connecting dimming controls by others.

PCB: Photocell button (a.k.a. button photoeye).

TLRD7*: Twist Lock Receptacle with 7 pins enabling dimming and additional functionality (by others), can be used with an Interact City node, a twistlock photoelectric cell or a shorting cap. Can also be used with Signify or third party control system. Pins 6 and 7 are capped off (not connected) unless used with SR driver - ETO Specials, contact factory. Receptacle located on top of luminaire housing.

* Use of photoelectric cell or shorting cap is required to ensure proper illumination. Note: Additional hardware will be required to utilize the additional 2 pins on this receptacle.

TLRPC*: Twist Lock Receptacle with 5 pins and includes 3 pin twistlock photoelectric cell (must specify voltage). Receptacle located on top of luminaire housing.

*Note: Maximum aiming angle is 45° with TLRD7 and TLRPC in order to maintain IP66 rating around the Twist Lock Receptacle; Light Engines and the rest of the luminaire maintain IP66 rating at all aiming angles. UL Wet Location rating is also maintained at all aiming angles. Use of photoelectric cell or shorting cap is required to ensure proper illumination. TLRD7 and TLRPC receptacle pins 4 & 5 are connected to dimming driver's dimming leads whenever no Dimming Controls are selected; if Dimming Controls are selected then receptacle pins 4 & 5 are capped off because driver's dimming leads are used with Dimming Controls.

FAWS: Field Adjustable Wattage Selector, pre-set to the highest position, can be easily switched in the field to the required position. This reduces total luminaire wattage consumption and reduces the light level - see the FAWS multiplier chart for more details.

Note: It is not recommended to use FAWS with other dimming or controls; if you do, set the switch to position 10 (maximum output) to enable the other dimming or controls. Switching FAWS to any position other than 10 will disable the other dimming or controls.

Connected Lighting

Interact City connector node provides the plug and play wireless communications technology to connect your floodlight to the Interact City lighting management system. With Interact you can remotely manage, monitor and control all city lighting, from roads and streets, to parks and plazas, and bridges from one single system. Connected lighting enables capabilities including, accurate on/off switching, dimming control, fault reporting and integration with other systems to enable condition-based lighting. Interact provides you with a robust and scalable infrastructure to further reduce energy consumption, improve operations, and turn lighting into a connected network for your smart city journey.

For more details visit: <https://www.interact-lighting.com/en-us/what-is-possible/interact-city>

Luminaire options

F1: Fusing Single (for 120, 277 or 347VAC)

F2: Fusing Double (for 208, 240 or 480VAC)

F3: Fusing Canadian Double Pole (for 208, 240 or 480VAC)

FP1: Fusing Pole Single (pole mounted near handhole, for 120, 277 or 347VAC)

FP2: Fusing Pole Double (pole mounted near handhole, for 208, 240 or 480VAC).

FP3: Fusing Pole Canadian Double Pole (pole mounted near handhole, for 208, 240 or 480VAC)

SP2: Surge Protection, 20kV/10kA. Surge protection device wired in parallel so that if it fails open the luminaire will remain lit/powerd on.

PFF PowerForm

Floodlight

Specifications

Housing

Main body castings made of a low copper die cast Aluminum alloy (A360) for a high resistance to corrosion, 0.100" (2.5mm) minimum thickness. Side rail extrusions made of corrosion resistant low copper extruded anodized aluminum alloy (Anodized 6063-T5).

Mounting

Up tilt aiming and down tilt aiming possible with all of the mounting options.

cULus Listed as suitable for mounting within 4' or 1.2m of the ground

SF: Adjustable Slip Fitter with AWG 16-3 wires (or AWG 16-5 if DD external control options are selected) exiting through the Slip Fitter. Integral splice compartment for field wiring with cULus Wet Location rated access cover with seal around entire perimeter. Slip Fitter made of low copper die cast Aluminum alloy (A360) for a high resistance to corrosion, adjustable knuckle has 4 degree aiming increments with integral interlocking teeth and bolt to secure aiming in place, integral cast-in aiming marks. Fits on a 2-3/8" O.D. tenon.

YK: Adjustable Yoke with 9' (2.74m) of AWG 16-3 SEOWW cord (or AWG 16-5 if DD external control options are selected) exiting the luminaire through IP66 rated cord seal. Customer-specified length or different cord type available - must contact factory prior to ordering, this is an ETO Special. Yoke made of high strength steel, galvanized and painted for high resistance to corrosion, 5 degree aiming increments with bolts to secure aiming in place.

Driver/Electrical Door

Removable die cast aluminum door made of a low copper die cast aluminum alloy (A360) for a high resistance to corrosion. Provides access to electronic components/LED drivers. Door secured with two captive screws outside of gasket perimeter. Includes a lanyard to prevent accidental dropping if access is required.

IP Rating

IP66 rated driver/electrical compartment and light engines in all aiming positions including up tilt aiming per ANSI C136.37 with seals around entire perimeter of the lenses and seal around entire perimeter of the driver/electrical compartment. IP66 rating including when PCB option is installed.

Light Engine

Composed of 4 main components: Heat Sink / LED Module / Optical System / Driver. Electrical components are RoHS compliant. LEDs tested by ISO 17025-2005 accredited lab in accordance with IESNA LM-80 guidelines, extrapolations in accordance with IESNA TM-21. Metal core board ensures greater heat transfer and longer lifespan.

Heat Sinks: Heat sinks that are part of LED Modules are anodized 6063-T5 Aluminum for a high resistance to corrosion. Housing acts as heat sink for drivers, designed to ensure high efficacy and superior cooling by natural vertical convection. Air flow pattern always

close to LEDs and driver optimizing their efficiency and life. Product does not use any cooling device with moving parts (only passive cooling).

LED Module: Composed of high performance white LEDs. Color temperature as per ANSI/NEMA bin 3000K nominal (3045K +/- 175K) or 4000K nominal (3985K +/- 275K), both CRI 70 min.

Optical System: Choice of four distributions including Spot (SP), Asymmetric 33° Flood (A33), Rectangular Medium Flood (RM) distributions and a specialty distribution designed for Airport Apron (AIRP) applications featuring a wide 87° horizontal and narrow 16° vertical beam. Composed of high performance UV stabilized optical grade polymer refractor lenses to achieve desired distribution optimized to get maximum spacing, target lumens and a superior lighting uniformity. Performance shall be tested per LM-63, LM-79 and TM-15 (IESNA) certifying its photometric performance.

IK Rating: IK10 highest impact resistance rating for LED Module lenses.

Driver: High power factor of 90% min. Electronic driver, operating range 50/60 Hz. Auto adjusting universal voltage input from 120 to 277 VAC or 347 to 480 VAC rated for both application line to line or line to neutral, Class I, THD of 20% max. The current supplying the LEDs will be reduced by the driver if the driver experiences internal overheating as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction. Standard built in driver surge protection of 2.5kV (min). Driver enables setting LED drive current to meet your specific total wattage consumption, lumen output and/or efficacy needs - ETO Specials, contact factory.

Integrated Features

Please note that these integrated features always come with this luminaire standard at no additional cost.

0-10V dimming driver included as standard, dimming leads pre-wired to Dimming Controls option except when DD external controls options are selected.

SP1: Surge protection device tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line-Ground, Line-Neutral and Neutral-Ground. Enhanced surge protection device SP2 20kV/10kA available as an option. Surge protection device wired in parallel so that if it fails open the luminaire will remain lit/power on.

Wiring

#2 - #14 AWG wires from the primary circuit, located inside the housing. Due to the inrush current that occurs with electronic drivers, recommend using a time delay or slow blow fuse to avoid unnecessary and unwanted fuse blowing (false tripping) that can occur with fast acting fuses.

Hardware and Seals

All exposed screws shall be stainless and/or corrosion resistant and captive. All seals and sealing devices are made and/or lined with EPDM and/or silicone and/or rubber.

Finish

Five standard textured colors: white, bronze, black, dark gray and medium gray. RAL and custom color matching available - must contact factory prior to ordering, these are ETO Specials. Color in accordance with the AAMA 2604 standard. Application of polyester powder coat paint (2.5 mils/62.5 microns) with ± 1 mils/24 microns of tolerance. The thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard.

LED Products Manufacturing Standard

The electronic components sensitive to electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with EC61340-5-1 and ANSI/ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product.

Luminaire Useful Life

Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, exclusive Signify System Reliability Tool, Advance driver data and LED manufacturer LM-80/TM-21 data, expected to reach 100,000 + hours with L70 lumen maintenance @ 25°C. Luminaire Useful Life accounts for LED lumen maintenance AND all of these additional factors including: LED color shift, LED life, driver life, PCB substrate, solder joints, on/off cycles, burning hours and corrosion.

Vibration Resistance

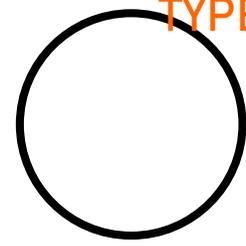
Luminaire meets the ANSI C136.31-2018 specifications, tested by independent lab over 100,000 cycles in all three axes: Bridge/Overpass for 138L 3 modules, 184L 4 modules, 230L 5 modules; Normal for 276L 6 modules.

Certifications and Compliance

cULus Listed for Canada and USA, per UL1598 and UL8750, including suitable for mounting within 4' or 1.2m of the ground. Configurations are DesignLights Consortium qualified, consult DLC QPL Qualified Products List for more details. Luminaire complies with or exceeds the following ANSI C136 standards: .2, .3, .10, .15, .21, .22, .24, .25, .31, .32, .37, .41. Entire luminaire is rated for operation in ambient temperature of -40°C (-40°F) up to +40°C (+104°F).

Limited Warranty

5-year limited warranty. See signify.com/warranties for details and restrictions.



The Gardco RA straight aluminum pole consists of a one-piece round extruded aluminum lighting standard mounted to a structural quality carbon galvanized steel base tenon. This construction offers the corrosion resistance and flexibility of aluminum with the strength and integrity of steel. The poles are finished with either Architectural Class 1 anodizing or electrostatically applied TGIC polyester powdercoat.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lamps: _____ Qty: _____
 Notes: _____

Order Guide

example: RA4-STB-15-D1-BRP

Prefix	Base	Height	Wind Factor Code*	Drilling	Finish	Options
	STB					
RA4	STB	10	-	D1 1 Way	BRP Bronze Paint BLP Black Paint WP White Paint NP Natural OC Aluminum Paint Optional Color Paint (Specify RAL designation ex: OC-RAL7024) SC Special Color Paint (Specify. Must supply color chip.)	DR Duplex Receptacle GFCI Ground Fault Receptacle VDA Vibration Dampener Nipples and Couplings NL Nipple - External thread CL Coupling - Internal thread Indicate size (1/2", 3/4", 1", 1 1/4", 1 1/2".) Indicate height above base and orientation to hand hole. See Pole Orientation Information on Page 4. Single Mount Bullhorn Brackets* A15BH-19 Single - 1.9" OD A15BH-24 Single - 2.4" OD A215BH-19 2-Tenon - 1.9" OD A215BH-24 2-Tenon - 2.4" OD Indicate height above base and orientation to hand hole. See Pole Orientation Information on Page 4.
		12		D2 2 Way		
		15		D2@90 2 Way at 90°		
		20		D3 3 Way D3@120 3 Way at 120° D4 4 Way T2 2 3/8" OD Tenon T4 4" OD Tenon		
RA4.5	STB	10	-			
		12				
		15				
		18				
RA5	STB	15	-			
		18				
		20				
		25		L M H		
		28		L M H		
		30		L M H		

*Refers to relative strength based on wind load factors. L = Light M = Medium H = Heavy

Poles Straight Round Aluminum - Tenon Base

Pole Data

Poles Specs					Normal Wind Conditions			Anchor Bolts ²		
					100 MPH	90 MPH	80 MPH			
Product Catalog Number	Height (ft)	Base Tenon Height (ft.)	Pole Diameter (inches)	Wall Thickness (inches)	EPA ft ²	EPA ft ²	EPA ft ²	Bolt Circle (inches)	Bolt Size (inches)	Max Proj. (inches)
RA4-STB-10	10.00	1.25	4	0.135	7.1	9.1	11.9	7	5/8 x 18 x 3	3
RA4-STB-12	11.67	1.25	4	0.135	5.2	6.8	9.1	7	5/8 x 18 x 3	3
RA4-STB-15	14.92	2	4	0.135	3.1	4.3	6	7	5/8 x 18 x 3	3
RA4-STB-20L	19.92	2	4	0.135	-	1.2	1.2	7	5/8 x 18 x 3	3
RA4-STB-20M	19.92	4	4	0.135	-	2.1	3.4	7	5/8 x 18 x 3	3
RA4-STB-20H	19.92	6	4	0.135	2.2	3.3	4.8	7	3/4 x 17 x 3	3
RA4.5-STB-10	9.67	1.5	4.5	0.15	12.6	15.7	20.2	7	3/4 x 17 x 3	3
RA4.5-STB-12	11.67	1.5	4.5	0.15	9.2	11.6	15	7	3/4 x 17 x 3	3
RA4.5-STB-15	14.75	1.5	4.5	0.15	5.8	7.4	9.9	7	3/4 x 17 x 3	3
RA4.5-STB-18	17.75	1.5	4.5	0.15	3.6	4.7	6.5	7	3/4 x 17 x 3	3
RA4.5-STB-20	19.75	1.5	4.5	0.15	2.4	3.2	4.7	7	3/4 x 17 x 3	3
RA5-STB-15	14.83	2.5	5	0.175	10.6	13.3	17.1	9	3/4 x 17 x 3	3
RA5-STB-18	17.75	2.5	5	0.175	7.4	9.4	12.1	9	3/4 x 17 x 3	3
RA5-STB-20	19.83	2.5	5	0.175	5.7	7.3	9.5	9	3/4 x 17 x 3	3
RA5-STB-25L	24.83	2.5	5	0.175	2.6	3.5	4.9	9	3/4 x 17 x 3	3
RA5-STB-25M	24.83	4	5	0.175	3.3	4.4	6	9	3/4 x 17 x 3	3
RA5-STB-25H	24.83	7	5	0.175	5.1	6.5	8.6	9	1 x 36 x 4.5	3
RA5-STB-28L	27.92	2.5	5	0.175	-	1.8	2.8	9	3/4 x 17 x 3	3
RA5-STB-28M	27.92	4	5	0.175	1.7	2.5	3.7	9	3/4 x 17 x 3	3
RA5-STB-28H	27.92	7	5	0.175	3.2	4.2	5.7	9	1 x 36 x 4.5	3
RA5-STB-30L	29.83	2.5	5	0.175	-	-	1.6	9	3/4 x 17 x 3	3
RA5-STB-30M	29.83	4	5	0.175	-	1.5	3	9	3/4 x 17 x 3	3
RA5-STB-30H	29.83	7	5	0.175	2.2	3	4.2	9	1 x 36 x 4.5	3

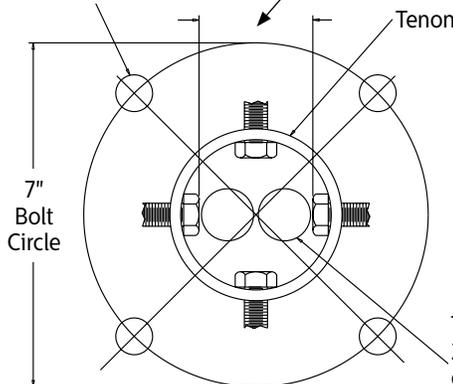
* **Warning:** Additional wind loading, in terms of EPA, from banners, cameras, floodlights and other accessories attached to the pole, must be added to the luminaire(s) EPA before selecting the pole with the appropriate wind load capability.

** Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement resulting from failure to use factory supplied templates.

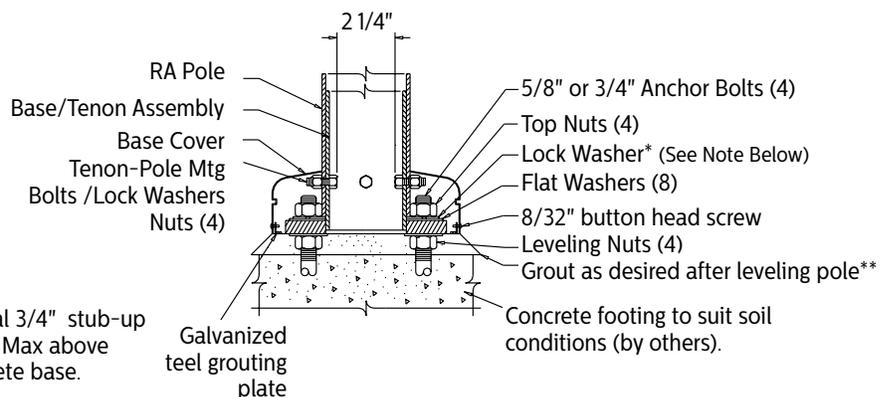
Dimensions

Cut hole in template 1/16" larger than diameter of anchor bolts used.

Conduit Opening
 RA4: ID 3.063" OD 2.25"
 RA4.5: ID 3.25" OD 2.75"
 RA5: ID 4.618" OD 3.25"



Typical 3/4" stub-up 2 1/2" Max above concrete base.



NOTE: Internal clearance of tenon/pole mounting bolts dictates allowable area for stub-ups.

* Anchor Bolt Lock Washers are not normally required and are not included in standard anchor bolt sets. They are available upon request at additional cost.

** Grouting should include a drainage slot or tube (by others) to permit water to drain from the base of the pole. Failure to provide drainage may weaken the pole base structure over time and may result in pole base failure, for which Gardco is not responsible.

NOTE: Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement from failure to use factory supplied templates.

Poles Straight Round Aluminum – Tenon Base

Specifications

POLE SHAFT

The pole shaft is a one-piece, seamless 6000 series extruded aluminum cylindrical tubing and is heat-treated to achieve a T6 temper with a guaranteed minimum yield strength of 31 KSI.

BASE TENON ASSEMBLY

The tenon anchor base assembly consists of structural quality carbon steel tubing with a minimum 46 KSI yield strength welded to a structural steel base with a guaranteed minimum yield strength of 50 KSI. The base plate telescopes the pole shaft and is circumferentially welded on both top and bottom. The base is provided with slotted

bolt holes to accommodate a $\pm .5$ " variation in the rotational flexibility. The entire assembly is hot-dipped galvanized. Four (4) mechanically galvanized fasteners secure the aluminum pole shaft to the base tenon assembly.

ANCHOR BOLTS

Anchor bolts are fabricated from a commercial quality hot rolled carbon steel bar that meets or exceeds a minimum guaranteed yield strength of 50,000 psi. Bolts have an "L" bend on one end and threaded on the opposite end. Anchor bolts are completely hot dipped galvanized. Four (4) properly sized bolts, each furnished with two (2) regular hex nuts and two

(2) flat washers, are provided per pole (priced separately), unless otherwise specified.

BASE COVER

A one-piece, heavy wall spun aluminum cover completely conceals the entire base plate and anchorage. The base cover is secured to the base assembly with two (2) stainless steel fasteners.

HAND HOLE

The hand hole has a nominal rectangular 2" x 4" or 2 5/8" x 5" inside opening in the pole shaft and tenon assembly. Included is an aluminum cover plate with attachment screws. The hand hole is located 18" – 20" above the base and 180° clockwise

with respect to the luminaire arm when viewed from the top of the pole for one arm. For two arms the hand hole is located directly under one arm.

POLE TOP CAP

Each RA pole assembly is provided with a removable composite friction-fit pole top cap.

FINISH

Poles are available with bronze, natural or black Aluminum Association Architectural Class 1 anodized finish. Electrostatically applied, thermally cured TGIC polyester powdercoat finish or liquid polyurethane is also available.

General Pole Information

DESIGN

The poles as charted are designed to withstand dead loads and predicted dynamic loads developed by variable wind speeds with an additional 30% gust factor under the following conditions: The charted weights include luminaire(s) and/or mounting bracket(s). The wind velocities are based on 10 mph increments from 80 mph through 100 mph. Poles to be located in areas of known abnormal conditions may require special consideration. For example: coastal areas, airports and areas of special winds.

Poles are designed for ground mounted applications. Poles mounted on structures (such as buildings and bridges) may also necessitate special consideration requiring Gardco's recommendation. Height correction factors and drag coefficients are applied to the entire structure. An appropriate safety factor is maintained based on the minimum yield strength of the material incorporated in the pole.

WARNING

This design information is intended as a general guideline only. The customer is solely

responsible for proper selection of pole, luminaire, accessory and foundation under the given site conditions and intended usage. The addition of any items to the pole, in addition to the luminaire, will dramatically impact the EPA load on that pole. It is strongly recommended that a qualified professional be consulted to analyze the loads given the user's specific needs to ensure proper selection of the pole, luminaire, accessories, and foundation. Gardco assumes no responsibility for such proper analysis or product selections. Failure to insure proper site analysis, pole selection, loads and installation can result in

pole failure, leading to serious injury or property damage.

GENERAL INFORMATION

Mounting height is the vertical distance from the base of the lighting pole to the center of the luminaire arm at the point of luminaire attachment. Twin arms as charted are oriented at 180° with respect to each other. For applications of two (2) arms at 90° or other multiple arm applications, consult the factory.

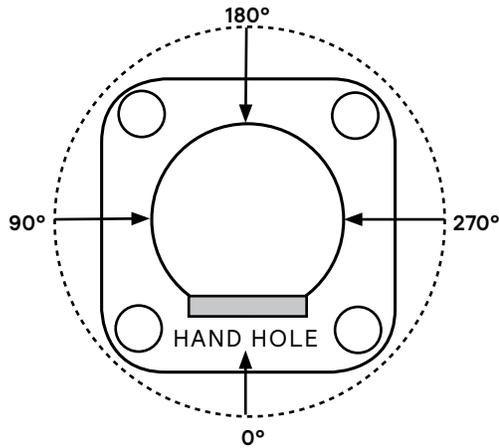
WARRANTY

Gardco poles feature a 1 year limited warranty. See Warranty Information on www.signify.com/warranties for complete details and exclusions.

Poles Straight Round Aluminum - Tenon Base

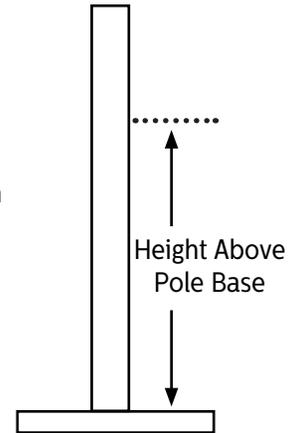
Orientation Information

Factory installed options and accessories



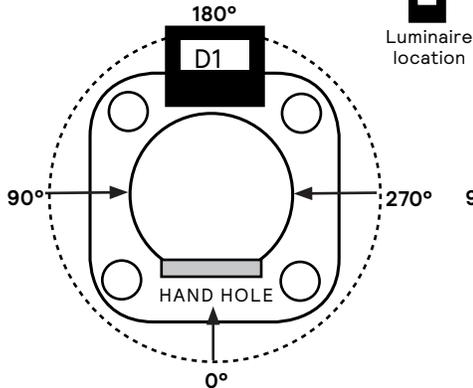
Orientation is measured clockwise from the Hand Hole Center.

For Factory Installed Options and Accessories, Specify Orientation from Hand Hole and Height Above Pole Base Where Required.

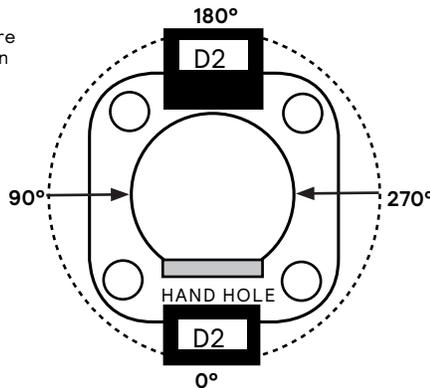


Standard arm mount luminaire orientation

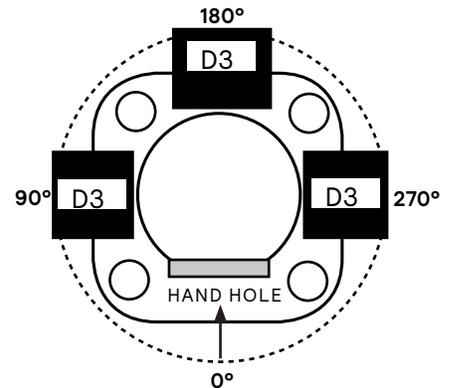
D1 Drilled for Single Luminaire



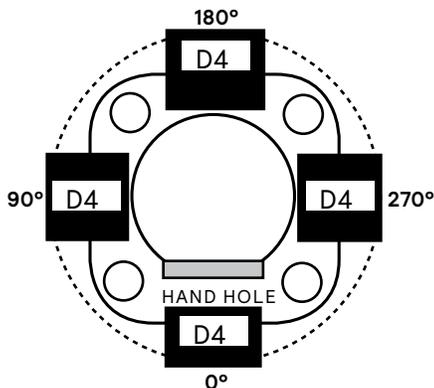
D2 Drilled for 2 Luminaires at 180°



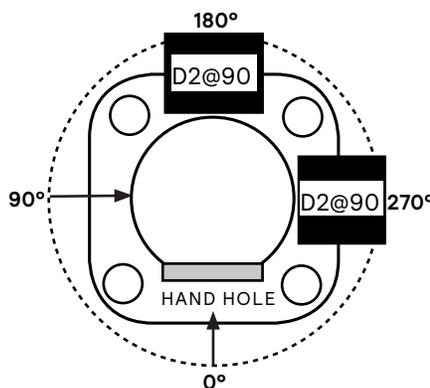
D3 Drilled for 3 Luminaires @ 90°



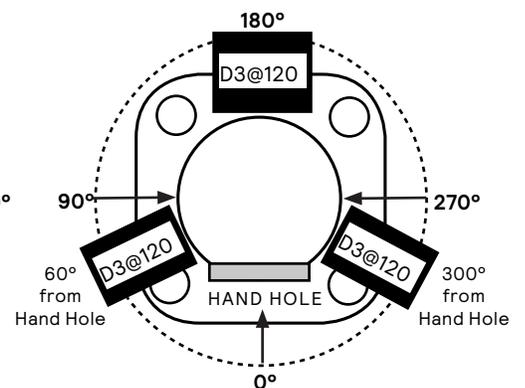
D4 Drilled for 4 Luminaires at 90°



D2@90 Drilled for 2 Luminaires at 90°



D3@120 Drilled for 3 Luminaires at 120°



PRE-2-M LED Specifications



Project Name:

Catalog Number:

Type:

Contemporary design meets the new generation of LED green technology in this stunning luminaire, the **PRE-2-M**. The PRE-2-M series provides up to fifty percent energy savings over traditional HID light sources; and offers excellent beam control and LED life beyond 100,000 hours for 350 milliamp systems. The PRE-2-M is offered in six optical distributions.

The PRE-2-M's fully-sealed housing features an exceptionally well-designed thermal management system that provides superior heat dissipation.

The PRE-2-M fixture is built with a cast aluminum housing, extruded aluminum arms and a spun aluminum, removable top.

The popular **PRE-2-M** is the perfect compliment to any university campus, business park, or walkway project where contemporary, architectural design is desired.

Ordering Information

MODEL	OPTICS	SOURCE	CURRENT	KELVIN	VOLTAGE	MOUNTING	FINISH	OPTIONS	OPTIONS
PRE-2-M	T1	16LC	3 350mA	3K 3000K	UNV 120-277V	PT Post Top *Slips over 3" OD tenon X 4.5" tall as standard	BZ Bronze	PC-120 PC-208 PC-240	DIM 0-10v Dimming Driver
	T2	32LC	5 530mA	4K 4000K	8 347V		BK Black	PC-277 Button Type Photocell	VWC Visionaire Wireless Controls *Consult Factory
	T3	48LC	7 700mA	5K 5000K	5 480V		SBK Smooth Black	WSC-8 Motion Sensor 8' Mounting Height	IR-(R, B, G Illuminated Rings (Red, Blue, Green)
	T4						WH White	WSC-20 Motion Sensor 9-20' Mounting Height	PER 3, 5, or 7 Pin Photo Receptacle w/shorting cap
	T5						SWH Smooth White	WSC-40 Motion Sensor 21-40' Mounting Height This option will require (1) FSIR 100 remote for programming	
	T5W						GP Graphite		
	T5WR						GY Grey		
							SL Silver Metallic		
							CC Custom Color		

Features & Specifications

Housing

The PRE-2-M's housing is constructed from durable, corrosion-resistant, cast aluminum. The spun aluminum top cap is .080 gauge, and easily removable for service. Silicone gasketing is provided for complete weather and insect protection.

Thermal Management

The PRE-2-M provides excellent overall thermal management by maximizing the efficiency of the heat sink in the fixture. This enables the PRE-2-M to withstand higher ambient temperatures and higher drive currents without degrading LED life.

Optical System

- The highest lumen output LEDs are utilized. High-performance acrylic optics feature industry leading Type 1, 2, 3, 4, 5, 5W and 5WR optical distributions. Acrylic optics are impact-resistant and rated to 94 percent translucence.
- L70 life of our LEDs is rated over 100,000 hours (for 350 mA), The optical system qualifies as IES full cutoff to restrict light trespass, glare and light pollution for neighborhood-friendly lighting. CRI values are 70.

Quali-Guard® Finish

- Fixture components are chemically pretreated through a multiple-stage washer, and finished with an electrostatically-applied, thermoset polyester powder coat textured paint with a 3 to 5 mils thickness.
- Finish is oven-baked at 400 °F for maximum adherence and finish hardness.
 - Available in standard and custom colors.
 - Finish is guaranteed for five (5) years.

Post Top Mount

The PRE-2-M contractor-friendly mounting hardware slips over 3" OD tenon X 4.5" tall as standard utilizing stainless steel hardware.

Electrical Assembly

- The PRE-2-M is supplied with a high-performance driver available in 350, 530 or 700. The driver is integrally-located in the housing, and is operational from 120 V through 480 V, 50 Hz to 60 Hz input.
- Power factor is 90%.
- Rated for -40o to 50° C operation.
- 10 kV surge protector supplied as standard.

Warranty

Five (5) year Limited Warranty on entire system, including finish. For full warranty information, please visit www.visionairelighting.com.

Options

- Button type photocell
 - 0-10v Dimming Driver
 - WattStopper FSP-211
 - Motion Sensor
 - Wireless Control
 - Illuminated Rings
 - Photo Receptacle
- Please consult factory for detailed custom options.

Listings

- PRE-2-M is cUL listed
- DLC Listed
- IDA Certification
- IP66 Rated
- LM79 and LM80
- Powder Coated Tough™

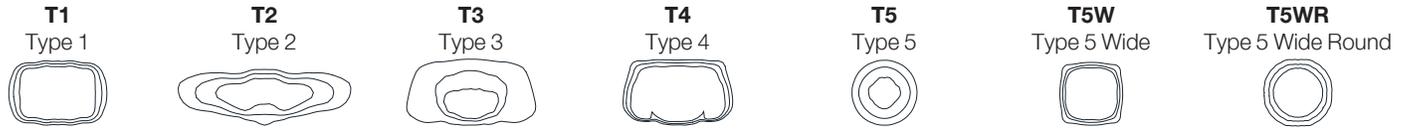


DesignLights Consortium (DLC) qualified Product. Some configurations of this product family may not be DesignLights Consortium (DLC) listed, please refer to the DLC qualified products list to confirm listed configurations. <http://www.designlights.org/>
3000K must be selected for IDA certification.

PRE-2-M - Electrical Load (A)							
Ordering Nomenclature	System Watts	120V	208V	240V	277V	347V	480V
PRE-2-M-T5-16LC-3-4K	18	0.15	0.09	0.08	0.06	0.05	0.04
PRE-2-M-T5-16LC-5-4K	26	0.22	0.13	0.11	0.09	0.07	0.05
PRE-2-M-T5-16LC-7-4K	39	0.33	0.19	0.16	0.14	0.11	0.08
PRE-2-M-T5-32LC-3-4K	35	0.29	0.17	0.15	0.13	0.10	0.07
PRE-2-M-T5-32LC-5-4K	56	0.47	0.27	0.23	0.20	0.16	0.12
PRE-2-M-T5-32LC-7-4K	73	0.61	0.35	0.30	0.26	0.21	0.15
PRE-2-M-T5-48LC-3-4K	55	0.46	0.26	0.23	0.20	0.16	0.11
PRE-2-M-T5-48LC-5-4K	80	0.67	0.38	0.33	0.29	0.23	0.17
PRE-2-M-T5-48LC-7-4K	106	0.88	0.51	0.44	0.38	0.31	0.22

PRE-2-M LED Specifications

Photometric Optical Summary



EPA Data

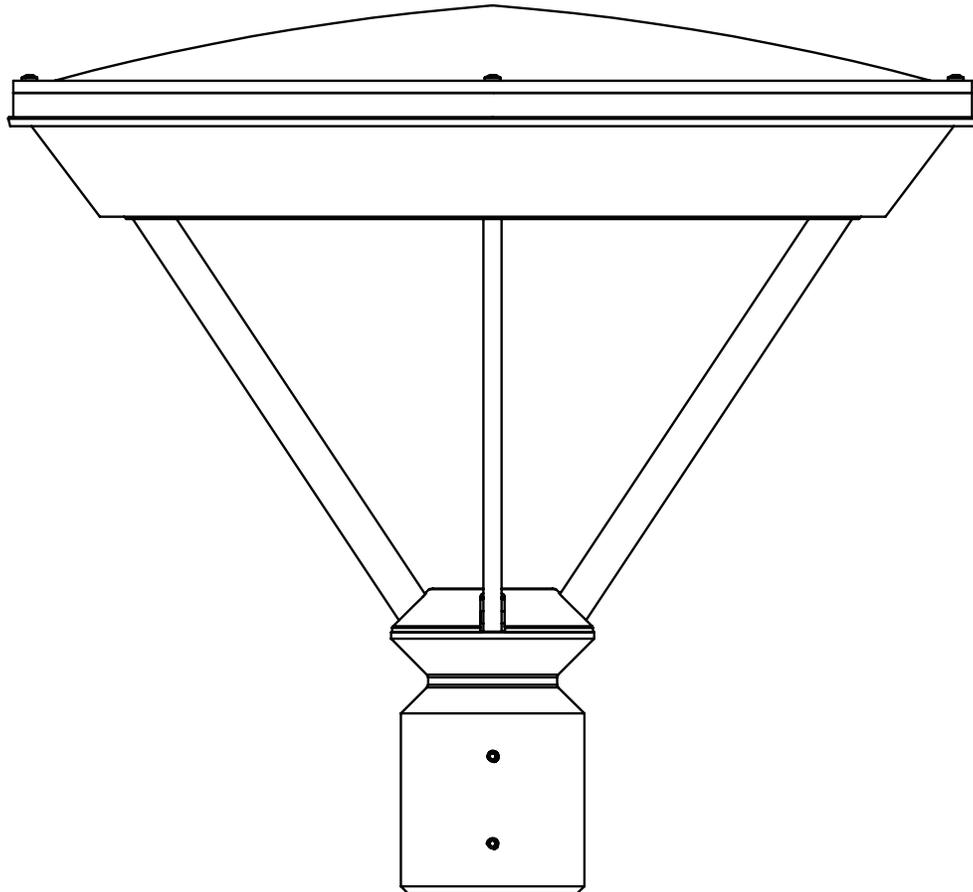
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Dimensions

Width: PRE-2-M 20"

Height: PRE-2-M 18.4"

Weight: 37 LBS



Motion Sensor Default Setting									
Type	High Mode	Low Mode	Time Delay	Cut off Delay	Sensitivity	Hold Off Set Point	Photocell On/Off	Ramp up Time	Fade Down Time
WSC- Default	10V	1V	5 Min	1 Hour	Max	Disabled	Disabled	Disabled	Disabled
WSC Range	0-10V	0-9.8V	5-30 Min	1-5 Hours	Low, Med, Max	1-250FC	1-250FC	1-60 Dec	1-60 Dec

PRE-2-M 3K Lumen Data *Lumen chart updated 08.20.19																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2320	129	2136	119	2117	118	2081	116	2288	127	2184	121	2202	123	18
	530	3181	122	2928	113	2903	112	2853	110	3137	121	2994	115	3018	117	26
	700	4417	113	4066	104	4031	103	3962	102	4356	112	4157	107	4192	108	39
32	350	4531	129	4171	119	4135	118	4064	116	4469	128	4265	122	4300	123	35
	530	6610	118	6085	109	6032	108	5929	106	6519	116	6222	111	6273	113	56
	700	8423	115	7753	106	7687	105	7555	103	8307	114	7928	109	7993	110	73
48	350	6916	126	6366	116	6311	115	6203	113	6821	124	6509	118	6563	120	55
	530	9810	123	9030	113	8952	112	8799	110	9675	121	9233	115	9309	117	80
	700	12431	117	11443	108	11344	107	11150	105	12260	116	11700	110	11797	112	106

PRE-2-M 4K Lumen Data																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2344	130	2157	120	2139	119	2102	117	2311	128	2206	123	2207	123	18
	530	3213	124	2957	114	2932	113	2979	115	3169	122	3024	116	3026	117	26
	700	4462	114	4107	105	4072	104	4002	103	4400	113	4199	108	4202	108	39
32	350	4577	131	4213	120	4177	119	4105	117	4514	129	4308	123	4310	124	35
	530	6677	119	6146	110	6093	109	5989	107	6585	118	6284	112	6289	113	56
	700	8508	117	7832	107	7764	106	7631	105	8391	115	8008	110	8013	110	73
48	350	6986	127	6430	117	6375	116	6266	114	6889	125	6575	120	6579	120	55
	530	9909	124	9121	114	9043	113	8888	111	9773	122	9326	117	9333	117	80
	700	12557	118	11558	109	11459	108	11263	106	12384	117	11818	111	11826	112	106

PRE-2-M 5K Lumen Data																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2442	136	2248	125	2229	124	2191	122	2409	134	2299	128	2318	129	18
	530	3348	129	3082	119	3055	118	3003	116	3302	127	3151	121	3177	123	26
	700	4650	119	4280	110	4243	109	4171	107	4586	118	4376	112	4412	114	39
32	350	4769	136	4390	125	4352	124	4278	122	4704	134	4489	128	4526	130	35
	530	6958	124	6405	114	6350	113	6241	111	6862	123	6549	117	6603	118	56
	700	8866	121	8161	112	8091	111	7953	109	8744	120	8345	114	8414	116	73
48	350	7280	132	6701	122	6643	121	6529	119	7180	131	6852	125	6908	126	55
	530	10326	129	9505	119	9424	118	9262	116	10184	127	9719	121	9799	123	80
	700	13086	123	12045	114	11941	113	11737	111	12905	122	12316	116	12418	118	106

Visit www.VisionaireLighting.com for up-to-the-minute chart information.

# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	2	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106

PRE-2-M 4K Bug Data																							
# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106

PRE-2-M 5K BUG Data																							
# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	2	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106



Round Non Tapered Aluminum Pole

Pole Shaft

- Extruded from 6063 alloy aluminum tubing. Shaft is furnished with aluminum ground lug inside pole, opposite hand hole opening. Pole shaft includes a reinforced hand hole opening with cover.

Base Cover

- Die-formed from heavy gauge quality aluminum. Two piece square cover for easy installation. Square base cover is standard, round base cover is optional.
- Base templates provided with order. Do not pre-pour.

Pole Cap

- Color-impregnated polymer snap-to-close pole cap provided in black.

Finish

- All poles are ground and chemically pretreated through a multi-stage washer prior to painting. A Quali-Guard® textured thermoset polyester powder coat is then applied to a minimum of 3 mils and then oven-baked at a temperature of 400 °F to promote exceptional adherence and finish hardness. Optional Wood Grain Finish is a custom color and is limited to 20' pole height, please consult factory. Optional Zinc-Free Primer - Recommended within three miles of the ocean. Pole finish is warranted for a full two (2) years. An optional five (5) year extended warranty is also available.

Project Name:

Catalog Number:

Type:

Date:

Location:

Anchor Bolts

- Poles are provided with hot-dip galvanized anchor bolts, with a "J" bend on one end and two flat hex bolts end and two flat washers per bolt. Anchor bolts meet or exceed a minimum of 36,000 PSI. Anchor bolts conform to ASTM F1554 grade 36 and are provided

MODEL	SHAFT SIZE	GAUGE	HEIGHT	BASE	ANCHORAGE
RNTA Round Non Tapered Aluminum	4R 4"	125 .125" - 4" Pole Only up to 14 feet	10' 12' 14' 16' 18' 20'	AKB Cast Aluminum Base CB Custom Base *Consult Factory	343 3/4" X 30"

MOUNTING	FINISH	OPTIONS
<p>S1 Single Bolt-On Arm</p>  <p>D2 Double 180° Bolt-On Arm</p>  <p>D9 Double 90° Bolt-On Arm</p>  <p>T1 Triple 120° Bolt-On Arm</p>  <p>T9 Triple 90° Bolt-On Arm</p>  <p>QD Quad Bolt-On Arm</p>  <p>Tenon Options</p> <p>T238R 2 3/8"</p> <p>T3R 3"</p> <p>T3.5R 3 1/2"</p> <p>T4R 4"</p>	<p>BZ Bronze</p> <p>BK Black</p> <p>SBK Smooth Black</p> <p>WH White</p> <p>SWH Smooth White</p> <p>GP Graphite</p> <p>GY Grey</p> <p>SL Silver Metallic</p> <p>GN Tennis Green</p> <p>FG Forest Green</p> <p>CC Custom Color</p> <p>WGF Custom Wood Grain Finish *20' Max Pole Height *Consult Factory</p> <p>ANO Anodized *No Paint</p> <p>XX+ANO Powder Coat Paint Over Anodized</p> <p>ZFP Zinc-Free Primer Coat *Consult Factory</p>	<p>GFI GFI Receptacle *Standard location is in hand hole. *Specify GFI location if different from hand hole location. Supplied with in use cover.</p> <p>USB USB Receptacle *Specify location. Supplied with in use cover.</p> <p>CUP1/2 Coupling 1/2" *Specify location</p> <p>CUP3/4 Coupling 3/4" *Specify location</p> <p>IVD Internal Vibration Dampener</p> <p>RBC Round Base Cover</p> <p>EB Eye Bolt</p> <p>UL UL Certified</p>

*Consult factory for EPA data.

· CAUTION: If any additional stress such as flags, banners, streamers, ropes, or any other such items are added to poles, Visionaire Lighting's normal product guarantee is null and void. Additionally, adding such items to any pole may create severely hazardous conditions. Poles are calculated to withstand steady wind velocities of between 70 and 100 mph wind zones with a 1.3 gust factor depending on height, wall thickness, and width/ diameter. For an exact rating on a specific order, contact Visionaire directly.

· Certain geographic areas experience unique wind conditions that can cause wind-induced vibrations leading to a fatigue problem. There is currently no known method to predict destructive vibration of lighting poles. These conditions are unique and cannot be guaranteed against, and it is the responsibility of a site engineer to address them locally.

GFI Receptacle

Standard location is in hand hole.
Supplied with in-use cover.

**USB Receptacle**

Standard location is in hand hole.
Supplied with in-use cover.



Optional round base cover shown.

Eye Bolt

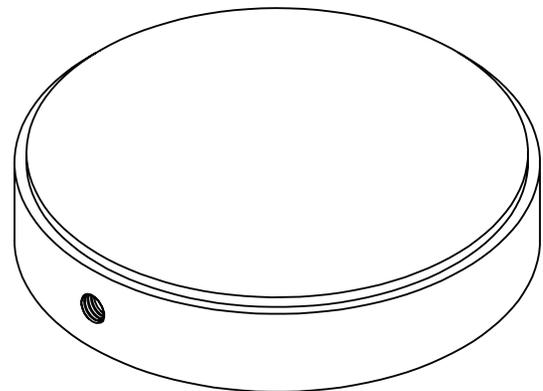
Specify orientation, height and location.
1 17/32" Max eye diameter. Standard
position 6" downwards from top, same
side as standard hand hole.



Optional round
base cover shown.

UL Certified

UL Certified option comes
supplied with aluminum
pole cap as standard.



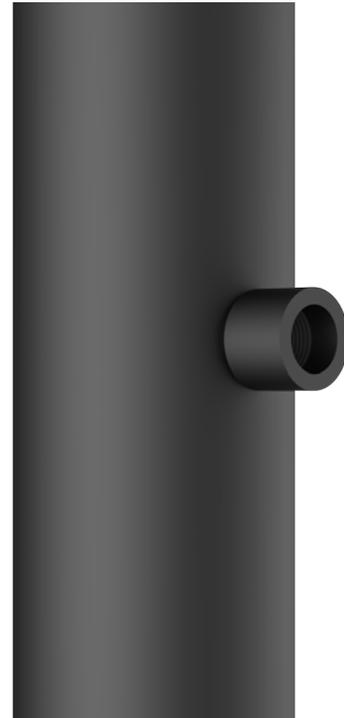
1/2" Coupling

Specify orientation, height and location

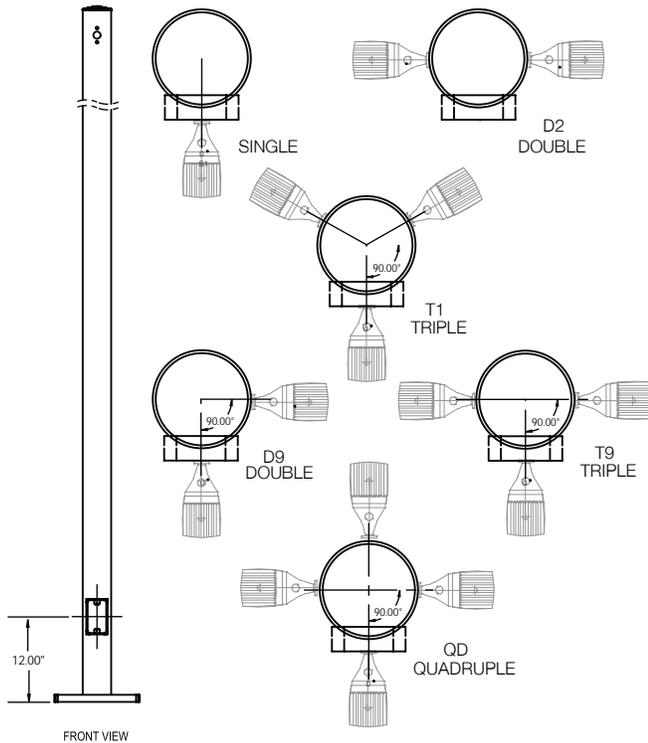


3/4" Coupling

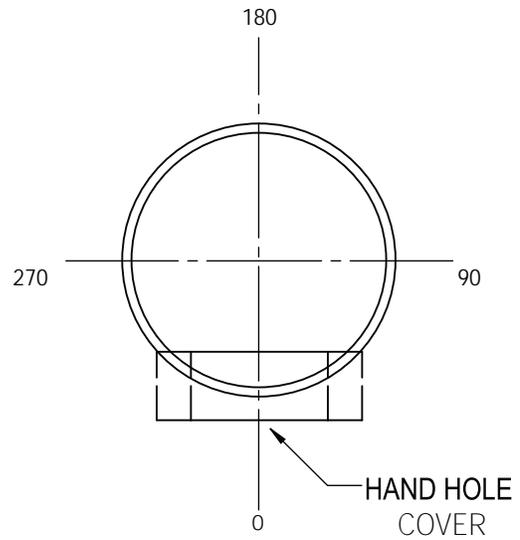
Specify orientation, height and location



Hand Hole And Fixture Orientation



Hand Hole And Accesories Orientation



Internal Vibration Dampener

Internal Chain Vibration Damper can be installed in the field to mollify first mode pole vibration.



Optional round base cover shown.

Custom Wood Grain Finish

Multi Stage Process for realistic wood grain finish. 20' Pole Height Max. Consult factory.



Standard Finish Colors



PRE-2-M LED Specifications



Project Name: _____

Catalog Number: _____

Type: _____

Contemporary design meets the new generation of LED green technology in this stunning luminaire, the **PRE-2-M**. The PRE-2-M series provides up to fifty percent energy savings over traditional HID light sources; and offers excellent beam control and LED life beyond 100,000 hours for 350 milliamp systems. The PRE-2-M is offered in six optical distributions.

The PRE-2-M's fully-sealed housing features an exceptionally well-designed thermal management system that provides superior heat dissipation.

The PRE-2-M fixture is built with a cast aluminum housing, extruded aluminum arms and a spun aluminum, removable top.

The popular **PRE-2-M** is the perfect compliment to any university campus, business park, or walkway project where contemporary, architectural design is desired.

Ordering Information

MODEL	OPTICS	SOURCE	CURRENT	KELVIN	VOLTAGE	MOUNTING	FINISH	OPTIONS	OPTIONS
PRE-2-M	T1	16LC	3 350mA	3K 3000K	UNV 120-277V	PT Post Top *Slips over 3" OD tenon X 4.5" tall as standard	BZ Bronze	PC-120 PC-208 PC-240	DIM 0-10v Dimming Driver
	T2	32LC	5 530mA	4K 4000K	8 347V		BK Black	PC-277 Button Type Photocell	VWC Visionaire Wireless Controls *Consult Factory
	T3	48LC	7 700mA	5K 5000K	5 480V		SBK Smooth Black	WSC-8 Motion Sensor 8' Mounting Height	IR-(R, B, G Illuminated Rings (Red, Blue, Green)
	T4						WH White	WSC-20 Motion Sensor 9-20' Mounting Height	PER 3, 5, or 7 Pin Photo Receptacle w/shorting cap
	T5						SWH Smooth White	WSC-40 Motion Sensor 21-40' Mounting Height This option will require (1) FSIR 100 remote for programming	
	T5W						GP Graphite		
	T5WR					GY Grey			
						SL Silver Metallic			
						CC Custom Color			

Features & Specifications

Housing

The PRE-2-M's housing is constructed from durable, corrosion-resistant, cast aluminum. The spun aluminum top cap is .080 gauge, and easily removable for service. Silicone gasketing is provided for complete weather and insect protection.

Thermal Management

The PRE-2-M provides excellent overall thermal management by maximizing the efficiency of the heat sink in the fixture. This enables the PRE-2-M to withstand higher ambient temperatures and higher drive currents without degrading LED life.

Optical System

- The highest lumen output LEDs are utilized. High-performance acrylic optics feature industry leading Type 1, 2, 3, 4, 5, 5W and 5WR optical distributions. Acrylic optics are impact-resistant and rated to 94 percent translucence.
- L70 life of our LEDs is rated over 100,000 hours (for 350 mA), The optical system qualifies as IES full cutoff to restrict light trespass, glare and light pollution for neighborhood-friendly lighting. CRI values are 70.

Quali-Guard® Finish

- Fixture components are chemically pretreated through a multiple-stage washer, and finished with an electrostatically-applied, thermoset polyester powder coat textured paint with a 3 to 5 mils thickness.
- Finish is oven-baked at 400 °F for maximum adherence and finish hardness.
 - Available in standard and custom colors.
 - Finish is guaranteed for five (5) years.

Post Top Mount

The PRE-2-M contractor-friendly mounting hardware slips over 3" OD tenon X 4.5" tall as standard utilizing stainless steel hardware.

Electrical Assembly

- The PRE-2-M is supplied with a high-performance driver available in 350, 530 or 700. The driver is integrally-located in the housing, and is operational from 120 V through 480 V, 50 Hz to 60 Hz input.
- Power factor is 90%.
- Rated for -40o to 50° C operation.
- 10 kV surge protector supplied as standard.

Warranty

Five (5) year Limited Warranty on entire system, including finish. For full warranty information, please visit www.visionairelighting.com.

Options

- Button type photocell
 - 0-10v Dimming Driver
 - WattStopper FSP-211
 - Motion Sensor
 - Wireless Control
 - Illuminated Rings
 - Photo Receptacle
- Please consult factory for detailed custom options.

Listings

- PRE-2-M is cUL listed
- DLC Listed
- IDA Certification
- IP66 Rated
- LM79 and LM80
- Powder Coated Tough™

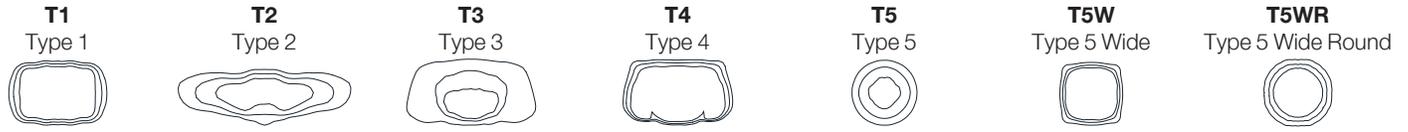


DesignLights Consortium (DLC) qualified Product. Some configurations of this product family may not be DesignLights Consortium (DLC) listed, please refer to the DLC qualified products list to confirm listed configurations. <http://www.designlights.org/>
3000K must be selected for IDA certification.

PRE-2-M - Electrical Load (A)							
Ordering Nomenclature	System Watts	120V	208V	240V	277V	347V	480V
PRE-2-M-T5-16LC-3-4K	18	0.15	0.09	0.08	0.06	0.05	0.04
PRE-2-M-T5-16LC-5-4K	26	0.22	0.13	0.11	0.09	0.07	0.05
PRE-2-M-T5-16LC-7-4K	39	0.33	0.19	0.16	0.14	0.11	0.08
PRE-2-M-T5-32LC-3-4K	35	0.29	0.17	0.15	0.13	0.10	0.07
PRE-2-M-T5-32LC-5-4K	56	0.47	0.27	0.23	0.20	0.16	0.12
PRE-2-M-T5-32LC-7-4K	73	0.61	0.35	0.30	0.26	0.21	0.15
PRE-2-M-T5-48LC-3-4K	55	0.46	0.26	0.23	0.20	0.16	0.11
PRE-2-M-T5-48LC-5-4K	80	0.67	0.38	0.33	0.29	0.23	0.17
PRE-2-M-T5-48LC-7-4K	106	0.88	0.51	0.44	0.38	0.31	0.22

PRE-2-M LED Specifications

Photometric Optical Summary



EPA Data



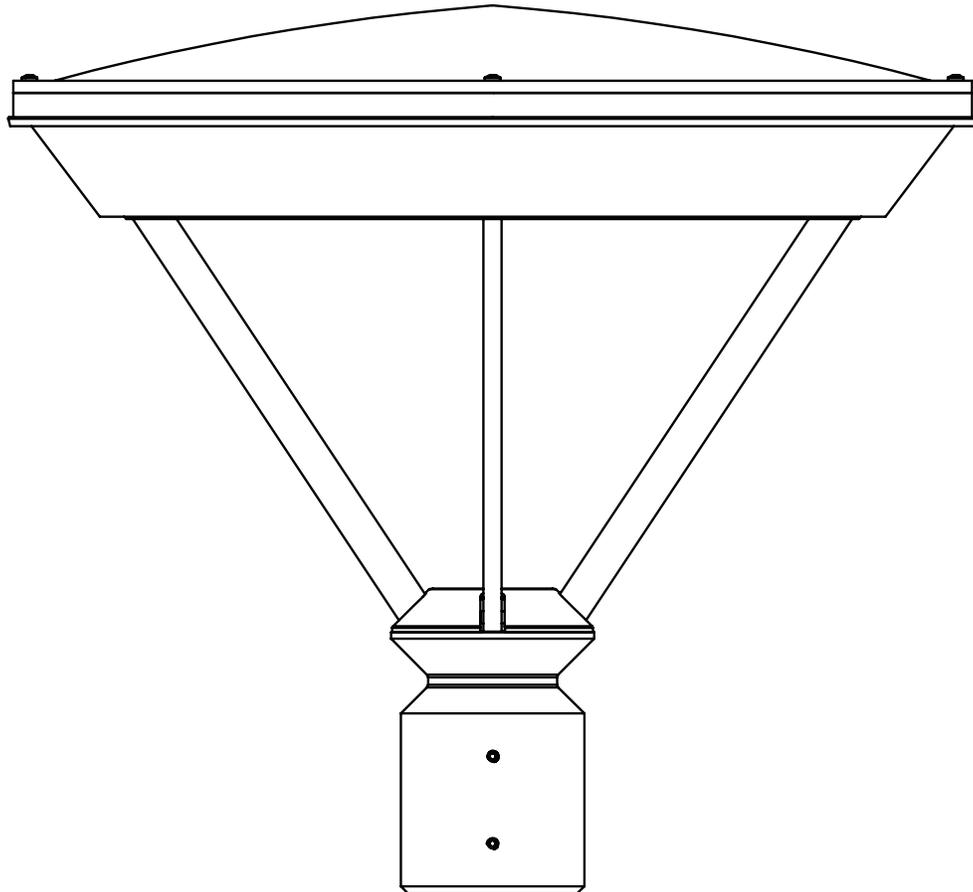
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Dimensions

Width: PRE-2-M 20"

Height: PRE-2-M 18.4"

Weight: 37 LBS



Motion Sensor Default Setting									
Type	High Mode	Low Mode	Time Delay	Cut off Delay	Sensitivity	Hold Off Set Point	Photocell On/Off	Ramp up Time	Fade Down Time
WSC- Default	10V	1V	5 Min	1 Hour	Max	Disabled	Disabled	Disabled	Disabled
WSC Range	0-10V	0-9.8V	5-30 Min	1-5 Hours	Low, Med, Max	1-250FC	1-250FC	1-60 Dec	1-60 Dec

PRE-2-M 3K Lumen Data *Lumen chart updated 08.20.19																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2320	129	2136	119	2117	118	2081	116	2288	127	2184	121	2202	123	18
	530	3181	122	2928	113	2903	112	2853	110	3137	121	2994	115	3018	117	26
	700	4417	113	4066	104	4031	103	3962	102	4356	112	4157	107	4192	108	39
32	350	4531	129	4171	119	4135	118	4064	116	4469	128	4265	122	4300	123	35
	530	6610	118	6085	109	6032	108	5929	106	6519	116	6222	111	6273	113	56
	700	8423	115	7753	106	7687	105	7555	103	8307	114	7928	109	7993	110	73
48	350	6916	126	6366	116	6311	115	6203	113	6821	124	6509	118	6563	120	55
	530	9810	123	9030	113	8952	112	8799	110	9675	121	9233	115	9309	117	80
	700	12431	117	11443	108	11344	107	11150	105	12260	116	11700	110	11797	112	106

PRE-2-M 4K Lumen Data																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2344	130	2157	120	2139	119	2102	117	2311	128	2206	123	2207	123	18
	530	3213	124	2957	114	2932	113	2979	115	3169	122	3024	116	3026	117	26
	700	4462	114	4107	105	4072	104	4002	103	4400	113	4199	108	4202	108	39
32	350	4577	131	4213	120	4177	119	4105	117	4514	129	4308	123	4310	124	35
	530	6677	119	6146	110	6093	109	5989	107	6585	118	6284	112	6289	113	56
	700	8508	117	7832	107	7764	106	7631	105	8391	115	8008	110	8013	110	73
48	350	6986	127	6430	117	6375	116	6266	114	6889	125	6575	120	6579	120	55
	530	9909	124	9121	114	9043	113	8888	111	9773	122	9326	117	9333	117	80
	700	12557	118	11558	109	11459	108	11263	106	12384	117	11818	111	11826	112	106

PRE-2-M 5K Lumen Data																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2442	136	2248	125	2229	124	2191	122	2409	134	2299	128	2318	129	18
	530	3348	129	3082	119	3055	118	3003	116	3302	127	3151	121	3177	123	26
	700	4650	119	4280	110	4243	109	4171	107	4586	118	4376	112	4412	114	39
32	350	4769	136	4390	125	4352	124	4278	122	4704	134	4489	128	4526	130	35
	530	6958	124	6405	114	6350	113	6241	111	6862	123	6549	117	6603	118	56
	700	8866	121	8161	112	8091	111	7953	109	8744	120	8345	114	8414	116	73
48	350	7280	132	6701	122	6643	121	6529	119	7180	131	6852	125	6908	126	55
	530	10326	129	9505	119	9424	118	9262	116	10184	127	9719	121	9799	123	80
	700	13086	123	12045	114	11941	113	11737	111	12905	122	12316	116	12418	118	106

Visit www.VisionaireLighting.com for up-to-the-minute chart information.

# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	2	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106

PRE-2-M 4K Bug Data																							
# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106

PRE-2-M 5K BUG Data																							
# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	2	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106

RNTA Specifications

CONTROL NUMBER: POLES-RNTA-08_20_2024

Round Non Tapered Aluminum Pole



Round Non Tapered Aluminum Pole

Pole Shaft

- Extruded from 6063 alloy aluminum tubing. Shaft is furnished with aluminum ground lug inside pole, opposite hand hole opening. Pole shaft includes a reinforced hand hole opening with cover.

Base Cover

- Die-formed from heavy gauge quality aluminum. Two piece square cover for easy installation. Square base cover is standard, round base cover is optional.
- Base templates provided with order. Do not pre-pour.

Pole Cap

- Color-impregnated polymer snap-to-close pole cap provided in black.

Finish

- All poles are ground and chemically pretreated through a multi-stage washer prior to painting. A Quali-Guard® textured thermoset polyester powder coat is then applied to a minimum of 3 mils and then oven-baked at a temperature of 400 °F to promote exceptional adherence and finish hardness. Optional Wood Grain Finish is a custom color and is limited to 20' pole height, please consult factory. Optional Zinc-Free Primer - Recommended within three miles of the ocean. Pole finish is warranted for a full two (2) years. An optional five (5) year extended warranty is also available.

Project Name:

Catalog Number:

Type:

Date:

Location:

Anchor Bolts

- Poles are provided with hot-dip galvanized anchor bolts, with a "J" bend on one end and two flat hex bolts end and two flat washers per bolt. Anchor bolts meet or exceed a minimum of 36,000 PSI. Anchor bolts conform to ASTM F1554 grade 36 and are provided

MODEL	SHAFT SIZE	GAUGE	HEIGHT	BASE	ANCHORAGE
RNTA Round Non Tapered Aluminum	4R 4"	125 .125" - 4" Pole Only up to 14 feet	10' 12' 14' 16' 18' 20'	AKB Cast Aluminum Base CB Custom Base *Consult Factory	343 3/4" X 30"

MOUNTING	FINISH	OPTIONS
<p>S1 Single Bolt-On Arm</p>  <p>D2 Double 180° Bolt-On Arm</p>  <p>D9 Double 90° Bolt-On Arm</p>  <p>T1 Triple 120° Bolt-On Arm</p>  <p>T9 Triple 90° Bolt-On Arm</p>  <p>QD Quad Bolt-On Arm</p>  <p>Tenon Options</p> <p>T238R 2 3/8"</p> <p>T3R 3"</p> <p>T3.5R 3 1/2"</p> <p>T4R 4"</p>	<p>BZ Bronze</p> <p>BK Black</p> <p>SBK Smooth Black</p> <p>WH White</p> <p>SWH Smooth White</p> <p>GP Graphite</p> <p>GY Grey</p> <p>SL Silver Metallic</p> <p>GN Tennis Green</p> <p>FG Forest Green</p> <p>CC Custom Color</p> <p>WGF Custom Wood Grain Finish *20' Max Pole Height *Consult Factory</p> <p>ANO Anodized *No Paint</p> <p>XX+ANO Powder Coat Paint Over Anodized</p> <p>ZFP Zinc-Free Primer Coat *Consult Factory</p>	<p>GFI GFI Receptacle *Standard location is in hand hole. *Specify GFI location if different from hand hole location. Supplied with in use cover.</p> <p>USB USB Receptacle *Specify location. Supplied with in use cover.</p> <p>CUP1/2 Coupling 1/2" *Specify location</p> <p>CUP3/4 Coupling 3/4" *Specify location</p> <p>IVD Internal Vibration Dampener</p> <p>RBC Round Base Cover</p> <p>EB Eye Bolt</p> <p>UL UL Certified</p>

*Consult factory for EPA data.

· CAUTION: If any additional stress such as flags, banners, streamers, ropes, or any other such items are added to poles, Visionaire Lighting's normal product guarantee is null and void. Additionally, adding such items to any pole may create severely hazardous conditions. Poles are calculated to withstand steady wind velocities of between 70 and 100 mph wind zones with a 1.3 gust factor depending on height, wall thickness, and width/ diameter. For an exact rating on a specific order, contact Visionaire directly.

· Certain geographic areas experience unique wind conditions that can cause wind-induced vibrations leading to a fatigue problem. There is currently no known method to predict destructive vibration of lighting poles. These conditions are unique and cannot be guaranteed against, and it is the responsibility of a site engineer to address them locally.

GFI Receptacle

Standard location is in hand hole.
Supplied with in-use cover.

**USB Receptacle**

Standard location is in hand hole.
Supplied with in-use cover.



Optional round base cover shown.

Eye Bolt

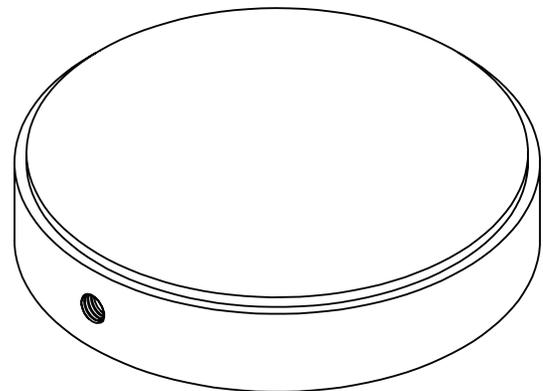
Specify orientation, height and location.
1 17/32" Max eye diameter. Standard
position 6" downwards from top, same
side as standard hand hole.



Optional round
base cover shown.

UL Certified

UL Certified option comes
supplied with aluminum
pole cap as standard.



1/2" Coupling

Specify orientation, height and location

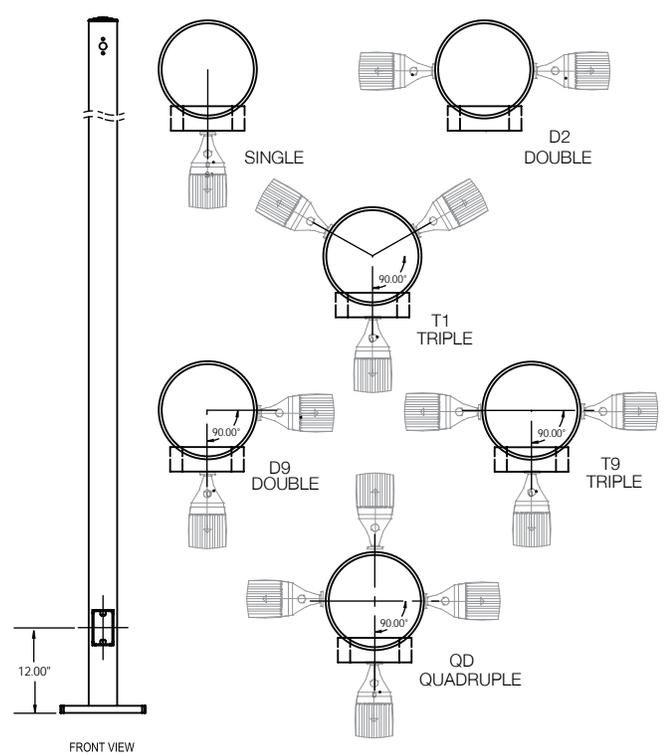


3/4" Coupling

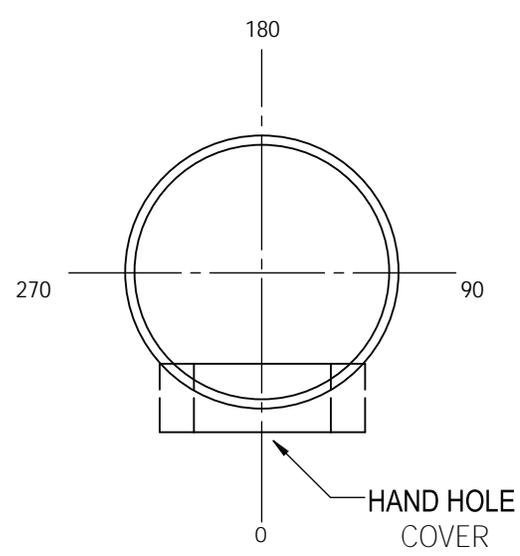
Specify orientation, height and location



Hand Hole And Fixture Orientation



Hand Hole And Accesories Orientation



Internal Vibration Dampener

Internal Chain Vibration Damper can be installed in the field to mollify first mode pole vibration.



Optional round base cover shown.

Custom Wood Grain Finish

Multi Stage Process for realistic wood grain finish. 20' Pole Height Max. Consult factory.



Standard Finish Colors



PRE-2-M LED Specifications



Project Name: _____

Catalog Number: _____

Type: _____

Contemporary design meets the new generation of LED green technology in this stunning luminaire, the **PRE-2-M**. The PRE-2-M series provides up to fifty percent energy savings over traditional HID light sources; and offers excellent beam control and LED life beyond 100,000 hours for 350 milliamp systems. The PRE-2-M is offered in six optical distributions.

The PRE-2-M's fully-sealed housing features an exceptionally well-designed thermal management system that provides superior heat dissipation.

The PRE-2-M fixture is built with a cast aluminum housing, extruded aluminum arms and a spun aluminum, removable top.

The popular **PRE-2-M** is the perfect compliment to any university campus, business park, or walkway project where contemporary, architectural design is desired.

Ordering Information

MODEL	OPTICS	SOURCE	CURRENT	KELVIN	VOLTAGE	MOUNTING	FINISH	OPTIONS	OPTIONS
PRE-2-M	T1 T2 T3 T4 T5 T5W T5WR	16LC 32LC 48LC	3 350mA 5 530mA 7 700mA	3K 3000K 4K 4000K 5K 5000K	UNV 120-277V 8 347V 5 480V	PT Post Top *Slips over 3" OD tenon X 4.5" tall as standard	BZ Bronze BK Black SBK Smooth Black WH White SWH Smooth White GP Graphite GY Grey SL Silver Metallic CC Custom Color	PC-120 PC-208 PC-240 PC-277 Button Type Photocell WSC-8 Motion Sensor 8' Mounting Height WSC-20 Motion Sensor 9-20' Mounting Height WSC-40 Motion Sensor 21-40' Mounting Height This option will require (1) FSIR 100 remote for programming	DIM 0-10v Dimming Driver VWC Visionaire Wireless Controls *Consult Factory IR-(R, B, G Illuminated Rings (Red, Blue, Green) PER 3, 5, or 7 Pin Photo Receptacle w/shorting cap

Features & Specifications

Housing

The PRE-2-M's housing is constructed from durable, corrosion-resistant, cast aluminum. The spun aluminum top cap is .080 gauge, and easily removable for service. Silicone gasketing is provided for complete weather and insect protection.

Thermal Management

The PRE-2-M provides excellent overall thermal management by maximizing the efficiency of the heat sink in the fixture. This enables the PRE-2-M to withstand higher ambient temperatures and higher drive currents without degrading LED life.

Optical System

- The highest lumen output LEDs are utilized. High-performance acrylic optics feature industry leading Type 1, 2, 3, 4, 5, 5W and 5WR optical distributions. Acrylic optics are impact-resistant and rated to 94 percent translucence.
- L70 life of our LEDs is rated over 100,000 hours (for 350 mA), The optical system qualifies as IES full cutoff to restrict light trespass, glare and light pollution for neighborhood-friendly lighting. CRI values are 70.

Quali-Guard® Finish

- Fixture components are chemically pretreated through a multiple-stage washer, and finished with an electrostatically-applied, thermoset polyester powder coat textured paint with a 3 to 5 mils thickness.
- Finish is oven-baked at 400 °F for maximum adherence and finish hardness.
 - Available in standard and custom colors.
 - Finish is guaranteed for five (5) years.

Post Top Mount

The PRE-2-M contractor-friendly mounting hardware slips over 3" OD tenon X 4.5" tall as standard utilizing stainless steel hardware.

Electrical Assembly

- The PRE-2-M is supplied with a high-performance driver available in 350, 530 or 700. The driver is integrally-located in the housing, and is operational from 120 V through 480 V, 50 Hz to 60 Hz input.
- Power factor is 90%.
- Rated for -40o to 50° C operation.
- 10 kV surge protector supplied as standard.

Warranty

Five (5) year Limited Warranty on entire system, including finish. For full warranty information, please visit www.visionairelighting.com.

Options

- Button type photocell
 - 0-10v Dimming Driver
 - WattStopper FSP-211
 - Motion Sensor
 - Wireless Control
 - Illuminated Rings
 - Photo Receptacle
- Please consult factory for detailed custom options.

Listings

- PRE-2-M is cUL listed
- DLC Listed
- IDA Certification
- IP66 Rated
- LM79 and LM80
- Powder Coated Tough™

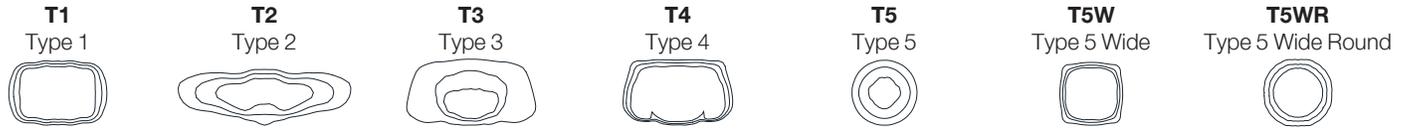


DesignLights Consortium (DLC) qualified Product. Some configurations of this product family may not be DesignLights Consortium (DLC) listed, please refer to the DLC qualified products list to confirm listed configurations. <http://www.designlights.org/>
3000K must be selected for IDA certification.

PRE-2-M - Electrical Load (A)							
Ordering Nomenclature	System Watts	120V	208V	240V	277V	347V	480V
PRE-2-M-T5-16LC-3-4K	18	0.15	0.09	0.08	0.06	0.05	0.04
PRE-2-M-T5-16LC-5-4K	26	0.22	0.13	0.11	0.09	0.07	0.05
PRE-2-M-T5-16LC-7-4K	39	0.33	0.19	0.16	0.14	0.11	0.08
PRE-2-M-T5-32LC-3-4K	35	0.29	0.17	0.15	0.13	0.10	0.07
PRE-2-M-T5-32LC-5-4K	56	0.47	0.27	0.23	0.20	0.16	0.12
PRE-2-M-T5-32LC-7-4K	73	0.61	0.35	0.30	0.26	0.21	0.15
PRE-2-M-T5-48LC-3-4K	55	0.46	0.26	0.23	0.20	0.16	0.11
PRE-2-M-T5-48LC-5-4K	80	0.67	0.38	0.33	0.29	0.23	0.17
PRE-2-M-T5-48LC-7-4K	106	0.88	0.51	0.44	0.38	0.31	0.22

PRE-2-M LED Specifications

Photometric Optical Summary



EPA Data



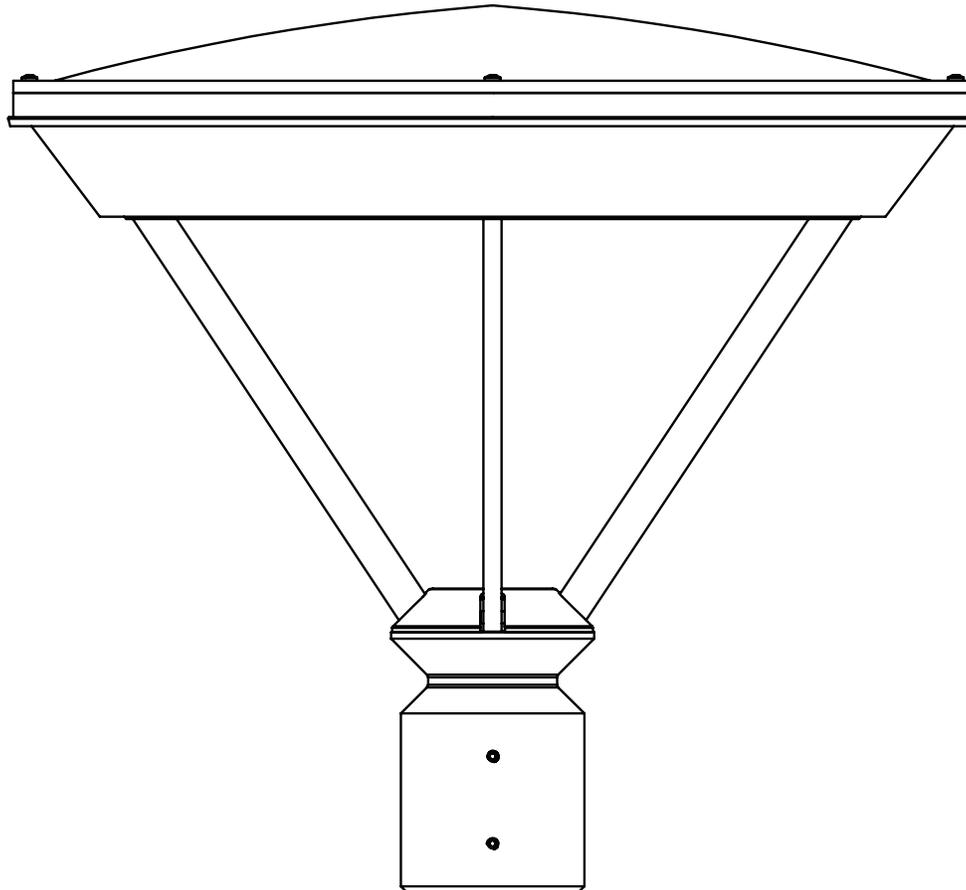
.88

Dimensions

Width: PRE-2-M 20"

Height: PRE-2-M 18.4"

Weight: 37 LBS



Motion Sensor Default Setting									
Type	High Mode	Low Mode	Time Delay	Cut off Delay	Sensitivity	Hold Off Set Point	Photocell On/Off	Ramp up Time	Fade Down Time
WSC- Default	10V	1V	5 Min	1 Hour	Max	Disabled	Disabled	Disabled	Disabled
WSC Range	0-10V	0-9.8V	5-30 Min	1-5 Hours	Low, Med, Max	1-250FC	1-250FC	1-60 Dec	1-60 Dec

PRE-2-M 3K Lumen Data *Lumen chart updated 08.20.19																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2320	129	2136	119	2117	118	2081	116	2288	127	2184	121	2202	123	18
	530	3181	122	2928	113	2903	112	2853	110	3137	121	2994	115	3018	117	26
	700	4417	113	4066	104	4031	103	3962	102	4356	112	4157	107	4192	108	39
32	350	4531	129	4171	119	4135	118	4064	116	4469	128	4265	122	4300	123	35
	530	6610	118	6085	109	6032	108	5929	106	6519	116	6222	111	6273	113	56
	700	8423	115	7753	106	7687	105	7555	103	8307	114	7928	109	7993	110	73
48	350	6916	126	6366	116	6311	115	6203	113	6821	124	6509	118	6563	120	55
	530	9810	123	9030	113	8952	112	8799	110	9675	121	9233	115	9309	117	80
	700	12431	117	11443	108	11344	107	11150	105	12260	116	11700	110	11797	112	106

PRE-2-M 4K Lumen Data																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2344	130	2157	120	2139	119	2102	117	2311	128	2206	123	2207	123	18
	530	3213	124	2957	114	2932	113	2979	115	3169	122	3024	116	3026	117	26
	700	4462	114	4107	105	4072	104	4002	103	4400	113	4199	108	4202	108	39
32	350	4577	131	4213	120	4177	119	4105	117	4514	129	4308	123	4310	124	35
	530	6677	119	6146	110	6093	109	5989	107	6585	118	6284	112	6289	113	56
	700	8508	117	7832	107	7764	106	7631	105	8391	115	8008	110	8013	110	73
48	350	6986	127	6430	117	6375	116	6266	114	6889	125	6575	120	6579	120	55
	530	9909	124	9121	114	9043	113	8888	111	9773	122	9326	117	9333	117	80
	700	12557	118	11558	109	11459	108	11263	106	12384	117	11818	111	11826	112	106

PRE-2-M 5K Lumen Data																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2442	136	2248	125	2229	124	2191	122	2409	134	2299	128	2318	129	18
	530	3348	129	3082	119	3055	118	3003	116	3302	127	3151	121	3177	123	26
	700	4650	119	4280	110	4243	109	4171	107	4586	118	4376	112	4412	114	39
32	350	4769	136	4390	125	4352	124	4278	122	4704	134	4489	128	4526	130	35
	530	6958	124	6405	114	6350	113	6241	111	6862	123	6549	117	6603	118	56
	700	8866	121	8161	112	8091	111	7953	109	8744	120	8345	114	8414	116	73
48	350	7280	132	6701	122	6643	121	6529	119	7180	131	6852	125	6908	126	55
	530	10326	129	9505	119	9424	118	9262	116	10184	127	9719	121	9799	123	80
	700	13086	123	12045	114	11941	113	11737	111	12905	122	12316	116	12418	118	106

Visit www.VisionaireLighting.com for up-to-the-minute chart information.

# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	2	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106

PRE-2-M 4K Bug Data																							
# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106

PRE-2-M 5K BUG Data																							
# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	2	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106



Round Non Tapered Aluminum Pole

Pole Shaft

- Extruded from 6063 alloy aluminum tubing. Shaft is furnished with aluminum ground lug inside pole, opposite hand hole opening. Pole shaft includes a reinforced hand hole opening with cover.

Base Cover

- Die-formed from heavy gauge quality aluminum. Two piece square cover for easy installation. Square base cover is standard, round base cover is optional.
- Base templates provided with order. Do not pre-pour.

Pole Cap

- Color-impregnated polymer snap-to-close pole cap provided in black.

Finish

- All poles are ground and chemically pretreated through a multi-stage washer prior to painting. A Quali-Guard® textured thermoset polyester powder coat is then applied to a minimum of 3 mils and then oven-baked at a temperature of 400 °F to promote exceptional adherence and finish hardness. Optional Wood Grain Finish is a custom color and is limited to 20' pole height, please consult factory. Optional Zinc-Free Primer - Recommended within three miles of the ocean. Pole finish is warranted for a full two (2) years. An optional five (5) year extended warranty is also available.

Project Name:

Catalog Number:

Type:

Date:

Location:

Anchor Bolts

- Poles are provided with hot-dip galvanized anchor bolts, with a "J" bend on one end and two flat hex bolts end and two flat washers per bolt. Anchor bolts meet or exceed a minimum of 36,000 PSI. Anchor bolts conform to ASTM F1554 grade 36 and are provided

MODEL	SHAFT SIZE	GAUGE	HEIGHT	BASE	ANCHORAGE
RNTA Round Non Tapered Aluminum	4R 4"	125 .125" - 4" Pole Only up to 14 feet	10' 12' 14' 16' 18' 20'	AKB Cast Aluminum Base CB Custom Base *Consult Factory	343 3/4" X 30"

MOUNTING	FINISH	OPTIONS
<p>S1 Single Bolt-On Arm</p>  <p>D2 Double 180° Bolt-On Arm</p>  <p>D9 Double 90° Bolt-On Arm</p>  <p>T1 Triple 120° Bolt-On Arm</p>  <p>T9 Triple 90° Bolt-On Arm</p>  <p>QD Quad Bolt-On Arm</p>  <p>Tenon Options</p> <p>T238R 2 3/8"</p> <p>T3R 3"</p> <p>T3.5R 3 1/2"</p> <p>T4R 4"</p>	<p>BZ Bronze</p> <p>BK Black</p> <p>SBK Smooth Black</p> <p>WH White</p> <p>SWH Smooth White</p> <p>GP Graphite</p> <p>GY Grey</p> <p>SL Silver Metallic</p> <p>GN Tennis Green</p> <p>FG Forest Green</p> <p>CC Custom Color</p> <p>WGF Custom Wood Grain Finish *20' Max Pole Height *Consult Factory</p> <p>ANO Anodized *No Paint</p> <p>XX+ANO Powder Coat Paint Over Anodized</p> <p>ZFP Zinc-Free Primer Coat *Consult Factory</p>	<p>GFI GFI Receptacle *Standard location is in hand hole. *Specify GFI location if different from hand hole location. Supplied with in use cover.</p> <p>USB USB Receptacle *Specify location. Supplied with in use cover.</p> <p>CUP1/2 Coupling 1/2" *Specify location</p> <p>CUP3/4 Coupling 3/4" *Specify location</p> <p>IVD Internal Vibration Dampener</p> <p>RBC Round Base Cover</p> <p>EB Eye Bolt</p> <p>UL UL Certified</p>

*Consult factory for EPA data.

· CAUTION: If any additional stress such as flags, banners, streamers, ropes, or any other such items are added to poles, Visionaire Lighting's normal product guarantee is null and void. Additionally, adding such items to any pole may create severely hazardous conditions. Poles are calculated to withstand steady wind velocities of between 70 and 100 mph wind zones with a 1.3 gust factor depending on height, wall thickness, and width/ diameter. For an exact rating on a specific order, contact Visionaire directly.

· Certain geographic areas experience unique wind conditions that can cause wind-induced vibrations leading to a fatigue problem. There is currently no known method to predict destructive vibration of lighting poles. These conditions are unique and cannot be guaranteed against, and it is the responsibility of a site engineer to address them locally.

GFI Receptacle

Standard location is in hand hole.
Supplied with in-use cover.



USB Receptacle

Standard location is in hand hole.
Supplied with in-use cover.



Optional round base cover shown.

Eye Bolt

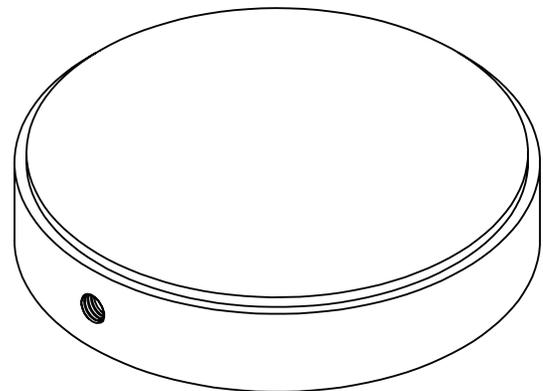
Specify orientation, height and location.
1 17/32" Max eye diameter. Standard
position 6" downwards from top, same
side as standard hand hole.



Optional round
base cover shown.

UL Certified

UL Certified option comes
supplied with aluminum
pole cap as standard.



1/2" Coupling

Specify orientation, height and location

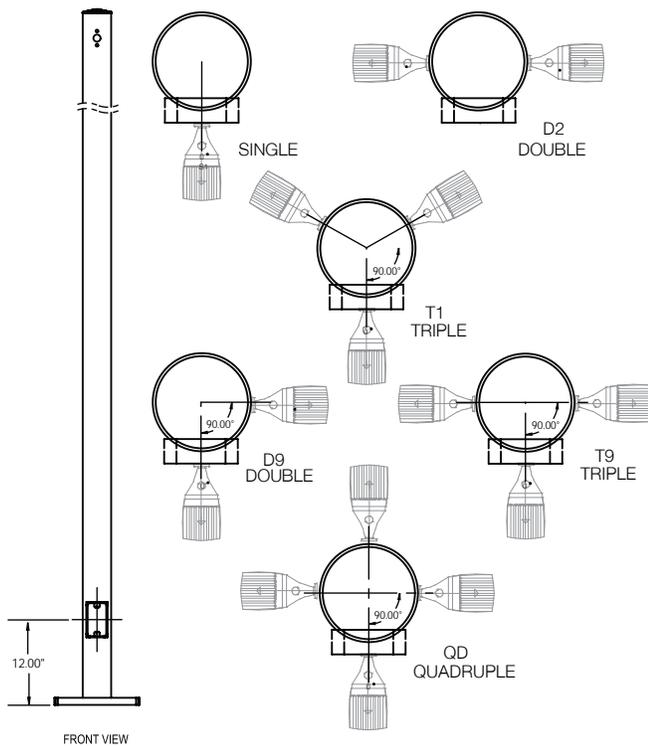


3/4" Coupling

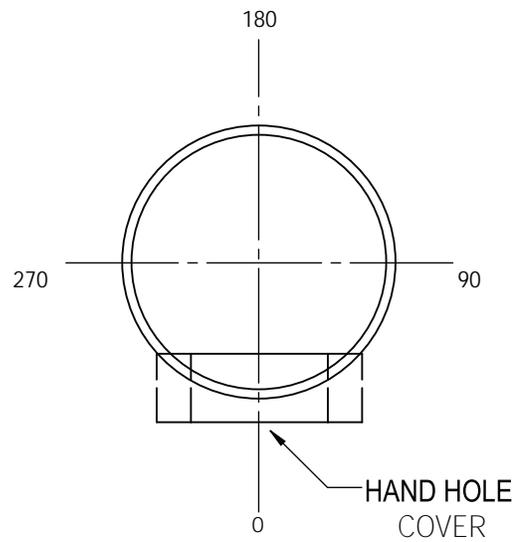
Specify orientation, height and location



Hand Hole And Fixture Orientation



Hand Hole And Accesories Orientation



Internal Vibration Dampener

Internal Chain Vibration Damper can be installed in the field to mollify first mode pole vibration.



Optional round base cover shown.

Custom Wood Grain Finish

Multi Stage Process for realistic wood grain finish. 20' Pole Height Max. Consult factory.



Standard Finish Colors



PRE-2-M LED Specifications



Project Name: _____

Catalog Number: _____

Type: _____

Contemporary design meets the new generation of LED green technology in this stunning luminaire, the **PRE-2-M**. The PRE-2-M series provides up to fifty percent energy savings over traditional HID light sources; and offers excellent beam control and LED life beyond 100,000 hours for 350 milliamp systems. The PRE-2-M is offered in six optical distributions.

The PRE-2-M's fully-sealed housing features an exceptionally well-designed thermal management system that provides superior heat dissipation.

The PRE-2-M fixture is built with a cast aluminum housing, extruded aluminum arms and a spun aluminum, removable top.

The popular **PRE-2-M** is the perfect compliment to any university campus, business park, or walkway project where contemporary, architectural design is desired.

Ordering Information

MODEL	OPTICS	SOURCE	CURRENT	KELVIN	VOLTAGE	MOUNTING	FINISH	OPTIONS	OPTIONS
PRE-2-M	T1	16LC	3 350mA	3K 3000K	UNV 120-277V	PT Post Top *Slips over 3" OD tenon X 4.5" tall as standard	BZ Bronze	PC-120 PC-208 PC-240	DIM 0-10v Dimming Driver
	T2	32LC	5 530mA	4K 4000K	8 347V		BK Black	PC-277 Button Type Photocell	VWC Visionaire Wireless Controls *Consult Factory
	T3	48LC	7 700mA	5K 5000K	5 480V		SBK Smooth Black	WSC-8 Motion Sensor 8' Mounting Height	IR-(R, B, G Illuminated Rings (Red, Blue, Green)
	T4						WH White	WSC-20 Motion Sensor 9-20' Mounting Height	PER 3, 5, or 7 Pin Photo Receptacle w/shorting cap
	T5						SWH Smooth White	WSC-40 Motion Sensor 21-40' Mounting Height This option will require (1) FSIR 100 remote for programming	
	T5W						GP Graphite		
	T5WR						GY Grey		
							SL Silver Metallic		
							CC Custom Color		

Features & Specifications

Housing

The PRE-2-M's housing is constructed from durable, corrosion-resistant, cast aluminum. The spun aluminum top cap is .080 gauge, and easily removable for service. Silicone gasketing is provided for complete weather and insect protection.

Thermal Management

The PRE-2-M provides excellent overall thermal management by maximizing the efficiency of the heat sink in the fixture. This enables the PRE-2-M to withstand higher ambient temperatures and higher drive currents without degrading LED life.

Optical System

- The highest lumen output LEDs are utilized. High-performance acrylic optics feature industry leading Type 1, 2, 3, 4, 5, 5W and 5WR optical distributions. Acrylic optics are impact-resistant and rated to 94 percent translucence.
- L70 life of our LEDs is rated over 100,000 hours (for 350 mA), The optical system qualifies as IES full cutoff to restrict light trespass, glare and light pollution for neighborhood-friendly lighting. CRI values are 70.

Quali-Guard® Finish

- Fixture components are chemically pretreated through a multiple-stage washer, and finished with an electrostatically-applied, thermoset polyester powder coat textured paint with a 3 to 5 mils thickness.
- Finish is oven-baked at 400 °F for maximum adherence and finish hardness.
 - Available in standard and custom colors.
 - Finish is guaranteed for five (5) years.

Post Top Mount

The PRE-2-M contractor-friendly mounting hardware slips over 3" OD tenon X 4.5" tall as standard utilizing stainless steel hardware.

Electrical Assembly

- The PRE-2-M is supplied with a high-performance driver available in 350, 530 or 700. The driver is integrally-located in the housing, and is operational from 120 V through 480 V, 50 Hz to 60 Hz input.
- Power factor is 90%.
- Rated for -40o to 50° C operation.
- 10 kV surge protector supplied as standard.

Warranty

Five (5) year Limited Warranty on entire system, including finish. For full warranty information, please visit www.visionairelighting.com.

Options

- Button type photocell
 - 0-10v Dimming Driver
 - WattStopper FSP-211
 - Motion Sensor
 - Wireless Control
 - Illuminated Rings
 - Photo Receptacle
- Please consult factory for detailed custom options.

Listings

- PRE-2-M is cUL listed
- DLC Listed
- IDA Certification
- IP66 Rated
- LM79 and LM80
- Powder Coated Tough™

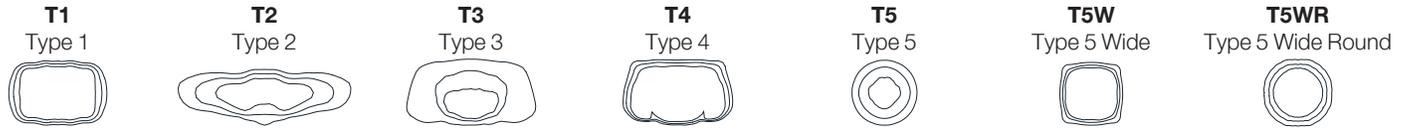


DesignLights Consortium (DLC) qualified Product. Some configurations of this product family may not be DesignLights Consortium (DLC) listed, please refer to the DLC qualified products list to confirm listed configurations. <http://www.designlights.org/>
3000K must be selected for IDA certification.

PRE-2-M - Electrical Load (A)							
Ordering Nomenclature	System Watts	120V	208V	240V	277V	347V	480V
PRE-2-M-T5-16LC-3-4K	18	0.15	0.09	0.08	0.06	0.05	0.04
PRE-2-M-T5-16LC-5-4K	26	0.22	0.13	0.11	0.09	0.07	0.05
PRE-2-M-T5-16LC-7-4K	39	0.33	0.19	0.16	0.14	0.11	0.08
PRE-2-M-T5-32LC-3-4K	35	0.29	0.17	0.15	0.13	0.10	0.07
PRE-2-M-T5-32LC-5-4K	56	0.47	0.27	0.23	0.20	0.16	0.12
PRE-2-M-T5-32LC-7-4K	73	0.61	0.35	0.30	0.26	0.21	0.15
PRE-2-M-T5-48LC-3-4K	55	0.46	0.26	0.23	0.20	0.16	0.11
PRE-2-M-T5-48LC-5-4K	80	0.67	0.38	0.33	0.29	0.23	0.17
PRE-2-M-T5-48LC-7-4K	106	0.88	0.51	0.44	0.38	0.31	0.22

PRE-2-M LED Specifications

Photometric Optical Summary



EPA Data



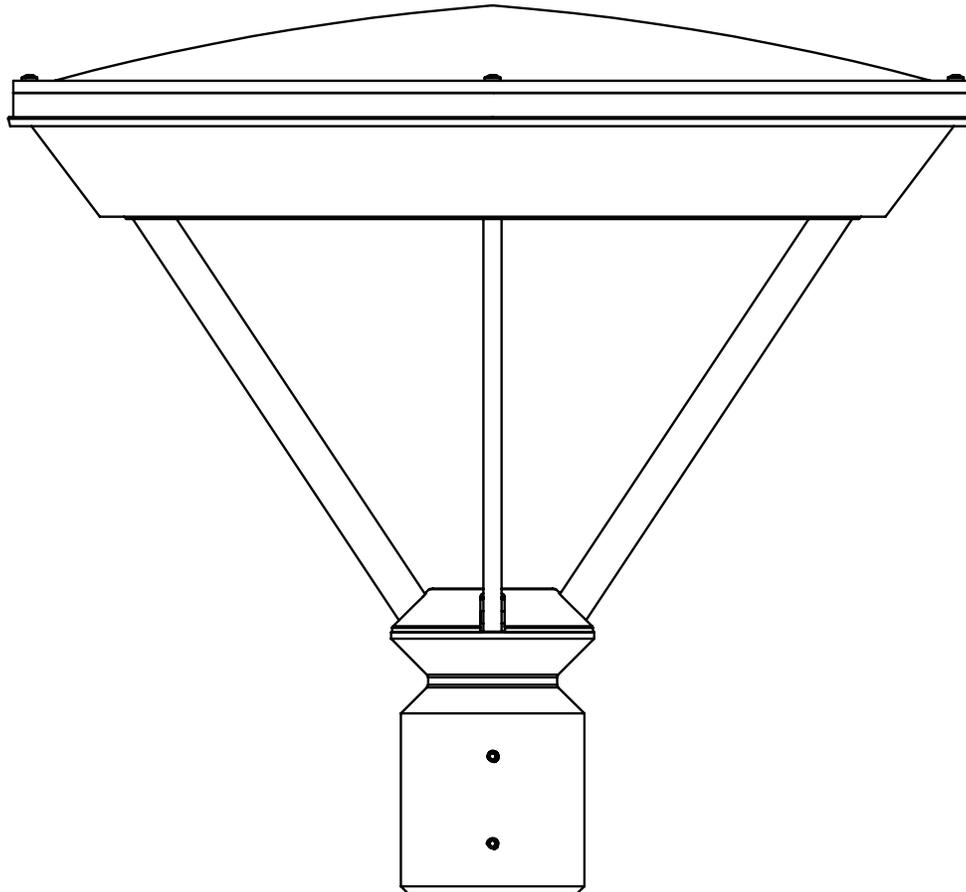
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Dimensions

Width: PRE-2-M 20"

Height: PRE-2-M 18.4"

Weight: 37 LBS



Motion Sensor Default Setting									
Type	High Mode	Low Mode	Time Delay	Cut off Delay	Sensitivity	Hold Off Set Point	Photocell On/Off	Ramp up Time	Fade Down Time
WSC- Default	10V	1V	5 Min	1 Hour	Max	Disabled	Disabled	Disabled	Disabled
WSC Range	0-10V	0-9.8V	5-30 Min	1-5 Hours	Low, Med, Max	1-250FC	1-250FC	1-60 Dec	1-60 Dec

PRE-2-M 3K Lumen Data *Lumen chart updated 08.20.19																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2320	129	2136	119	2117	118	2081	116	2288	127	2184	121	2202	123	18
	530	3181	122	2928	113	2903	112	2853	110	3137	121	2994	115	3018	117	26
	700	4417	113	4066	104	4031	103	3962	102	4356	112	4157	107	4192	108	39
32	350	4531	129	4171	119	4135	118	4064	116	4469	128	4265	122	4300	123	35
	530	6610	118	6085	109	6032	108	5929	106	6519	116	6222	111	6273	113	56
	700	8423	115	7753	106	7687	105	7555	103	8307	114	7928	109	7993	110	73
48	350	6916	126	6366	116	6311	115	6203	113	6821	124	6509	118	6563	120	55
	530	9810	123	9030	113	8952	112	8799	110	9675	121	9233	115	9309	117	80
	700	12431	117	11443	108	11344	107	11150	105	12260	116	11700	110	11797	112	106

PRE-2-M 4K Lumen Data																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2344	130	2157	120	2139	119	2102	117	2311	128	2206	123	2207	123	18
	530	3213	124	2957	114	2932	113	2979	115	3169	122	3024	116	3026	117	26
	700	4462	114	4107	105	4072	104	4002	103	4400	113	4199	108	4202	108	39
32	350	4577	131	4213	120	4177	119	4105	117	4514	129	4308	123	4310	124	35
	530	6677	119	6146	110	6093	109	5989	107	6585	118	6284	112	6289	113	56
	700	8508	117	7832	107	7764	106	7631	105	8391	115	8008	110	8013	110	73
48	350	6986	127	6430	117	6375	116	6266	114	6889	125	6575	120	6579	120	55
	530	9909	124	9121	114	9043	113	8888	111	9773	122	9326	117	9333	117	80
	700	12557	118	11558	109	11459	108	11263	106	12384	117	11818	111	11826	112	106

PRE-2-M 5K Lumen Data																
# LEDs	mA	T1		T2		T3		T4		T5		T5W		T5WR		Watts
		Lumens	LPW													
16	350	2442	136	2248	125	2229	124	2191	122	2409	134	2299	128	2318	129	18
	530	3348	129	3082	119	3055	118	3003	116	3302	127	3151	121	3177	123	26
	700	4650	119	4280	110	4243	109	4171	107	4586	118	4376	112	4412	114	39
32	350	4769	136	4390	125	4352	124	4278	122	4704	134	4489	128	4526	130	35
	530	6958	124	6405	114	6350	113	6241	111	6862	123	6549	117	6603	118	56
	700	8866	121	8161	112	8091	111	7953	109	8744	120	8345	114	8414	116	73
48	350	7280	132	6701	122	6643	121	6529	119	7180	131	6852	125	6908	126	55
	530	10326	129	9505	119	9424	118	9262	116	10184	127	9719	121	9799	123	80
	700	13086	123	12045	114	11941	113	11737	111	12905	122	12316	116	12418	118	106

Visit www.VisionaireLighting.com for up-to-the-minute chart information.

# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	2	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106

PRE-2-M 4K Bug Data																							
# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106

PRE-2-M 5K BUG Data																							
# LEDs	mA	T1			T2			T3			T4			T5			T5W			T5WR			Watts
		B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	B	U	G	
16	350	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	18
	530	2	0	2	1	0	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	1	26
	700	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	39
32	350	2	0	2	1	0	2	1	0	1	1	0	1	2	0	1	3	0	1	3	0	1	35
	530	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	56
	700	3	0	3	2	0	2	2	0	2	1	0	2	3	0	1	3	0	2	3	0	2	73
48	350	3	0	3	2	0	2	1	0	2	1	0	2	3	0	1	3	0	1	3	0	2	55
	530	3	0	3	2	0	3	2	0	2	2	0	2	3	0	2	3	0	2	4	0	2	80
	700	3	0	3	3	0	3	2	0	2	2	0	2	3	0	2	4	0	2	4	0	2	106

RNTA Specifications

CONTROL NUMBER: POLES-RNTA-08_20_2024

Round Non Tapered Aluminum Pole



Round Non Tapered Aluminum Pole

Pole Shaft

- Extruded from 6063 alloy aluminum tubing. Shaft is furnished with aluminum ground lug inside pole, opposite hand hole opening. Pole shaft includes a reinforced hand hole opening with cover.

Base Cover

- Die-formed from heavy gauge quality aluminum. Two piece square cover for easy installation. Square base cover is standard, round base cover is optional.
- Base templates provided with order. Do not pre-pour.

Pole Cap

- Color-impregnated polymer snap-to-close pole cap provided in black.

Finish

- All poles are ground and chemically pretreated through a multi-stage washer prior to painting. A Quali-Guard® textured thermoset polyester powder coat is then applied to a minimum of 3 mils and then oven-baked at a temperature of 400 °F to promote exceptional adherence and finish hardness. Optional Wood Grain Finish is a custom color and is limited to 20' pole height, please consult factory. Optional Zinc-Free Primer - Recommended within three miles of the ocean. Pole finish is warranted for a full two (2) years. An optional five (5) year extended warranty is also available.

Project Name:

Catalog Number:

Type:

Date:

Location:

Anchor Bolts

- Poles are provided with hot-dip galvanized anchor bolts, with a "J" bend on one end and two flat hex bolts end and two flat washers per bolt. Anchor bolts meet or exceed a minimum of 36,000 PSI. Anchor bolts conform to ASTM F1554 grade 36 and are provided

MODEL	SHAFT SIZE	GAUGE	HEIGHT	BASE	ANCHORAGE
RNTA Round Non Tapered Aluminum	4R 4"	125 .125" - 4" Pole Only up to 14 feet	10' 12' 14' 16' 18' 20'	AKB Cast Aluminum Base CB Custom Base *Consult Factory	343 3/4" X 30"

MOUNTING	FINISH	OPTIONS
<p>S1 Single Bolt-On Arm </p> <p>D2 Double 180° Bolt-On Arm </p> <p>D9 Double 90° Bolt-On Arm </p> <p>T1 Triple 120° Bolt-On Arm </p> <p>T9 Triple 90° Bolt-On Arm </p> <p>QD Quad Bolt-On Arm </p> <p>Tenon Options</p> <p>T238R 2 3/8"</p> <p>T3R 3"</p> <p>T3.5R 3 1/2"</p> <p>T4R 4"</p>	<p>BZ Bronze</p> <p>BK Black</p> <p>SBK Smooth Black</p> <p>WH White</p> <p>SWH Smooth White</p> <p>GP Graphite</p> <p>GY Grey</p> <p>SL Silver Metallic</p> <p>GN Tennis Green</p> <p>FG Forest Green</p> <p>CC Custom Color</p> <p>WGF Custom Wood Grain Finish *20' Max Pole Height *Consult Factory</p> <p>ANO Anodized *No Paint</p> <p>XX+ANO Powder Coat Paint Over Anodized</p> <p>ZFP Zinc-Free Primer Coat *Consult Factory</p>	<p>GFI GFI Receptacle *Standard location is in hand hole. *Specify GFI location if different from hand hole location. Supplied with in use cover.</p> <p>USB USB Receptacle *Specify location. Supplied with in use cover.</p> <p>CUP1/2 Coupling 1/2" *Specify location</p> <p>CUP3/4 Coupling 3/4" *Specify location</p> <p>IVD Internal Vibration Dampener</p> <p>RBC Round Base Cover</p> <p>EB Eye Bolt</p> <p>UL UL Certified</p>

*Consult factory for EPA data.

· CAUTION: If any additional stress such as flags, banners, streamers, ropes, or any other such items are added to poles, Visionaire Lighting's normal product guarantee is null and void. Additionally, adding such items to any pole may create severely hazardous conditions. Poles are calculated to withstand steady wind velocities of between 70 and 100 mph wind zones with a 1.3 gust factor depending on height, wall thickness, and width/ diameter. For an exact rating on a specific order, contact Visionaire directly.

· Certain geographic areas experience unique wind conditions that can cause wind-induced vibrations leading to a fatigue problem. There is currently no known method to predict destructive vibration of lighting poles. These conditions are unique and cannot be guaranteed against, and it is the responsibility of a site engineer to address them locally.

GFI Receptacle

Standard location is in hand hole.
Supplied with in-use cover.

**USB Receptacle**

Standard location is in hand hole.
Supplied with in-use cover.



Optional round base cover shown.

Eye Bolt

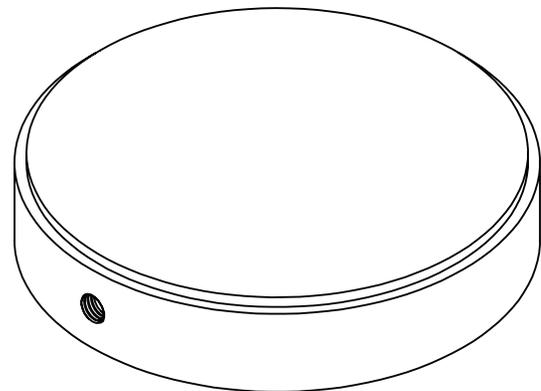
Specify orientation, height and location.
1 17/32" Max eye diameter. Standard
position 6" downwards from top, same
side as standard hand hole.



Optional round
base cover shown.

UL Certified

UL Certified option comes
supplied with aluminum
pole cap as standard.



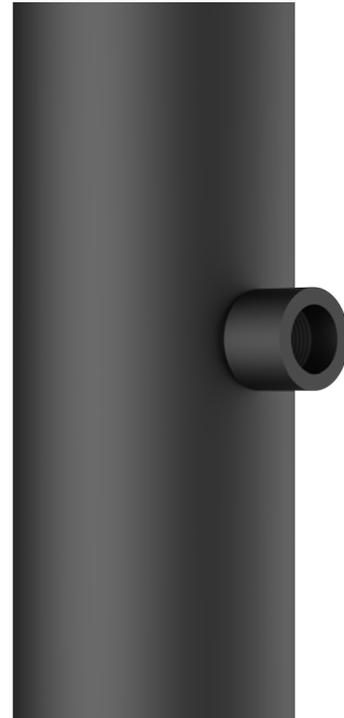
1/2" Coupling

Specify orientation, height and location

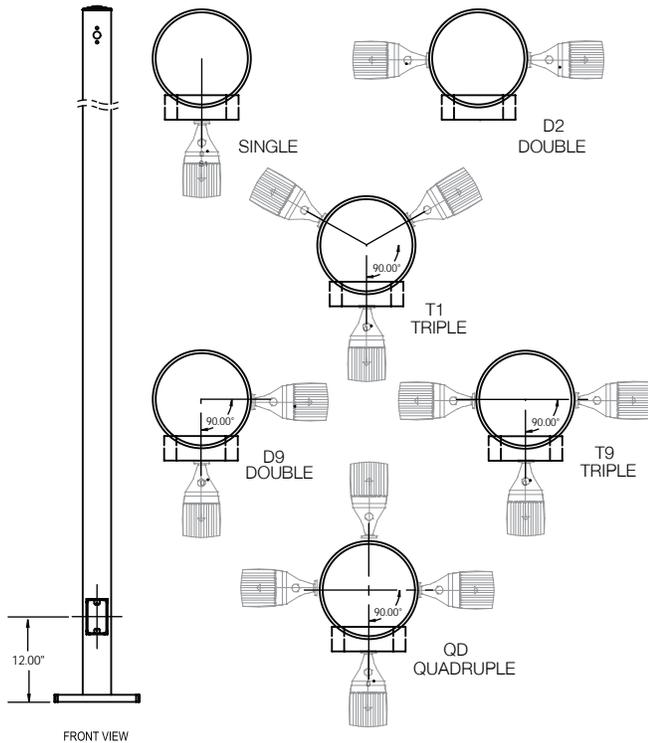


3/4" Coupling

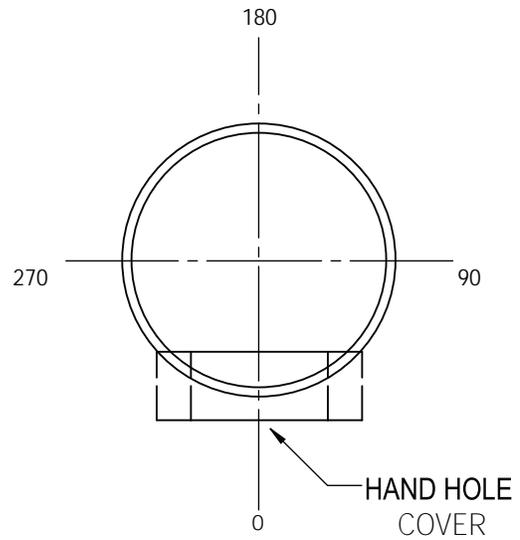
Specify orientation, height and location



Hand Hole And Fixture Orientation



Hand Hole And Accesories Orientation



Internal Vibration Dampener

Internal Chain Vibration Damper can be installed in the field to mollify first mode pole vibration.



Optional round base cover shown.

Custom Wood Grain Finish

Multi Stage Process for realistic wood grain finish. 20' Pole Height Max. Consult factory.



Standard Finish Colors



EXHIBIT J
Geotechnical Report

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Geotechnical Evaluation
City of Alameda New Aquatic Center
Jean Sweeney Open Space Park
1100 Atlantic Avenue
Alameda, California 94501

City of Alameda
950 West Mall Square | Alameda, California 94501

May 30, 2025 | Project No. 403773009



Geotechnical | Environmental | Construction Inspection & Testing | Forensic Engineering & Expert Witness

Geophysics | Engineering Geology | Laboratory Testing | Industrial Hygiene | Occupational Safety | Air Quality | GIS

Ninyo & Moore

A SOCOTEC COMPANY

Geotechnical Evaluation
City of Alameda New Aquatic Center
Jean Sweeney Open Space Park
1100 Atlantic Avenue
Alameda, California

DRAFT

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May 30, 2025 | Project No. 403773009

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1 INTRODUCTION

In accordance with your request and authorization, Ninyo & Moore has conducted a geotechnical evaluation for the proposed City of Alameda New Aquatic Center project at Jean Sweeney Open Space Park in Alameda, California (Figure 1). This report presents the findings from the subsurface exploration conducted for this evaluation, the conclusions from our review of geologic conditions at the site, and our geotechnical recommendations for the design and construction of the project.

2 SCOPE OF SERVICES

Our scope of services included the following:

- Review of readily available geologic and seismic literature pertinent to the project area including geologic maps and reports, regional fault maps, seismic hazard maps, water resources, and aerial photography.
- Performance of a site reconnaissance to mark the proposed subsurface exploration and percolation test locations and to observe general site conditions, including topographic features, drainage, and surficial geologic conditions and to review project limits and check equipment access.
- Coordination with Underground Service Alert (USA) to locate underground utilities in the vicinity of the subsurface exploration locations.
- Performance of a private utility survey to further check the exploration locations for potential conflicts with underground utilities.
- Procurement of Alameda County Public Works soil boring and well permits.
- Subsurface exploration consisting of ten cone penetrometer test (CPT) probes and four soil borings. The CPTs and borings were advanced to depths of up to about 53 feet and 50½ feet, respectively, below the existing grade. The CPTs and borings were backfilled with grout in accordance with the permit. Soil cuttings generated during drilling were drummed and off-hauled. The exploration locations are shown in Figure 2.
- Collecting of shear wave velocity measurements at 5-foot intervals at one cone penetration testing to evaluate the seismic site class.
- Installation of 2-inch diameter monitoring wells in two of the borings after geotechnical sampling to record groundwater levels.
- Percolation testing at two locations using the borehole method.
- Laboratory testing of selected soil samples to evaluate in-place soil moisture content and dry density, percentage of soil particles finer than the No. 200 sieve, Atterberg limits, consolidation characteristics, unconsolidated-undrained triaxial compressive strength, R-value, and soil corrosivity, as appropriate for the subsurface materials encountered.
- Data compilation and engineering analysis of the information obtained from our background review, subsurface evaluation, and laboratory testing.

- Preparation of this geotechnical evaluation report presenting our findings and conclusions regarding the subsurface conditions encountered at the project site, and our geotechnical recommendations for the design and construction of the project.

3 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The new Alameda Aquatics Center will be located at the western end of Jean Sweeney Open Space Park, near the crossroads of Wilma Chan Way and Atlantic Avenue in Alameda, California (Figure 1). The proposed project site is bounded by residential homes to the north and south, commercial businesses to the northeast, food stores and parking lots to the immediate west, and relatively open space with paved walkways and trails which transitions to the more developed portion of the park. In addition, a chain-linked fence was observed on the south boundary of the project site. During our subsurface exploration, the site was an open space park with grass fields and pedestrian asphalt concrete paved access walking trails. The project site is characterized by a low degree of topographic relief with a ground surface elevation that ranges between approximately 6 to 15 feet (NAVD88) from southwest corner to northeast corner of the project site and a ground surface elevation that ranges between 8 to 12 feet from northwest to southeast corner of the project site (ELS Architecture+Urban Design, 2025). There is an approximately 3-foot-tall mound of dirt in the eastern portion of the project.

Based on our review of the design drawings (ELS Architecture+Urban Design, 2025), the new Alameda Aquatics Center will be a swim facility that features a one-story building designed to support a 30-meter competitive swimming pool, a smaller activity pool, and spectator seating areas adjacent to the pools (Figure 3). The Competition Pool depth will range from 3'-6" to 7'-0", and the Activity Pool depth will range from zero to 5'-0". The primary structure has an L-shaped layout, with the north wing housing essential spaces such as pool mechanical equipment, an electrical room, locker rooms, and a lifeguard room, while the south wing contains administration offices and a multipurpose room. These two wings are connected by a covered breezeway, which serves as the primary entry to the facility. A secondary structure will accommodate pool storage. Anticipated structure loads provided by the design team (DL plus LL) are 32 kips on column footings and 1618 pounds per linear foot (plf) on strip footings. Surrounding the perimeter of the pool deck is fencing that stands at a minimum height of 10 feet for security, with an increased height of 15 feet along the western side to provide necessary wind protection for the pools. This fencing consists of a combination of solid and semi-porous materials. Other associated improvements include construction of an entry plaza, bicycle parking, and new parking lot and installation of underground utilities.

We understand that rough grading will include placement of up to about three feet of fill in the area of the proposed pools and structures, and cuts and fills are anticipated to generally balance the site as much as possible. Based on the preliminary pool depths, we anticipate the swimming pools will require excavations on the order of 10 to 12 feet deep. Excavations will be required for foundations. The mound of dirt in the eastern portion of the project will need to be removed.

We understand the settlement tolerance for the planned buildings is 1 inch maximum and a differential of $\frac{1}{4}$ inch over a distance of 30 feet. The planned pools and associated piping and surge chamber need to settle relatively uniformly with a goal of achieving a maximum differential settlement of $\frac{1}{2}$ inch over the length/width of the pool. The goal is to also reduce differential settlement in pool decks as well as impacts to utilities entering/exiting the pools. Based upon engineering analyses and communications with the design team, we understand the desired goal of $\frac{1}{2}$ inch differential across the length/width of the pool (80 to 100 feet) under combined static and dynamic settlement was deemed costly and may not be possible.

4 SUBSURFACE EVALUATION AND LABORATORY TESTING

4.1 Subsurface Exploration

Our field exploration included a site reconnaissance and subsurface exploration of the project site. The initial subsurface exploration was conducted on December 5th and 6th, 2023, and consisted of five CPT soundings (CPT-1 through CPT-5) and four exploratory borings (B-1 through B-4), two of which were completed as monitoring wells. Infiltration tests were performed at I-1 and I-2 locations. Supplemental subsurface exploration was conducted on October 23, 2024, and consisted of five CPT soundings (CPT-6 through CPT-10). The approximate locations of the CPT soundings, borings, monitoring wells, and infiltration tests are shown on Figure 2.

4.1.1 Cone Penetration Testing

The CPT soundings were advanced to depths up to about 53 feet below ground surface (bgs) using a truck-mounted rig with 20-ton reaction capacity. Penetration and pore water pressure data were collected and recorded electronically at intervals of approximately 2 inches while the sounding was being conducted. The soil behavior type index (I_c) of the materials encountered were assessed using correlations (Robertson, 2010) based on the cone penetration data including tip resistance and sleeve friction penetration. Shear wave velocity measurement at 5-foot intervals during cone penetration testing was collected at CPT-2 to assist with evaluation of the seismic site classification. The logs of CPT data and the interpreted soil behavior types are presented in Appendix A.

4.1.2 Geotechnical Borings

The exploratory borings were advanced with a truck-mounted drill rig using hollow-stem augers to depths up to about 50½ feet below the existing grade. One of the borings was located near a CPT to assist with correlation of subsurface data. A representative of Ninyo & Moore logged the subsurface conditions exposed in the borings and collected bulk and relatively undisturbed soil samples from the borings for laboratory testing. Soil was field-classified in accordance with the Unified Soil Classification System (USCS) using the visual-manual procedures in Standard D2488 by the American Society for Testing and Material (ASTM). Descriptions of the subsurface materials encountered are presented in the following sections. Detailed logs of the borings and sampling procedures are presented in Appendix B. The collected samples were transported to our geotechnical laboratory for testing. The borings were backfilled with cement grout shortly after drilling. The soil cuttings generated during drilling were drummed and off-hauled.

Two of the borings (B-1 and B-3) were completed as monitoring wells to maximum depths of approximately 26 feet bgs. Refer to Section 5.5 for additional information regarding monitoring well construction.

4.2 Laboratory Testing

Geotechnical laboratory testing of soil samples recovered from the borings included in-situ soil moisture content and dry density, percentage of soil particles finer than the No. 200 sieve, Atterberg limits, consolidation characteristics, unconsolidated-undrained triaxial compressive strength and R-value. The results of the in-place moisture content and dry density tests are shown at the corresponding sample depths on the boring logs in Appendix B. The results of the remaining laboratory tests performed are presented in Appendix C.

It was requested that we provide the average soil unit weight for the upper 14 feet of soil for the design of the pool. The table below summarizes the average soil unit weights based on our laboratory testing and CPT data.

Table 1 – Average Soil Unit Weight

General Description	Layer Depth (feet)	Average Wet Density (pcf)	Assumed Moisture Content (%)	Dry Density (pcf)
Fill	0 – 5	121	10	110
Bay Mud	5 – 14	100	55	65

Additionally, one sample of the near-surface soil was sent to CERCO Analytical (CERCO) in Concord, California for corrosivity analysis. The results of this testing, including a brief evaluation, are presented in Appendix D, and are discussed in Section 6.8.

4.3 Infiltration Testing

The permeability of the near surface soils was evaluated at two locations as shown on Figure 2. Infiltration testing was performed on December 6, 2023. Borehole percolation testing was performed in general accordance with the Alameda County Department of Environmental Health Onsite Wastewater Treatment Manual (2018) at depths of about 3 feet below the ground surface. The test holes were backfilled with soil cuttings and tamped using the drill rig shortly after completion of test.

The percolation test procedures and test data are presented in Appendix E and the test results are listed in Table 2 below. The test results at the two tested locations indicate infiltration rate of 0 inches per hour, which is considered low. Due to the variability of subsurface materials encountered during our exploration, variability in subsurface infiltration should be anticipated.

Table 2 – Percolation Test Results

Test (Boring)	Test Depth (ft.)	Subsurface Conditions	Percolation Rate (inch/hour)	Infiltration Rate ¹ (inch/hour)
I-1	3.0	Lean Clay	0.0	0.0
I-2	3.0	Lean Clay	0.0	0.0

Note:

¹ Infiltration rate is percolation rate adjusted by a reduction factor to exclude percolation through sides of test hole.

5 GEOLOGIC AND SUBSURFACE CONDITIONS

Our findings regarding regional geologic setting, site geology, subsurface stratigraphy, and groundwater conditions at the subject site are provided in the following sections.

5.1 Regional Geologic Setting

The subject site is on the eastern margin of San Francisco Bay in the Coast Ranges geomorphic province of California. The Coast Ranges are comprised of several mountain ranges and structural valleys formed by tectonic processes commonly found around the Circum-Pacific belt. Basement rocks have been sheared, faulted, metamorphosed, and uplifted, and are separated by thick blankets of Cretaceous and Cenozoic sediments that fill structural valleys and line continental margins. The San Francisco Bay Area has several ranges that trend northwest, parallel to major strike-slip faults such as the San Andreas, Hayward, and Calaveras (Figure 4).

Major tectonic activity associated with these and other faults within the region consists primarily of right-lateral, strike-slip movement.

5.2 Site Geology

Regional geologic mapping indicates that the project site is underlain by artificial fill (Graymer, 2000). The material used as fill varies in composition depending upon the source of the material. Per Graymer (2000), some fills are compacted and quite firm, but fills placed before 1965 are typically loose and poorly compacted consisting of dumped materials.

Graymer (2000) maps the natural portions of Alameda Island as Dune Sand from the Holocene and Pleistocene, with deposition likely ending around 6,000 years ago. Radbruch (1957) classifies it as Merritt sand. The material is described as fine-grained, very well sorted (poorly graded), well drained eolian deposits, mainly occurring in large sheets or small hills. Graymer distinguishes the two units based on morphology, stating that the Merritt Sand displays yardang morphology. In both cases, the sand interfingers with Holocene Bay Mud deposits.

As described by Graymer (2000), Bay Mud consists of water saturated estuarine mud, predominantly gray, green, and blue clay and silty clay. The mud interfingers with and grades into fine-grained deposits at the distal edges of Holocene fans. Mapping of thickness of the Young Bay Mud deposit in the Bay Area (McDonald et. al., 1978) indicates the Bay Mud thickness at the project site is between zero and 20 feet with the southern limit of Bay Mud near the southern limit of the undeveloped area.

The findings of our subsurface exploration, described below, indicate that the site is underlain by fill and Young Bay Mud. Underlying the Young Bay Mud are Dune Sand and Old Bay Mud, both of which include an interlayered soil profile including sand, clay and silt mixtures. A regional geologic map for the site and surrounding area is presented on Figure 5.

5.3 Subsurface Conditions

The following sections provide a generalized description of the geologic units encountered during our subsurface evaluation at the project site. More detailed descriptions are presented on the CPT logs in Appendix A and boring logs in Appendix B.

5.3.1 Artificial Fill

Artificial fill was encountered in the borings and CPTs at the surface and extended to depths varying from about 3 to 9 feet below existing grade. As encountered in the borings, the artificial fill generally consisted of brown and gray, moist to wet, loose to dense silty and clayey sand and grayish brown, moist, very stiff sandy lean clay. The behavior index of the

fill as encountered in the CPT soundings indicate the fill generally consists of silty and clayey sand and clay.

5.3.2 Young Bay Mud

Young Bay Mud was encountered below the artificial fill in Borings B-1, B-2, B-3, and in the CPT soundings. The Young Bay Mud varies in thickness between 8 to 13 feet with the bottom of the Young Bay Mud varying up to about 19 feet below existing grade. In general, the Young Bay Mud as encountered in the borings consisted of black, gray, and bluish-gray, moist to wet, soft to stiff clay, and medium dense, silty sand. The behavior index of the Young Bay Mud as encountered in the CPT soundings indicate that the Bay Mud generally consisted of clay and silty clay and silty and clayey sand. As encountered in the subsurface exploration, the soft clay portion of the Young Bay Mud is less than 10 feet thick and bottomed about 12 to 14 feet below grade.

5.3.3 Dune Sand

Dune Sand was encountered below the Young Bay Mud in Borings B-1, B-2, B-3 and in the CPT soundings. The Dune Sand, as encountered in the borings extended to a maximum depth of 39 feet below existing grade. The Dune Sand, as encountered in the borings, generally consisted of olive brown and brown, wet, loose to very dense, silty and clayey sand. As encountered in the CPT soundings, the Dune Sand generally consisted of interlayered silty clay, clayey silt, and silty sand.

5.3.4 Old Bay Mud

Old Bay Mud was encountered below the Dune Sand in Boring B-1 at a depth of about 39 feet below existing grade. Based on CPT soundings, we anticipate that Old Bay Mud is present; however, it is difficult to distinguish between the Dune Sand and Old Bay Mud. In general, the Old Bay Mud as encountered in the boring consisted of bluish-gray, wet, dense to very dense silty sand.

5.3.5 CPT Summary

The CPT data recorded in CPT-1 is generally consistent with the subsurface materials encountered in Boring B-1 which is close to CPT-1.

In general, the CPT data indicates materials of low tip resistance and/or low friction, consistent with low strength clayey or organic and loose sandy materials, extending to depths up to about 18 feet below existing grade. The subsurface materials below this upper weaker zone generally consist of interbedded fine-grained and sandy layers. The CPT soundings 1

through 5, 7 and 9 encountered refusal at depths varying from about 40 to 53 feet below grade suggesting the presence of dense zones or inclusions which are restrictive to penetration.

5.4 Groundwater

Groundwater was encountered during our subsurface exploration at depths ranging between 5 feet and 13¾ feet below the ground surface in the CPT soundings, and approximately between 13 feet and 14 feet below the ground surface in the borings. Groundwater may rise to a higher elevation than was encountered in the exploratory borings due to the short time available for seepage of water into the boring. Regional groundwater records compiled by the California Geological Survey (CGS, 2003a), indicate that the historic high groundwater level at the site is about 5 feet below the ground surface. Groundwater monitoring at the site during the period between January 2024 to March 2025 indicated groundwater levels within the monitoring wells varied from about 3.5 to 5.0 feet below grade (See Section 5.5).

Variations or fluctuations in the groundwater levels across the site and over time may occur due to seasonal precipitation, spatial variations in topography or subsurface hydrogeologic conditions, or as a result of tidal variations or other factors. In addition, seeps may be encountered at elevations above the groundwater levels encountered due to perched groundwater conditions, leaking pipes, preferential drainage, or other factors not evident at the time of our exploration. Monitoring wells were installed to further evaluate the depth to groundwater in the study area and fluctuation in groundwater levels.

5.5 Groundwater Monitoring and Waste Disposal

5.5.1 Monitoring Well Installation and Monitoring

On December 6, 2023, Ninyo & Moore personnel oversaw the installation of groundwater monitoring wells MW-1 and MW-2 in geotechnical borings B-1 and B-3 at the site, respectively. Following soil sampling and lithologic logging, the wells were constructed with 2-inch diameter schedule 40 polyvinyl chloride (PVC) blank casing and 0.010-inch slotted PVC well screen. The screened intervals for the wells are 20 feet in length, extending from approximately 6 to 26 feet bgs. Well filter packs consist of #2/12 sand placed within the annulus of each boring from the bottom of each boring to approximately 1 foot above the top of each well screen, followed by an approximate 2 foot well transition seal consisting of bentonite. The remaining open borehole annulus in each well was sealed with neat cement to near ground surface. The boring logs are presented in Appendix B. Upon well completion,

each wellhead was finished at the ground surface with a locking well cap and traffic-rated bolt-down well vault. The vaults were installed and finished with a concrete apron.

Groundwater levels within the monitoring wells varied from about 3.5 to 5.0 feet below grade during the period between January 2024 to March 2025 as indicated in Table 3.

Date	Groundwater Depth at MW-1 (ft.)	Groundwater Depth at MW-2 (ft.)
January 15, 2024	3.9	3.5
April 29, 2024	4.5	3.5
June 26, 2024	5.0	4.5
August 1, 2024	5.0	4.5
September 4, 2024	5.0	4.8
October 21, 2024	5.0	5.0
March 25, 2025	4.5	3.5

5.5.2 Waste Disposal

Investigation-derived waste (IDW) was temporarily stored on-site in 55-gallon, U.S. Department of Transportation–approved 17H drums, pending characterization and disposal. The IDW was characterized in accordance with waste disposal and recycling facility acceptance requirements. Ninyo & Moore coordinated the transport and disposal of the IDW with Belshire Environmental Services (Belshire) of Lake Forest, California, an appropriately licensed transporter to an approved waste facility. The waste was transported offsite by Belshire on December 29, 2023 to Soil Safe of Adelanto, California for disposal. A copy of the soil disposal certificate is attached in Appendix F.

6 GEOLOGIC HAZARDS AND GEOTECHNICAL CONSIDERATIONS

This study considered a number of potential issues relevant to the proposed project including seismic hazards, flooding and dam failure inundation, landsliding and slope stability, naturally occurring asbestos, collapsible soil, regional land subsidence, consolidation and static settlement, corrosive soil, expansive soil, and excavation characteristics. These issues are discussed in the following subsections.

6.1 Seismic Hazards

The seismic hazards considered in this study include the potential for ground surface fault rupture, seismic ground shaking, liquefaction and cyclic softening, dynamic settlement, sand boil ground subsidence, lateral spreading, seismic slope stability, and tsunamis and seiches. These potential hazards are discussed in the following subsections.

6.1.1 Historical Seismicity

The site is located in a seismically active region, as is much of northern California. Figure 4 presents the location of the site relative to the epicenters of historic earthquakes with magnitudes of 5.5 or more from 1800 to 2000. Records of historic ground effects related to seismic activity (e.g. liquefaction, sand boils, lateral spreading, ground cracking) compiled by Knudsen et al. (2000), indicate that no ground effects related to historic seismic activity have been reported for the site vicinity.

6.1.2 Ground Surface Fault Rupture

The site is not located within an Earthquake Fault Zone established by the state geologist (CGS, 1982) (formerly known as Alquist-Priolo Special Studies Zones) to delineate regions of potential ground surface rupture adjacent to active faults. As defined by the CGS, active faults are faults that have caused surface displacement within Holocene time, or within approximately the last 11,700 years (CGS, 2018). The closest fault rupture hazard zone is associated with the Hayward Fault. This hazard zone is approximately 5½ miles from the site to the northeast.

Based on our review of the referenced seismic hazard and geologic maps, known active faults are not mapped on the site, and the site is not located within a fault-rupture hazard zone. Therefore, the probability of damage from surface fault rupture is considered to be low.

6.1.3 Seismic Ground Motion and Site Classification

Considering the proximity of the site to historic and Holocene active faults (Figure 4), the potential for future strong seismic ground shaking at the site is significant. Seismic design criteria to address ground shaking are provided in Section 8.1. The peak ground acceleration (PGA) associated with the Maximum Considered Earthquake Geometric Mean (MCEG) was calculated in accordance with the American Society of Civil Engineers (ASCE) 7-16 Standard and the 2022 California Building Code (CBC). The MCE_G peak ground acceleration with adjustment for site class effects (PGA_M) was calculated as 0.724g using the seismic design tool developed by the Structural Engineers Association of California in conjunction with the Office of Statewide Health Planning and Development (SEAOC & OSHPD, 2023). The

calculated PGA_M is based a mapped MCE_G peak ground acceleration of 0.658g for the site and a site coefficient (F_{PGA}) of 1.1 for Site Class D. We performed one seismic CPT sounding at the site (CPT-2) that was terminated at a depth of about 52½ feet due to cone refusal. A shear wave velocity profile with respect to depth was obtained from this sounding that yielded an average shear wave velocity of about 940 feet per second. This shear wave velocity value correlates to a seismic Site Class D for the subject site (in accordance with ASCE 7-16). Considering the anticipated deep soil profile at the site, regional mapped $Vs30$ values (CGS, 2015), and soft clay soils less than 10 feet thick, we judge that Site Class D is appropriate for the project site.

6.1.4 Liquefaction and Cyclic Softening

The strong vibratory motions generated by earthquakes can trigger a rapid loss of shear strength in saturated, loose, granular soils of low plasticity (liquefaction) or in wet, sensitive, cohesive soil (cyclic softening). Liquefaction and strain softening can result in a loss of foundation bearing capacity or lateral spreading of sloping or unconfined ground. Liquefaction can also cause settlement of buildings on shallow foundation and generate sand boils leading to subsidence at the ground surface. Liquefaction (or cyclic softening) is generally not a concern at depths more than 50 feet bgs.

The project site is located within a liquefaction hazard zone (Figure 6) established by the California Geological Survey (CGS, 2003). Regional studies of liquefaction susceptibility indicate that the site is in an area considered to be very highly susceptible to liquefaction (Witter et al., 2006, and Knudsen et al., 2000).

Ninyo & Moore performed an analysis to evaluate the potential for liquefaction and cyclic softening using the CPT data collected during the subsurface exploration for this study and the methodology presented in Boulanger & Idriss (2014) and Robertson (2009) for liquefaction and cyclic softening, respectively. A groundwater level approximately 5 feet below the ground surface was assumed for the analysis which considered a seismic event producing a PGA of 0.724g resulting from a Magnitude 7.51 earthquake on the Hayward Fault (USGS, 2014). Corrections for thin layers and transitions zones were applied to account for reductions in measured penetration resistance where thin layers of sand are underlain by clay. Based on a comparison of borings and CPT soundings that were performed in close proximity to one another, material that was identified as having a behavior type index (I_c) of between 2.4 or 2.6 in the soundings generally correlated with sand, clay, and silt mixtures. A soil behavior type index (I_c) of 2.6 was selected as the cutoff for the liquefaction analysis. Soil with an I_c exceeding 2.6 was evaluated for cyclic softening. The results of the analysis, presented in Appendix G, indicate that layers of sandy soil within the artificial fill, Young Bay

Mud, and Dune Sand will liquefy to depths varying from about 5 to 34 feet below existing grade, and the weaker clayey Young Bay Mud layers will be subject to cyclic softening under the considered ground motion based on a computed factor of safety of less than one. High tip resistance and skin friction were encountered below depths of 34 feet, and refusal was encountered in CPT soundings 1 through 5, 7, and 9 at depths ranging between approximately 40½ and 53 feet below the ground surface. Furthermore, based on soil behavior type and calculated $N_{1(60)}$ from the CPT data, we judge the risk of liquefaction is low for subsurface materials below a depth of 34 feet.

Foundation type selection to mitigate liquefaction concerns and cyclic softening is provided in Section 8.3.1. Other consequences of liquefaction, including dynamic settlement, sand-boil-induced ground subsidence, and lateral spreading, are addressed in the following sections.

6.1.5 Dynamic Settlement

Earthquake ground shaking can dynamically compact loose granular soil leading to surficial settlements. Dynamic or volumetric-induced settlement is not limited to the near surface environment and may occur in both dry and saturated sandy soil. Cohesive soil is not typically susceptible to dynamic settlement.

Ninyo & Moore evaluated the potential for dynamic settlement due to strong ground motion of dry sandy soil and liquefaction of saturated soil using the computer program CLiq (GeoLogismiki, 2018) to evaluate the CPT data collected during our field investigation. The analysis estimates dynamic settlement due to seismic shaking for sandy soil layers with an I_c of 2.6 or less using the CPT data from the subsurface exploration for this study and methods by Boulanger & Idriss (2014) for saturated soil subject to liquefaction and by Robertson & Shao (2010) for dry sand settlement. A groundwater level approximately 5 feet below the ground surface was assumed for the analysis which considered a seismic event producing a PGA of 0.724g resulting from a Magnitude 7.51 earthquake. The results of the analysis indicate that the estimated total free-field dry and saturated dynamic settlement at the site following the considered seismic event is on the order of about 1¾ to 3½ inches occurring within the upper 5 to 34 feet below existing grade. Differential dynamic settlement is estimated to be up to about 2 inches over a horizontal distance of approximately 50 feet.

6.1.6 Sand Boil Ground Subsidence

In addition to dynamic or volumetric-induced settlement, sand boils that occur when liquefied, near-surface soil escapes to the ground surface, can result in additional ground subsidence

due to loss of material. Ishihara (1985) concluded based on case study findings that the potential for surface manifestation of liquefaction or sand boils is low where the SPT penetration resistance of soil susceptible to liquefaction exceeds 10 blows per foot. Ninyo & Moore calculated the Ishihara-inspired Liquefaction Potential Index (LPI) described by Maurer et al (2015) from the results of the liquefaction analysis for liquefiable soil with an equivalent ratio SPT penetration resistance for 60 percent energy ratio (N_{60}) of 10 or less based on the CPT data near the proposed improvements to evaluate the potential for surface manifestation of liquefaction such as sand boils. The computed value of the index is approximately 9 to 18 which indicates that the potential for surface manifestation of liquefaction or sand boils is moderate to high. Foundation type selection to mitigate sand-boil ground subsidence is provided in Section 8.3.1.

6.1.7 Lateral Spreading

In addition to vertical displacements, seismic ground shaking can induce horizontal displacements as surficial soil deposits spread laterally by floating atop liquefied subsurface layers. Lateral spread can occur on sloping ground or on flat ground adjacent to an exposed face. Lateral spreading is generally not significant where the clean-sand-equivalent, overburden normalized, and corrected SPT penetration resistance (N_{160cs}) of the soil that can liquefy is more than 15 blows per foot (Caltrans, 2020). Based on the results of our subsurface exploration and liquefaction analysis, layers of liquefiable soil with an equivalent N_{160cs} less than 15 are present at depths ranging between approximately 5 and 19 feet below the ground surface.

Ninyo & Moore calculated the Lateral Displacement Index (LDI) as described by Zhang et al (2004) from the CPT data near the proposed improvements for liquefiable soil layers based on the liquefaction analysis with an N_{160cs} of 15 or less. Estimates of lateral spread displacement based on the computed LDI at each CPT sounding for an average ground slope of 0.7 percent toward San Francisco Bay to the southwest, have been performed without consideration for laterally discontinuous liquefiable soil layers between soundings or constraints resulting from adjacent down gradient areas where less lateral displacement is expected. The estimated lateral spread displacement of up to approximately 1 inch from our analysis conforms with the upper limit on lateral displacement for shallow foundations in Table 12.13-2 of ASCE 7-16 on projects with a Risk Category of I, II, or III. Foundation type selection is provided in the recommendation section to mitigate differential lateral spread displacement for structural elements.

6.1.8 Seismic Slope Stability

The site is not located within a hazard zone for earthquake-induced landslides on the Seismic Hazard Zones Map (Figure 6) prepared by the CGS (2003). As such, we do not regard seismic slope stability as a design consideration. Slope stability and landsliding are further addressed in Section 6.3.

6.1.9 Tsunamis and Seiches

Tsunamis are long wavelength seismic sea waves (long compared to ocean depth) generated by the sudden movements of the ocean floor during submarine earthquakes, landslides, or volcanic activity. The project location is within a tsunami hazard area as shown on the Tsunami Hazard Area Map for the County of Alameda (Kate Thomas, CGS, 2021). The Tsunami Inundation Map for the project site is presented on Figure 7.

Seiches are waves generated in a large enclosed body of water. Based on the lack of large enclosed bodies of water adjacent to the site, the potential for inundation due to seiches is not a consideration but the site may be subject to inundation by a tsunami.

6.2 Flood Hazards and Dam Failure Inundation

Our review of Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FEMA, 2018) indicates that the project site location is in a Future Conditions 1% Annual flood hazard area (Zone X) (Figure 8).

Properties located downstream of dams can be inundated with flood waters if the dams were to fail. Dam owners are required to prepare inundation maps showing the limits of flooding caused by dam failure. Our review of dam breach inundation maps on file with the Division of Safety of Dams at the California Department of Water Resources (DWR, 2020) indicates that the site is outside the inundation boundaries on the available inundation maps and therefore the potential for inundation at the site due to dam failure is very low. Figure 9 presents the Dam Inundation Map for a conjectured sunny day breach of the Central dam about 2.9 miles northeast of the site.

6.3 Landsliding and Slope Stability

The site is not within a seismic hazard zone for earthquake-induced landslides (Figure 6) as mapped by the State Geologist (CGS, 2021) and no existing landslides are mapped on the site based on the regional inventory in the seismic hazard zone report (CGS, 2003a). The site and vicinity are relatively flat with low topographic relief of about 1 foot on site and an average slope gradient of approximately 2.3 percent. No significant slopes are proposed for the project under

consideration. Based on the existing topography and our review of existing maps and literature, we do not regard landslides or slope stability as design considerations for the proposed project.

6.4 Unsuitable Materials

Fill materials that were not placed and compacted in lifts with geotechnical observation and testing, or fill materials lacking documentation of such observation and testing, are considered non-engineered or undocumented fill. Non-engineered or undocumented fill is generally unsuitable as a bearing material below foundations and new fill due to the potential for differential settlement resulting from variable support characteristics or the potential inclusion of deleterious materials. The artificial fill encountered in our exploratory borings at the proposed project improvement areas are considered undocumented and may include or cover unsuitable material.

Recommendations for remedial grading are provided to mitigate surficial concerns related to undocumented fill and weak or soft soils at shallow depth which may impact access for construction equipment.

6.5 Collapsible Soil

Loose, dry, low-density soil can “collapse” or compact with the addition of water under foundation loads or the weight of overlying soil. Ground settlement occurs when the collapsible soil is first saturated or is saturated to depths greater than those achieved by typical rain events. Non-engineered or undocumented fill, young alluvial fans, debris flow sediments, and deposits of wind-blown soil may include collapsible soils, particularly in arid or semi-arid environments. The subsurface conditions encountered during the exploration indicate that collapsible soil is not a consideration for the site. If present, foundation type selection and remedial pad grading are provided in the recommendation section to mitigate differential settlement resulting from collapsible soils.

6.6 Regional Land Subsidence

The site is not in an area known for regional land subsidence due to groundwater withdrawal, peat loss, or oil extraction (USGS, 2018). As such we do not regard land subsidence as a design consideration.

6.7 Static Settlement and Settlement Mitigation

Based on the information available regarding the proposed project improvements, anticipated loads, and the subsurface conditions encountered, we anticipate the following considerations related to static settlement.

Considering the relatively low density of Bay Mud, the weight of an 7-foot deep pool is estimated to induce an additional new load on the order of 170 pounds per square foot (psf) resulting in estimated static settlement of the pools underlain by unmitigated soil on the order of several inches.

The estimated fill placement of uniform new aerial fill of about 3 feet is estimated to induce static settlement of several inches due to consolidation of the un-mitigated Young Bay Mud. The amount of settlement will depend upon the thickness of new fill and the variability of the subsurface materials below the new fill. The static settlement due to anticipated new building loads (32 kips on isolated footings and 1618 plf on strip footings (DL + LL) on un-mitigated subsurface materials is estimated to be on the order of 1 inch or more assuming an allowable bearing capacity of 1500 psf on isolated or continuous footings or 200 psf average load over the footprint of a reinforced concrete mat foundation.

As previously indicated, liquefaction densification settlement of un-mitigated subsurface materials is estimated to be on the order of about 1¾ to 3½ inches occurring within the upper 5 to 34 feet below existing grade. Differential dynamic settlement is estimated to be up to about 2 inches over a horizontal distance of approximately 50 feet for un-mitigated soils.

Because of the compressibility and liquefaction susceptibility of the subsurface materials and the estimated total settlements anticipated from new loads and seismic densification, we recommend deep foundations and ground improvement, or a combination of these to mitigate settlement of proposed pools and structures. Ground improvement can be implemented in areas adjacent to new structures or the pools to mitigate differential settlement which may impact utilities or abrupt differential movement between mitigated and un-mitigated areas.

For ground improvement at the project site to reduce total and differential settlements, we recommend that ground improvement could include rigid inclusion, deep soil mixing (DSM), drilled displacement columns (DDC), stone columns, aggregate piers, pressure grout, or other ground improvement methods that achieve the performance requirements of the project. The selection of ground improvement method should take into consideration the shallow groundwater, Young Bay Mud deposits which typically experience strength loss due to remolding, sandy and/or weak soil layers which may be prone to caving, and sandy layers which are locally dense and may be encountered above the target depth of mitigation.

The ground improvement should extend to a minimum depth of 20 feet below the existing ground surface to mitigate total static settlement to ½ inch. Seismic settlement below depth of 20 feet is up to 2.6 inches with differential static plus seismic settlement up to about 2 inches over 50 feet. Ground improvement to a depth of 34 feet reduces total static plus seismic settlement to about 1

inch with differential settlement up to about ½ inches over 50 feet. We anticipate that the ground improvement elements themselves would typically be heavier than the existing soils and are anticipated to induce settlement of the subsurface materials below the ground improvement. Ground improvement may consider the use of light-weight materials to reduce the settlement induced by the ground improvement elements. Design of the ground improvement system should also consider the drag loads induced by consolidation and seismic settlement.

6.8 Corrosive/Deleterious Soil

Laboratory testing was performed to evaluate the corrosivity of on-site soil. A soil sample collected during the subsurface exploration was submitted to CERCO Analytical of Concord, California to perform laboratory testing and evaluate the corrosivity of the samples on the basis of tests to quantify pH, redox potential, electrical resistivity, chloride content, and soluble sulfate content. The results of the testing and the findings from the corrosivity evaluation are presented in Appendix D.

California Department of Transportation (Caltrans) defines a corrosive environment for structures as an area where the soil has a chloride concentration of 500 parts per million (ppm) or greater, soluble sulfate concentration of 0.15 percent (1,500 ppm) or greater, or a pH of 5.5 or less (Caltrans, 2021). The criteria used to evaluate the deleterious nature of soil on concrete are listed in Table 4. Based on these criteria and the results of the testing, the near-surface soil as encountered at the tested location does not meet the definition of a corrosive environment for structures, and the sulfate exposure to concrete is negligible with an exposure classification for sulfate of S0. As noted in Appendix D, the test results indicate that the tested soil is moderately corrosive to ferrous metals based on the resistivity test results and slightly corrosive based on the redox potential. Buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric coated steel should be appropriately protected against corrosion depending on the importance or expected service life of the element. Additional corrosivity testing may be needed, and a corrosion engineer may be consulted to provide recommendations to mitigate corrosion. Please refer to the CERCO Analytical report included in Appendix D for more information regarding their test results and brief evaluation.

Table 4 – Criteria for Deleterious Soil on Concrete

Sulfate Content Percent by Weight	Sulfate Exposure	Exposure Class
0.0 to 0.1	Negligible	S0
0.1 to 0.2	Moderate	S1
0.2 to 2.0	Severe	S2
> 2.0	Very Severe	S3

Reference: American Concrete Institute (ACI) Committee 318 Table 19.3.1.1 (ACI, 2021)

6.9 Expansive Soil

Some clay minerals undergo volume changes upon wetting or drying. Unsaturated soils containing those minerals will shrink/swell with the removal/addition of water. The heaving pressures and differential movement associated with expansion and changes in soil moisture can damage structures and flatwork. Laboratory testing performed on selected soil samples indicated plasticity index values generally ranging between 4 and 13, indicating a low potential for swell/expansion. However, one laboratory result for a soil sample at location B-3 obtained at a depth of about 6 feet (within the Young Bay Mud) indicated a plasticity index of 54 which corresponds to critically high expansion potential. The Young Bay Mud is generally located below the groundwater where the risk of shrink/swell effects is low.

We would like to point out that, historically, Bay Mud was sometimes used in fill operations, and there is a possibility that expansive Bay Mud may be encountered within the artificial fill. Note that chemical treatment is often used to reduce expansive characteristics.

6.10 Excavation Characteristics

We anticipate that the project will involve excavations of up to approximately 10 feet for the proposed swimming pools. The geologic units encountered over this interval during the subsurface exploration included artificial fill and Young Bay Mud that generally consisted of loose to medium dense sandy soils and soft to stiff clays.

We anticipate that conventional earthmoving and foundation drilling equipment in good working condition should be able to make the proposed excavations; however, consideration should be given to using light-weight and/or track equipment when overexcavating existing fills as conventional rubber-tired equipment may induce pumping, rutting, or bearing failure. Excavations in fill, where present, may encounter obstructions consisting of debris, rubble, abandoned structures, or over-sized materials that may require special handling or demolition equipment for removal.

Near-vertical cuts in these deposits may not be stable particularly if the excavation is exposed to rainfall/runoff, encounters seepage, or extends below groundwater. Groundwater was measured at depths ranging from 3.5 to 5 feet below grade within monitoring wells installed as part of this investigation. Variations in groundwater levels within and outside this range should be anticipated. We anticipate dewatering measures will be needed to provide a dry excavation in which to work. Excavations that extend near or below the water table may experience “quick” conditions or bottom instability. The conditions at the bottom of the excavations can be improved by soil mitigation or ground improvement.

Excavated materials may be wet and need to be dried out before reuse as fill or off-hauled if there is not sufficient time for drying.

Any ground disturbance work performed as part of the Aquatic Center development shall be conducted in accordance with the Construction Soil and Groundwater Management Plan (SGMP) prepared for the project.

6.11 Construction Dewatering

Groundwater was encountered in our exploratory borings at depths as shallow as approximately 3.5 feet below the ground surface. Fluctuations in the groundwater level may occur as a result of variations in seasonal precipitation and other factors. Water intrusion into the excavations may occur as a result of groundwater intrusion or surface runoff. The contractor should be prepared to take appropriate dewatering measures in the event that water intrudes into the excavations. Considerations for construction dewatering should include anticipated drawdown, volume of pumping, potential for settlement, and groundwater discharge. Disposal of groundwater should be performed in accordance with the guidelines of the Regional Water Quality Control Board.

When excavating near or below groundwater, the dewatering system should depress the water level below the bottom of the cut to reduce the potential for subgrade instability and washout from behind sheeting or sloughing of exposed trench walls. The dewatering system should maintain the water level about 2 feet below the bottom of excavation to improve bottom stability when placing and compacting fill. Note that additional measures such as subgrade stabilizing and filtering geosynthetic materials and granular bridging layers may be needed depending upon the depth of excavation and strength of exposed subgrade soils. Sump pumps, well points, deep wells, geotextile-geonet composites, perforated underdrains, or stone blankets should be used, as appropriate, to drain water from below the bedding and foundation material and provide a stable working surface. Perforated underdrains and open-graded stone blankets should be wrapped in a suitable geotextile filter to reduce the potential for the removal of fines and subsequent creation of voids in the overlying and adjacent materials. The operation of the

dewatering system should continue during and after construction of the below-grade structure until the potential uplift due to buoyancy has been mitigated. For deeper portions of the excavations, consideration should be given to installing a temporary cut-off wall (e.g. interlocking sheet piles, or similar) to help reduce the volume of water generated to maintain a workable area.

Consideration can be given to installing deep wells near the pools which can be used to draw down the groundwater level during construction. If dewatering wells will be left in place for post-construction use to draw down water level when the pool is empty for repairs or maintenance, the siting of the wells should be carefully considered along with their long-term performance capabilities and maintenance considerations.

6.12 Uplift Resistance

The groundwater levels at the project site are anticipated to range from about 3½ to 5 feet bgs based upon measurements from monitoring wells installed at the project site, summarized in Table 2.

Further, we anticipate that groundwater levels may rise in the future in response to sea-level rise. When the water level in the pools is lowered below the elevation of the adjacent groundwater, the pool will be subject to buoyant uplift forces that can be resisted by a combination of relief valves in the pool bottom, weight of the pool structure, pumping wells around the perimeter of the pool, or structural elements to tie down the pool. Temporary dewatering wells used during construction can be converted to permanent dewatering wells. Considering the size of the large pool, we anticipate that several pumping wells will be required around the perimeter of the pool as well as additional dewatering efforts in the interior of the pool to draw down the groundwater table and assist with dewatering during construction. While efforts to empty the pools for maintenance/repairs could be coordinated with low groundwater levels as measured in sounding wells around the perimeter of the pools, we judge that the efforts to achieve sufficiently low groundwater levels may be hindered by rising groundwater due to sea level rise or other unanticipated conditions during the life of the structure. Permanent dewatering wells around the pool perimeter typically have a limited perimeter of influence to draw down the groundwater table and the filtering materials included in the well construction can become clogged over time reducing their effectiveness. We judge that multiple relief valves would be required in the pool bottom to reduce hydrostatic loads. Further, the water pumped from dewatering wells and from the pool would need to be properly discharged which is anticipated to have an associated cost implication. Therefore, we recommend that the pools be designed to resist hydrostatic uplift using structural elements such as deep foundation, tiedown anchors, or uplift resistance incorporated into the ground improvement system. Recent groundwater measurements documented a high

groundwater level of 3½ feet bgs. However, we recommend the design groundwater level take into consideration elevated groundwater levels over the life of the structure due to rising sea level over time.

Uplift resistance can be provided using a combination of the weight of the structure or structural tie-downs which can be included in the ground improvement elements or installed separately (e.g. deep foundations or tiedown anchors). Considering the combined goals of reducing total and differential settlement of the pools as well as the uplift resistance requirements, we suggest that a deep foundation system such as auger cast in place piles (ACIP) be considered below pools in combination with a mat or pile cap/grade beams connected to the pool shell. When deep foundations or ground improvement elements are installed from existing grade, portions of these elements remaining within the depth of the pool excavations would need to be carefully removed as the excavation proceeds to maintain structural integrity of the required portion of the elements below the pool structure.

7 CONCLUSIONS

Based on our review of the referenced background data, site field reconnaissance, subsurface evaluation, and laboratory testing, our opinion is that the proposed project is feasible from a geotechnical standpoint. Geotechnical considerations include the following:

- Our subsurface exploration encountered artificial fill, Young Bay Mud, Dune Sand, and Old Bay Mud. The artificial fill generally consisted of loose to dense silty and clayey sand and very stiff sandy lean clay and it varies in depth from the surface to depths between 3 to 9 feet below existing grade. The Young Bay Mud, as encountered below the artificial fill, generally consisted of soft to stiff clays and medium dense silty sand and varies in thickness between 8 to 13 feet with the bottom of the Young Bay Mud varying up to about 19 feet below existing grade. The Dune Sand, as encountered below the Young Bay Mud, generally consisted of loose to very dense silty and clayey sand and extended to a maximum depth of 39 feet below existing grade in the borings. Old Bay Mud was encountered below the Dune Sand in Boring B-1 at a depth of about 39 feet below existing grade. Based on CPT soundings, we anticipate that Old Bay Mud is present; however, it is difficult to distinguish between the Dune Sand and Old Bay Mud. In general, the old bay mud as encountered in the boring consisted of bluish-gray, wet, dense to very dense silty sand.
- Groundwater was encountered during our subsurface exploration at depths ranging between 5 feet and 13¾ feet below the ground surface in the CPT soundings, and approximately between 13 feet and 14 feet below the ground surface in the borings. Groundwater measurements in monitoring wells varied from 3½ to 5 feet bgs. Variation and fluctuation in groundwater levels should be anticipated as discussed in Section 5.4. The contractor should be prepared to take appropriate dewatering measures in the event that water intrudes into the excavations as discussed in Section 6.11.
- The site could experience a relatively large degree of ground shaking during a significant earthquake on a nearby fault. Seismic design criteria are presented in Section 8.1.

- The project site is located within a liquefaction hazard zone established by the California Geological Survey (CGS, 2003). The results of our analyses indicate that there is a high potential for liquefaction to occur at the site and that dynamic settlement will be up to about 3½ inches with about 2 inches of differential settlement over a distance of 50 feet. Based on our evaluation, we judge that surface disruption due to liquefaction is likely to impact development of the site. Since the anticipated settlement exceeds acceptable tolerances for structures supported on conventional shallow footings, foundation type selection and ground improvement considerations are provided in the recommendation section.
- The potential for surface manifestation of liquefaction or sand boils is moderate to high. Foundation type selection is provided in the recommendation section.
- The estimated lateral spread displacement of up to approximately 1 inch from our analysis conforms with the upper limit on lateral displacement for shallow foundations in Table 12.13-2 of ASCE 7-16 on projects with a Risk Category of I, II, or III. Foundation type selection is provided in the recommendation section to mitigate differential lateral spread displacement for structural elements.
- The site and vicinity are relatively flat with low topographic relief of about 1 foot on site and an average slope gradient of approximately 2.3 percent. No significant slopes are proposed for the project under consideration. The site is not located within a hazard zone for earthquake-induced landslides on the Seismic Hazard Zones Map prepared by the CGS (2003). Based on the existing topography and our review of existing maps and literature, we do not regard landslides or seismic slope stability as design considerations for the proposed project.
- Unsuitable materials are anticipated to be present at the site based on our subsurface exploration. Recommendations for remedial pad grading are provided to mitigate surficial concerns related to undocumented fill and weak or soft soils at shallow depth which may impact access for construction equipment.
- The subsurface conditions encountered during the exploration indicate that collapsible soil is not a consideration for the site. If present, foundation type selection and remedial pad grading are provided in the recommendation section to mitigate differential settlement resulting from collapsible soils.
- The site is not in an area known for regional land subsidence due to groundwater withdrawal, peat loss, or oil extraction (USGS, 2018). As such we do not regard land subsidence as a design consideration.
- Based on the subsurface materials encountered in our exploratory borings and CPT soundings, static and dynamic settlement as discussed in Sections 6.1.5 and 6.7 are a design consideration. Ground improvement and deep foundation systems, or a combination of these, should be considered to mitigate static and dynamic settlement.
- Limited laboratory testing of one soil sample collected during the subsurface exploration for this study indicates that the tested soil does not meet the definition of a corrosive environment for structures (Caltrans, 2021) and the sulfate exposure to concrete is negligible (Class S0). Based on electrical resistivity, the sample tested are considered to be moderately corrosive to ferrous metals and slightly corrosive based on redox potential, as noted in Appendix D. A corrosion engineer may be consulted to provide specific guidance on protective measures to mitigate corrosion.
- Laboratory testing performed on selected soil samples indicated plasticity index values generally ranging between 4 and 13, indicating a low potential for swell/expansion. However, one laboratory result for a soil sample at location B-3 obtained at a depth of about 6 feet

(within the Young Bay Mud) indicated a plasticity index of 54 which corresponds to critically high expansion potential. The Young Bay Mud is generally located below the groundwater where the risk of shrink/swell effects is low. However, Bay Mud was often used as fill and may be encountered within the fill materials at the project site. Recommendations are provided to mitigate soil expansion.

- Excavations that remain unsupported and exposed to water, or encounter seepage, or granular soil may be unstable and prone to sloughing. Recommendations for excavation stabilization are provided.
- The earth materials underlying the site over the anticipated depth of excavation should be excavatable with conventional earth moving equipment in good working condition; however, there is a moderate to high risk of encountering weak surficial conditions which may impact accessibility for construction equipment, and recommendations are provided for ground improvement and chemical treatment.
- We anticipate that the pool will be subject to buoyant uplift forces given that the groundwater levels at the project site were measured to range from 3½ to 5 feet, and groundwater may rise in the future in response to sea-level rise. Uplift resistance is a design consideration for the project and can be resisted by a combination of relief valves in the pool bottom, weight of the pool structure, pumping wells around the perimeter of the pool, or structural elements to tie down the pool. Recommendations are provided in the proceeding sections below.

8 RECOMMENDATIONS

The following sections present our geotechnical recommendations for the design and construction of the proposed improvements. The project improvements should be designed and constructed in accordance with these recommendations, applicable codes, and appropriate construction practices.

8.1 Seismic Design Criteria

Design of the proposed improvements should be performed in accordance with the requirements of governing jurisdictions and applicable building codes. Seismic Site Class D was selected based on the shear wave velocity measurements collected on CPT-2, regional mapped Vs30 values, and subsurface findings indicating soft clay soils are less than 10 feet thick. The spectral ordinates and seismic coefficients based on the mapped values of the risk-targeted spectral response acceleration, consistent with Section 11.4 of ASCE Standard 7-16, are presented in the Table 5 (SEAOC & OSHPD, 2023). In conformance with the 2022 California Building Code and the exception to item 1 in Section 11.4.8 of ASCE 7-16 Supplement 3, the spectral ordinates consistent with Section 11.4 of ASCE Standard 7-16 provided in Table 5 may be used for seismic design.

Table 5 – California Building Code Seismic Design Criteria

Seismic Design Parameter Evaluated for 37.779751° North latitude, 122.272906° West longitude	Value
Site Class	D – Stiff Soil
Site Coefficient, F_a	1
Site Coefficient, F_v	1.7
Mapped Spectral Acceleration at 0.2-second Period, S_s	1.536 g
Mapped Spectral Acceleration at 1.0-second Period, S_1	0.6 g
Spectral Acceleration at 0.2-second Period Adjusted for Site Class, S_{MS}	1.536 g
Spectral Acceleration at 1.0-second Period Adjusted for Site Class, S_{M1}	1.530 g
Design Spectral Response Acceleration at 0.2-second Period, S_{DS}	1.024 g
Design Spectral Response Acceleration at 1.0-second Period, S_{D1}	1.020 g
Seismic Design Category for Risk Category I, II, or III	D

Note: * S_{M1} and S_{D1} for Section 11.4 parameters include 50% increase per ASCE 7-16 Section 11.4.8 Item 1

8.2 Earthwork Recommendations

Earthwork should be performed in accordance with the requirements of applicable governing agencies and the recommendations presented below. Evaluations performed by the geotechnical consultant during the course of operations may result in new recommendations, which could supersede the recommendations in this section.

8.2.1 Pre-Construction Conference

We recommend that a pre-construction conference be held to discuss the recommendations presented in the report. Representatives of the City, the design engineer, Ninyo & Moore, and the contractor should be in attendance to discuss project schedule and earthwork requirements.

8.2.2 Site Preparation

Site preparation should begin with the demolition of the designated existing improvements and removal of vegetation, utility lines, surface obstructions (e.g., pavements, aggregate base, curb/gutter, foundations), rubble and debris, and other deleterious materials from areas to be graded. Vegetation should be removed to such a depth that organic material is generally not present. Clearing and grubbing should extend to the outside of the proposed excavation and fill areas. Rubble and excavated materials that do not meet criteria for use as fill should be removed from the site for disposal in an appropriate landfill. Soil containing roots or other organic matter may be stockpiled for later use as landscaping fill, as authorized by the owner's representative. Active utilities within the project limits, if any, should be re-routed or protected from damage by construction activities. Existing utilities to be abandoned should

be removed, crushed in place, or backfilled with grout. Excavations resulting from removal of buried utilities, tree stumps, or obstructions should be backfilled with compacted fill in accordance with the recommendations in the following sections.

8.2.3 Treatment of Near-Surface Soils

In order to provide suitable support and reduce the potential for settlement of the proposed improvements, we recommend that the upper one to two feet of fill soils in the areas beneath the proposed new improvements be recompact. Prior to compaction of surficial soils, a representative of our firm should observe proof rolling of the surface to check for pumping which would suggest weak surficial soils and possible need for alternative considerations (e.g. chemical treatment, geogrid, or other methods to improve subgrade strength). Where overexcavation is performed, suitable excavated soils should be replaced as engineered fill compacted to 90 percent relative compaction per ASTM D 1557. The lateral limits of surficial compaction for the building area should extend to approximately five (5) feet beyond the building perimeter or to a distance equal to the depth of overexcavation, whichever is greater, where overexcavation is performed. The lateral limits of surficial compaction for pavements should extend to approximately 2 feet or to a distance equal to the depth of overexcavation, whichever is greater, where overexcavation is performed.

Where excavation is performed, the bottom of the excavation may expose soft or weak soils. The excavation bottom should be evaluated by our representative during the excavation work. Prior to placing new compacted fill, the exposed subgrade should be observed by a representative of Ninyo & Moore to confirm the bottom is firm and unyielding.

8.2.4 Chemical Treatment

We would like to point out that, historically, Bay Mud was sometimes used in fill operations, and there is a possibility that expansive Bay Mud may be encountered within the artificial fill. Note that chemical treatment is often used to reduce expansion potential and strengthen soils, especially in fill over Bay Mud conditions, to improve access for grading equipment. The on-site soil may be chemically treated with high calcium quicklime to reduce the expansion characteristic of the soil as an alternative to importing select fill. The high calcium quicklime, for treatment of primarily clayey soils, should conform to ASTM Standard C977. Alternatively, cement treatment can be used to improve strength of sandy or combination (e.g. sand, silt, clay mixed soils). The chemical treatment should be performed by an experienced contractor that specializes in the chemical treatment of soil. The chemical agent should be proportioned and spread with a mechanical spreader and mixed into the soil on a mixing table or in place to produce consistent distribution of the agent within the treated layer.

The depth of mixing should not exceed 18 inches per lift or the capacity of the mixer if less. Precautions to reduce the potential for dusting of quicklime or cement, such as scheduling or suspending operations to avoid windy weather, should be taken. Casting or tailgating of the chemical agent should not be permitted. The mixer should be equipped with a rotary cutting/mixing assembly, and an automatic water distribution system. Mixing or spreading operations should not be performed during inclement weather or when the ambient temperature is less than 35 degrees Fahrenheit or during foggy or rainy weather. Adjacent passes of the mixer should overlap by 4 inches or more.

For preliminary cost evaluation a dosage of 5 percent by dry weight of soil should be assumed, with an assumed dry weight of soil of 110 pcf. The actual dosage should be determined through laboratory testing at the time of construction. Testing typically requires about 5 days from receipt of a fresh sample of lime. The contractor should provide a sample of the lime that will be used in construction to Ninyo & Moore about 2 weeks prior to the planned start of lime treatment.

Mixing and pulverizing should continue until the treated soil does not contain untreated soil clods larger than 1 inch and the quantity of untreated soil clods retained on the No. 4 sieve is less than 40 percent of the dry soil mass. Water should be added as-needed during the mixing process to achieve moisture content above the optimum, as evaluated by ASTM D1557, for the lime-soil mixture. The lime-soil mixture should be re-mixed following a 16-hour minimum mellowing period after the initial mixing. The lime-soil mixture should be compacted within 3 days after initial mixing to achieve 90 percent of the reference density as evaluated by ASTM D1557 on a dry density basis.

The grading contractor should provide assistance to Ninyo & Moore with grade checking to confirm surface elevations and depth of mixing as the lime treatment operation proceeds.

8.2.5 Observation and Removals

Prior to placement of fill, or the placement of forms or reinforcement for foundations, the client should request an evaluation of the exposed subgrade by Ninyo & Moore. Materials that are considered unsuitable shall be excavated under the observation of Ninyo & Moore in accordance with the recommendations in this section or supplemental recommendations by the geotechnical engineer.

Unsuitable materials include, but may not be limited to dry, loose, soft, wet, expansive, organic, or compressible natural soil, and undocumented or otherwise deleterious fill materials. Unsuitable materials should be removed from trench bottoms and below bearing

surfaces to a depth at which suitable foundation subgrade is exposed, as evaluated in the field by Ninyo & Moore.

8.2.6 Material Recommendations

Materials used during earthwork, grading, and paving operations should comply with the requirements listed in Table 6. On-site materials that have been chemically treated may be used as fill outside areas where the chemical properties may impact planned vegetation. Materials should be evaluated by the geotechnical engineer for suitability prior to use. The contractor should notify the geotechnical consultant prior to import of materials or use of on-site materials to permit time for sampling, testing, and evaluation of the proposed materials. On-site materials may need to be dried out before re-use as fill. Also, as previously noted, expansive clay soils can be difficult to work with. The contractor should be responsible for the uniformity of import material brought to the site.

Table 6 – Recommended Material Requirements

Material and Use	Source	Requirements ^{1,2,3}
Select Fill	Import	Close-graded with 35 percent or more passing No. 4 sieve and either: Expansion Index of 50 or less, Plasticity Index of 12 or less, or less than 10 percent, by dry weight, passing No. 200 sieve
Pipe/Conduit Bedding and Pipe Zone Material -material below conduit invert to 12 inches above conduit	Import	90 to 100 percent (by mass) should pass No. 4 sieve, and 5 percent or less should pass No. 200 sieve
Trench Backfill - above bedding material	Import or On-site Borrow	As per general fill and excluding rock/lumps retained on 4-inch sieve or 2-inch sieve in top 12 inches
Aggregate Base	Import	Class 2, ¾ inch max. Should not contain recycled asphalt concrete if used below floor slabs, CSS ⁵ Section 26-1.02
Controlled Low Strength Material (CLSM)	Import	CSS5 Section 19-3.02G

Notes:

- ¹ In general, fill should be free of rocks or lumps in excess of 6 inches in diameter, trash, debris, roots, vegetation or other deleterious material.
- ² In general, import fill should be tested or documented to be non-corrosive³ and free from hazardous materials in concentrations above levels of concern.
- ³ The specification of utility owner or local agency may supersede the indicated requirements in this table.
- ⁴ Non-corrosive as defined by the Corrosion Guidelines (Caltrans, 2021).
- ⁵ CSS is California Standard Specifications (Caltrans, 2022).

8.2.7 Subgrade Preparation

Where chemical treatment has not been performed, subgrade below slabs or fill should be prepared as per the recommendations in Table 7. Prepared subgrade should be maintained in a moist (but not saturated) condition by the periodic sprinkling of water prior to placement of additional overlying fill. Subgrade that has been permitted to dry out and loosen or develop desiccation cracking, should be scarified, moisture-conditioned, and recompact as per the requirements above.

Table 7 – Subgrade Preparation Recommendations	
Subgrade Location	Source
Below Slabs, Pavement, and General Fill	<ul style="list-style-type: none"> • After clearing per Section 8.2.2., check for unsuitable materials as per Section 8.2.5 • Scarify 8 inches then moisture condition and compact as per Section 8.2.8. • Keep in moist condition by sprinkling water.

8.2.8 Fill Placement and Compaction

Fill and backfill should be compacted in horizontal lifts in conformance with the recommendations presented in Table 8. The allowable uncompacted thickness of each lift of fill depends on the type of compaction equipment utilized, but generally should not exceed 8 inches in loose thickness.

Table 8 – Fill Placement and Compaction Recommendations			
Fill Type	Location	Compacted Density ¹	Moisture Content ²
Subgrade	Below pavement (within 12 inches of finished subgrade)	95 percent	+ 2 percent or above
	Below slabs or fill and in locations not already specified	90 percent	+ 2 percent or above
General Fill	Below pavement (within 12 inches of finished subgrade)	95 percent	+ 2 percent or above
	In locations not already specified	90 percent	+ 2 percent or above
Lime-Treated Soils	All locations	95%	+3%
Bedding and Pipe Zone Fill	Material below invert to 12 inches above pipe or conduit	90 percent	Within +/- 2 Optimum
Trench Backfill	Top 12 inches below finish subgrade for areas subject to vehicular loading	95 percent	+ 2 percent or above
	In locations not already specified	90 percent	+ 2 percent or above

Table 8 – Fill Placement and Compaction Recommendations

Fill Type	Location	Compacted Density ¹	Moisture Content ²
Aggregate Base	Below slabs or pavement	95 percent	Near Optimum

Notes:

¹ Expressed as percent relative compaction or ratio of field density to reference density (typically on a dry density basis for soil and aggregate). The reference density of soil and aggregate should be evaluated by ASTM D 1557.

² Target moisture content at compaction relative to the optimum as evaluated by ASTM D 1557

Compacted fill should be maintained in a moist (but not saturated) condition by the periodic sprinkling of water prior to placement of additional overlying fill. Fill that has been permitted to dry out and loosen or develop desiccation cracking, should be scarified, moisture-conditioned, and recompact as per the requirements above.

8.2.9 Temporary Excavations and Shoring

We understand that the maximum depth of the pools will be on the order of 7 feet. Considering that up to 3 feet of fill may be placed in the pool areas, the depth of pools is estimated to be on the order of 10 feet below existing grade, and excavations up to about 12 feet below finished grade are anticipated. Given the historic and more recent observations of groundwater depth, groundwater is likely to be encountered during excavation for the pool(s). The construction contractor should be advised that installation of a robust groundwater control system will most likely be required. The design, installation, and operation of such a system, which is the responsibility of the contractor, should ensure that groundwater levels are maintained at least 2 feet below the deepest point of the excavation. Dewatering pits or sumps or wellpoints should be used to depress the groundwater level (if encountered) below the bottom of the excavation.

Excavations should be stabilized in accordance with the Excavation Rules and Regulations (29 Code of Federal Regulations [CFR], Part 1926) stipulated by the Occupational Safety and Health Administration (OSHA). Stabilization should consist of shoring sidewalls or laying slopes back.

Table 9 lists the OSHA material type classifications and corresponding allowable temporary slope layback inclinations for soil deposits that may be encountered on site. We encountered granular soils that consisted of loose to very dense, silty sand and sand during our subsurface investigation, which corresponds to OSHA Type C soil. If materials other than those anticipated are encountered, Ninyo & Moore should be provided an opportunity to review subsurface conditions.

Alternatively, an internally-braced shoring system or trench shield conforming to the OSHA Excavation Rules and Regulations (29 CFR, Part 1926) may be used to stabilize excavation sidewalls during construction. The lateral earth pressures listed in Table 9 may be used to design or select the internally-braced shoring system or trench shield. The recommendations listed in Table 9 are based upon the limited subsurface data provided by our subsurface exploration and reflect the influence of the environmental conditions that existed at the time of our exploration. Excavation stability, material classifications, allowable slopes, and shoring pressures should be re-evaluated and revised, as-needed, during construction. Excavations, shoring systems and the surrounding areas should be evaluated daily by a competent person for indications of possible instability or collapse.

If the contractor intends to use temporary shoring to support the excavation during construction, and does not have a fully redundant groundwater control system (meaning extra pumps and power sources available on site at all times), then the shoring should be designed to resist full hydrostatic water pressures on the shoring.

Table 9 – OSHA Material Classifications and Allowable Slopes

Material	OSHA Classification	Allowable Temporary Slope ^{1,2,3}	Lateral Earth Pressure on Shoring ⁴ (psf)
Cohesive Soils (above groundwater)	Type B	1h:1v (45°)	45×D + 72
Granular Soils (above groundwater)	Type C	1½ h:1v (34°)	80×D + 72

Notes:

- ¹ Allowable slope for excavations less than 20 feet deep. Excavation sidewalls in cohesive soil may be benched to meet the allowable slope criteria (measured from the bottom edge of the excavation). The allowable bench height is 4 feet. The bench at the bottom of the excavation may protrude above the allowable slope criteria.
- ² In layered soil, layers shall not be sloped steeper than the layer below.
- ³ Temporary excavations less than 5 feet deep may be made with vertical side slopes and remain unshored if judged to be stable by a competent person (29 CFR, Part 1926.650).
- ⁴ 'D' is depth of excavation for excavations up to 20 feet deep. Includes a surface surcharge equivalent to two feet of soil.

The shoring system should be designed or selected by a suitably qualified individual or specialty subcontractor. The shoring parameters presented in this report are preliminary design criteria, and the designer should evaluate the adequacy of these parameters and make appropriate modifications for their design. We recommend that the contractor take appropriate measures to protect workers. OSHA requirements pertaining to worker safety should be observed.

Excavations made in close proximity to existing structures may undermine the foundation of those structures and/or cause soil movement related distress to the existing structures.

Stabilization techniques for excavations in close proximity to existing structures will need to account for the additional loads imposed on the shoring system and appropriate setback distances for temporary slopes. The contractor should be solely responsible for protection of existing site improvements and provide shoring and/or underpinning as needed.

The excavation bottoms may encounter wet, loose material which may be subject to pumping under heavy equipment loads. The contractor should be prepared to stabilize the bottom of the excavations. In general, unstable bottom conditions may be mitigated by using a stabilizing geogrid, overexcavating the excavation bottom to suitable depths and replacing with compacted fill, chemical treatment, ground improvement or other suitable method. Additionally, aeration of wet soils should be anticipated.

8.2.10 Utility Trenches

Trenches constructed for the installation of underground utilities should be stabilized in accordance with our recommendations in Section 8.2.9. Where groundwater is encountered within utility trench excavations, groundwater should remain drawn down until sufficient backfill has been placed to counteract uplift forces. Utility trenches should be backfilled with materials that conform to our recommendations in Section 8.2.6. Trench backfill, bedding, and pipe zone fill should be compacted in accordance with Section 8.2.8 of this report. Bedding and pipe zone fill should be shoveled under pipe haunches and compacted by manual or mechanical, hand-held tampers. Trench backfill should be compacted by mechanical means. Densification of trench backfill by flooding or jetting should not be permitted.

Trenches should not be excavated adjacent to footings. If trenches are to be excavated near a continuous footing, the bottom of the trench should be located above a 2:1 (horizontal to vertical) plane projected downward from the bottom of the footing. Utility lines that cross beneath footings should be encased in concrete or CLSM below the footing for a distance equivalent to the depth of the excavation.

8.3 Foundations

Foundations should be designed in accordance with structural considerations and our geotechnical recommendations. In addition, requirements of the governing jurisdictions, practices of the Structural Engineers Association of California, and applicable building codes should be considered in the design of the structures.

8.3.1 Foundation Type Selection

Settlement estimates based on static settlement due to sustained loads and seismically-induced settlement can be reduced if the ground is improved or deep foundations are used. At this site, given the significant level of seismic shaking, and the depth and thickness of the potentially liquefiable soil, mitigating this estimated settlement is likely to be very costly.

In order to reduce the effects of differential settlement including where underground utilities enter/exit structures supported on deep foundations or improved soil. Utilities should be either be supported on piles or improved soil. Alternatively, a utility vault could be constructed to house utilities and include flexible connections to reduce the impacts of differential settlement.

Minor improvements that have higher tolerance for total or differential settlement can be supported on rigid shallow foundations without soil improvement.

8.3.2 Ground Improvement

Ground improvement and deep foundation systems, or a combination of these, should be considered to mitigate the static and dynamic settlement considerations, as discussed in Sections 6.1.5 and 6.7 of the report. We recommend that displacement methods be considered for alternative foundations or soil improvement to reduce the amount of soil off-haul generated. Ground improvement should extend through the upper liquefiable soils to mitigate the seismically-induced settlement, and shallow foundations can then be supported on the improved soil. As previously indicated, we recommend that ground improvement could include rigid inclusion, deep soil mixing (DSM), drilled displacement columns (DDC), stone columns, aggregate piers, pressure grout, or other ground improvement methods that achieve the performance requirements of the project. In general, shallow foundations supported on improved soil have a significantly improved allowable bearing capacity compared to shallow foundations supported on un-improved site soils. The grid spacing of ground improvement should take into consideration the spanning capabilities of the supported slab-on-grade or pool shell.

We recommend that a specialty contractor be retained for design of ground improvement system(s) including element size, spacing, depth, and layout of the proposed ground improvement as a design-build component to the construction. The ground improvement should extend to a minimum depth of 20 feet below the existing ground surface to mitigate total static settlement to ½ inch. Seismic settlement below a depth of 20 feet is up to 2.6 inches with differential static plus seismic settlement up to about 2 inches over 50 feet. Ground improvement to a depth of 34 feet reduces total static plus seismic settlement to

about 1 inch with differential settlement up to about ½ inches over 50 feet. The design of the ground improvement system should verify compliance with specified bearing capacity and settlement tolerance, and include consideration of downdrag loads from consolidation and seismic settlement. Typically, the spacing between individual ground improvement elements varies from about 5 to 15 feet on-center, depending upon the type of ground improvement. The ground improvement should be designed to achieve an allowable bearing capacity of at least 3500 psf for dead load plus live load and a 1/3 increase for all loads including wind or seismic. We understand from the design team that post-improvement combined static and seismic differential settlement which exceeds 2 inches across the length or width of the pool will result in unreasonably high post-earthquake repair costs, and is not acceptable.

To achieve the bearing capacity and design settlement tolerances, we recommend that soil improvement (e.g. deep foundations or ground improvement) be performed for the swimming pools and associated underground piping and surface chambers. For reduction of differential settlement between the pool decking and the pools, ground improvement should be considered below the pool deck as well. We recommend that soil improvement be performed to a minimum depth of 34 feet below existing grade. Where possible, the ground improvement should extend laterally at least 10 feet beyond the limits of improvements that have differential settlement tolerance concerns or one row of ground improvement members, whichever is less. If there are existing improvements within this recommended zone of ground improvement, they would need to be demolished and rebuilt or evaluated individually on a case-by-case basis. We recommend that consideration be given to performing the soil improvement from existing site grades to reduce difficulties associated with excavation and access in unimproved excavations, particularly for the deeper pool excavations; however, contractor means and methods may include ground improvement installation following required excavations.

The soil improvement should include CPT testing prior to improvement and post-improvement to check that the improvement has achieved the specified settlement tolerance. Depending upon the type of improvement, bearing capacity testing should be performed. Post-improvement performance testing that indicates settlement tolerance or specified bearing capacity has not been achieved would require additional improvement at intermediate spacing to the initial installation grid. The proposed ground improvement method and approach should be submitted to the design team and Ninyo & Moore for review.

8.3.3 Ground Improvement Contractor Requirements

The ground improvement contractor (Contractor) shall be responsible for design of a ground improvement system that meets the project densification, allowable bearing capacity, and settlement requirements. Industry recognized standards or design methods specific to the Contractor’s equipment and construction methods should be used.

The contractor shall provide an improvement plan with shop drawings and design computations, using generally accepted design methodology in geotechnical and structural engineering that meets the performance requirements. These requirements include the factor of safety and the tolerable settlement amounts in the case of structural footings and pools. The following minimum performance requirements shall be used in the table and bullet points below:

Table 10 – Ground Improvement Specifications	
Ground Improvement Options	Settlement Specification
Un-mitigated Soils	<ul style="list-style-type: none"> Total Static & Dynamic: Estimated to be > 3 inches Differential Static & Seismic: Estimated to be > 2 inches (over a distance of 50 feet)
Ground Improvement to 20 feet min.	<ul style="list-style-type: none"> Total Static = ½ inch Total Dynamic = 2.6 inches Differential Static & Seismic (over a distance of 50 feet) = 2 inches
Ground Improvement to 34 feet min.	<ul style="list-style-type: none"> Total Static & Seismic = 1 inch Differential Static & Seismic (over a distance of 50 feet) = ½ inch
Notes: The ground improvement should extend a minimum of 10 feet or one row of improvements beyond the area of improvement, whichever is less.	

- Allowable Bearing Pressure (Min.) for Footings supported by Ground Improvement:
 - Dead and Live Load: 3,500 psf.
 - Dead and Live and Earthquake loads allowable bearing pressure with 1/3 increase of 4667 psf.
 - Ultimate Load bearing pressure of 10,500 psf.

The Contractor should make their own interpretation of strength parameters for the soil, obtained or derived from the soil boring logs, cone penetration tests, and any geotechnical laboratory testing data provided in the Geotechnical Report. Static settlement shall be

assessed using appropriate soil parameters for an elastic settlement analysis based on an area replacement ratio considering the stiffness of the native soils, and the ground improvement system. Liquefaction and seismic settlement estimates shall be performed using methodology presented in the project geotechnical report, which followed the procedures in the Idriss and Boulanger, 2014. Liquefaction and settlement shall be evaluated for the upper 50-feet of the soil profile. Any additional subsurface information needed to design the ground improvement shall be the responsibility of the Contractor, and results of additional subsurface information should be provided to the Owner/Design Team.

8.3.4 Submittals Required

- The Contractor should submit detailed design calculations and construction drawings to the Owner for approval at least six (6) weeks prior to the start of construction. All plans should be signed and sealed by a Geotechnical Engineer (the Designer) registered in the State of California.
- The Contractor Experience Profile. The Contractor must submit documentation evidencing the experience requirements.
- Pre-Construction Test Data – The Contractor should furnish Owner a description of the installation equipment, installation records, complete test data and original digital files, analysis of the test data, compliance with acceptance criteria, and recommended design parameter values based on the pre-construction test program results. The report shall be prepared, signed and sealed by a Geotechnical Engineer registered in the State of California.
- Shop Drawings of the ground improvement plan signed and sealed by a California Licensed Geotechnical Engineer showing horizontal limits, locations, pattern, spacing, diameters, top and bottom elevations, and identification numbers, in addition to any other details needed to describe the work.
- Pre-construction test report should be submitted for review.
- Field Validation Program Plan: At least 30 days before the start of the field validation program, the Contractor should submit a field validation program plan which contains descriptions of the construction procedures, equipment and ancillary equipment to be used for ground improvement, operational and material parameters to be monitored during field validation, layout of the ground improvement elements to be constructed, and summary of QC/QA samples to be collected and tested, along with examples of the forms that will be used to document the work.
- Ground Improvement Work Plan.
- Detailed descriptions of sequence of construction and all construction procedures, equipment (catalog cut-sheets), and ancillary equipment to be used.
- Methods for controlling and recording the verticality and the top and bottom elevation of each element.

- When ground improvement elements are required to penetrate into a bearing layer, the necessary procedure and the measurement to confirm the end-bearing.
- Working drawings and calculations for the ground improvement elements, showing the site location of the project, and the dimensions, layout and locations of all elements. Drawings should indicate the identification number of every element. Calculations and drawings should demonstrate that the element layout, depth and quantity meet the specification requirements. The design calculations shall be performed by a Professional Engineer registered in state of California, who shall also prepare, stamp, and sign the drawings.
- Ground Improvement schedule information.
- Sample Daily Production Report.
- Details of all means and methods proposed for QC/QA activities including surveying, process monitoring, sampling, testing, documentation, and schedule milestones.
- Names of any subcontractors used for QC/QA activities. An independent laboratory should be used for QC/QA testing and should be approved by the City, SEOR and GEOR.
- Material Certifications: Certificates of compliance must be submitted as proof of conformance to materials standards and requirements.
- Production Records. By the end of the next business day following each shift, the Contractor shall submit a Daily Production Report in the approved format. The Daily Production Report shall be completed and signed by the Contractor's Project Superintendent. The report should contain at a minimum:
 - Project name.
 - Day, month, year, time of work shift (beginning and end).
 - Name of field superintendent in charge of work for the contractor.
 - Ground improvement equipment (rig number) in operation during the shift and specific activities conducted by said equipment.
 - Treatment zone and reference drawing number.
 - Elevation of top and bottom of treatment zone.
 - Element number, diameter, and location coordinates.
 - Date and time (start and finish) of element.
 - A record of the location of each completed column/element installed during the work shift and all zones completed to-date on a plan of suitable scale to clearly show the location of the elements.
 - Element verticality measurements.
 - A description of obstructions, interruptions, or other difficulties during installation and their resolution.

- Other pertinent observations including, but not limited to: ground settlement and/or heave, collapses of the treatment zone, and any unusual behavior of any equipment during the process.
- For QA/QC testing, provide collection date, time, plan location, elevation, and identification numbers of all samples.
- Quantities of all materials delivered to site, plus a reconciliation with amounts used for the ground improvement operation.
- Summary of any downtime or other unproductive time, including time, duration and reason.
- Detailed results of all testing.
- Quality Control/Quality Assurance Records. Calibration data must be submitted for all measurement devices. Within three business days of completing any QC/QA testing, the Contractor shall submit the test results, including original data sheets from the laboratory and an evaluation of the compliance of the test results with project acceptance criteria. Equipment should be calibrated prior to initial use and repeated every 3 months.
- As-Built Field Measurement Data. After completion of the project, the Contractor must submit as-built field measurement data indicating surveyed as-built plan locations of each CDSM element including: the element center (per site specific coordinates), the element dimension, the column verticality, and the top and bottom elevations of each element to the accuracy required by the project Specifications.
- Verification testing for the ground improvement should include pre improvement and post improvement testing to verify compliance.

8.3.5 Deep Foundations

Deep foundations consisting of driven or drilled displacement piles are an option for settlement sensitive structures to mitigate static settlement. However, deep displacement foundations may encounter refusal at depths shallower than 34 feet which is the anticipated maximum depth of liquefaction and associated settlement. We understand that deep foundations are not currently under consideration for the project; however, we can provide recommendations for the deep foundation, if requested.

8.3.6 Shallow Foundations (Improved Soil)

Allowable bearing capacity of shallow foundations supported by improved soil is 3,500 psf for dead plus live loads. The allowable bearing capacity can be increased by one-third for all loads including wind or seismic.

Resistance to lateral loads for shallow foundations bearing on granular fill may be designed using a coefficient of friction of 0.45 (total frictional resistance equals coefficient of friction times the dead load). Foundations may be designed using a passive resistance value of 350

pounds per square foot per foot of depth. The upper foot should be ignored for passive resistance unless confined by a slab or pavement. Where waterproofing is placed below footings, the coefficient of friction is significantly reduced and is dependent upon the material used for waterproofing. If waterproofing is placed below the footing, we recommend ignoring the coefficient of friction below footings.

8.3.7 Rigid Shallow Foundations (Unimproved Soil)

Rigid shallow foundations such as footings interconnected with grade beams or reinforced thickened concrete mat foundations are effective for reducing differential settlement, and can be used over unimproved soil for structures or planned improvements which are more tolerant of settlement. The allowable capacities of shallow foundations will be governed primarily by settlement. The existing fill at the project site is not considered engineered fill, and the upper one to two feet of existing fill should be recompacted per Section 8.2.3 to improve foundation supporting conditions.

Lime treatment of existing clayey soils is another option for improving supporting conditions for shallow foundations. For granular fill soils, cement treatment is more effective. Both sandy and clayey fill soils were encountered in our subsurface exploration. Therefore, limits of surficial treatment should be further evaluated for appropriate treatment option with lime, cement, or a combination of both.

Allowable bearing capacity of shallow foundations (unmitigated for liquefaction) would be on the order of about 1000 psf to 2000 psf for dead load plus live load, depending upon the settlement tolerance and subgrade preparation. The allowable bearing capacity can be increased by one-third for all loads including wind or seismic.

Resistance to laterals loads for shallow foundations bearing on fill may be designed using a coefficient of friction of 0.30 (total frictional resistance equals coefficient of friction times the dead load). Foundations may be designed using a passive resistance value of 300 pounds per square foot per foot of depth. The upper foot should be ignored for passive resistance unless confined by a slab or pavement. Where waterproofing is placed below footings, the coefficient of friction is significantly reduced and is dependent upon the material used for waterproofing. If waterproofing is placed below the footing, we recommend ignoring the coefficient of friction below footings.

Mat foundations supported on engineered fill overlying Young Bay Mud may be designed using a coefficient of subgrade reaction, K_{v1} , of 100 kips per cubic foot (kcf). The coefficient

of subgrade reaction K_b for a mat of a specific width, may be evaluated using the following equation where b is the width of the foundation:

$$K_b = K_{v1}[(b+1)/2b]^2$$

8.3.8 Slabs-on-Grade (Improved Soil)

Building floor slabs and the pool bottom slabs underlain by improved soil should be designed by the project structural engineer based on the anticipated loading conditions. The subgrade should be prepared in accordance with Section 8.2.7.

Beneath the pools' bottoms and the pools' decks, an 8-inch thick layer of Caltrans Class 2 aggregate base should be used, placed in accordance with Section 8.2.8. A modulus of subgrade reaction of 300 pounds per square inch per inch of deflection (psi/in) for the improved soil can be used for initial modeling of the slab. The actual subgrade reaction below the mat will result in a variable subgrade modulus that matches the tendency for dishing settlement between soil improvement columns.

For other slabs where a vapor retarding system is not used, slabs should be constructed on 6 inches, or more, of Caltrans Class 2 aggregate base conforming to Section 8.2.6 and placed in accordance with Section 8.2.8.

Slabs should be reinforced with deformed steel bars. We recommend that masonry briquettes or plastic chairs be used to aid in the correct placement of slab reinforcement in the upper half of the slab. Refer to Section 8.8 for the recommended concrete cover over reinforcing steel. A vapor retarder is recommended in areas where moisture-sensitive floor coverings or conditioned environments are anticipated. Joints consistent with ACI guidelines (ACI, 2020) may be constructed at periodic intervals to reduce the potential for random cracking of the slab.

8.3.9 Slab-on-Grade (Unimproved Soil)

Slab-on-grade floors for buildings on unimproved soil should be designed by the project structural engineer as structural slabs based on the anticipated loading conditions. A vapor retarder is recommended in areas where moisture-sensitive floor coverings or conditioned environments are anticipated. Where a vapor retarding system is not used, slabs should be constructed on 4 inches of compacted aggregate base. The slab should be reinforced with deformed steel bars with a nominal diameter of $\frac{3}{8}$ -inch or more as designed by the project structural engineer. Masonry briquettes or plastic chairs should be used to maintain the

position of slab reinforcement, during concrete placement, in the upper half of the slab with appropriate concrete cover over the reinforcing steel. Refer to Section 8.8 for the recommended concrete cover over reinforcing steel. Joints consistent with the guidelines of ACI Committee 302 may be constructed at periodic intervals to reduce the potential for random cracking of the slab.

8.3.10 Moisture Vapor Retarder

The migration of moisture through slabs underlying enclosed spaces or overlain by moisture sensitive floor coverings should be discouraged by providing a moisture vapor retarding system between the subgrade soil and the bottom of slabs. We recommend that the moisture vapor retarding system consist of a 4-inch-thick capillary break, overlain by a 15-mil-thick plastic membrane. Sand should not be placed over the vapor retarder. The capillary break should be constructed of clean, compacted, open-graded crushed rock or angular gravel of ¾-inch nominal size. The crushed rock or angular gravel should be compacted with a vibratory plate compactor or roller to reduce the potential for damage to the vapor retarder by rock puncture during placement of reinforcement and concrete. The plastic membrane should conform to the requirements in the latest version of ASTM Standard E 1745 for a Class A membrane. To reduce the potential for slab curling and cracking, an appropriate concrete mix with low shrinkage characteristics and a low water-to-cementitious-materials ratio should be specified. In addition, the concrete should be delivered and placed in accordance with ASTM C94 with attention to concrete temperature and elapsed time from batching to placement, and the slab should be cured in accordance with the guidelines of ACI Committee 302.

Where the exterior grade is at a higher elevation than the moisture vapor retarding system (including the capillary break layer), consideration should be given to constructing a subdrain around the foundation perimeter. The subdrain should consist of ¾-inch crushed rock wrapped in filter fabric (Mirafi 140N, or equivalent). The subdrain should be 12-inches wide capped by a pavement or 12 inches of native soil and drained by a 4-inch perforated pipe (Schedule 40 polyvinyl chloride pipe, or similar) with the perforations facing down. The pipe should be sloped at 1 percent or more to discharge at an appropriate outlet away from the foundation. The pipe should be located below the bottom elevation of the moisture vapor retarding system but above a plane extending down and away from the bottom edge of the foundation at a 2:1 (horizontal to vertical) gradient. A sump may be used where gravity drainage is not feasible. The effectiveness of a perimeter subdrain pipe should be considered relative to the invert elevation of the subdrain and anticipated depth of groundwater.

8.4 Retaining Walls Including Pool Side Walls

Walls backfilled with imported select fill and retaining up to 10 feet of soil above the wall footing with level backfill may be designed for active or at-rest equivalent fluid earth pressures of 82 or 91 psf per foot depth (below design groundwater level) and 40 or 60 pcf EFW for drained conditions or above design groundwater level. Walls that yield or deflect may be designed for active earth pressures. Wall deflection equivalent to about 1 percent of wall height may be needed to reduce at-rest earth pressures to active earth pressures. Walls that are restrained by abutting walls should be designed to resist at-rest earth pressures. An additional equivalent fluid pressure of 14 psf per foot depth may be used to evaluate seismic earth pressure on retaining walls, as appropriate, for consideration with active earth pressures.

Walls retaining level ground should be designed to resist construction or live load surcharges on the backfill. The lateral earth pressure due to a backfill surcharge of 240 psf should be a uniform horizontal surcharge of 80 psf for yielding conditions and 120 psf for at-rest conditions.

Pool walls should be designed for at-rest earth pressures, using the recommended values above.

Wall height should be evaluated as the vertical distance above the wall footing to the ground surface at the heel of the wall.

8.5 Hydrostatic Uplift

The design of the swimming pool and underground utilities should consider hydrostatic uplift and include appropriate design measures to resist hydrostatic uplift. We recommend a design groundwater level of 3 feet or higher below existing grade and take into consideration potentially higher groundwater levels due to sea level rise over the life of the project. Hydrostatic uplift can be resisted by a combination of dead weight, tie-down elements, and lowered groundwater level. The pools should be designed to resist hydrostatic uplift when the pool is empty for repair or maintenance as discussed in Section 6.12. The improved soil below the pool and underground utilities may be constructed with tie-down features that can be structurally connected to the pool shell and underground utilities. Alternatively, the pool shell and/or structurally incorporated pool base mat can be thickened to increase the dead weight to restrict hydrostatic uplift. Extending the limits of the pool base mat beyond the pool limits and utilizing the effective weight of the overlying soils is another way providing additional resistance to uplift loads. Deep wells can be installed near the pool to lower the groundwater level and reduce hydrostatic uplift, and hydrostatic relief valves should be installed in the pools to discharge groundwater into the pools, if needed.

8.6 Tiedown Anchors (Preliminary Recommendations)

Tiedown anchors consisting of a bar tendon installed in a drilled hole backfilled with grout, may be used to provide tensile resistance to uplift. A smooth plastic sleeve should be provided over the tendon to create an unbonded zone that extends no less than ___ feet for bar tendons, and no less than ___ feet below the ground surface. Gravity-grouted tiedown anchors embedded ___ feet below grade with a bonded length of no less than ___ feet may be designed for an allowable grout-to-ground bond strength of _____ psf with a safety factor of 2. Pressure grouting during initial grout placement or during one or more post-grouting operations, may be performed below a depth of ___ feet from the ground surface to enhance pullout resistance. The allowable grout-to-ground bond strength may be increased to _____ psf, with a safety factor of 2, where pressure grouting is performed to enhance pullout resistance with injection pressures of 150 pounds per square inch (psi) or more.

Tensile static load testing should be performed to check the design assumptions and installation methods. Verification testing to 200 percent of the design load (DL) should be performed on pre-production tiedown anchors. Verification testing should be performed on each anchor type (combination of bonded length, nominal diameter, tendon size, or installation method) specified with no less than two verification tests. Verification testing above 200 percent DL, but not more than 80 percent of the specified minimum tensile strength for the tendon, may be performed to justify an increase in the assumed grout-to-ground bond strength. Five percent of the production anchors should be proof tested to 160 percent DL. The foundation contractor's testing equipment should include dial gages capable of measuring to 0.001 inches with sufficient range for the anticipated movement, dial gage supports, jack with pressure gage, electronic load cell for verification creep testing, and a reaction frame. The hydraulic jack and pressure gage should have a range not exceeding twice the maximum test pressure and the gage should be graduated in increments of 100 psi or less.

The load testing should conform with Federal Highway Administration (FHWA) guidelines. The verification testing should consist of no less than three, progressively increasing load cycles from the alignment load (AL) or 5 percent DL to 130 percent DL in loading increments of not more than 15 percent DL with a hold time of 2.5 minutes at each load and a 60-minute creep test at 130 percent DL. Anchor head movement should be measured and recorded following the 2.5-minute hold at each load and at 1, 2, 3, 4, 5, 6, 10, 20, 30, 40, 50, and 60 minutes during the creep test. Following the creep test, the test load should be increased to 145 percent DL before beginning a final load cycle from the alignment load to 200 percent DL in increments of not more than 15 percent DL, with a 10-minute hold time at 200 percent. After the 10-minute hold, the test load should be reduced in increments of not more than 50 percent DL with a 5-minute hold at each load increment.

The proof testing should consist of one load cycle from AL up to 130 percent DL with load increments of not more than 15 percent DL. Anchor head movement should be measured and recorded following a 2.5-minute hold at each intermediate load with a 10- or 60-minute creep test at 130 percent DL. Anchor head movement should be measured and recorded at 1, 2, 3, 4, 5, 6, and 10 minutes during the creep test with additional measurements at 20, 30, 40, 50, and 60 minutes if the test is extended. Following the creep test, the test load should be increased to 160 percent DL in increments of not more than 15 percent DL with a 2.5-minute hold at each increment before reducing the test load in increments of not more than 30 percent DL with a 4-minute hold at each load increment.

The acceptance criteria for verification and proof testing should consist of (1) the apparent free length at 130 percent DL exceeds the jack length plus 80 percent of the unbonded length, (2) anchor movement of not more than 0.04 inches during the creep test between the 1-minute and 10-minute readings or not more than 0.08 inches between the 6- and 60-minute reading, and (3) the maximum test load can be held for 10 minutes during the verification test or 2.5 minutes during the proof test without continued anchor movement.

Class I Corrosion Protection with encapsulated tendons over the unbonded length and encapsulation or fusion bonded epoxy coatings over the bonded length should be provided for tiedown anchors to mitigate against potentially aggressive ground conditions.

Tiedown ground anchors may be prestressed with a nominal lock off load of up to 10 kips. If a greater lock-off load is needed, the impact on footing settlement should be re-evaluated.

Drilling to install the tiedown anchors will likely encounter cohesionless soil and groundwater. Overburden drilling techniques that advance casing, such as rotary duplex or sonic drilling, may be needed to mitigate unstable conditions. Hollow stem auger or open-hole rotary drilling stabilized with a polymer-water slurry may also be considered.

The nominal diameter of the drilled hole should be about 6 inches or more. The center-to-center spacing between adjacent tiedown anchors should be at least 30 inches and not less than three times the nominal diameter of the drilled hole. For groups of three or more tiedown anchors, the allowable group uplift resistance should not be more than the sum of the allowable uplift resistance for each anchor in the group, and not more than two-thirds of the sum of the effective weight of the soil block defined by the group plus the ultimate shear resistance around the perimeter of the block. An effective average soil unit weight of ___ pounds per cubic foot and an ultimate shear resistance of ___ pounds per square foot per foot below finish grade may be used for this calculation.

The foundation contractor should submit detailed plans for the anchor load testing, calibration reports for the test equipment, and a grouting plan. The grouting plan should include the grout mix design; methods and equipment for monitoring grout depth, volume, and pressure during placement; grouting rate calculations; estimated grout curing time; and procedures for contractor monitoring of grout quality.

The foundation contractor should select the drilling method, grouting procedure, and grouting pressure used for installation of the anchors. The foundation contractor is responsible for estimating grout take. Drilled holes that encounter groundwater or cohesionless soil may be unstable and may need to be stabilized by temporary casing or use of drilling mud. Addition of bentonite to the drilling mud or slurry is not recommended. The foundation contractor should monitor the conditions in the vicinity of the installation on a daily basis for signs of ground heave or subsidence.

Anchors should be primary grouted on the day the bonded length is drilled. The contractor should monitor and measure grout quantity and pressure during grouting operations. Gages for monitoring grout pressures should be capable of measuring not less than 150 psi or twice the actual grout pressures used. Each anchor should be primary grouted in one operation within one hour of grout mixing. The primary grout should be injected from the lowest point of the drilled holes until uncontaminated grout flows from the top of the hole while the tremie pipe extends below the level of the grout in the hole. Temporary casing, if used, should be extracted in stages so that after each length of casing is removed, the grout level is brought back up to the top of the hole. The grout pressures and grout takes should be controlled to reduce the potential for heave or fracturing of rock or soil.

The geotechnical engineer of record should be retained to observe anchor drilling, tendon installation, grouting, load testing, and prestressing.

8.7 Pavements and Flatwork

Recommendations for pavement (rigid and flexible) and exterior flatwork are presented in the following sections. A design R-value of 12 was selected based on the results of the R-Value testing performed for this study (Appendix C). The pavement subgrade should be evaluated by the geotechnical engineer during grading to check the finish subgrade for consistency with the assumed condition. Finished grades should be reviewed relative to thickness of existing fill and depth to weak subgrade soils which may require mitigation for construction equipment access. Recommendations for preparation of subgrade are presented in Section 8.2.7.

8.7.1 Asphalt Concrete Pavement

Recommended asphalt pavement sections based on the empirical procedure in the Highway Design Manual (Caltrans, 2020) are presented in Table 11 for a range of traffic indexes. Alternative sections are provided for consideration. The designer may interpolate between the values provided once a traffic index has been selected. The pavement sections were designed for a 20-year service life presuming that periodic maintenance, including crack sealing and resurfacing will be performed during the service life of the pavement. Premature deterioration may occur without periodic maintenance.

Laboratory testing for this evaluation indicated that some of the near-surface site soil is highly expansive. Seasonal variations in soil moisture, particularly near the edge of pavement, may result in differential vertical and lateral movement with seasonal shrinkage and swelling of the expansive soil. The potential degree of differential movement from shrinkage/swelling of expansive subgrade soil can be reduced, where desirable, by chemically treating the subgrade with quicklime. Where the expansion characteristic of the pavement subgrade is not mitigated by chemical treatment and the pavement is not laterally restrained by curbs, the potential for longitudinal cracking from differential lateral movement can be mitigated by placing a layer of geotextile (Mirafi 600X or equivalent) below the aggregate base layer.

Table 11 – Asphalt Concrete Pavement Structural Sections

Design R-Value	Traffic Index	Option 1	Option 2	Option 3
12	3	4 inches AC ^[1]	2 inches AC 4 inches AB ^[2]	4 inches AC 18 inches TS ^[3]
12	4	5¾ inches AC	2½ inches AC 6 inches AB	5 inches AC 18 inches TS
12	5	7½ inches AC	3 inches AC 8½ inches AB	5½ inches AC 18 inches TS
12	6	9 inches of AC	4 inches AC 10 inches AB	7 inches AC 18 inches TS
12	7	10½ inches AC	4½ inches AC 13 inches AB	8½ inches AC 18 inches TS

Notes:

¹ AC is Type A, Dense-Graded Hot Mix Asphalt complying with Caltrans Standard Specification 39-2 (2022).

² AB is Class II Aggregate Base complying with Caltrans Standard Specification 26-1.02 (2022).

³ TS is subgrade chemically treated with quicklime.

Asphalt concrete should be placed and compacted per in lifts not more than 4 inches thick to 91 percent of the reference density as evaluated by ASTM D2041 on a wet density basis. Pavements should be sloped so that runoff is diverted to an appropriate collector (concrete gutter, swale, or area drain) to reduce the potential for ponding of water on the pavement.

Concentration of runoff over asphalt pavement should be discouraged. Cracks that form in the asphalt concrete surface should be periodically sealed to reduce moisture intrusion into the aggregate base section. Deep curbs that extend 6 inches below the aggregate base section may be used to reduce the potential moisture intrusion into the aggregate base section adjacent to landscaped areas or the bottom of slopes. Subdrains may be considered as a supplement or alternative means of the mitigating moisture in the aggregate base section. Root barriers adjacent to trees may be considered to reduce the potential for pavement heave from root growth.

8.7.2 Exterior Flatwork

Walkways and other exterior flatwork not subject to vehicular loading should be 4 inches thick (or more) over 4 inches of aggregate base that conforms to the criteria for Class 2 aggregate base in Section 26-1.02 of the California Standard Specifications (Caltrans, 2023). Concrete and aggregate base thickness should be increased to 8 inches or more for flatwork subject to vehicular traffic up to periodic garbage trucks and emergency vehicles.

Appropriate jointing of concrete flatwork can encourage cracks to form at joints, reducing the potential for crack development between joints. Joints should be laid out in a square pattern at consistent intervals. Contraction and construction should be detailed and constructed in accordance with the guidelines of ACI Committee 302. The ratio of lateral spacing between contraction joints to the nominal thickness of the slab should not exceed 24 for jointed plain concrete. Contraction joints formed by premolded inserts, grooving plastic concrete, or saw-cutting at initial hardening, should extend to a depth equivalent to 25 percent of the slab thickness and 1 inch or more for thin slabs.

Flatwork may be reinforced with distributed steel to reduce potential for differential slab movement where cracking occurs. The distributed reinforcing steel should be terminated about 3 inches from contraction joints and should consist of No. 3 deformed bars at 18 inches on center, both ways, or with 6x6-D4/D4 welded wire fabric supplied as sheets (not rolls). Slabs reinforced with distributed steel should be 6 inches thick (or more) for No. 3 bar reinforcement and 5 inches thick (or more) for 6x6-D4/D4 reinforcement to provide adequate concrete cover for the steel. The lateral spacing between contraction joints should be 10 feet or less for a 5-inch-thick slab, and 12 feet or less for a 6-inch-thick slab. To reduce the potential for differential slab movement across joints, the distributed steel may be extended through the joints. This improvement will be balanced by a reduction in the functionality of the contraction joint to encourage crack formation at joints. Masonry briquettes or plastic chairs should be used to maintain the position of the reinforcement in the upper half of the

slab with 1½ inches of cover over the steel. Root barriers adjacent to trees may be considered to reduce the potential for flatwork heave from root growth.

8.8 Concrete

Laboratory testing indicated that the concentration of sulfate and corresponding potential for sulfate attack on concrete is negligible for the soil tested. However, due to the potential variability in the on-site soil and the potential future use of reclaimed water at the site, we recommend that Type II/V or Type V cement be used for concrete structures in contact with soil. In addition, we recommend a water-to-cement ratio of no more than 0.45. A 3-inch thick, or thicker, concrete cover should be maintained over reinforcing steel where concrete is in contact with soil in accordance with recommendations of ACI Committee 318.

To reduce the potential for shrinkage cracks in the concrete during curing, concrete for slabs and flatwork should not contain large quantities of water or accelerating admixtures containing calcium chloride. Higher compressive strengths may be achieved by using larger aggregates in lieu of increasing the cement content and corresponding water demand. Additional workability, if desired, may be obtained by including water-reducing or air-entraining admixtures. Concrete should be placed in accordance with the guidelines of ACI Committee 302 and project specifications. Particular attention should be given to curing techniques and curing duration. Slabs that do not receive adequate curing have a more pronounced tendency to curl upwards at edges and corners, and to develop random shrinkage cracks and other defects.

In the event that contraction joints are used to influence the location of crack development in slabs and the joints are to be constructed by saw cutting of the slabs, saw cuts should be made by soff-cut sawing within 4 to 12 hours after the initial hardening (not curing) of the concrete, as required by atmospheric conditions. The contractor should be responsible for monitoring of the concrete during initial set or hardening and selecting the appropriate time for cutting the slabs.

8.9 Surface Drainage and Site Maintenance

Surface drainage on the site should generally be provided so that water is diverted away from structures and is not permitted to pond. Positive drainage should be established adjacent to structures to divert surface water to an appropriate collector (graded swale, v-ditch, or area drain) with a suitable outlet. Drainage gradients should be 2 percent or more for a distance of 5 feet or more from the structure for impervious surfaces and 5 percent or more for a distance of 10 feet or more from the structure for pervious surfaces. Slope, pad, and roof drainage (from adjacent structures) should be collected and diverted to suitable discharge areas away from structures or other slopes by non-erodible devices (e.g., gutters, downspouts, concrete swales, etc.). Graded swales, v ditches, or curb and gutter should be provided at the site perimeter to restrict flow of

surface water onto and off of the site. Slopes should be vegetated or otherwise armored to reduce potential for erosion of soil. Drainage structures should be periodically cleaned out and repaired, as-needed, to maintain appropriate site drainage patterns.

Landscaping adjacent to foundations should include vegetation with low-water demands and irrigation should be limited to that which is needed to sustain the plants. Trees should be restricted from the areas adjacent to foundations a distance equivalent to the canopy radius of the mature tree. Infiltration basins, dry wells, and other stormwater management measures that rely on infiltration without a liner and subdrain should not be located within 20 feet of structure foundations. Bioretention planters located within 10 feet of structure foundations should be lined with concrete or a plastic membrane and include a subdrain.

Care should be taken by the contractor during grading to preserve any berms, drainage terraces, interceptor swales or other drainage devices on or adjacent to the project area. Drainage patterns established at the time of grading should be maintained for the life of the project. Future alteration of the established drainage patterns may impact the constructed improvements.

8.10 Geotechnical Engineer of Record

The recommendations provided in this report are based on preliminary design information for the proposed construction. The Geotechnical Engineer-of-Record (GEOR) should review the plans that are developed by the design team before construction bidding, to check that the scope of the project as designed is consistent with the assumed basis of this report and evaluate conformance with the geotechnical recommendations.

During construction, the GEOR should evaluate the exposed subsurface conditions for consistency with the conditions encountered in the discrete borings performed for this study, and to check that the work conforms with the geotechnical recommendations. Specifically, the geotechnical engineer should be retained to:

- Observe installation of ground improvement and tie-downs.
- Observe preparation and compaction of subgrade.
- Check and test imported materials prior to use as fill.
- Observe placement and compaction of fill and aggregate base.
- Perform field density tests to evaluate fill and subgrade compaction.
- Check foundation excavations for bearing materials and cleaning prior to placement of reinforcing steel and concrete.

The recommendations provided in this report assume that Ninyo & Moore will be retained as the geotechnical consultant during the construction phase of the project. If another geotechnical consultant is selected, we request that the selected consultant provide a letter to the architect and the owner (with a copy to Ninyo & Moore) indicating that they fully understand Ninyo & Moore's recommendations, and that they are in full agreement with the recommendations contained in this report.

9 LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analyses presented in this geotechnical evaluation report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified and additional recommendations will be provided, as appropriate. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur because

of government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

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FIGURES



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NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCE: USGS, 2018

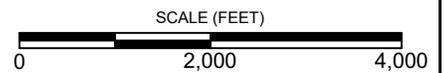
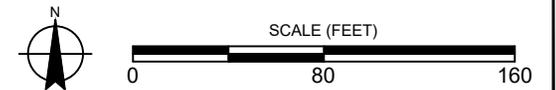


FIGURE 1

LEGEND				
	SITE BOUNDARY		CPT-2 (52.7')	SEISMIC CPT, 2023 (TOTAL DEPTH)
	CPT-3 (52.5')		I-1 (3')	INFILTRATION TEST, 2023 (TOTAL DEPTH)
	B-1/MW-1 (50.5'/26')		B-1 (20')	BORING (CTS) (TOTAL DEPTH)
	CPT-1 (53')			



NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCE: GOOGLE EARTH, 2024



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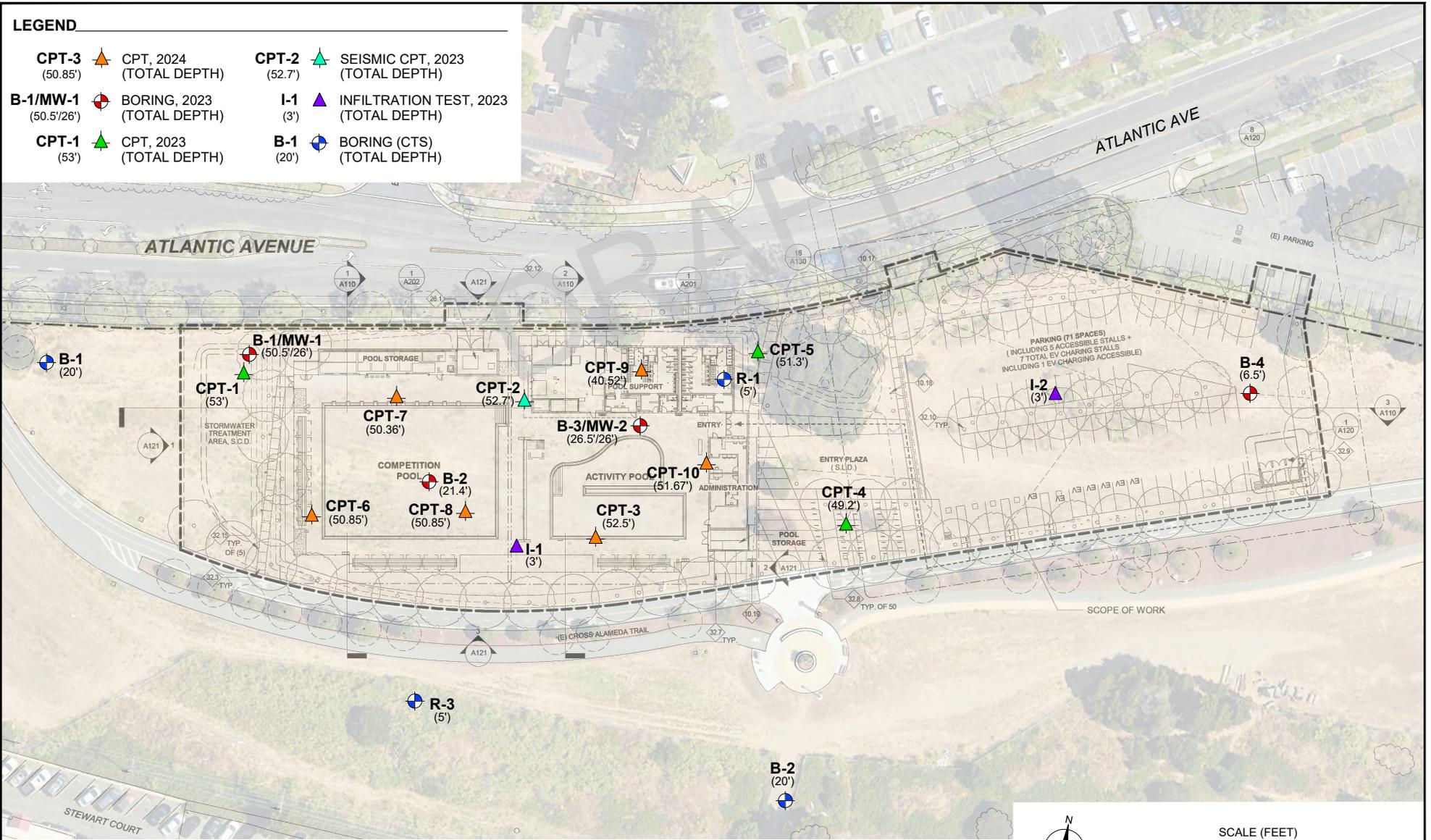
FIGURE 2



EXPLORATION LOCATIONS
 CITY OF ALAMEDA NEW AQUATICS CENTER
 1100 ATLANTIC AVENUE
 ALAMEDA, CALIFORNIA
 403773009 | 5/25

LEGEND

- | | | | |
|--------------------------------|---|-------------------------|--|
| CPT-3
(50.85') |  CPT, 2024
(TOTAL DEPTH) | CPT-2
(52.7') |  SEISMIC CPT, 2023
(TOTAL DEPTH) |
| B-1/MW-1
(50.5'/26') |  BORING, 2023
(TOTAL DEPTH) | I-1
(3') |  INFILTRATION TEST, 2023
(TOTAL DEPTH) |
| CPT-1
(53') |  CPT, 2023
(TOTAL DEPTH) | B-1
(20') |  BORING (CTS)
(TOTAL DEPTH) |

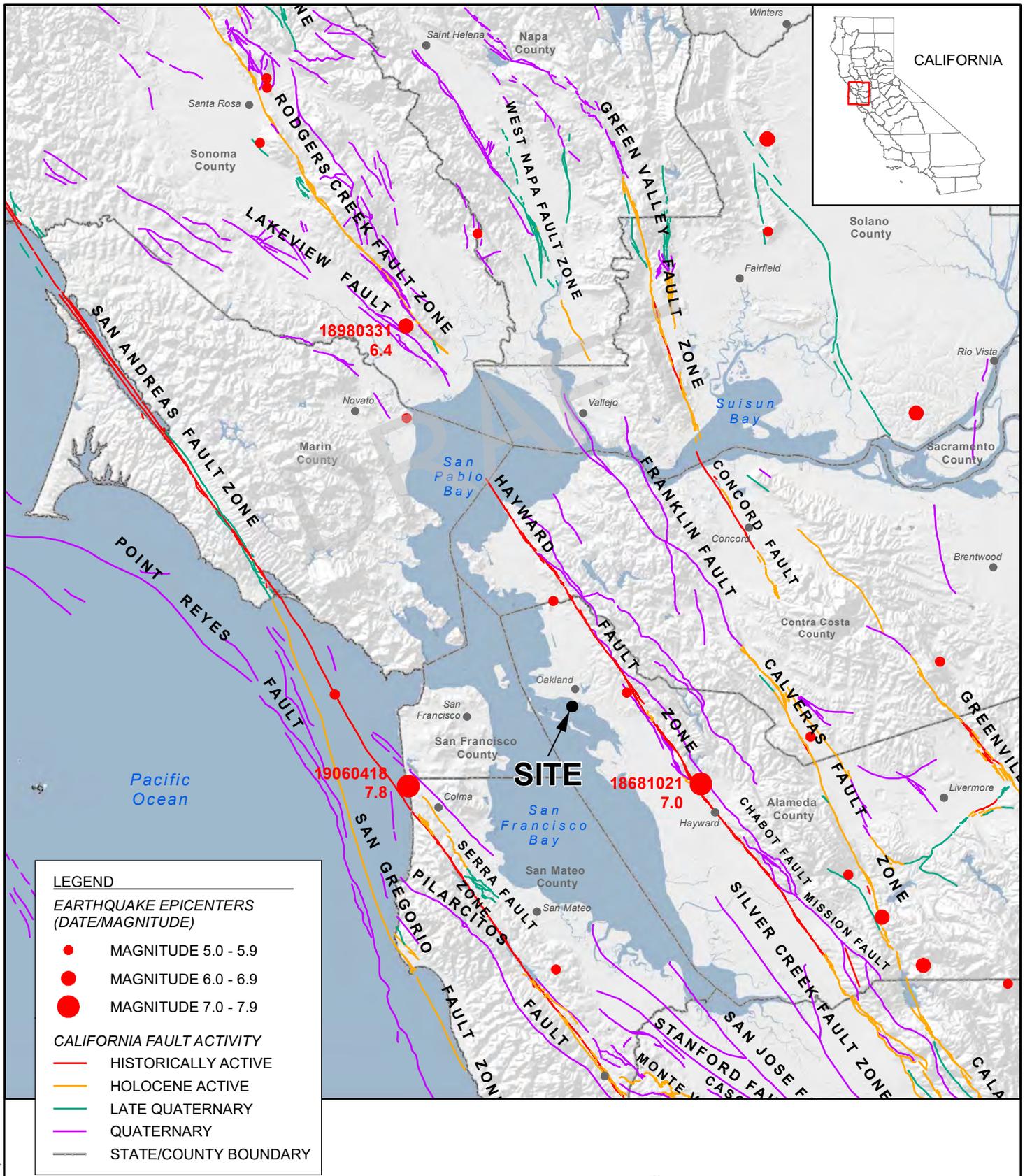


NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCES: ELS ARCHITECTURE AND URBAN DESIGN, 2025; GOOGLE EARTH, 2024

403773009.dwg 05/29/2025 AEK



FIGURE 3
SITE PLAN WITH EXPLORATION LOCATIONS
 CITY OF ALAMEDA NEW AQUATICS CENTER
 1100 ATLANTIC AVENUE
 ALAMEDA, CALIFORNIA
 403773009 | 05/25



NOTE: DIRECTIONS, DIMENSIONS, AND LOCATIONS ARE APPROXIMATE

SOURCES: CALIFORNIA GEOLOGICAL SURVEY, 2010, FAULT ACTIVITY MAP OF CALIFORNIA;
CALIFORNIA GEOLOGICAL SURVEY, 2000, MAP SHEET MS 49



FIGURE 4

FAULT LOCATIONS AND EARTHQUAKE EPICENTERS

CITY OF ALAMEDA NEW AQUATIC CENTER
1100 ATLANTIC AVENUE
ALAMEDA, CALIFORNIA



LEGEND

- | | |
|---|---|
| af ARTIFICIAL FILL (HISTORIC) | Qpaf ALLUVIAL FAN & FLUVIAL DEPOSITS (PLEISTOCENE) |
| Qds DUNE SAND (HOLOCENE/PLEISTOCENE) | Qmt MARINE TERRACE DEPOSITS (PLEISTOCENE) |
| Qms MERRIT SAND (HOLOCENE/PLEISTOCENE) | |

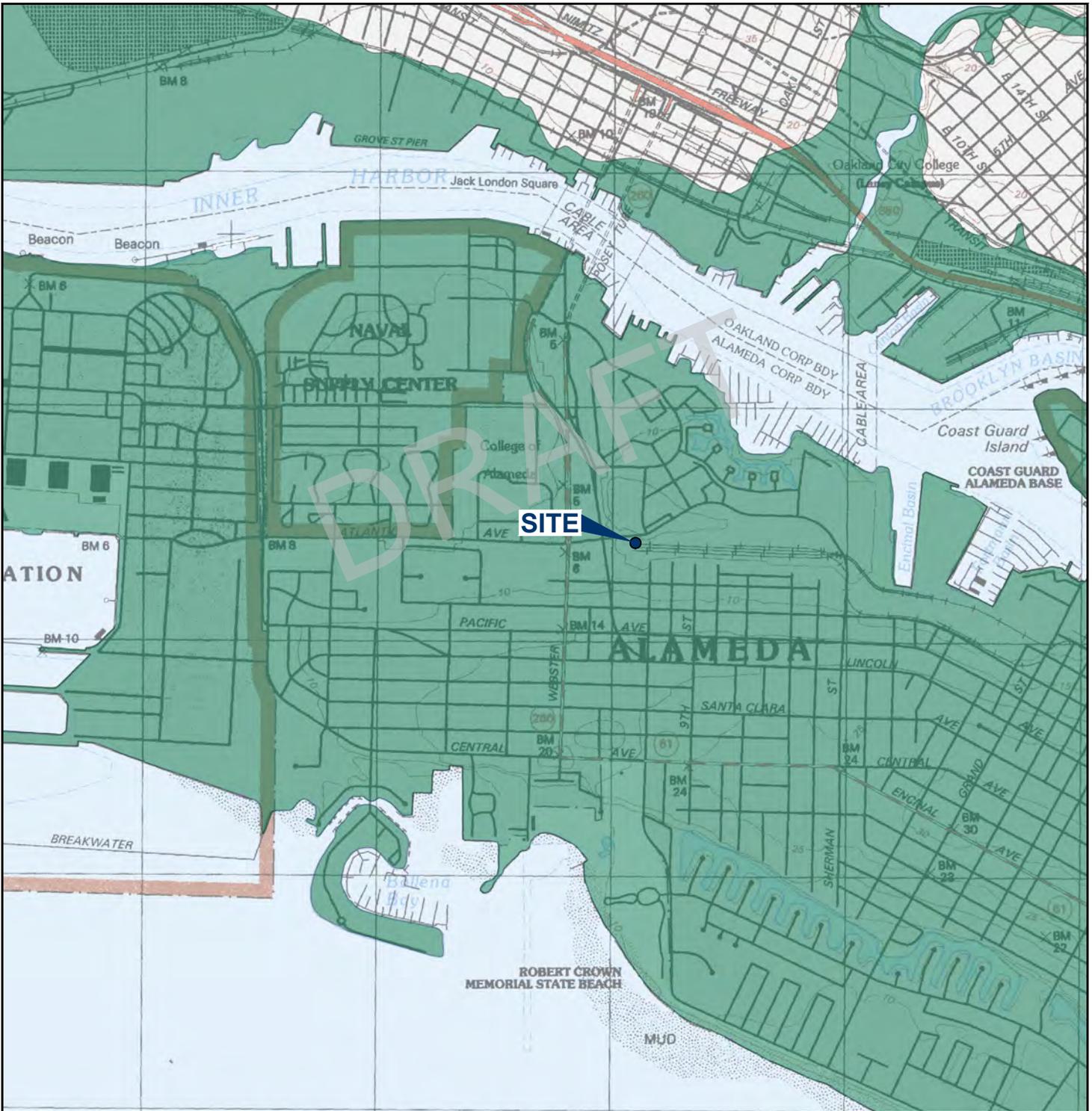
- ▲▲▲▲ THRUST FAULT
- FAULT

- - - - - GEOLOGIC CONTACT
- |— STRIKE AND DIP OF BEDDING



NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCE: USGS, GRAYMER, 2000

FIGURE 5



LEGEND



LIQUEFACTION ZONES:
 Areas where historic occurrence of liquefaction, or local geological, geotechnical, and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCE: CGS; 1982, 2003

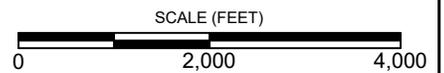
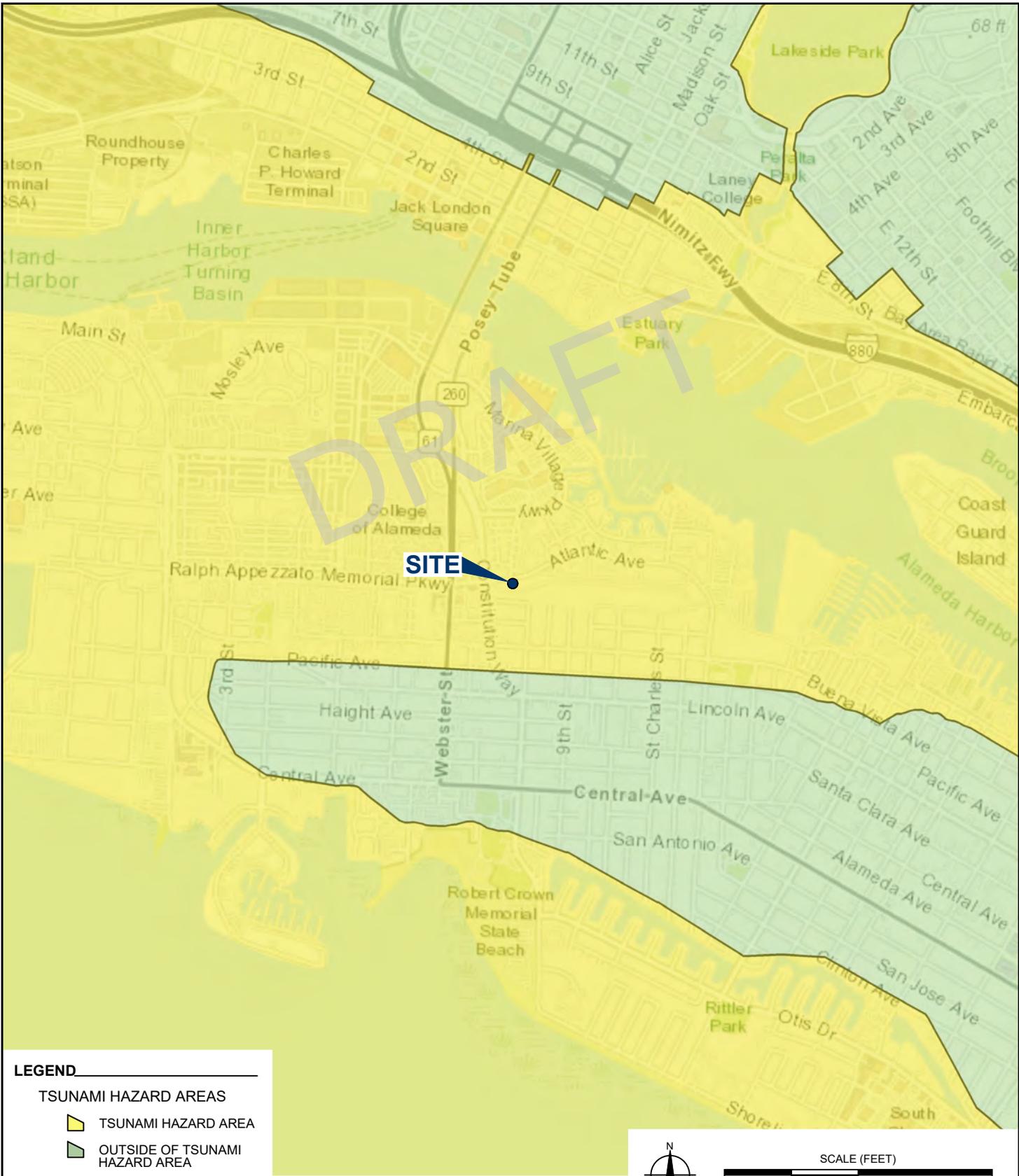


FIGURE 6

SEISMIC HAZARD ZONES

CITY OF ALAMEDA NEW AQUATICS CENTER
 1100 ATLANTIC AVENUE
 ALAMEDA, CALIFORNIA
 403773009 | 5/25



LEGEND

TSUNAMI HAZARD AREAS

- TSUNAMI HAZARD AREA
- OUTSIDE OF TSUNAMI HAZARD AREA

NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCE: CGS; 2021

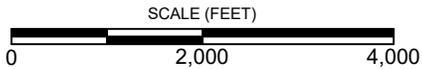


FIGURE 7

National Flood Hazard Layer FIRMette



122°16'42"W 37°47'1"N



122°16'4"W 37°46'33"N

Basemap Imagery Source: USGS National Map 2023

Legend

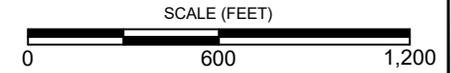
SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	<ul style="list-style-type: none"> Without Base Flood Elevation (BFE) Zone A, V, A99 With BFE or Depth Zone AE, AO, AH, VE, AR Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	<ul style="list-style-type: none"> 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X Future Conditions 1% Annual Chance Flood Hazard Zone X Area with Reduced Flood Risk due to Levee. See Notes, Zone X Area with Flood Risk due to Levee Zone D
OTHER AREAS	<ul style="list-style-type: none"> NO SCREEN Area of Minimal Flood Hazard Zone X Effective LOMRs Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES	<ul style="list-style-type: none"> Channel, Culvert, or Storm Sewer Levee, Dike, or Floodwall
OTHER FEATURES	<ul style="list-style-type: none"> Cross Sections with 1% Annual Chance Water Surface Elevation Coastal Transect Base Flood Elevation Line (BFE) Limit of Study Jurisdiction Boundary Coastal Transect Baseline Profile Baseline Hydrographic Feature
MAP PANELS	<ul style="list-style-type: none"> Digital Data Available No Digital Data Available Unmapped <p>The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.</p>

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/12/2024 at 4:39 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



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NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCE: FEMA, 2024

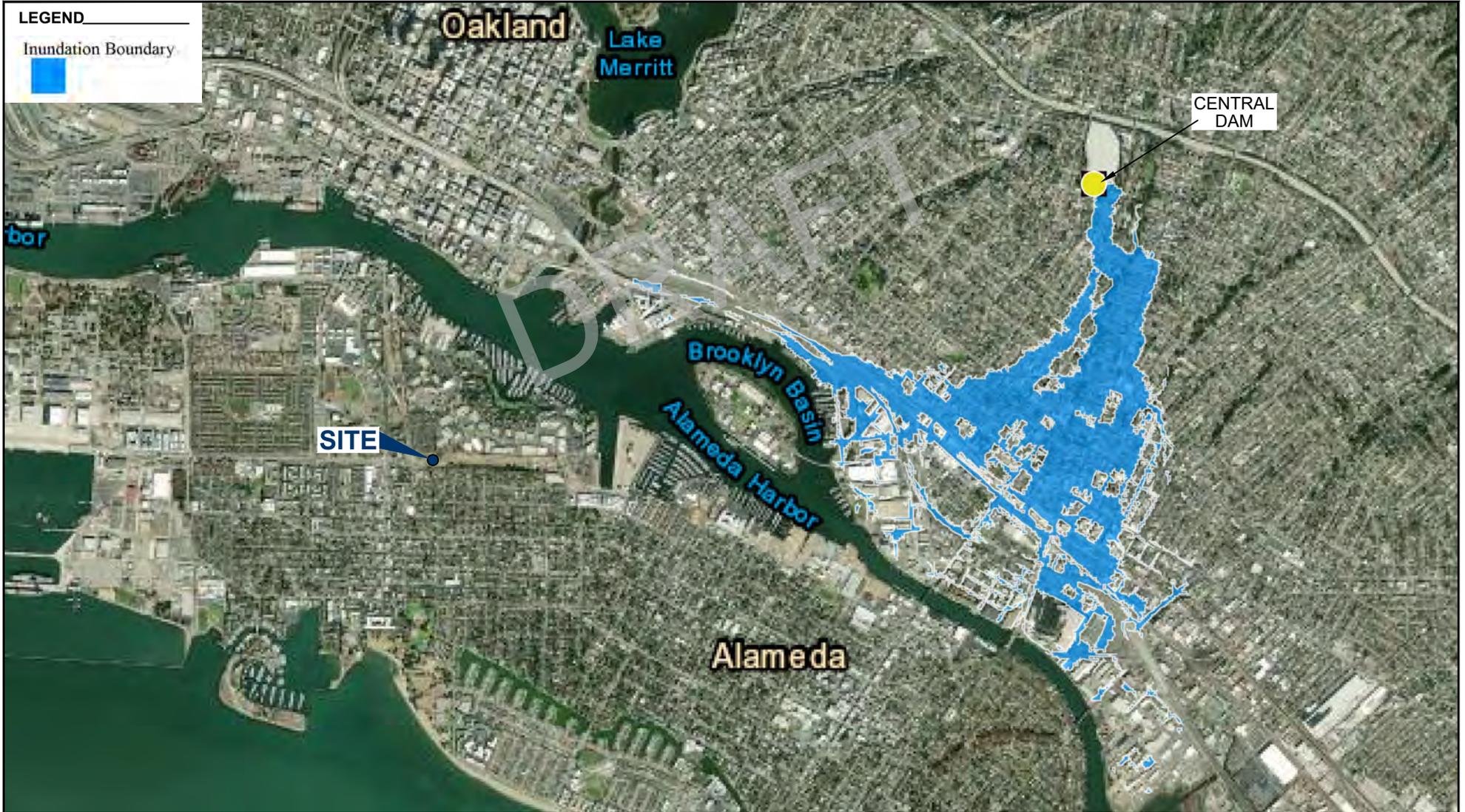
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

FIGURE 8

FEMA FLOOD HAZARD ZONES
CITY OF ALAMEDA NEW AQUATICS CENTER
1100 ATLANTIC AVENUE
ALAMEDA, CALIFORNIA
403773009 | 525

LEGEND

Inundation Boundary



403773009.dwg 12/19/2024 AEK

NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCES: BLM, ESRI, 2024



SCALE (FEET)



FIGURE 9

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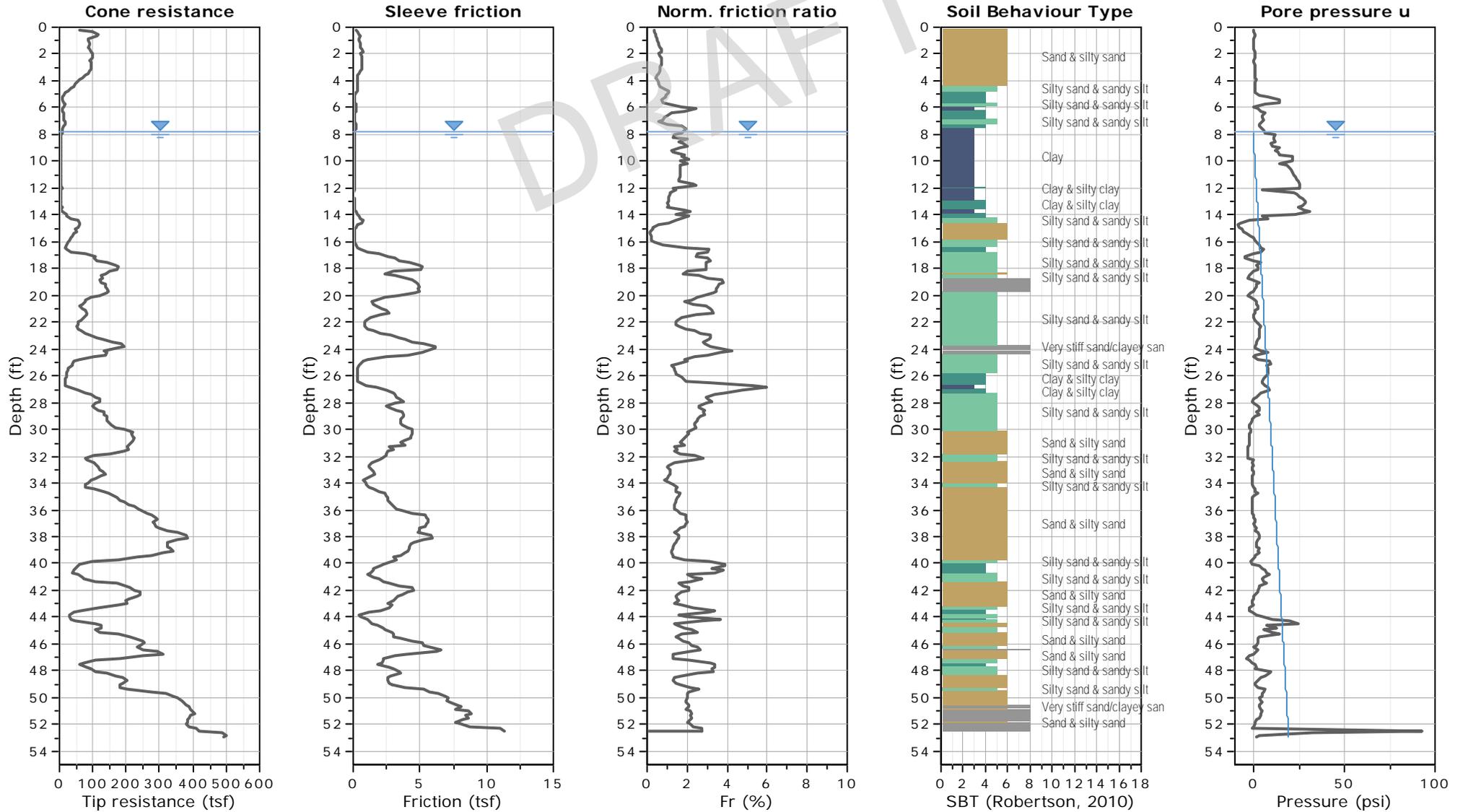
APPENDIX A

Cone Penetrometer Test (CPT) Logs



Project: Alameda Aquatic Center

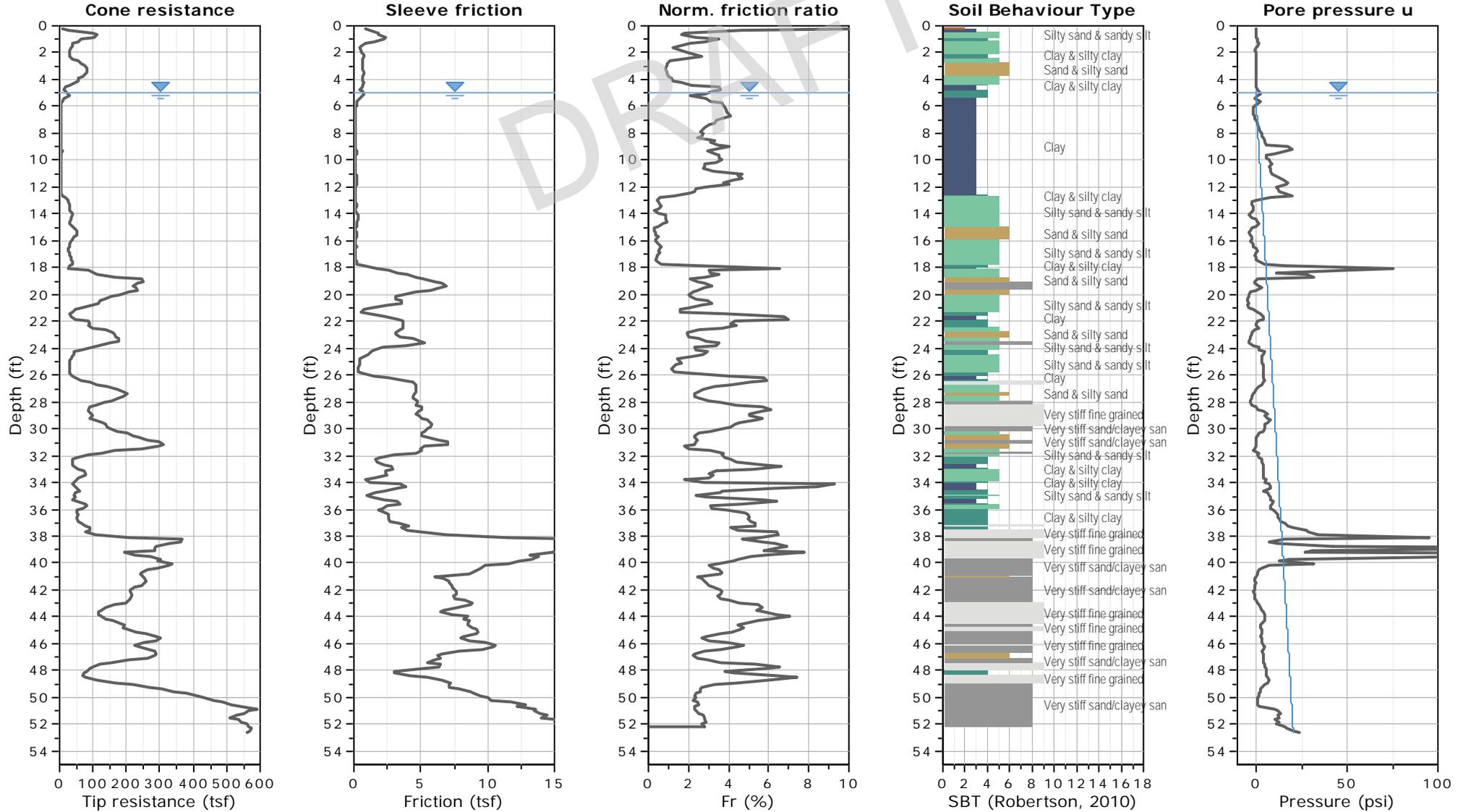
Location: 1100 Atlantic Avenue, Alameda, CA 94501





Project: Alameda Aquatic Center

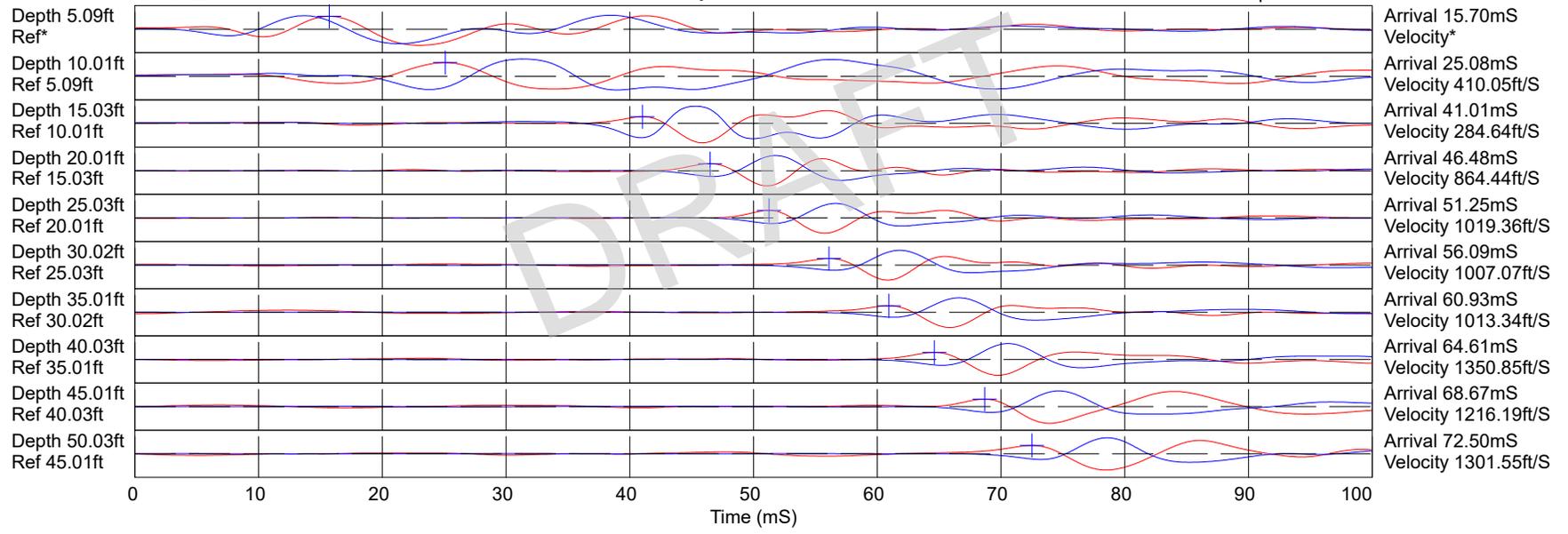
Location: 1100 Atlantic Avenue, Alameda, CA 94501



CPT-02

Ninyo and Moore

Alameda Aquatic Center



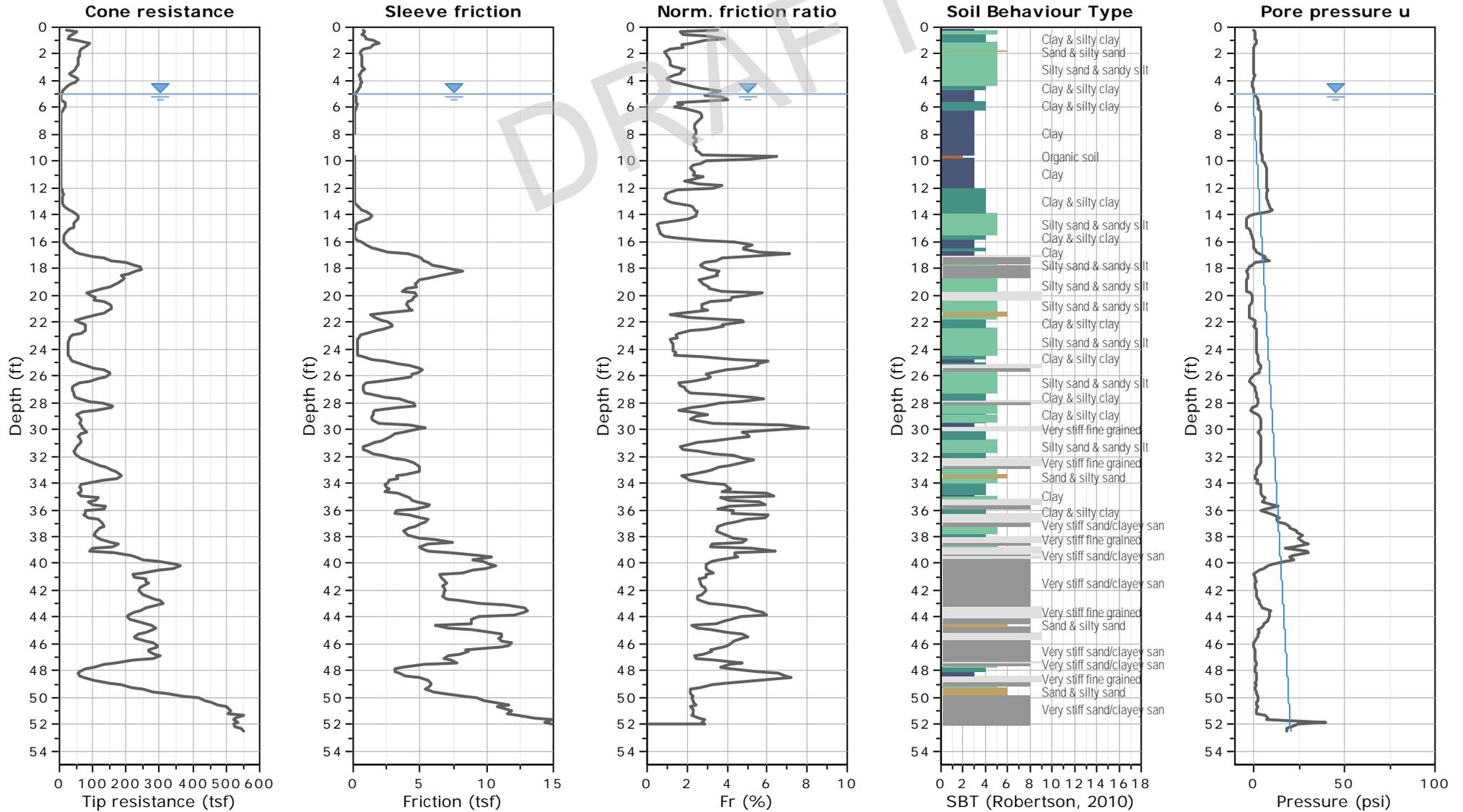
Hammer to Rod String Distance (ft): 5.83
* = Not Determined

COMMENT:



Project: Alameda Aquatic Center

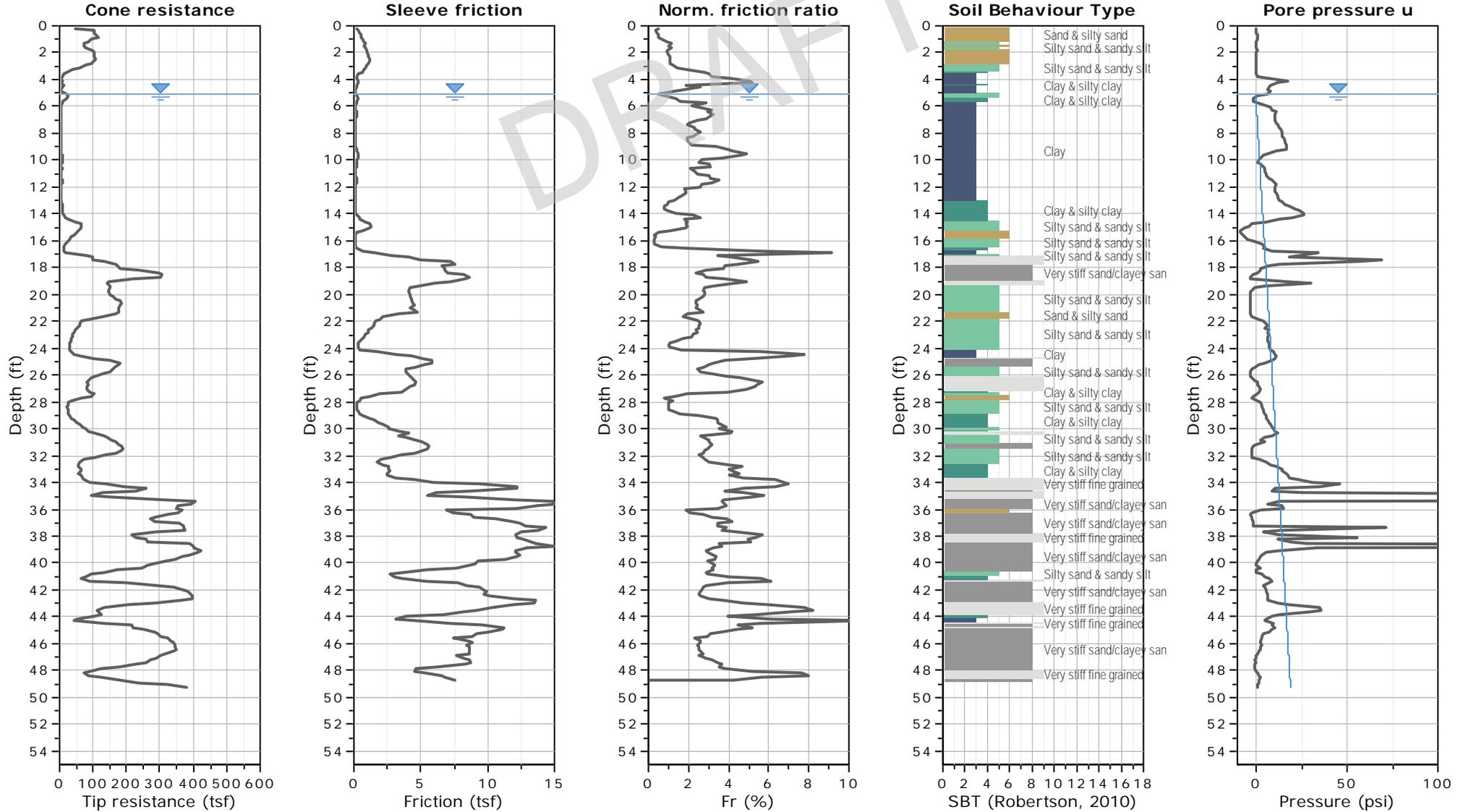
Location: 1100 Atlantic Avenue, Alameda, CA 94501





Project: Alameda Aquatic Center

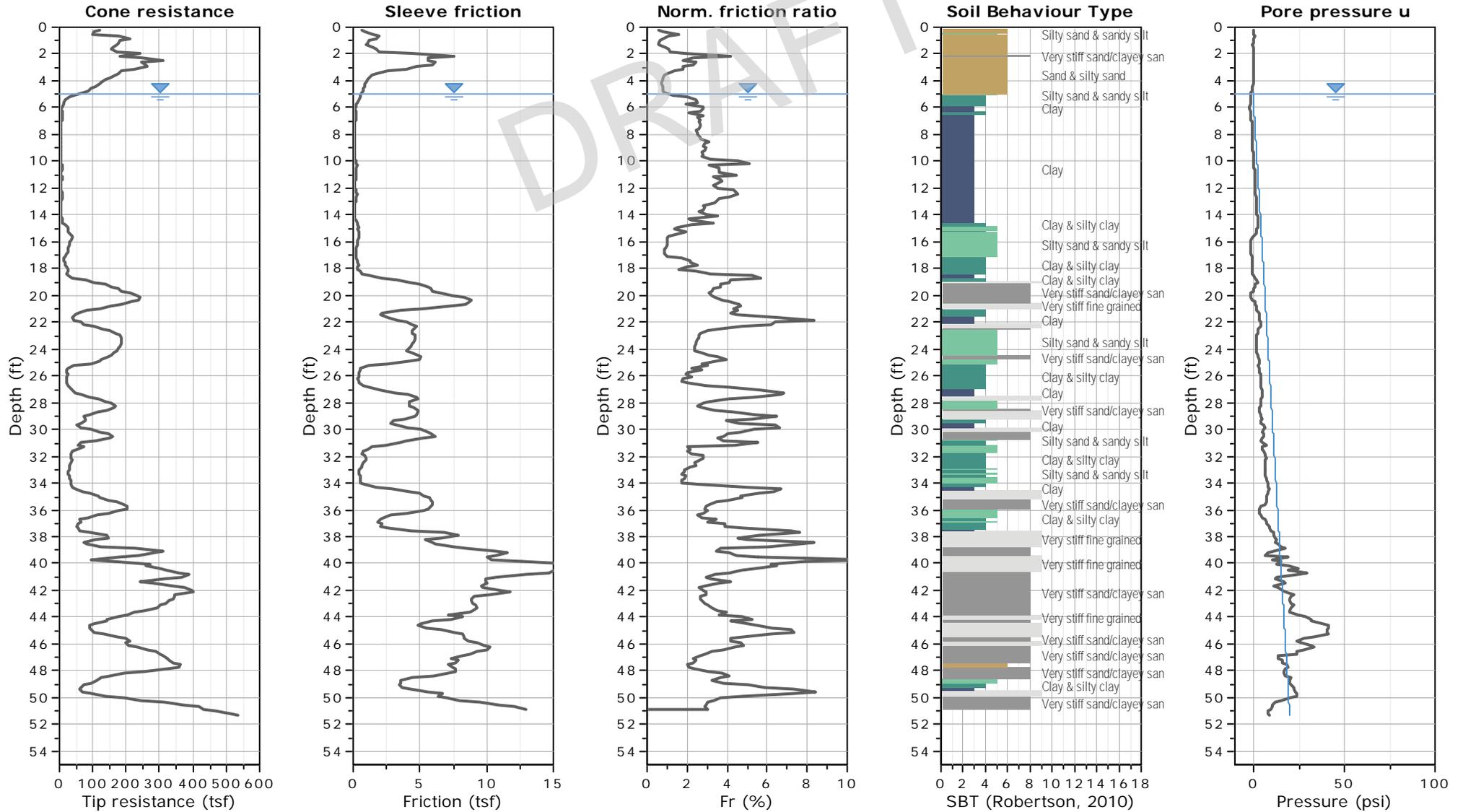
Location: 1100 Atlantic Avenue, Alameda, CA 94501





Project: Alameda Aquatic Center

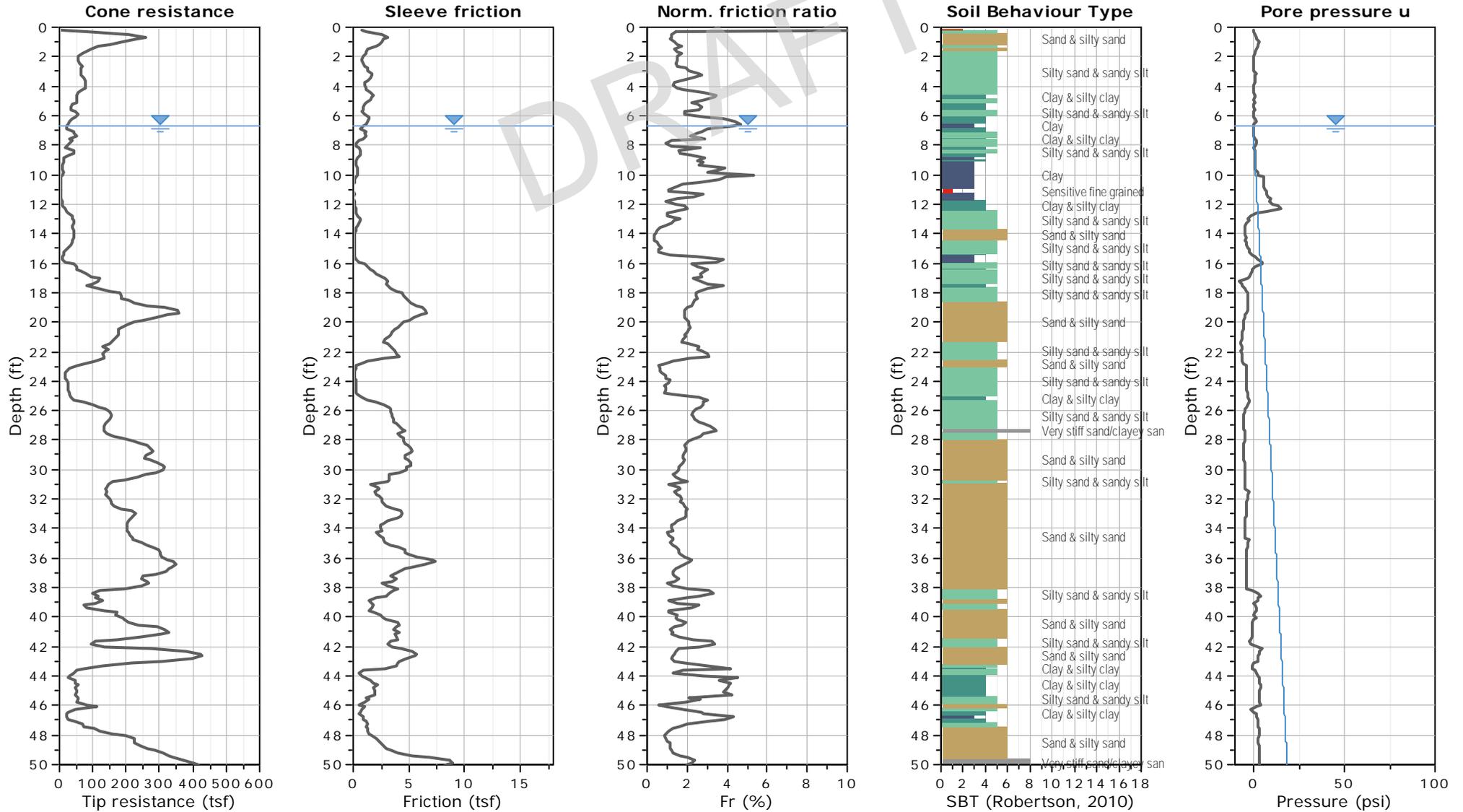
Location: 1100 Atlantic Avenue, Alameda, CA 94501





Project: Alameda Aquatic Center

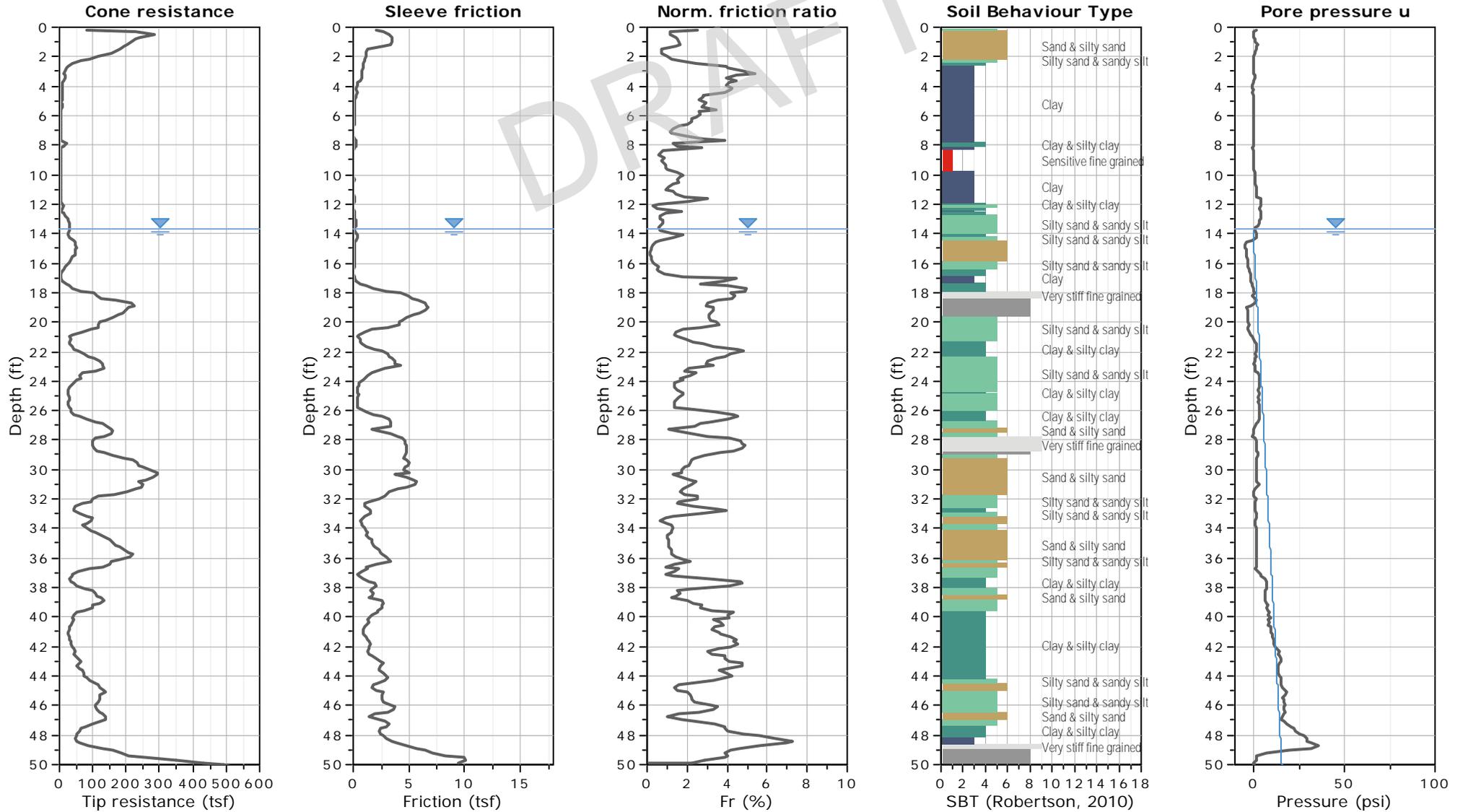
Location: 1100 Atlantic Avenue, Alameda, CA 94501





Project: Alameda Aquatic Center

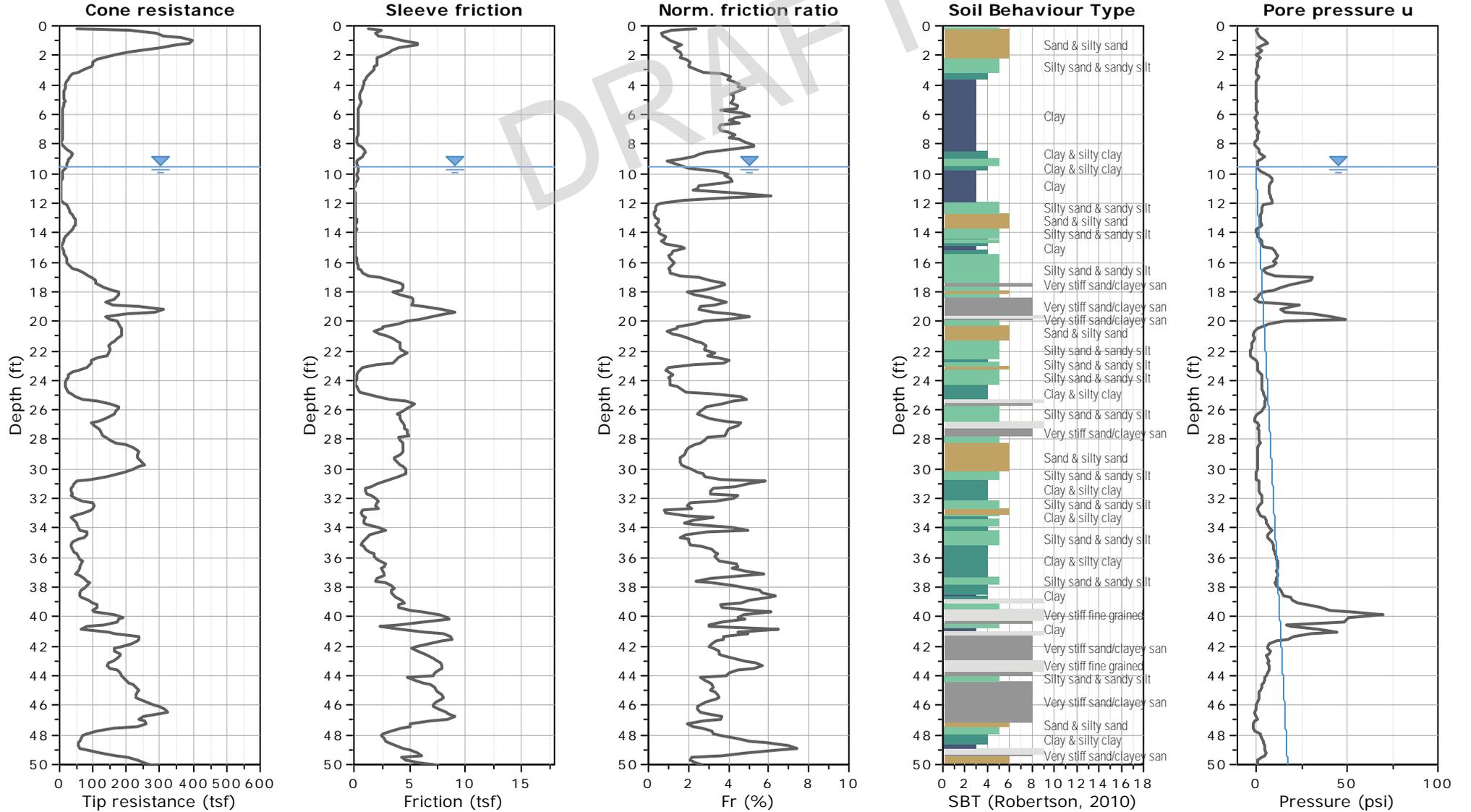
Location: 1100 Atlantic Avenue, Alameda, CA 94501





Project: Alameda Aquatic Center

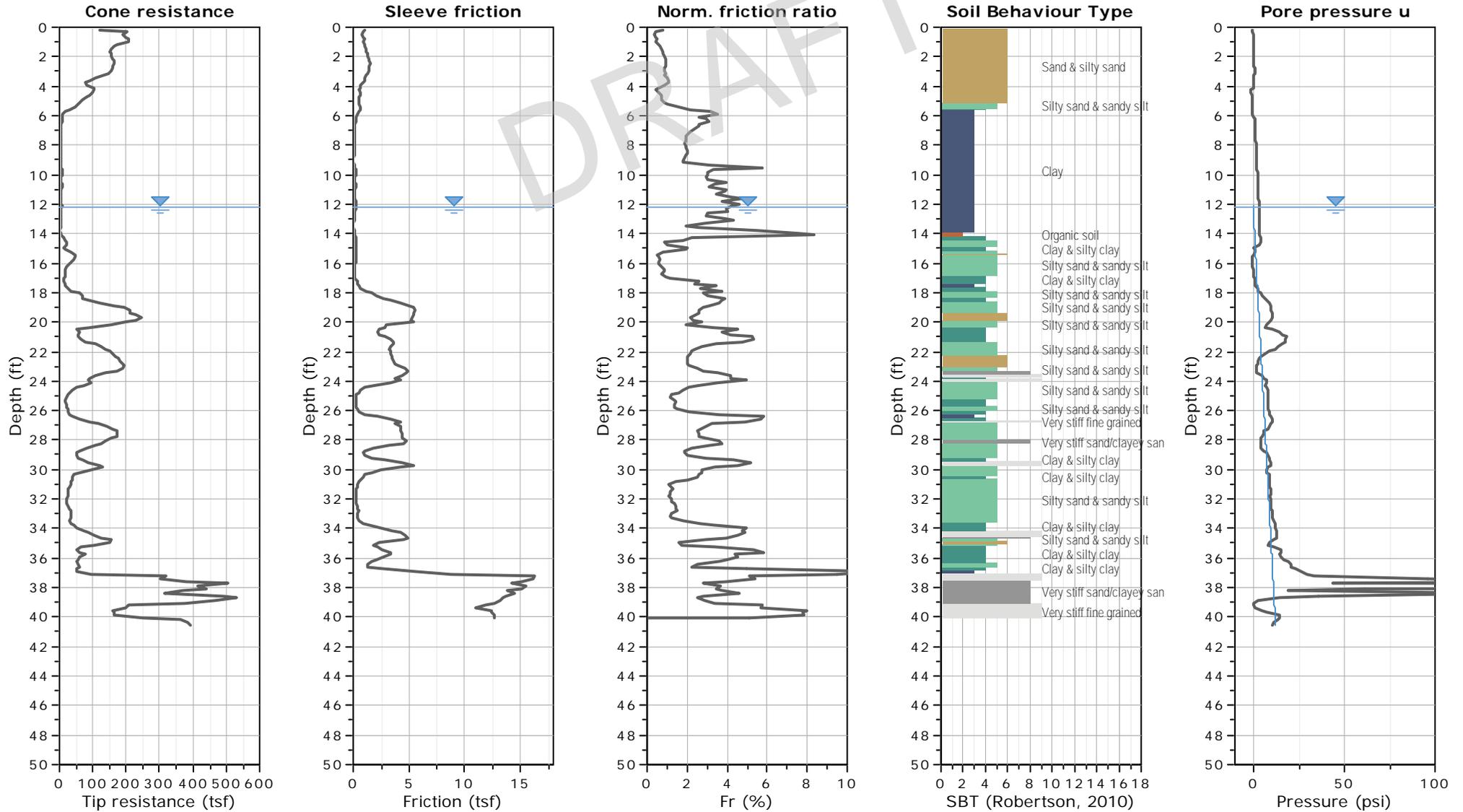
Location: 1100 Atlantic Avenue, Alameda, CA 94501





Project: Alameda Aquatic Center

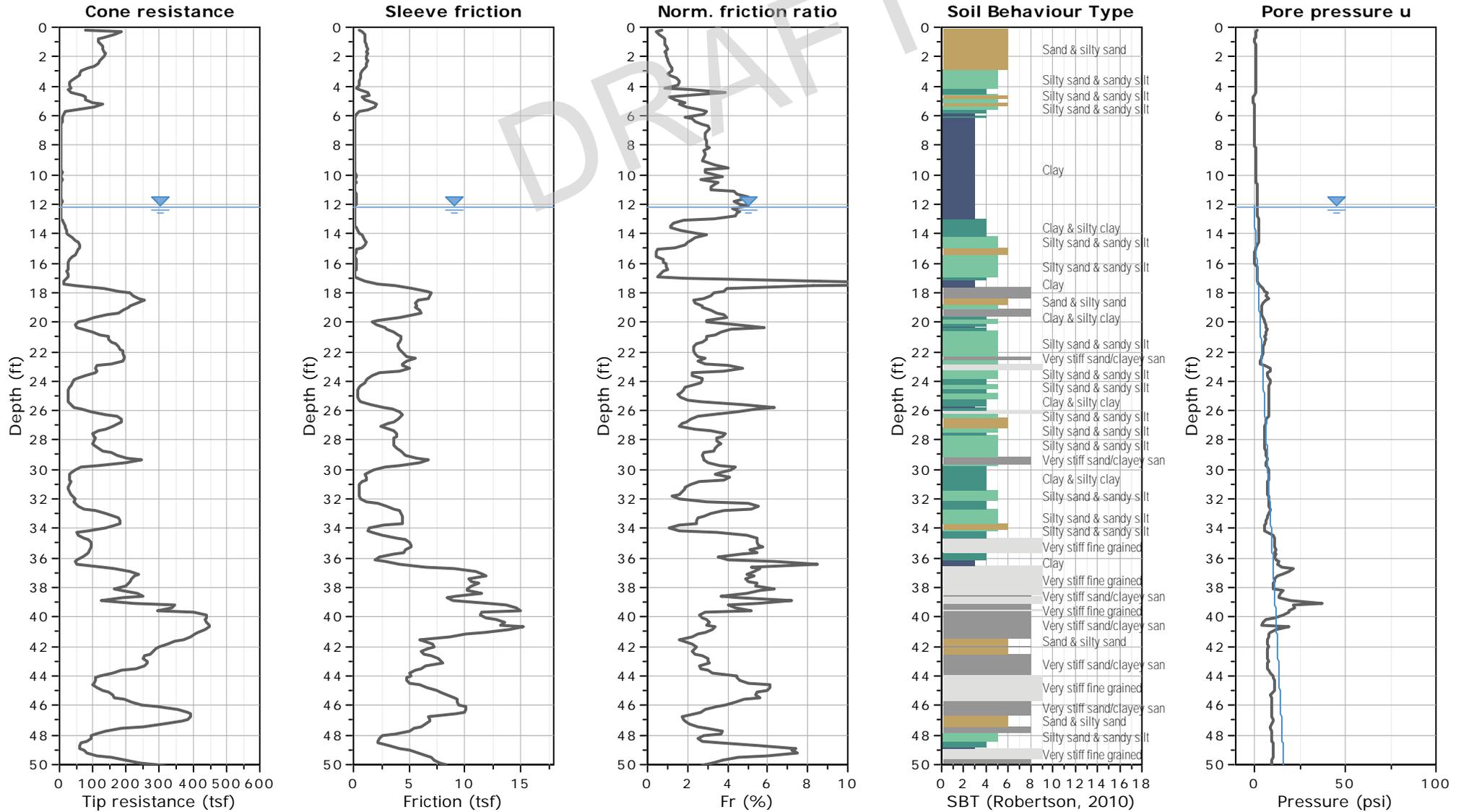
Location: 1100 Atlantic Avenue, Alameda, CA 94501





Project: Alameda Aquatic Center

Location: 1100 Atlantic Avenue, Alameda, CA 94501



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APPENDIX B

Boring Logs

APPENDIX B

BORING LOGS

Field Procedure for the Collection of Disturbed Samples

Disturbed soil samples were obtained in the field using the following method.

Bulk Samples

Bulk samples of representative earth materials were obtained from the exploratory boring. The samples were bagged and transported to the laboratory for testing.

The Standard Penetration Test (SPT) Sampler

Disturbed drive samples of earth materials were obtained by means of a Standard Penetration Test sampler. The sampler is composed of a split barrel with an external diameter of 2 inches and an unlined internal diameter of 1-3/8 inches. The sampler was driven into the ground 12 to 18 inches with a 140-pound hammer free-falling from a height of 30 inches in general accordance with ASTM D 1586. The blow counts were recorded for every 6 inches of penetration; the blow counts reported on the logs are those for the last 12 inches of penetration. Soil samples were observed and removed from the sampler, bagged, sealed and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples

Relatively undisturbed soil samples were obtained in the field using the following method.

The Modified Split-Barrel Drive Sampler

The sampler, with an external diameter of 3.0 inches, was lined with 6-inch long, thin brass liners with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a hammer in general accordance with ASTM D 3550. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass liners, sealed, and transported to the laboratory for testing.

BORING LOG EXPLANATION SHEET

DEPTH (feet)	SAMPLES		BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	
	Bulk	Driven						
0	XX/XX							Bulk sample. Modified split-barrel drive sampler. No recovery with modified split-barrel drive sampler. Sample retained by others. Standard Penetration Test (SPT). No recovery with a SPT. Shelby tube sample. Distance pushed in inches/length of sample recovered in inches. No recovery with Shelby tube sampler. Continuous Push Sample. Seepage. Groundwater encountered during drilling. Groundwater measured after drilling.
5								
10								
15							SM	<u>MAJOR MATERIAL TYPE (SOIL):</u> Solid line denotes unit change.
15							CL	Dashed line denotes material change. Attitudes: Strike/Dip b: Bedding c: Contact j: Joint f: Fracture F: Fault cs: Clay Seam s: Shear bss: Basal Slide Surface sf: Shear Fracture sz: Shear Zone sbs: Shear Bedding Surface
20								The total depth line is a solid line that is drawn at the bottom of the boring.

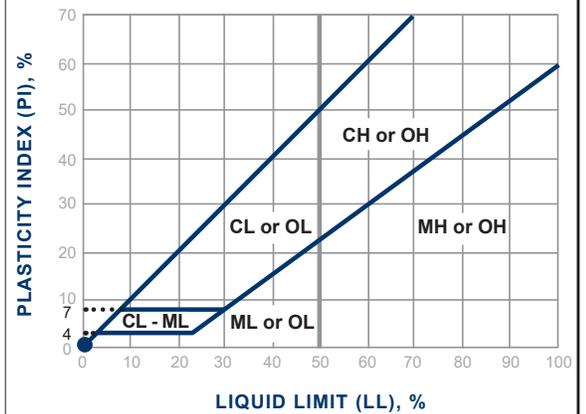
Soil Classification Chart Per ASTM D 2488

Primary Divisions		Secondary Divisions			
		Group Symbol	Group Name		
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	GRAVEL more than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	well-graded GRAVEL	
			GP	poorly graded GRAVEL	
		GRAVEL with DUAL CLASSIFICATIONS 5% to 12% fines	GW-GM	well-graded GRAVEL with silt	
			GP-GM	poorly graded GRAVEL with silt	
			GW-GC	well-graded GRAVEL with clay	
			GP-GC	poorly graded GRAVEL with	
			GM	silty GRAVEL	
			GC	clayey GRAVEL	
		GRAVEL with FINES more than 12% fines	GC-GM	silty, clayey GRAVEL	
			GM	silty SAND	
	SC		clayey SAND		
	SC-SM		silty, clayey SAND		
	SAND 50% or more of coarse fraction passes No. 4 sieve	CLEAN SAND less than 5% fines	SW	well-graded SAND	
			SP	poorly graded SAND	
		SAND with DUAL CLASSIFICATIONS 5% to 12% fines	SW-SM	well-graded SAND with silt	
			SP-SM	poorly graded SAND with silt	
			SW-SC	well-graded SAND with clay	
			SP-SC	poorly graded SAND with clay	
			SM	silty SAND	
			SC	clayey SAND	
SAND with FINES more than 12% fines		SC-SM	silty, clayey SAND		
		CL	lean CLAY		
FINE-GRAINED SOILS 50% or more passes No. 200 sieve	SILT and CLAY liquid limit less than 50%	INORGANIC	ML	SILT	
			CL-ML	silty CLAY	
			OL (PI > 4)	organic CLAY	
		ORGANIC	OL (PI < 4)	organic SILT	
			INORGANIC	CH	fat CLAY
				MH	elastic SILT
	ORGANIC	OH (plots on or above "A"-line)	organic CLAY		
		OH (plots below "A"-line)	organic SILT		
	Highly Organic Soils		PT	Peat	

Grain Size

Description	Sieve Size	Grain Size	Approximate Size
Boulders	> 12"	> 12"	Larger than basketball-sized
Cobbles	3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4 - 3"	Thumb-sized to fist-sized
	Fine	#4 - 3/4"	Pea-sized to thumb-sized
Sand	Coarse	#10 - #4	Rock-salt-sized to pea-sized
	Medium	#40 - #10	Sugar-sized to rock-salt-sized
	Fine	#200 - #40	Flour-sized to sugar-sized
Fines	Passing #200	< 0.0029"	Flour-sized and smaller

Plasticity Chart



Apparent Density - Coarse-Grained Soil

Apparent Density	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Loose	≤ 4	≤ 8	≤ 3	≤ 5
Loose	5 - 10	9 - 21	4 - 7	6 - 14
Medium Dense	11 - 30	22 - 63	8 - 20	15 - 42
Dense	31 - 50	64 - 105	21 - 33	43 - 70
Very Dense	> 50	> 105	> 33	> 70

Consistency - Fine-Grained Soil

Consistency	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Soft	< 2	< 3	< 1	< 2
Soft	2 - 4	3 - 5	1 - 3	2 - 3
Firm	5 - 8	6 - 10	4 - 5	4 - 6
Stiff	9 - 15	11 - 20	6 - 10	7 - 13
Very Stiff	16 - 30	21 - 39	11 - 20	14 - 26
Hard	> 30	> 39	> 20	> 26

DEPTH (feet)	SAMPLES		BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION	
	Bulk	Driven						DATE DRILLED	BORING NO.
								12/6/2023	B-1
								8.6' NAVD88	SHEET 1 OF 2
								8" HSA, B-53R Truck Mounted (Exploration Geo.)	
								140 lbs (wireline)	DROP 30 inches
								SSA	LOGGED BY SSA REVIEWED BY RPM/MKW
0			19	3.0			SM	ARTIFICIAL FILL: Brown, moist, loose to medium dense, silty SAND.	
			15					Moist to wet.	
10			6	30.3			CL	YOUNG BAY MUD: Gray, moist, firm, sandy lean CLAY.	
								Wet.	
			24	16.0	118.7		CL-ML	Blackish gray, wet, firm to stiff, silty CLAY.	
20			82/12"				SM	DUNE SAND: Olive brown, wet, very dense, silty SAND.	
			52					Brown.	
30			40					Dense.	
			48	18.7			SC	Olive brown, wet, medium dense, clayey SAND.	
40							SM	OLD BAY MUD: Bluish gray, wet, dense, silty SAND.	

FIGURE B- 1

DEPTH (feet)	SAMPLES		BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>12/6/2023</u> BORING NO. <u>B-1</u>	
	Bulk	Driven						GROUND ELEVATION <u>8.6' NAVD88</u>	SHEET <u>2</u> OF <u>2</u>
								METHOD OF DRILLING <u>8" HSA, B-53R Truck Mounted (Exploration Geo.)</u>	
								DRIVE WEIGHT <u>140 lbs (wireline)</u> DROP <u>30 inches</u>	
								SAMPLED BY <u>SSA</u> LOGGED BY <u>SSA</u> REVIEWED BY <u>RPM/MKW</u>	
DESCRIPTION/INTERPRETATION									
40			42				SM	<p>OLD BAY MUD (Continued): Bluish gray, wet, dense, silty SAND.</p>	
			31						
50			50/6"					<p>Very dense. Total depth = 50.5 feet.</p>	
								<p>Backfilled with neat cement shortly after drilling.</p>	
								<p>Notes: Groundwater was measured at a depth of approximately 13.0 feet in the borehole shortly after completion of drilling.</p>	
								<p>Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report.</p>	
								<p>The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents (ELS Architecture + Urban Design, 2025).</p>	
60									
70									
80									

DRAFT

FIGURE B- 2

DEPTH (feet)	BULK SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.	
							12/5/2023	B-2	
							GROUND ELEVATION	SHEET	OF
							8.9' NAVD88	1	1
							METHOD OF DRILLING 8" HSA, B-53R Truck Mounted (Exploration Geo.)		
							DRIVE WEIGHT	DROP	
							140 lbs (wireline)	30 inches	
							SAMPLED BY	LOGGED BY	REVIEWED BY
							SSA	SSA	RPM/MKW
							DESCRIPTION/INTERPRETATION		
0		34	8.2			SC	ARTIFICIAL FILL: Gray and grayish brown, moist, medium dense, clayey SAND.		
		27					Dark brown.		
10		13	23.8	105.3		CL-ML	YOUNG BAY MUD: Black, moist, stiff, silty CLAY.		
		14				SC	DUNE SAND: Grayish brown and olive brown, wet, loose to medium dense, clayey SAND.		
20		92/11"				SM	Olive brown, wet, very dense, silty SAND.		
							Total depth = 21.4 feet.		
							Backfilled with neat cement shortly after drilling.		
							<u>Notes:</u> Groundwater was measured at a depth of approximately 14.0 feet in the borehole shortly after completion of drilling.		
							Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report.		
							The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents (ELS Architecture + Urban Design, 2025).		

FIGURE B- 3

DEPTH (feet)	SAMPLES		BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
	Bulk	Driven						
DATE DRILLED <u>12/6/2023</u> BORING NO. <u>B-3</u> GROUND ELEVATION <u>9.4' NAVD88</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>8" HSA, B-53R Truck Mounted (Exploration Geo.)</u> DRIVE WEIGHT <u>140 lbs (wireline)</u> DROP <u>30 inches</u> SAMPLED BY <u>SSA</u> LOGGED BY <u>SSA</u> REVIEWED BY <u>RPM/MKW</u>								
0							SM	ARTIFICIAL FILL: Light brown and bluish gray, moist, medium dense, silty SAND.
			26	17.7				
			40	67.5	58.2		CH	YOUNG BAY MUD: Bluish gray, moist, hard, fat CLAY (possible fill in the upper few feet).
10			10	78.4	53.3			Soft. Wet.
			20				SM	Bluish gray, wet, medium dense, silty SAND.
20			42				SC	DUNE SAND: Bluish gray and brown, wet, dense, clayey SAND.
			35					
30								Total depth = 26.5 feet. Backfilled with neat cement shortly after drilling. <u>Notes:</u> Groundwater was measured at a depth of approximately 13.0 feet in the borehole shortly after completion of drilling. Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents (ELS Architecture + Urban Design, 2025).
40								

FIGURE B- 4

DEPTH (feet)	SAMPLES		BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
	Bulk	Driven						
DATE DRILLED <u>12/5/2023</u> BORING NO. <u>B-4</u> GROUND ELEVATION <u>14.0' NAVD88</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>8" HSA, B-53R Truck Mounted (Exploration Geo.)</u> DRIVE WEIGHT <u>140 lbs (wireline)</u> DROP <u>30 inches</u> SAMPLED BY <u>SSA</u> LOGGED BY <u>SSA</u> REVIEWED BY <u>RPM/MKW</u>								
0							SC	ARTIFICIAL FILL: Grayish brown, moist, medium dense to dense, clayey SAND; trace gravel.
			39	9.9	118.9		CL	Grayish brown, moist, very stiff, sandy lean CLAY.
			29	44.8	74.5			
10								Total depth = 6.5 feet. Backfilled with neat cement shortly after drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents (ELS Architecture + Urban Design, 2025).
20								
30								
40								

FIGURE B- 5

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APPENDIX C

Laboratory Testing

APPENDIX C

LABORATORY TESTING

Classification

Soil was classified using visual-manual procedures (ASTM D 2488). Soil classifications were updated in accordance with the Unified Soil Classification System (USCS) and ASTM D 2487 based on the results of laboratory tests to evaluate particle size characteristics and Atterberg Limits. Soil classifications are indicated on the log of the exploratory boring in Appendix B.

In-Place Moisture and Density Tests

The moisture content and dry density of relatively undisturbed samples obtained from the exploratory borings were evaluated in general accordance with ASTM D 2937. The test results are presented on the logs of the exploratory borings in Appendix B.

200 Wash Analysis

An evaluation of the percentage of minus-200 sieve material in a selected soil sample was performed in accordance with ASTM D 1140. The results of the test are presented on Figure C-1.

Atterberg Limits

Tests were performed on selected soil samples to evaluate the liquid limit, plastic limit, and plasticity index in accordance with ASTM D 4318. These test results were utilized to evaluate the soil classification in accordance with the USCS. The test results and classifications are shown on Figure C-2.

Consolidation Test

Consolidation test was performed on a selected relatively undisturbed soil sample in accordance with ASTM D 2435. The sample was inundated during testing to represent adverse field conditions. The percent of consolidation for each load cycle was recorded as a ratio of the amount of vertical compression to the original height of the sample. The consolidation test results are summarized graphically on Figure C-3.

Unconsolidated-Undrained (UU) Triaxial Tests

Unconsolidated-Undrained Triaxial tests were performed on undisturbed samples in accordance with ASTM D 2850 to evaluate the undrained shear strength of selected materials. The results are shown on Figure C-4.

R-Value Test

The resistance value, or R-value, for site soils were evaluated in general accordance with CT 301. A sample was prepared and evaluated for exudation pressure and expansion pressure. The equilibrium R-value is reported as the lesser or more conservative of the two calculated results. The test results are shown on Figure C-5

SAMPLE LOCATION	SAMPLE DEPTH (ft)	DESCRIPTION	PERCENT PASSING NO. 4	PERCENT PASSING NO. 200	USCS (TOTAL SAMPLE)
B-1	6.0 - 6.5	Silty SAND	100	16	SM
B-1	45.0 - 46.5	Silty SAND	100	33	SM
B-2	3.0 - 3.5	Clayey SAND	100	32	SC
B-2	16.0 - 16.5	Clayey SAND	100	20	SC
B-3	15.5 - 16.0	Silty SAND	100	24	SM
B-3	25.0 - 26.5	Clayey SAND	100	44	SC
B-4	0.0 - 5.0	Clayey SAND; trace gravel	91	39	SC

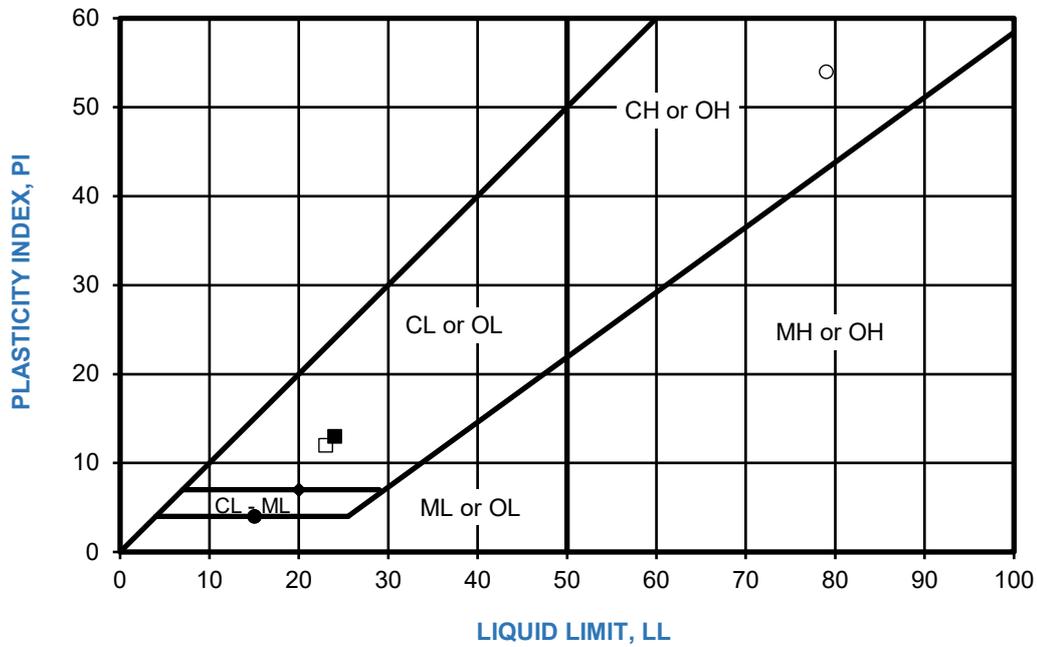
PERFORMED IN ACCORDANCE WITH 1140

FIGURE C-1

NO. 200 SIEVE ANALYSIS TEST RESULTS

CITY OF ALAMEDA NEW AQUATIC CENTER
1100 ATLANTIC AVENUE, ALAMEDA, CALIFORNIA

SYMBOL	LOCATION	DEPTH (ft)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	USCS CLASSIFICATION (Fraction Finer Than No. 40 Sieve)	USCS
●	B-1	15.5 - 16.0	15	11	4	CL-ML	CL-ML
■	B-2	0.0 - 5.0	24	11	13	CL	SC
◆	B-2	10.5 - 11.0	20	13	7	CL-ML	CL-ML
○	B-3	6.0 - 6.5	79	25	54	CH	CH
□	B-4	3.0 - 3.5	23	11	12	CL	CL



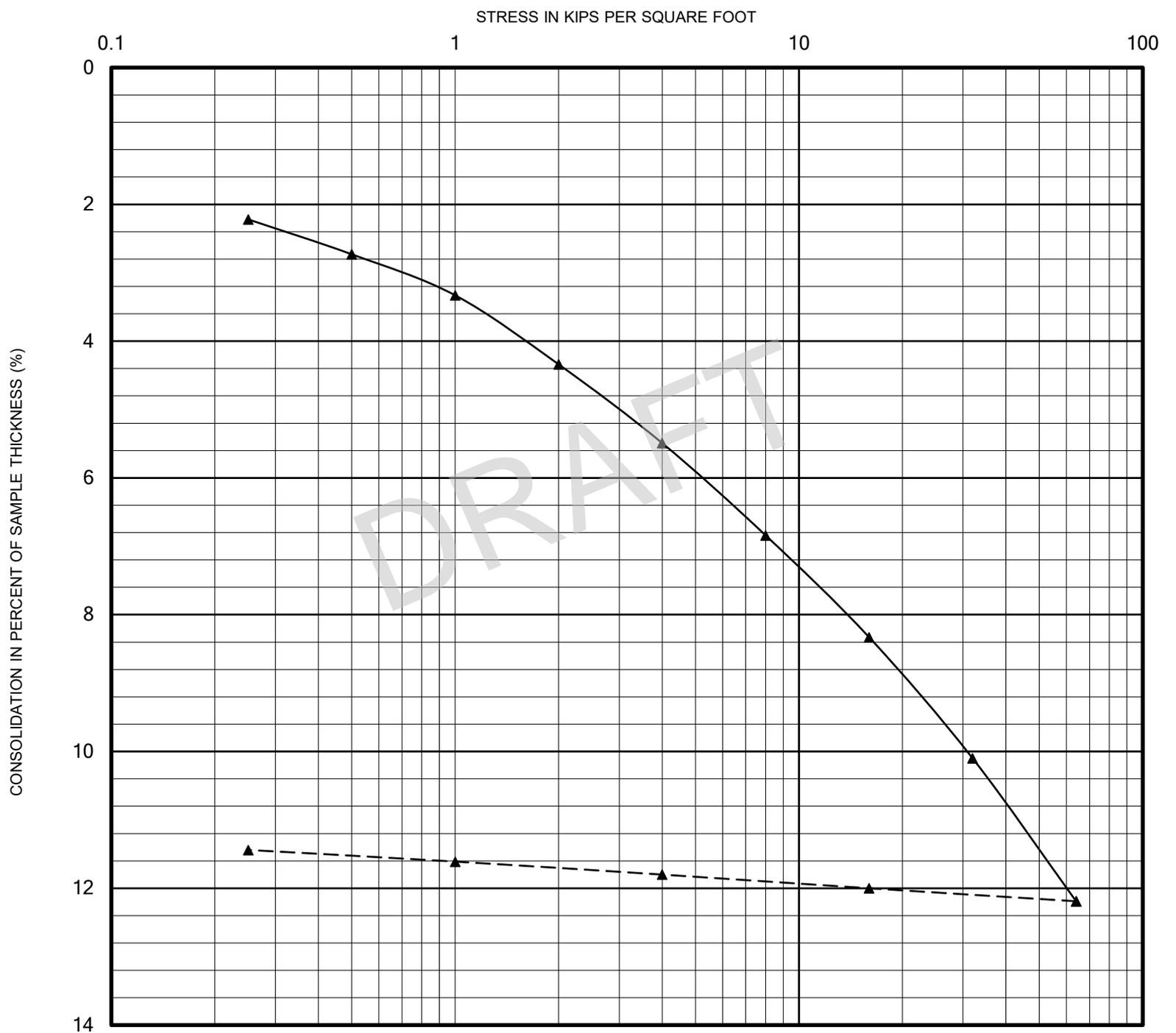
PERFORMED IN ACCORDANCE WITH ASTM D 4318

FIGURE C-2

ATTERBERG LIMITS TEST RESULTS

CITY OF ALAMEDA NEW AQUATIC CENTER
1100 ATLANTIC AVENUE, ALAMEDA, CALIFORNIA

403773009 | 05/25



—▲— Loading After Inundation
 -▲- Rebound Cycle

Sample Location
 Depth (ft)
 Soil Type

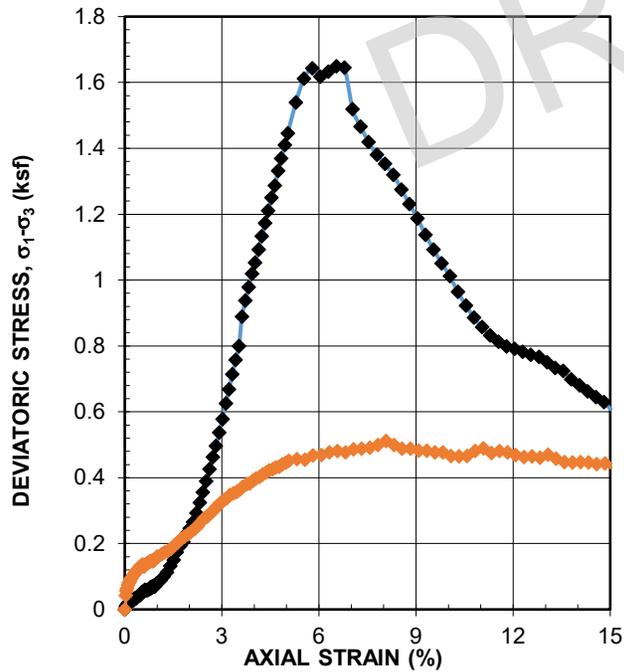
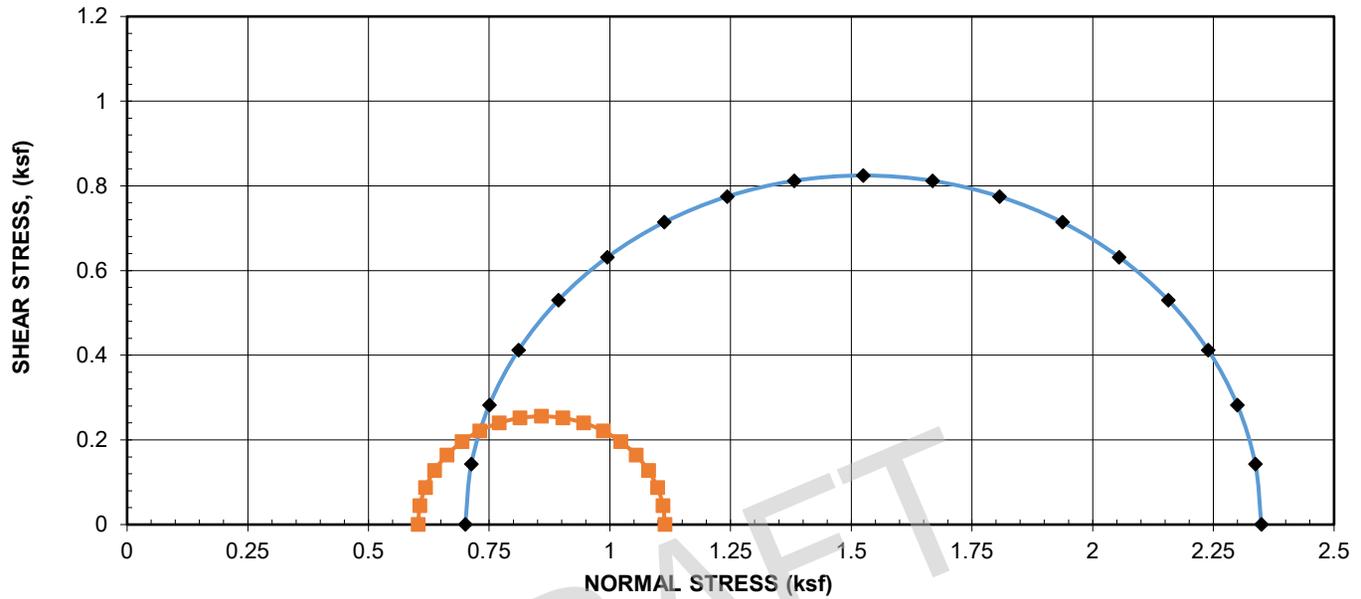
B-2
 11.0 - 11.5
 CL-ML

PERFORMED IN ACCORDANCE WITH ASTM D 2435

FIGURE C-3

CONSOLIDATION TEST RESULTS

CITY OF ALAMEDA NEW AQUATIC CENTER
 1100 ATLANTIC AVENUE, ALAMEDA, CALIFORNIA



SYMBOL		◆	◇
SAMPLE LENGTH, (in)		5.28	5.90
SAMPLE DIAMETER, (in)		2.39	2.40
SPECIFIC GRAVITY, ()		2.65	2.65
INITIAL	MOISTURE, (%)	16.0	78.4
	DRY DENSITY, (pcf)	118.7	53.3
	VOID RATIO, ()	0.3931	2.1024
	SATURATION, (%)	107.9	98.8
CELL PRESSURE, (ksf)		0.7	0.6
BACK PRESSURE, (ksf)		0.0	0.0
STRAIN RATE, (%/minute)		1.0	1.0
AT FAILURE	ELAPSED TIME, tf (min)	6.5	8.1
	AXIAL STRAIN, εf (%)	6.5	8.1
	DEVIATOR STRESS (ksf)	1.65	0.51
	MAJOR STRESS, σ1f (ksf)	2.35	1.11
MINOR STRESS, σ3f (ksf)		0.70	0.60
MEMBRANE CORRECTION USED		FALSE	TRUE

	DESCRIPTION (USCS SOIL TYPE)	SAMPLE LOCATION	SAMPLE DEPTH (feet)	COMPRESSIVE STRENGTH (ksf)	UU SHEAR STRENGTH s _u , (ksf)	REMARKS
◆	Silty CLAY (CL-ML)	B-1	16.0-16.5	1.65	0.82	
◇	Fat CLAY (CH)	B-3	10.5-11.0	0.51	0.26	

PERFORMED IN ACCORDANCE WITH ASTM D 2850 ON INTACT SPECIMENS
 MOISTURE CONTENT & DENSITY EVALUATED BY ASTM D 2216 & ASTM D 7263, SPECIFIC GRAVITY ASSUMED

FIGURE C-4

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION RESULTS



Geotechnical & Environmental Sciences Consultants

CITY OF ALAMEDA NEW AQUATIC CENTER
 1100 ATLANTIC AVENUE, ALAMEDA, CALIFORNIA

SAMPLE LOCATION	SAMPLE DEPTH (ft)	SOIL TYPE	R-VALUE
B-4	0.0-5.0	SC	12.0

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PERFORMED IN ACCORDANCE WITH ASTM D 2844/CT 301

FIGURE C-5

R-VALUE TEST RESULTS

CITY OF ALAMEDA NEW AQUATIC CENTER
 1100 ATLANTIC AVENUE, ALAMEDA, CALIFORNIA

403773009 | 05/25

DRAFT

APPENDIX D

Corrosivity Testing (CERCO Analytical)

2 January, 2024

Job No. 2312042
Cust. No. 13270

Mr. Rathna Mothkuri
Ninyo & Moore
2149 O'Toole Avenue, Suite 30
San Jose, CA 95131

Subject: Project No.: 403773004
Project Name: City of Alameda New Aquatic Center, 1100 Atlantic Ave., Alameda, CA
Corrosivity Analysis – ASTM Test Methods

Dear Mr. Mothkuri:

Pursuant to your request, CERCO Analytical has analyzed the soil sample submitted on December 22, 2023. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurement, this sample is classified as “moderately corrosive”. All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentration is 28 mg/kg and is determined to be insufficient to attack steel embedded in a concrete mortar coating.

The sulfate ion concentration is 78 mg/kg and is determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at this location.

The pH of the soil is 7.81, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potential is 260-mV and is indicative of potentially “slightly corrosive” soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc.* at (925) 927-6630.

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.



J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

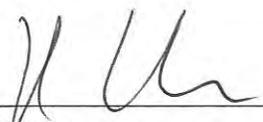
Client: Ninyo & Moore
 Client's Project No.: 403773004
 Client's Project Name: City of Alameda New Aquatic Center, 1100 Atlantic Avenue, Alameda, CA
 Date Sampled: 5-Dec-23
 Date Received: 22-Dec-23
 Matrix: Soil
 Authorization: Signed Chain of Custody

Date of Report: 2-Jan-2024

DRAFT

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2312042-001	B-2/0.0-5.0'	260	7.81	-	2,200	-	28	78

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	22-Dec-2023	28-Dec-2023	-	22-Dec-2023	-	28-Dec-2023	28-Dec-2023



 Julia Clauson
 Chemist

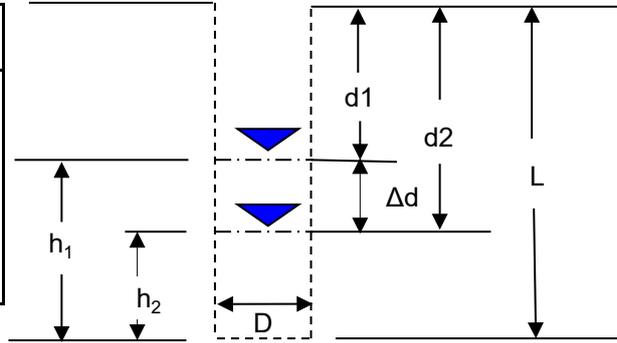
* Results Reported on "As Received" Basis
 N.D. - None Detected

DRAFT

APPENDIX E

Percolation Tests Results

Project = City of Alameda New Aquatic Center
 Project No. = 403773009
 Depth of Boring, L (ft) = 3.0
 Diameter of Boring, D (in) = 8.0
 Diameter of Pipe (in) = N/A
 Initial Depth to Water, d1 (in), (Final Period) = 30.0
 Initial Height of Water, h1 (in), (Final Period) = 6.0
 Water Level Drop, Δd (in), (Final Period) = 0.0
 Reduction factor, Rf = 2.5
 $h_1 = L - d_1$ (in inches)
 $Rf = ((2h_1 - \Delta d)/DIA) + 1$



Test No. (Hole No.)	Time (hr:min)	Elapsed Time (min)	Depth to Water, d (in)	Water Level, h (in)	Change in Water Level, Δd (in)	Time Interval (hour)	Percolation Rate (inch/hour)	Adjusted Percolation Rate (inch/hour)
IT-1	9:00	15	30.00	6.00	0.0	0.25	0.0	0.0
	9:15							
	9:15	15	30.00	6.00	0.0	0.25	0.0	0.0
	9:30							
	9:30	15	30.00	6.00	0.0	0.25	0.0	0.0
	9:45							
	9:45	15	30.00	6.00	0.0	0.25	0.0	0.0
	10:00							
	10:00	15	30.00	6.00	0.0	0.25	0.0	0.0
	10:15							
10:15	15	30.00	6.00	0.0	0.25	0.0	0.0	
10:30								
10:30	15	30.00	6.00	0.0	0.25	0.0	0.0	
10:45								
10:45	15	30.00	6.00	0.0	0.25	0.0	0.0	
11:00								

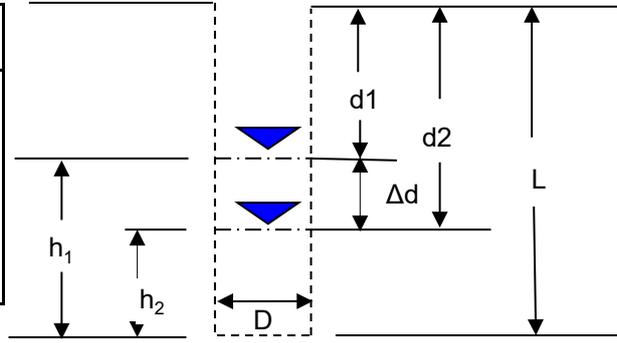
FIGURE E-1

PERCOLATION TEST RESULTS

CITY OF ALAMEDA NEW AQUATIC CENTER
 1100 ATLANTIC AVENUE, ALAMEDA, CALIFORNIA



Project = City of Alameda New Aquatic Center
 Project No. = 403773009
 Depth of Boring, L (ft) = 3.0
 Diameter of Boring, D (in) = 8.0
 Diameter of Pipe (in) = N/A
 Initial Depth to Water, d1 (in), (Final Period) = 30.0
 Initial Height of Water, h1 (in), (Final Period) = 6.0
 Water Level Drop, Δd (in), (Final Period) = 0.0
 Reduction factor, Rf = 2.5
 $h_1 = L - d_1$ (in inches)
 $Rf = ((2h_1 - \Delta d)/DIA) + 1$



Test No. (Hole No.)	Time (hr:min)	Elapsed Time (min)	Depth to Water, d (in)	Water Level, h (in)	Change in Water Level, Δd (in)	Time Interval (hour)	Percolation Rate (inch/hour)	Adjusted Percolation Rate (inch/hour)	
IT-2	9:10 9:25	15	30.00	6.00	0.0	0.25	0.0	0.0	
	9:25 9:40	15	30.00	6.00	0.0	0.25	0.0	0.0	
	9:40 9:55	15	30.00	6.00	0.0	0.25	0.0	0.0	
	9:55 10:10	15	30.00	6.00	0.0	0.25	0.0	0.0	
	10:10 10:25	15	30.00	6.00	0.0	0.25	0.0	0.0	
	10:25 10:40	15	30.00	6.00	0.0	0.25	0.0	0.0	
	10:40 10:55	15	30.00	6.00	0.0	0.25	0.0	0.0	
	10:55 11:10	15	30.00	6.00	0.0	0.25	0.0	0.0	

REMARKS: At 9:55 AM, all the water was absorbed by the soil - active sign of caving/soil collapse at the bottom making the depth of the percolation hole to 2.5 feet. Added 6 inches of water to the hole and continued the test.

FIGURE E-2

PERCOLATION TEST RESULTS



CITY OF ALAMEDA NEW AQUATIC CENTER
 1100 ATLANTIC AVENUE, ALAMEDA, CALIFORNIA

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APPENDIX F

Soil Disposal Certificate

Manifest

SOIL SAFE OF CA - TPST
Non-Hazardous Soils

Manifest #

Date of Shipment: 12/29/23 Responsible for Payment: Lariat Transport Truck #: A07 Facility #: A5-0205 Approval Number: 601 Load #

Generator's Name and Billing Address: **CITY OF ALAMEDA
950 WEST MALL SQUARE
ALAMEDA, CA 94501** Generator's Phone #: **510-747-7948**
Person to Contact:
FAX#:
Customer Account Number

Consultant's Name and Billing Address:
Consultant's Phone #:
Person to Contact:
FAX#:
Customer Account Number

Generation Site (Transport from): (name & address) **JEAN SWEENEY OPEN SPACE PARK
6TH STREET AND STEWART COURT
ALAMEDA, CA 94501** Site Phone #:
Person to Contact:
FAX#:
Customer Account Number

Designated Facility (Transport to): (name & address) **SOIL SAFE
12328 HIBISCUS AVENUE
ADELANTO, CA 92301** Facility Phone #: **(800) 882-8001**
Person to Contact: **JOE PROVANSAL**
FAX#: **(780) 248-8004**

Transporter Name and Mailing Address: **BELSHIRE
28871 TOWNE CENTRE DRIVE
FOOTHILL RANCH, CA 92610** 3x55 BESI: 361589 Transporter's Phone #: **949-480-5200** **CAR000183913**
Person to Contact: **LARRY MOOTHART** **1629189**
FAX#: **949-480-5210** Customer Account Number

Description of Soil	Moisture Content	Contaminated by:	Approx. Qty:	Description of Delivery	Gross Weight	Tare Weight	Net Weight
Sand <input type="checkbox"/> Organic <input type="checkbox"/> Clay <input type="checkbox"/> Other <input type="checkbox"/>	0 - 10% <input type="checkbox"/> 10 - 20% <input type="checkbox"/> 20% - over <input type="checkbox"/>	Gas <input type="checkbox"/> Diesel <input type="checkbox"/> Other <input type="checkbox"/>	3 DM	soil	39840	38100	1740
Sand <input type="checkbox"/> Organic <input type="checkbox"/> Clay <input type="checkbox"/> Other <input type="checkbox"/>	0 - 10% <input type="checkbox"/> 10 - 20% <input type="checkbox"/> 20% - over <input type="checkbox"/>	Gas <input type="checkbox"/> Diesel <input type="checkbox"/> Other <input type="checkbox"/>					.87

List any exception to items listed above:
Scale Ticket # **178976**

Generator's and/or consultant's certification: I/We certify that the soil referenced herein is taken entirely from those soils described in the Soil Data Sheet completed and certified by me/us for the Generation Site shown above and nothing has been added or done to such soil that would alter it in any way.

Print or Type Name: Generator Consultant Signature and date: [Signature] Month 12 Day 29 Year 23
Larry Moothart of BESI on behalf of generator

Transporter's certification: I/We acknowledge receipt of the soil referenced above and certify that such soil is being delivered in exactly the same condition as when received. I/We further certify that the soil is being directly transported from the Generation Site to the Designated Facility without off-loading, adding to, subtracting from or in any way delaying delivery to such site.

Print or Type Name: Paul Freeman Signature and date: [Signature] Month 12 Day 29 Year 23

Discrepancies:
Recycling Facility certifies the receipt of the soil covered by this manifest except as noted above:

Print or Type Name: **Joe Provansal / Barry Meek / Bill Blahop** Signature and date: [Signature] **1-26-04**

Please print or type

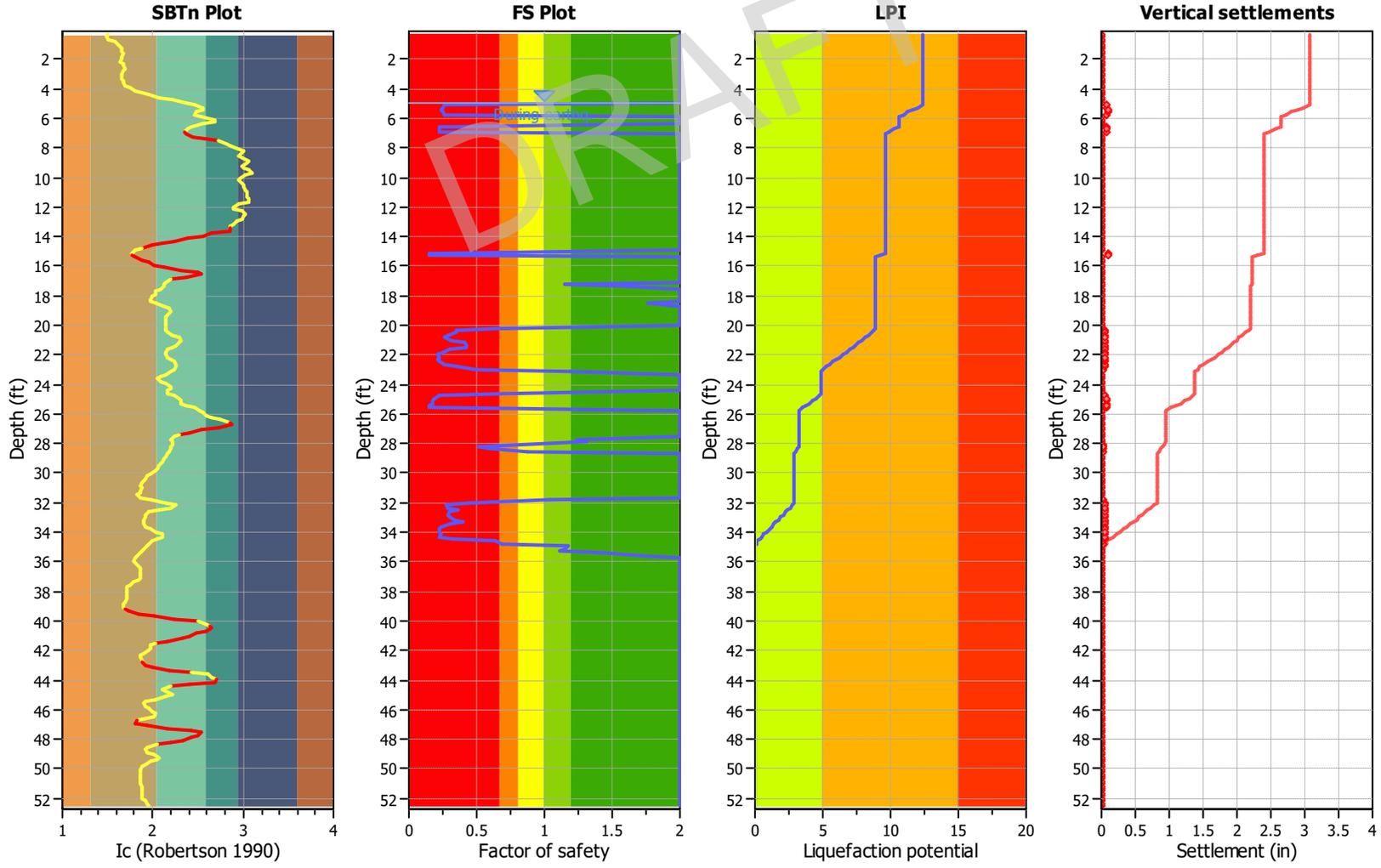
8THSTREE/3427030

TRANSPORTER COPY

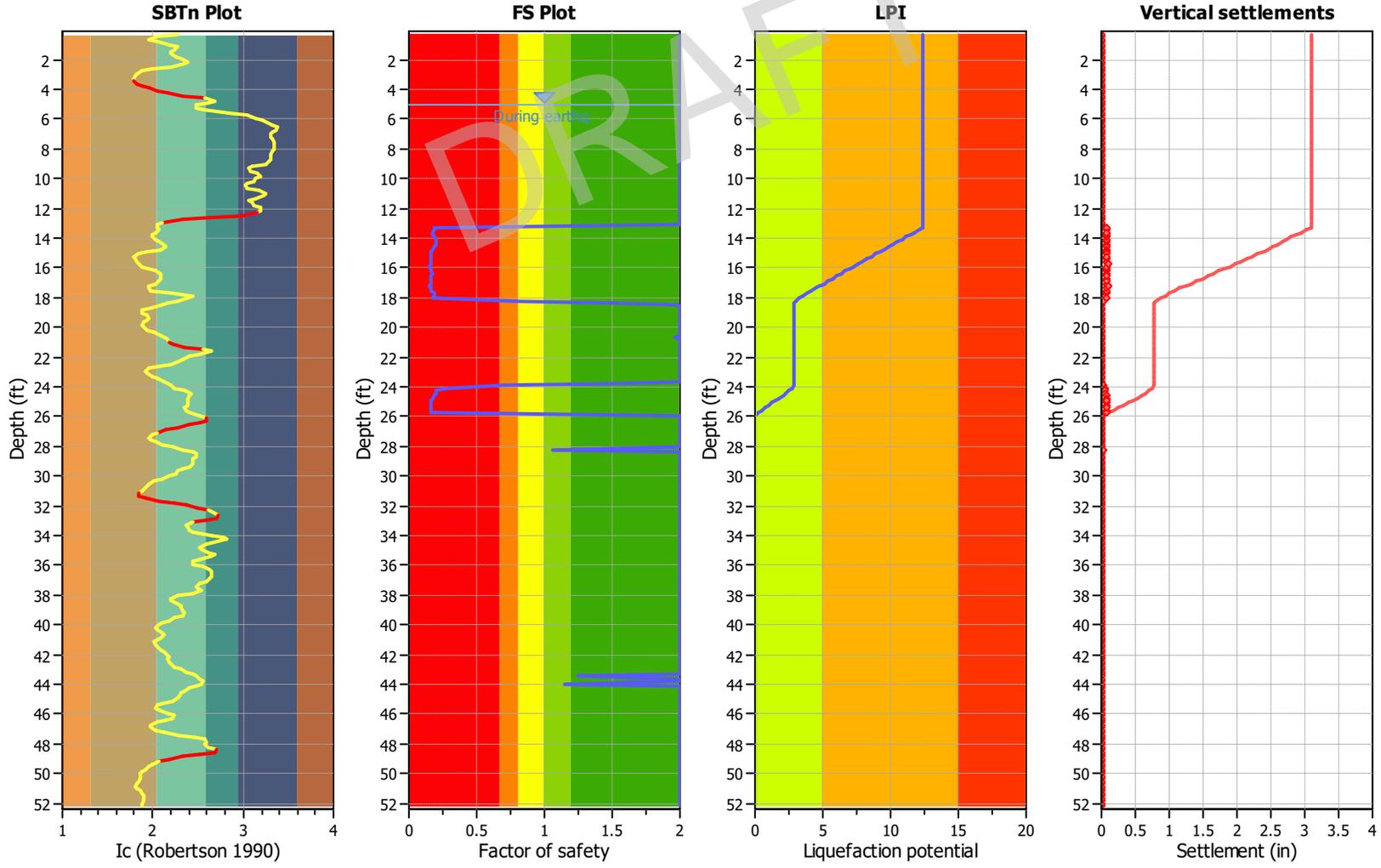
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APPENDIX G

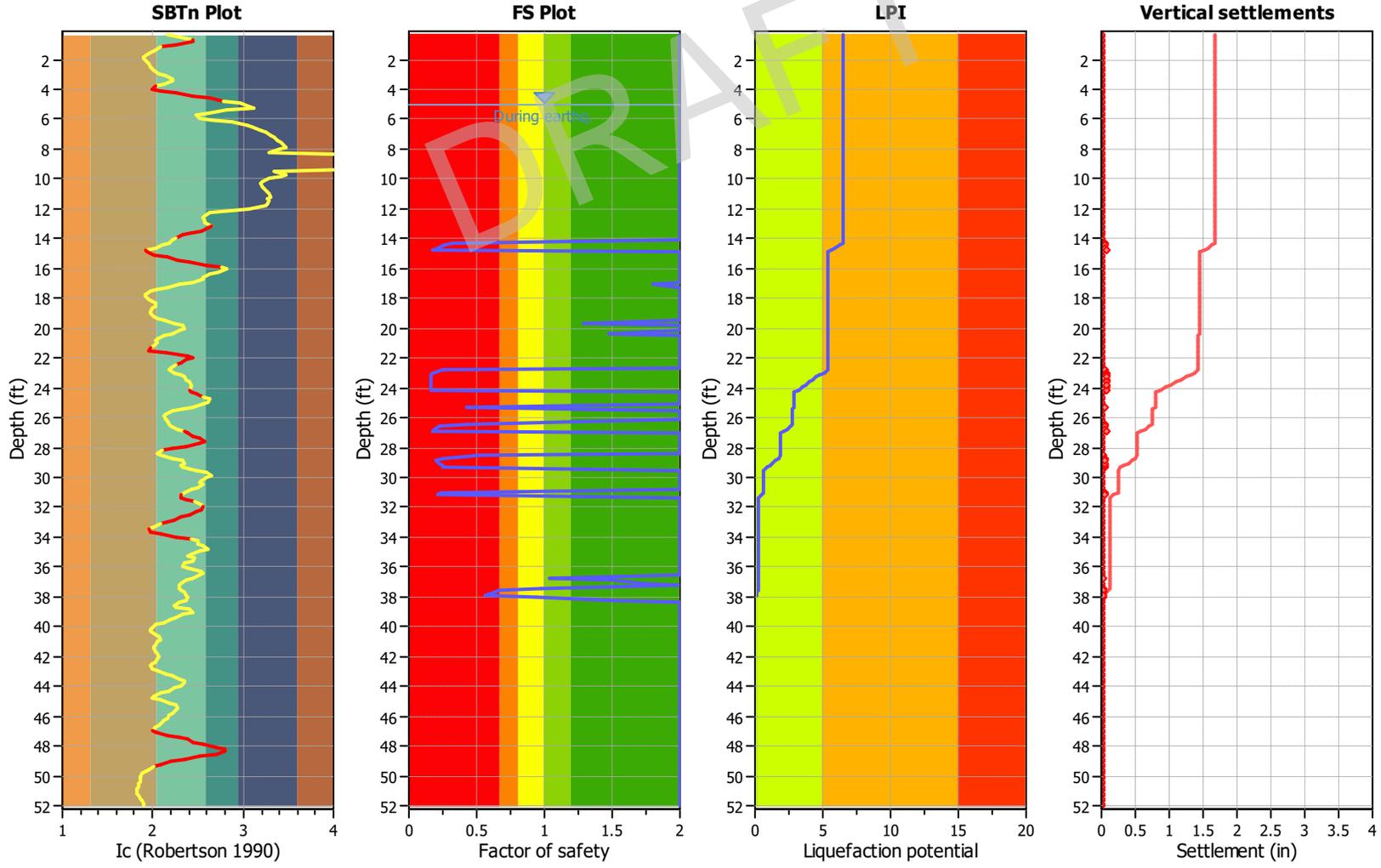
Calculation



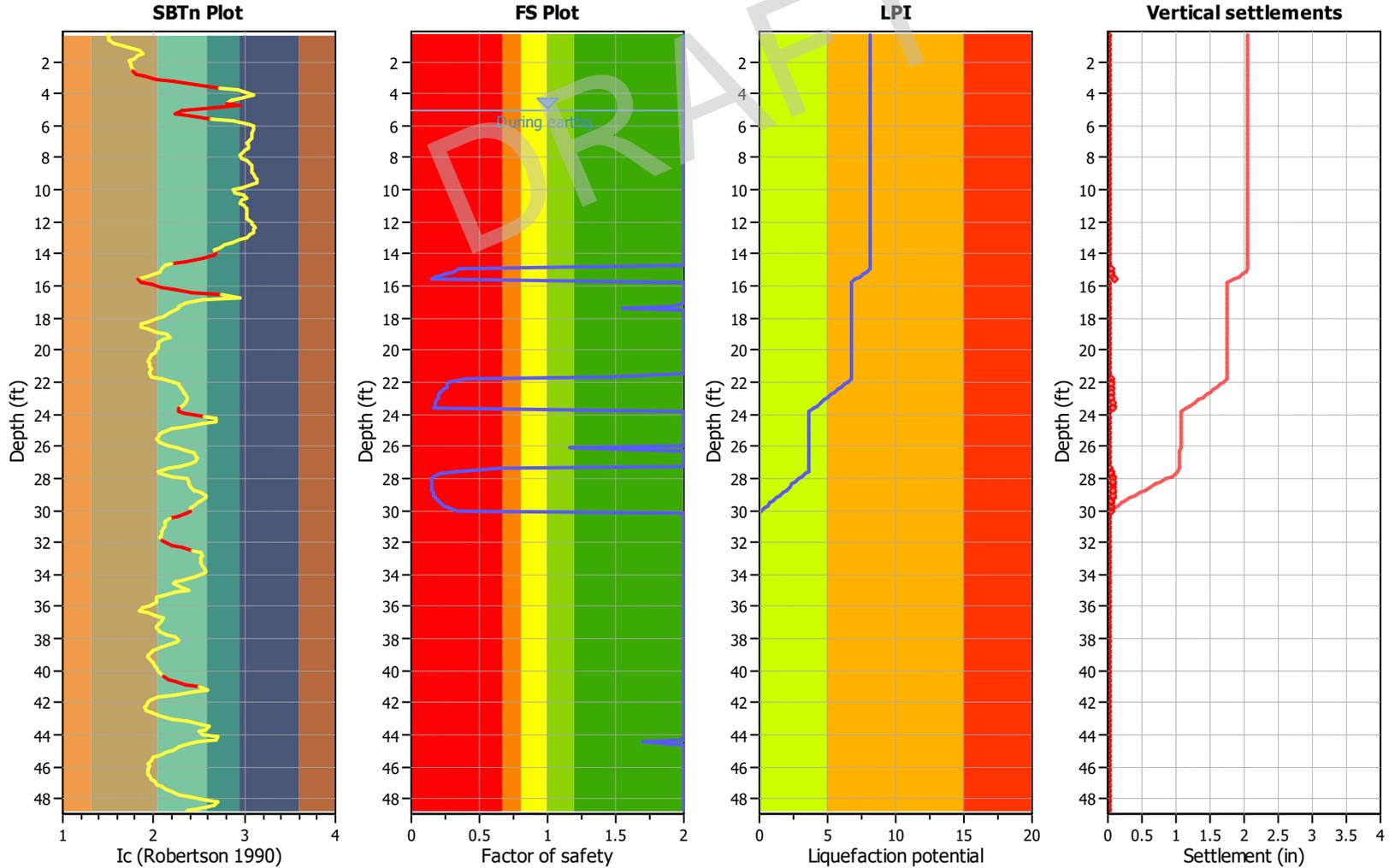
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Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:
Earthquake magnitude M_w :	7.51	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:
Peak ground acceleration:	0.72	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:
						Method based



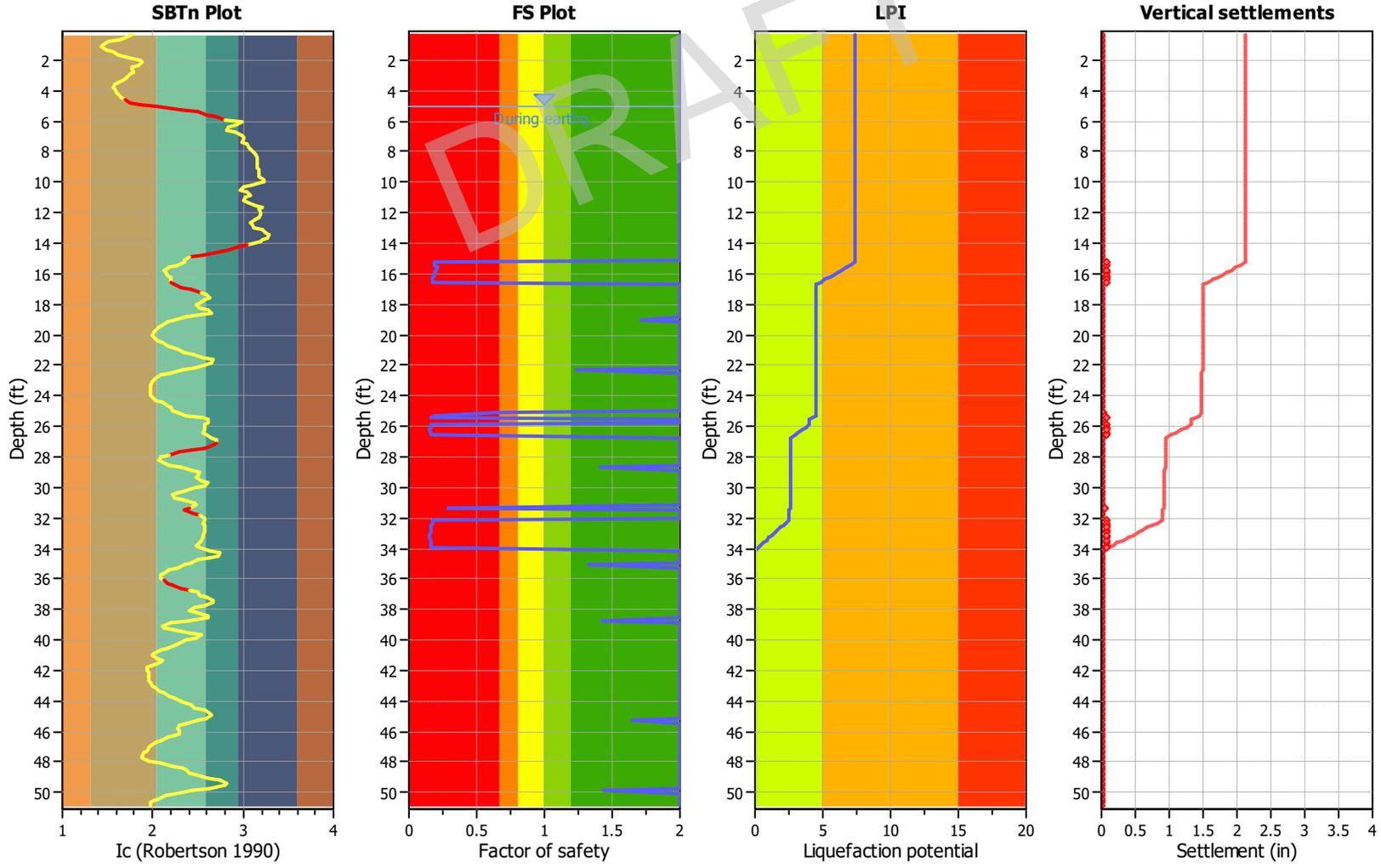
Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	7.51	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	50.00 ft
Peak ground acceleration:	0.72	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based



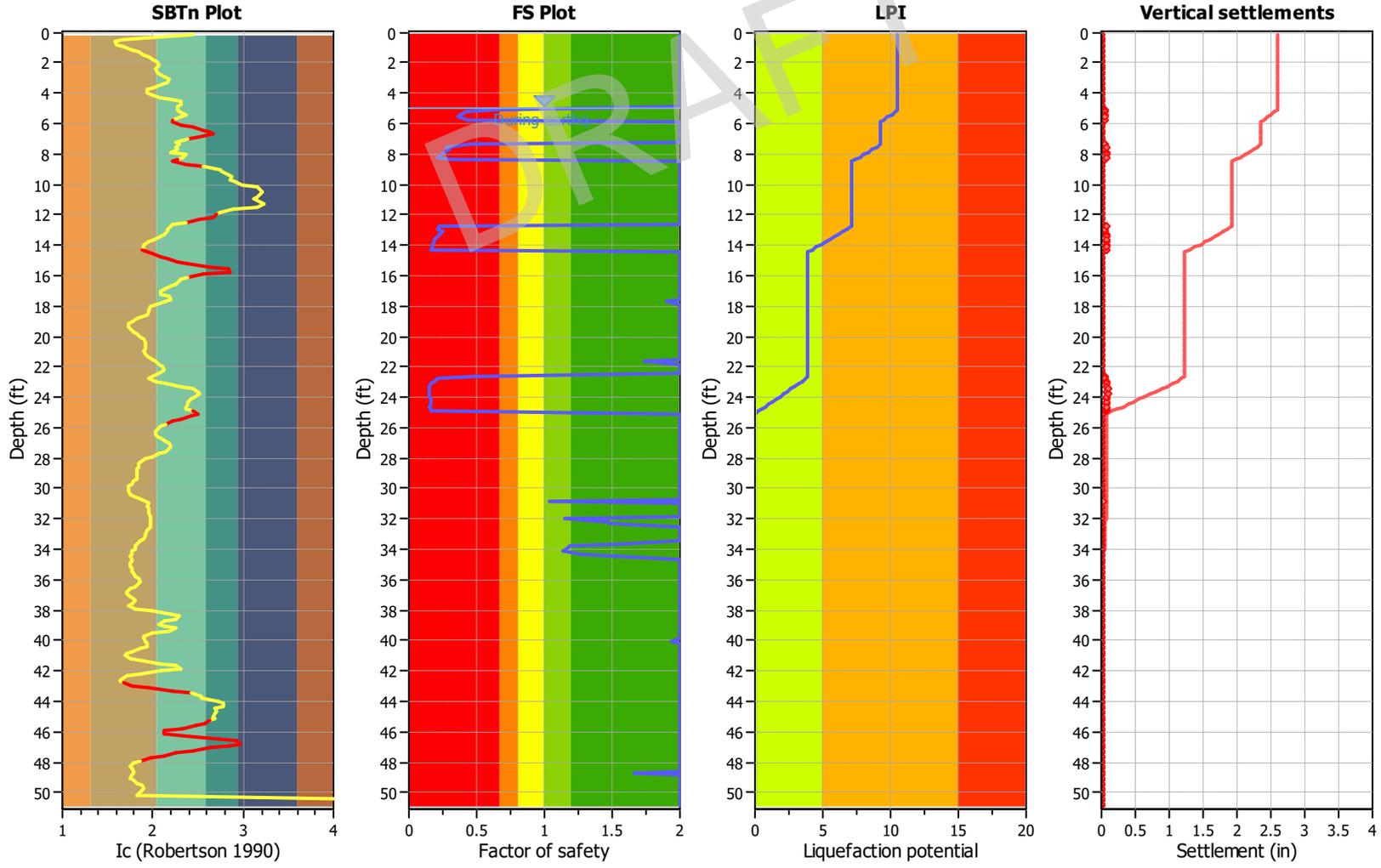
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Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	applied:
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:
Earthquake magnitude M_w :	7.51	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:
Peak ground acceleration:	0.72	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:
						Method based



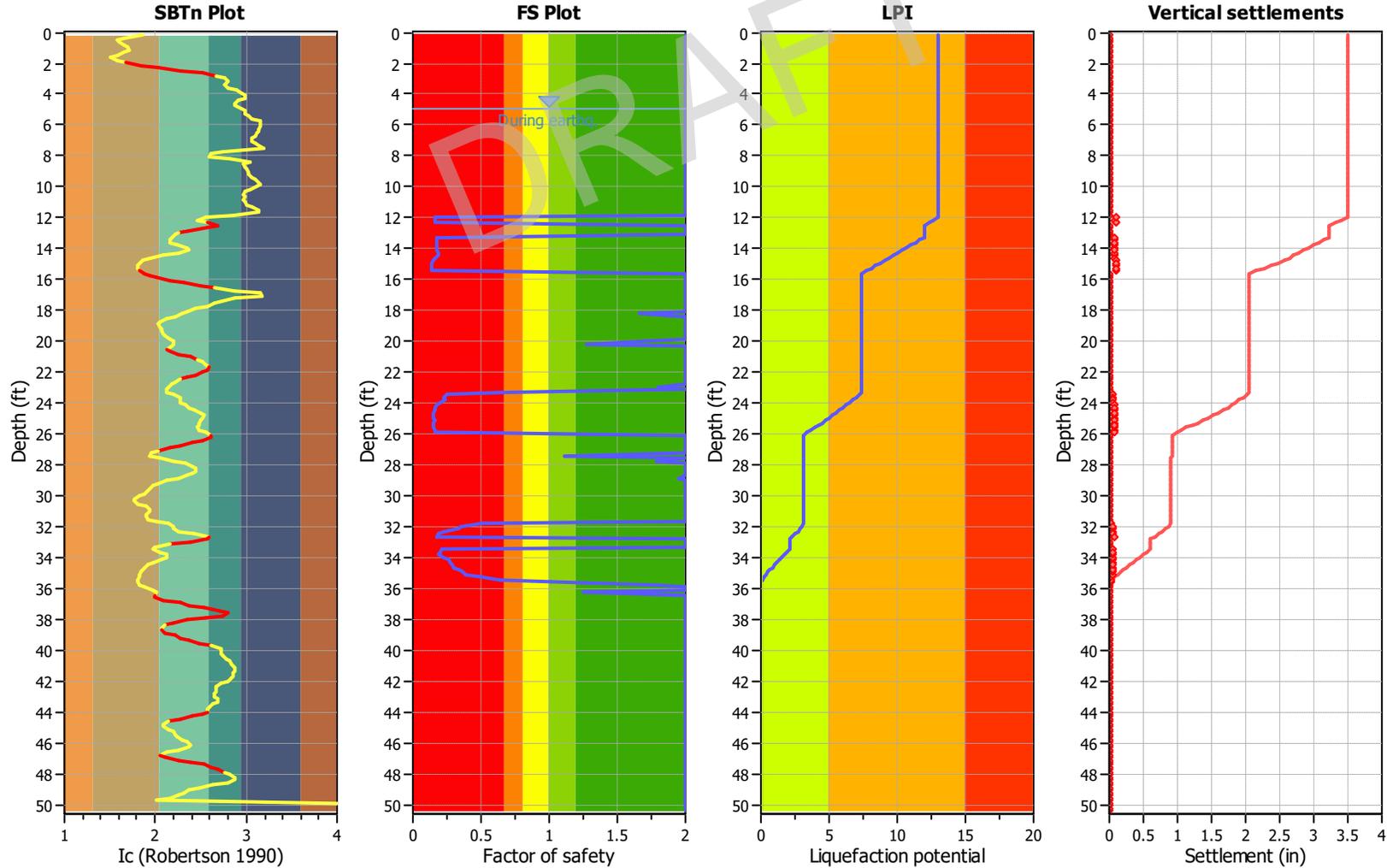
Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	applied:
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:
Earthquake magnitude M_w :	7.51	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:
Peak ground acceleration:	0.72	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:
						Method based



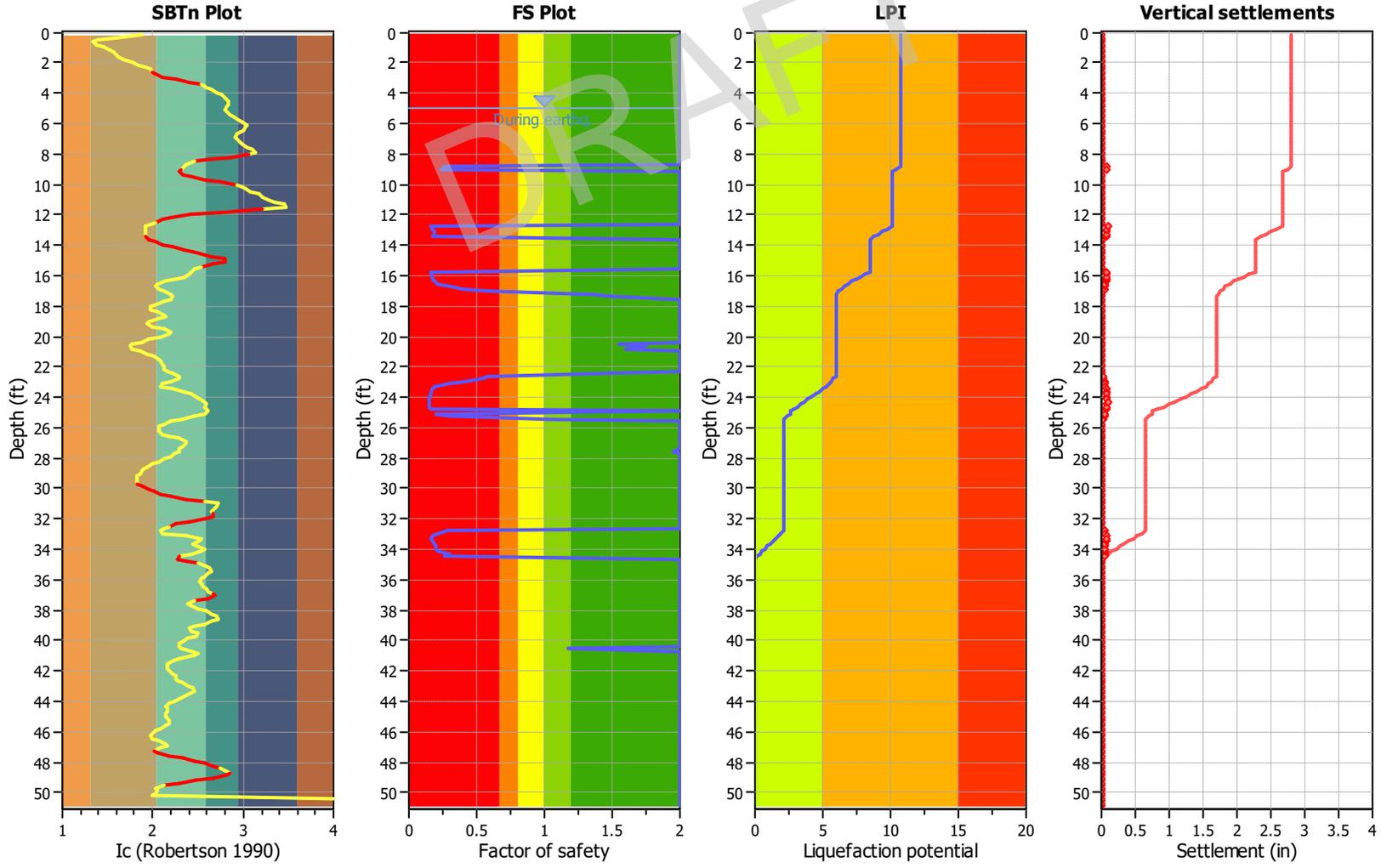
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Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	7.51	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	50.00 ft
Peak ground acceleration:	0.72	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based



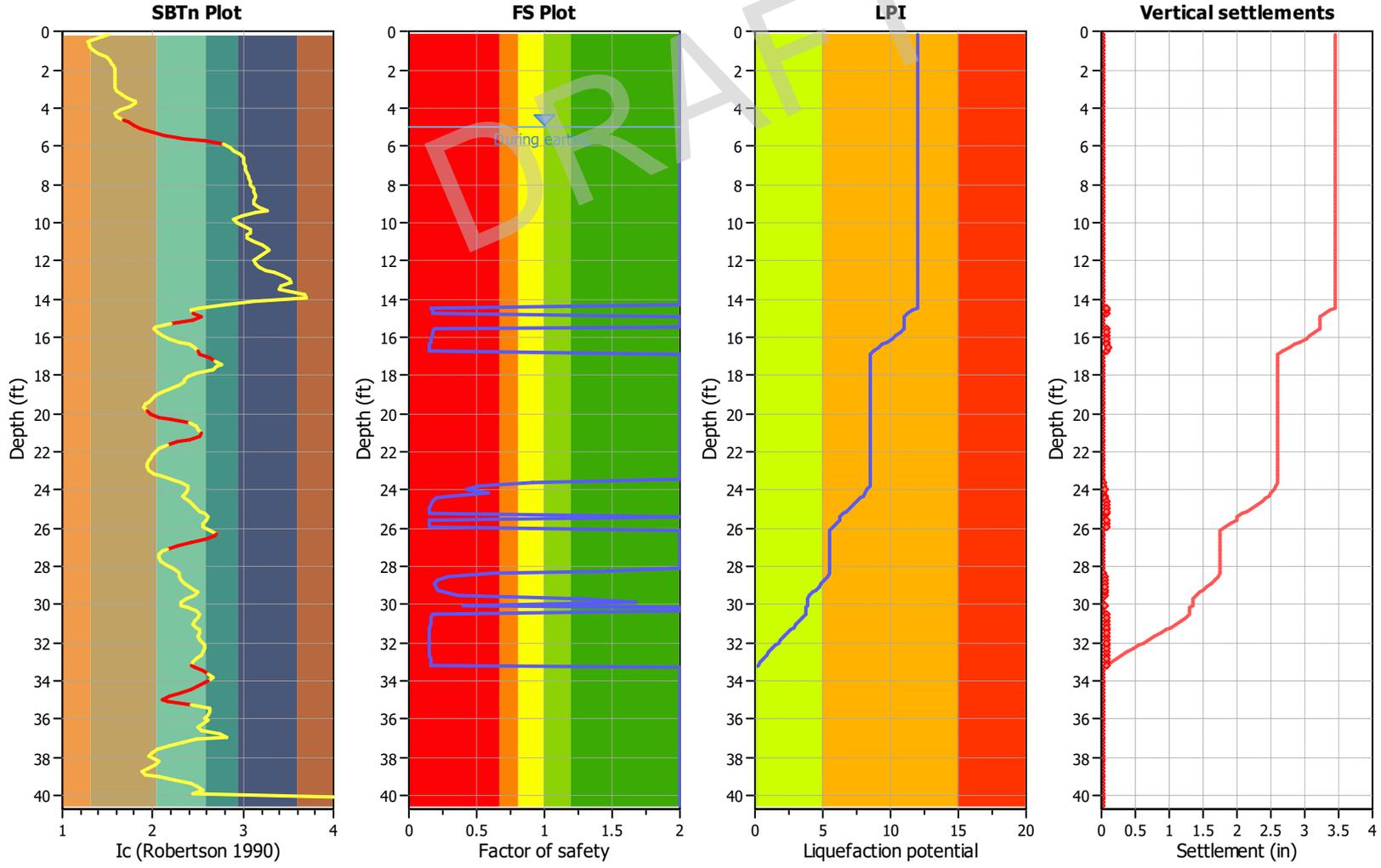
Analysis method:	B&I (2014)	G.W.T. (in-situ):	6.70 ft	Use fill:	No	Clay like behavior
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	applied:
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:
Earthquake magnitude M_w :	7.51	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:
Peak ground acceleration:	0.72	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:
						Method based



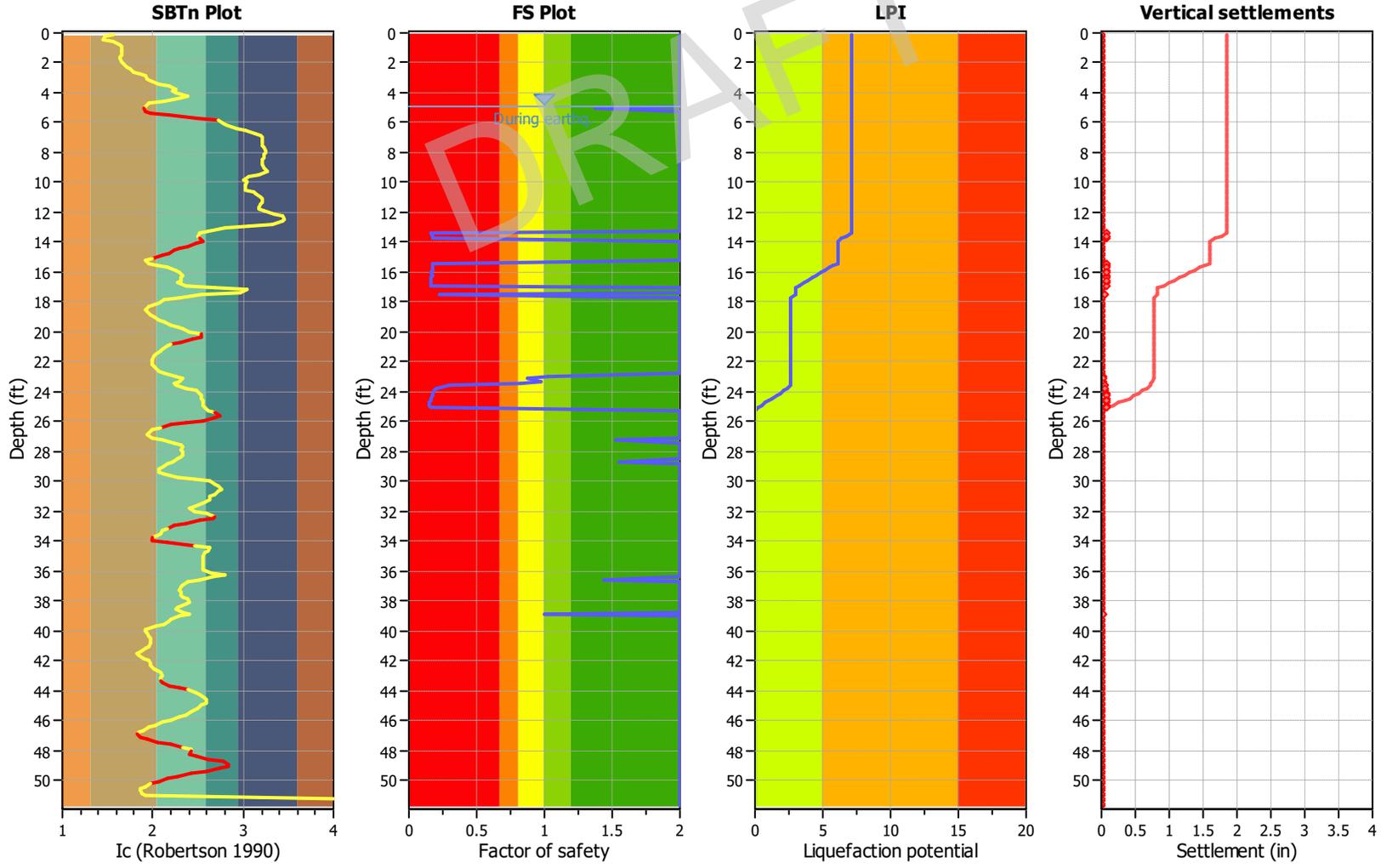
Analysis method:	B&I (2014)	G.W.T. (in-situ):	13.70 ft	Use fill:	No	Clay like behavior
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	applied:
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:
Earthquake magnitude M_w :	7.51	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:
Peak ground acceleration:	0.72	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:
						Method based



Analysis method:	B&I (2014)	G.W.T. (in-situ):	9.50 ft	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	7.51	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	50.00 ft
Peak ground acceleration:	0.72	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based



Analysis method:	B&I (2014)	G.W.T. (in-situ):	12.20 ft	Use fill:	No	Clay like behavior
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	applied:
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:
Earthquake magnitude M_w :	7.51	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:
Peak ground acceleration:	0.72	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:
						Method based



Analysis method:	B&I (2014)	G.W.T. (in-situ):	12.20 ft	Use fill:	No	Clay like behavior
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	applied:
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:
Earthquake magnitude M_w :	7.51	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:
Peak ground acceleration:	0.72	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:
						Method based

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EXHIBIT K
Draft Transportation Impact Analysis Report

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Draft Memorandum

Date: March 7, 2025
To: Natalie Noyes, David J. Powers & Associates
From: Sam Tabibnia and Henry Helmuth, Fehr & Peers
Subject: Alameda Aquatic Center Project – Transportation Impact Analysis

OK20-0355.03

Fehr & Peers conducted a transportation assessment for the proposed development, an aquatic center including a one-story multi-purpose building, one 30-meter competition swimming pool, one activity pool, and spectator seating. This memorandum summarizes the Project description, trip generation, vehicle miles traveled (VMT) screening, traffic operations at intersections in the Project vicinity, and access and circulation around the Project vicinity.

Based on our analysis:

1. The Project would generate approximately 710 daily, 23 AM, and 66 PM peak hour automobile trips on a typical non-summer weekday, approximately 1,670 daily, 383 AM, and 149 PM peak hour automobile trips on a typical summer weekday, and approximately 840 daily automobile trips on a typical weekend day with no special events.
2. The Project is considered a local-serving use and is therefore presumed to have a less-than-significant impact on vehicle miles traveled (VMT).
3. The Project site plan dated February 14, 2025 meets the City of Alameda's requirements for total number of automobile parking spaces, and short-term bicycle parking. However, it may not meet the City's requirements for compact spaces, ADA accessible spaces, EV parking spaces, or long-term bicycle parking. It is recommended to review the final site plan to ensure that these City requirements are met.



4. The Project would not substantially affect intersection level of service (LOS) at three nearby intersections (Atlantic Avenue/Wilma Chan Way, Atlantic Avenue/Bartlett Drive, and Atlantic Avenue/Challenger Drive)
5. Several on and off-site modifications are recommended to improve the multi-modal access and circulation for the Project. These recommendations are listed at the end of the memorandum and include provision of a left-turn lane on westbound Atlantic Avenue at the Project driveway, improving the midblock crosswalk across Atlantic Avenue, explicitly prohibiting parking and stopping along Atlantic Avenue, and designating the west curb along the Project frontage for passenger loading.

The remainder of this memorandum provides detail on our analysis assumptions, methodology, and findings.

1. Project Description

The Project would be located at 1100 Atlantic Avenue, along the south side of Atlantic Avenue east of Wilma Chan Way. The Cross Alameda Trail would form the south boundary of the site. The Project is anticipated to serve as the primary aquatic sport center for the City of Alameda and would be used for practices, swim meets, and public uses. The Project site is part of the Jean Sweeney Open Space Park and is currently vacant. **Figure 1** shows the Project site plan.

The Project would provide 72 vehicular parking spaces in a surface parking lot on the east side of the Project. Parking would be accessed via one driveway on Atlantic Avenue, about 300 feet east of Bartlett Drive. The Project parking lot would provide a secondary access point through a drive aisle connecting to the adjacent parking lot for the College of Alameda Science Annex just east of the Project.

The Project would provide two long-term bicycle parking spaces in two lockers located on the south end of the Project site with adequate space to accommodate parking for 10 additional bikes for a total of 12 long-term bicycle parking spaces. Short-term bicycle parking would consist of bike racks accommodating 100 bicycles, provided just east of the main facility entrance and adjacent to the parking lot. Atlantic Avenue on the north side of the Project and the Cross Alameda Trail on the south side of the Project would provide pedestrian and bicycle connections for the Project.

The Project would provide a variety of programming throughout the year. **Attachment A** provides details on planned programming at the proposed aquatic center by time of year and day of week as estimated by the City of Alameda staff, and presents the estimated number of visitors



and staff and hours of operations by activity. The Project would be open seven days per week from 5:30 AM to 9:00 PM with most activities occurring from 2:00 PM to 9:00 PM on weekdays and 9:00 AM to 4:00 PM on weekends. The aquatic center would also host summer camp activities on weekdays from 8:00 AM to 7:30 PM, and special events, such as swim meets and water polo tournaments, throughout the year.

Table 1 summarizes the hours of activity and number of staff and visitors for weekdays and weekends under typical operations. During non-summer months, the Project is estimated to have about 275 visitors on a typical weekday, about 315 visitors on a typical weekend day, and three full-time and about five to ten part-time staff on both weekdays and weekends. During summer months, the Project would host summer camp activities on weekdays which would result in about 620 visitors and 20 to 30 part-time staff in addition to the three full-time staff.

The Project would also accommodate several special events. These events, which primarily consist of swim meets and water polo tournaments, would generally occur on weekends and can have up to 800 visitors throughout the event.

Table 1: Project Operation Characteristics

Season	Typical Weekday			Typical Weekend		
	Hours of Operations	Visitors	Staff	Hours of Operations	Visitors	Staff
Non-Summer						
Main Activities	5:30 AM to 9:00 PM with most activities from 2:00 PM to 9:00 PM	275	3 full-time and 5-10 part-time	5:30 AM to 9:00 PM with most activities from 8:00 AM to 4:00 PM	315	3 full-time and 5-10 part-time
Summer						
Main Activities	5:30 AM to 9:00 PM with most activities from 8:00 AM to 7:00 PM	320	3 full-time and 5-10 part-time	5:30 AM to 9:00 PM with most activities from 8:00 AM to 4:00 PM	315	3 full-time and 5-10 part-time
Summer Camps	8:00 AM to 7:30 PM with most camps occurring from 9:00 AM to 4:00 PM	300	15-20 part-time	None	0	0
Total		620	3 full-time and 20-30 part-time		315	3 full-time and 5-10 part-time

Source: Data provided by City of Alameda and summarized by Fehr & Peers, 2025. See **Attachment A** for details.



2. VMT Evaluation

The effects of the Project on VMT is evaluated based on the guidance provided by the State’s Office of Planning and Research (OPR) in their *Technical Advisory on Evaluating Transportation Impacts in CEQA*. The OPR guidance recommends using an efficiency metric (such as VMT per person) than an absolute numeric threshold (such as total VMT) because an efficiency metric speaks to how efficiently the people at a given location travel. A project that contributes to a more efficient use of the transportation system would reduce the VMT per person.

According to the OPR guidance, screening criteria can be used to identify projects that can be expected to cause a less-than-significant impact without conducting a detailed analysis. Local-serving uses can be presumed to have a less-than-significant impact on VMT absent substantial evidence to the contrary. Local serving uses, such as grocery stores, local schools, and community centers, can be considered to have a less-than-significant impact on VMT because they would draw most of their users, customers, and/or visitors from a relatively small geographical area. The Project is the relocation and expansion of an existing aquatic center that primarily serves the City of Alameda residents. Most of the trips generated by the Project under typical conditions are expected to be local Alameda residents. In addition, the Project site is easily accessible by non-automobile modes. Class II bicycle lanes on Atlantic Avenue and the Class I Cross Alameda Trail provide non-motorized access adjacent to the site, and Webster Street, about 0.2 miles walking distance west of the Project site, provides high-frequency transit service.

Considering the Project use and availability of non-automobile modes, the Project can be considered a local-serving use and presumed to have a less-than-significant impact on VMT.

3. Trip Generation, Distribution, and Assignment

Trip Generation

Trip generation is the process of estimating the number of vehicles that would likely access the Project site. Fehr & Peers estimated the Project trip generation based on the anticipated programming at the site, including attendance and staffing estimates for various activities on typical weekdays and weekends, which are summarized in Table 1 with more detail in Attachment A.

Table 2 summarizes the daily trip generation for a weekday and a weekend, as well as weekday morning and evening peak commute hours for typical non-summer and summer months. In



addition to the visitor and staffing assumptions by time of day summarized in Table 1 and Attachment A, the trip generation is based on the following assumptions:

- Each adult visitor and staff would generate two trips, consisting of one trip to and one trip from the Project site.
- For main activities involving kids, 50% would be dropped off and picked up. These kids would generate four trips per day each, as their parents/guardians would drive to and from the site for both the drop-off and the pick-up. The other 50% would have parents park and wait. These kids would generate two trips per day, consisting of one trip to and one trip from the Project site.
- For all-day summer camps, all kids would be dropped off and picked up, generating four trips per day each.
- For 1.5-hour-long or shorter summer camps, parents/guardians would wait while kids would be at camp. These kids would generate two trips per day, consisting of one trip to and one trip from the Project site.
- For main activities, about 90% of visitors and staff would drive to the site with an average automobile occupancy of 1.1 persons per vehicle.
- For summer camps, about 95% of visitors and staff would drive to the site with an average automobile occupancy for kids of 1.5 persons per vehicle, and for staff of 1.1 persons per vehicle.
- All trip generation is increased by 10% to account for other trips such as deliveries, additional visitors, midday staff trips, and ridesourcing trips (Uber, Lyft, Taxi).

During non-summer periods, the Project is estimated to generate about 710 vehicle trips on a typical weekday, with about 23 trips during the weekday AM peak hour, and 66 trips during the weekday PM peak hour.

During the summer months, the Project would generate about 1,670 daily trips with about 383 trips during the weekday AM peak hour and 149 trips during the weekday PM peak hour. The Project would generate about 840 trips on typical weekend days during both summer and non-summer months.



Table 2: Project Automobile Traffic Generation Summary

Season	Typical Weekday							Typical Weekend
	Daily	AM Peak Hour			PM Peak Hour			Daily
		In	Out	Total	In	Out	Total	
Non-Summer								
Main Activities	710	15	8	23	33	33	66	840
Typical Operations – Non-Summer	710	15	8	23	33	33	66	840
Summer								
Main Activities	880	39	39	78	61	60	121	840
Summer Camps	790	186	119	305	0	28	28	0
Typical Operations – Summer	1,670	225	158	383	61	88	149	840

Notes:

Trip generation based on the following assumptions:

- Number of visitors and staffing levels per day and time of day as provided by the City of Alameda in December 2024 (and presented in Attachment A)
- Main Activities: Drive mode share of 90%, auto occupancy of 1.1 person per car for kid activities, 50% are dropped off and picked up and 50% park and wait during the activity.
- Summer Camps: drive mode share of 95%, auto occupancy of 1.5 person per car. For all-day camps, four vehicle trips generated per kid: all kids are dropped off and picked up, and each drop-off and pick-up generates two trips (one inbound and one outbound). For shorter summer camps, parents/guardians would wait while kids at camp, generating two trips per day.
- Includes a 10% increase to account for other trips such as deliveries, rideshares, etc.

Source: Fehr & Peers, 2025.

Special Event Trip Generation

The Project anticipates accommodating a variety of special events throughout the year. The largest anticipated events would have up to 800 visitors and are expected a few times a year. These events, which generally consist of swim meets and water polo tournaments, would generally occur on weekends from 9:00 AM to 7:00 PM. Most of the 800 visitors would arrive throughout the day and not remain at the site throughout the day. Although the Project could provide seating for up to 500 spectators, the Project does not anticipate having more than 150 visitors at once throughout most special events. No other activities are anticipated at the aquatic center at the same time as the special events.

Attendees for these events are assumed to have about 100% driving mode share with two people per car. The trip generation for special events is increased by 15% to account for other trips, such



as deliveries and ridesourcing trips. Based on these assumptions, a capacity event with 800 attendees and 20 staff would generate about 940 vehicle trips. Considering the low frequency of these events, the traffic operations analysis presented in the next section does not consider the trips generated by the special events.

Trip Distribution and Assignment

The trip distribution and assignment process is used to estimate how trips generated by the Project would be distributed across the roadway network. Based on existing travel patterns and locations of complimentary land uses, we determined directions of approach to and departure from the Project site. **Figure 2** and **Figure 3** show the resulting peak hour trip distribution and Project trip assignment for non-summer and summer months, respectively.

The following study intersections were selected in consultation with the City of Alameda staff because they are either adjacent to the site or are most likely to be affected by the Project:

1. Atlantic Avenue/Wilma Chan Way
2. Atlantic Avenue/Bartlett Drive
3. Atlantic Avenue/Challenger Drive
4. Atlantic Avenue/Project Driveway

4. Traffic Operations Analysis

Although transportation analysis under CEQA no longer recognizes vehicle delay as an environmental impact, intersection level of service (LOS) was evaluated to help identify potential transportation system improvements that could be implemented as part of the Project. LOS is a qualitative description of traffic operations from the vehicle driver perspective and consists of the delay experienced by the driver at the intersection. It ranges from LOS A, with no congestion and little delay, to LOS F, with excessive congestion and delays.

For this study, traffic operations during typical weekday AM and PM peak commute hours at the study intersections were evaluated under the following scenarios:

- **Existing Conditions:** Represents existing traffic volumes based on data collected in November 2024, as shown in **Figure 4. Attachment B** provides the detailed count data. This scenario also accounts for the current signal timing parameters at the signalized study intersections including the recently implemented timings at the Atlantic Avenue/Wilma Chan Way intersection which was completed as part of the Cross Alameda Trail Project to better accommodate pedestrians and bikes between the separated two-way



bicycle lanes and the sidewalk on the south side of Atlantic Avenue west of Wilma Chan Way with the walking and biking paths through the Jean Sweeney Open Space Park on the west side of Wilma Chan Way.

- **Background No Project Conditions:** Represents Existing Conditions plus traffic generated by proposed or approved but not completed major developments and transportation network changes in the Project vicinity, which consist of the following:
 - 200 Wind River Way (120,000 square feet of research and development)
 - 1501 Buena Vista Avenue (10 townhomes)
 - 2015 Grand Street (90 townhomes plus five accessory dwelling units). This development project would also include the completion of Clement Avenue through the site (between Grand and Hibbard Streets).

Figure 5 shows the traffic volumes and the intersection configurations at the study intersections under this scenario.

- **Background Plus Project Conditions (Non-Summer):** Represents Background No Project Conditions plus traffic generated by the Project during the non-summer months, as shown in **Figure 6**.
- **Background Plus Project Conditions (Summer):** Represents Background No Project Conditions plus traffic generated by the Project during the summer months, as shown in **Figure 7**.

Based on the traffic volumes and the intersection configurations and signal timings under each scenario, Fehr & Peers calculated the vehicle delay and associated LOS at the study intersections using the *Highway Capacity Manual* 6th Edition methodologies as incorporated in the Synchro 12 software. Under all evaluated scenarios, the study intersections, including the Project Driveway on Atlantic Avenue, would operate at LOS D or better during both the AM and PM peak hours, as summarized in **Table 3. Attachment C** provides detailed LOS calculation sheets.



Table 3: Intersection Level of Service Summary

Intersection	Traffic Control	Peak Hour	Existing Conditions		Background No Project Conditions		Background Plus Project Conditions (Non-Summer)		Background Plus Project Conditions (Summer)	
			Delay (sec) ¹	LOS	Delay (sec) ¹	LOS	Delay (sec) ¹	LOS	Delay (sec) ¹	LOS
1. Atlantic Avenue/ Wilma Chan Way	Signal	AM	35	C	38	D	38	D	43	D
		PM	34	C	37	D	37	D	38	D
2. Atlantic Avenue/ Bartlett Drive	Side-Street Stop	AM	<1 (10)	B	<1 (11)	B	<1 (11)	B	<1 (12)	B
		PM	<1 (11)	B	1 (12)	B	<1 (12)	B	<1 (12)	B
3. Atlantic Avenue/ Challenger Drive	Signal	AM	27	C	28	C	28	C	30	C
		PM	30	C	34	C	34	C	34	C
4. Atlantic Avenue/ Project Driveway ²	Side-Street Stop	AM	-	-	-	-	<1 (11)	B	4 (16)	C
		PM	-	-	-	-	<1 (11)	B	2 (12)	B

Notes:

1. Average intersection delay and LOS are calculated using the HCM 6th edition. Average intersection delay is presented in seconds for all intersections. The worst approach delay is presented in parentheses for side street stop-controlled intersections.
2. Intersection does not exist under Existing or Background No Project Conditions.

Source: Fehr & Peers, 2025.

5. Site Access and Circulation Analysis

An evaluation of access and circulation for all travel modes based on the site plan dated February 14, 2025, and provided in **Figure 1** is summarized below.

Automobile Access and Circulation

Automobile access would be provided via one main driveway on the south side of Atlantic Avenue, offset about 60 feet east of an existing driveway for the Marina Village Research Park, which is on the north side of Atlantic Avenue. The Project driveway would be 20 feet wide and provide direct access to a 72-space surface parking lot. The driveway would accommodate all turns into and out of the Project. A second driveway on the east side of the parking lot would connect the proposed parking lot and the existing parking lot for the College of Alameda Science Annex.

The driveway on Atlantic Avenue would provide a clear line-of-sight between a motorist 10 feet back from the sidewalk exiting the driveway and pedestrians on the sidewalk 10 feet away on



either side. Additionally, according to the Caltrans *Highway Design Manual*, the stopping sight distance for Atlantic Avenue (with a 25-mph posted speed limit) is 150 feet. The Project Driveway meets this sight distance for both motor vehicles and bicycles in both directions of Atlantic Avenue.

The Project driveway on Atlantic Avenue would connect to two two-way drive aisles generally parallel to Atlantic Avenue, which would accommodate 72 parking spaces generally along both sides of the two drive aisles. All parking spaces would be perpendicular to the 24-foot-wide two-way drive aisles, which would meet the dimensional requirement in the *City of Alameda Municipal Code* (Section 30-7.8), such that passenger vehicles would be able to maneuver into and out of all parking spaces.

Currently, Atlantic Avenue provides a painted median (two double yellow lines) east of the Marina Village Research Park driveway. To better accommodate left-turns from westbound Atlantic Avenue into the Project site, consider implementing the following (shown in **Figure 8**):

Recommendation 1: Stripe a 100-foot westbound left-turn lane with a 60-foot taper along Atlantic Avenue at the Project driveway.

The Project driveway would also provide access to an approximately 100-foot passenger loading area on the west side of the parking lot and adjacent to the Project entry plaza. Thus, passengers can be dropped off or picked up without crossing any vehicles.

Recommendation 2: Along the west side of the parking lot, Install R25(C) (CA) "Passenger Loading Only" signs and paint the curb white to discourage parking.

Automobile Parking

The Project parking lot would provide 72 parking spaces, consisting of four ADA accessible spaces and 68 non-accessible spaces. The Project would also provide three electric vehicle charging parking spaces including one ADA accessible space. Automobile parking requirements and the estimated parking demand for the Project are discussed below.

Automobile Parking Requirements

The *City of Alameda Municipal Code* (Section 30-7.3) requires off-street automobile parking, as summarized in **Table 4**. The City has no minimum parking requirement and has a maximum parking requirement of three spaces per 1,000 square feet of floor area for commercial recreation land uses. The Project is approximately 33,700 square feet, considering the building floor area,



enclosed outdoor area, and pools. This square footage corresponds to a maximum of 101 spaces per *Code*. The Project would provide 72 parking spaces, which is below the maximum and therefore meets *Code* requirements.

Table 4: Automobile Parking Requirements

Land Use	Size (SF) ¹	Required Off-Street Parking Supply		Parking Supply	Within Range?
		Minimum	Maximum ²		
Commercial Recreation	33,700	0	101	72	Yes

Notes:

1. SF = Square Feet
2. Per [City of Alameda Municipal Code 30-7.3](#) – Off-Street Vehicle Parking Regulations, Table A: Allowable Maximum Off-Street Parking Requirements, Commercial Recreation: up to three spaces are allowed per 1,000 SF.

Fehr & Peers, 2025.

The *Code* (Section 30-7.8) also requires that no more than 50% of parking spaces be compact (7.5 feet by 15 feet) and at least 50% of spaces be regular (8.5 feet by 18 feet). The 68 non-accessible spaces in the surface lot would be 8.5 feet by 16 feet. Although the parking space widths would meet the minimum width dimension for regular spaces, the parking space lengths would not meet the minimum length dimensions.

Recommendation 3: Review the final site plan to ensure at least 50% of all parking spaces provided are “regular” spaces (8.5 feet by 18 feet) per *Code* requirements.

Plug-in Electric Vehicle (EV) Charging Infrastructure

The *City of Alameda Municipal Code* (Section 30-7.5) requires that the Project provide EV-ready spaces with a mix of Level 1 and Level 2 charging capacities. For commercial recreation uses, the *Code* requires a minimum of 10% of parking spaces to be equipped with an installed EV Charging Station, corresponding to seven EV spaces required for the 72 spaces for the Project. As summarized in **Table 5**, the Project would provide 3 EV spaces, which would not meet *Code* requirements.

Recommendation 4: Review the final site plan to ensure that at least 10% of all parking spaces are equipped with an installed EV charging Station per *Code* requirements.



Table 5: Electric Vehicle Charging and Accessible Parking Requirements

Parking Type	Size	Required	Provided	Meets Code Requirements?
EV Charging Requirements				
EV Spaces	72 parking spaces (provided by Project)	7 spaces ¹	3 spaces	No
ADA-Accessible Parking Spaces				
Passenger Vehicle Accessible	101 parking spaces (City Code maximum)	5 spaces ²	4 spaces	No
Van Accessible		1 space ³	1 space	Yes

Notes:

1. Per *City of Alameda Municipal Code* Section 30-7.5 – Off-Street Electric Vehicle (EV) Charging Requirements, Nonresidential (including commercial recreation), 10% of spaces shall be equipped with an Electric Vehicle Charging Station.
2. Per *City of Alameda Municipal Code* Section 30-7.3 – Off-Street Parking for Persons with Disabilities, accessible parking should be provided in accordance with California Building Code (CBC) requirements and be calculated based on the maximum number of parking spaces set forth for vehicles (101 for the Project). Per *California Building Code* (CBC) Section 11b-208.2, five total accessible parking spaces should be provided for between 101 to 150 total vehicular parking spaces.
3. Per CBC Section 1109A.8.6, one in every eight accessible spaces, but not less than one, shall be van accessible.

Fehr & Peers, 2025.

ADA Accessible Parking

The *City of Alameda Municipal Code* (Section 30-7.4) requires that Projects adhere to the *California Building Code* (Sections CBC 11B-208.2 and 1109.8.6) accessible parking requirements based on the maximum parking requirements (as calculated per Section 30-7.3). As shown in Table 4, the maximum parking for the Project site would be 101 spaces, compared to the 72 spaces provided by the Project. As summarized in **Table 5**, a parking lot with between 101 and 150 spaces requires at least five ADA accessible parking spaces. In addition, at least one of every eight accessible spaces (but not less than one) must be van accessible, which corresponds to one van accessible space required for the Project. The Project would provide four total accessible spaces, with 2 van accessible spaces, which would not meet the ADA accessible parking requirements.¹

Recommendation 5: Review the final site plan to ensure that the Project meets the minimum ADA accessible parking requirements.

¹ Although the Project would not meet the ADA accessible parking requirement for the maximum parking allowed at the Project, the 4 ADA accessible parking spaces would exceed the 3 spaces required for a 72-space parking lot.



Estimated Parking Demand – Typical Operations

The Project parking demand is estimated based on the anticipated programming at the site and using the same transportation characteristics and similar assumptions used to estimate the trip generation discussed earlier in this memorandum.

Figure 9 shows the parking demand by time of day on a typical weekday during non-summer months. Most weekday activities are expected from 2:00 PM to 6:00 PM. The 72-space parking lot would generally accommodate the estimated demand through most of the day, except between 2:30 and 3:30 PM, when the estimated parking demand would exceed the parking lot capacity. The parking demand is estimated to peak at around 3:00 PM, when about 83 parking spaces (corresponding to 116% occupancy) would be occupied. Vehicles not able to park at the Project parking lot are expected to use the adjacent College of Alameda Science Annex parking lot, which can be directly accessed through the Project parking lot. It is estimated that up to 11 vehicles may park in the College of Alameda Science Annex parking lot on a typical non-summer weekday.

Figure 9 - Parking Demand by Hour on a Typical Non-Summer Weekday

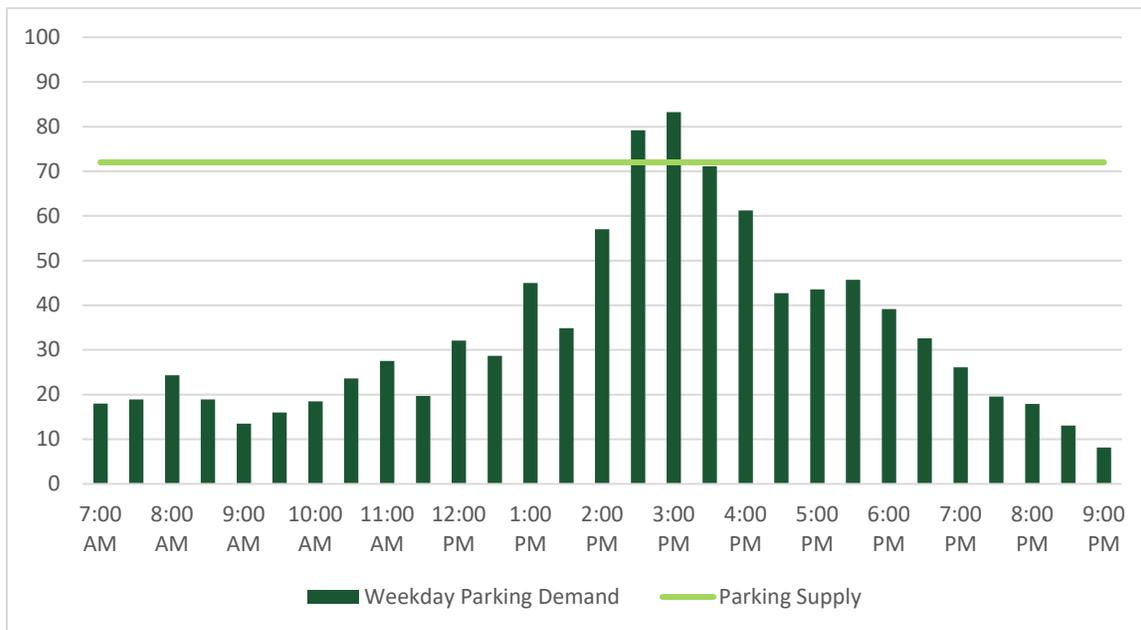


Figure 10 shows the parking demand by time of day on a typical summer weekday. Summer weekdays are expected to have more activities than non-summer weekdays, with most activities expected from 8:00 AM to 7:00 PM. The parking lot would continue to generally accommodate the estimated demand through most of the day. However, the parking demand is expected to exceed the parking lot capacity for several hours at various times of the day on a typical summer



weekday. The summer weekday parking demand is estimated to peak at around 1:00 PM, when about 90 parking spaces (corresponding to about 125% occupancy) would be occupied. It is estimated that up to 18 vehicles that cannot park in the Project parking lot on a typical summer weekday may park in the College of Alameda Science Annex parking lot.

Figure 10 - Parking Demand by Hour on a Typical Summer Weekday

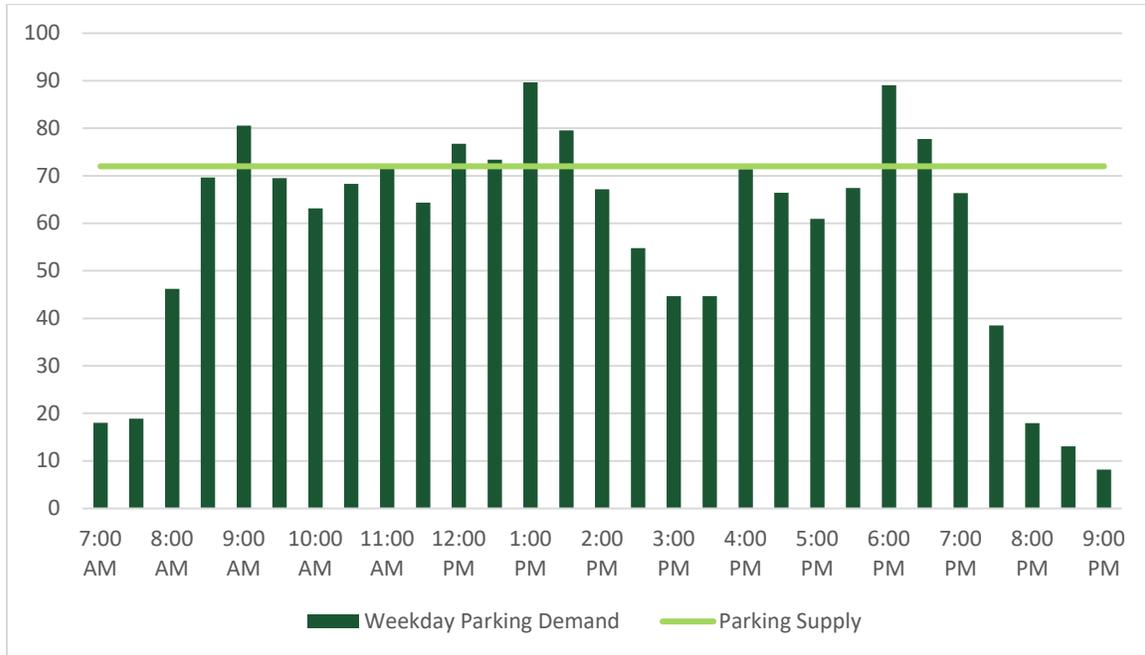
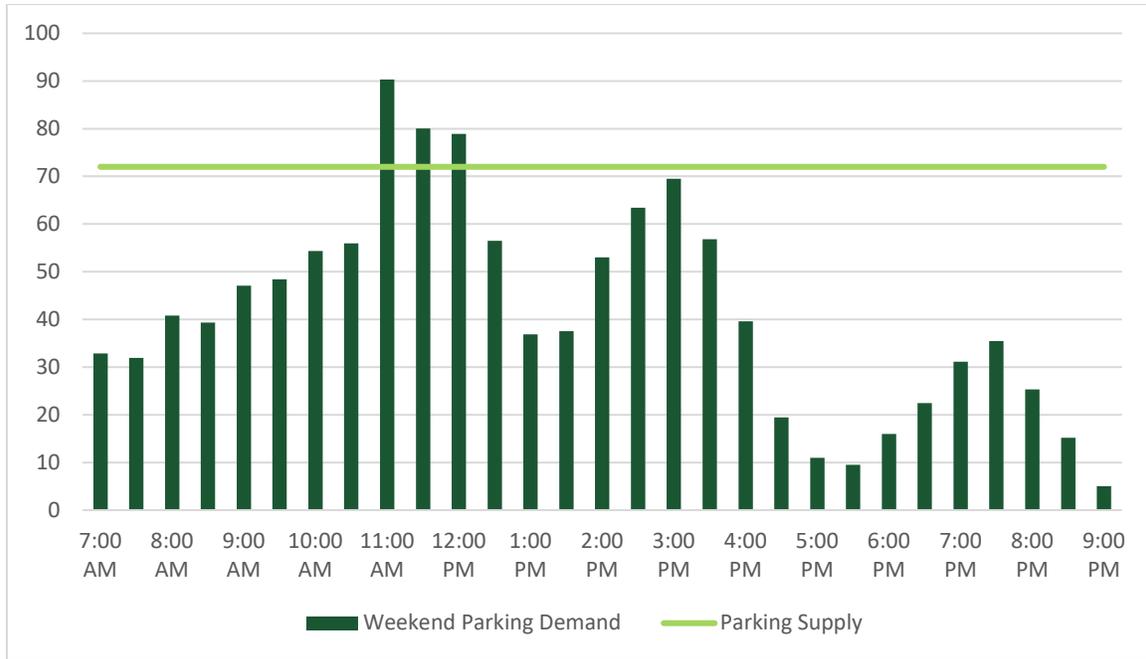


Figure 11 shows the parking demand by time of day on a typical weekend, assuming no special events. Weekends, regardless of season, are generally expected to have more activities than non-summer weekdays but less than summer weekdays. Most weekend activities are expected from 8:00 AM to 4:00 PM. Similar to weekdays, the parking lot would continue to generally accommodate the estimated parking demand through most of the weekend day. However, the parking demand is expected to exceed the parking lot capacity between 11:00 AM and 1:00 PM. Parking demand is estimated to peak at around 11:00 AM, when about 90 parking spaces (corresponding to 125% occupancy) would be occupied. It is estimated that up to 18 vehicles that cannot park in the Project parking lot on a typical weekend may park in the College of Alameda Science Annex parking lot.



Figure 11 - Parking Demand by Hour on a Typical Weekend



Estimated Parking Demand – Special Events

The Project anticipates a variety of special events that would occur infrequently and mostly on weekends. It is expected that no regular activities would be programmed when these large events, such as swim meets and water polo tournaments, are scheduled. The largest events would occur a few times a year and would have up to 800 attendees who would mostly arrive and leave throughout the day. Although the Project can accommodate up to 500 spectators, it does not anticipate exceeding 150 visitors at once for most events.

The parking demand for special events is estimated using the same assumptions as the trip generation presented earlier in this memorandum (100% driving mode share and two attendees per vehicle). The proposed 72 parking spaces would accommodate approximately 150 visitors at once, which is the typical maximum expected. For events that anticipate exceeding 150 visitors at once, including the Project capacity of 500 spectators, the Project would use the adjacent College of Alameda Science Annex parking lot.

Recommendation 6: Monitor parking demand at the Project site and consider one or more of the following if parking demand exceeds capacity during regular operations and/or special events:



- Encourage visitors and staff to use non-automobile modes to travel to and from the site through communicating information about transportation options, such as including information on transportation options on the Project website, in regular communications, on promotional material for special events, and postings at the main entrance.
- Encourage site staff to park in the College of Alameda Science Annex parking lot or other lots during peak demand times
- Limit most parking spaces to 2-hours to ensure availability for visitors
- Ensure that the College of Alameda Science Annex parking lot and/or other parking lots in the Project vicinity can accommodate the Project parking demand overflow

Bicycle Access and Bicycle Parking

Bicycle Facilities

The following bicycle facilities are currently provided in the Project vicinity:

- Bike lanes in both directions on Atlantic Avenue between Wilma Chan Way and Sherman Street
- Bike lanes in both directions on Challenger Drive between Atlantic Avenue and Marina Village Parkway
- Bike path directly south of the Project through the Jean Sweeney Open Space Park between the Atlantic Avenue/Wilma Chan Way intersection and the Atlantic Avenue/Sherman Street intersection (part of the Cross Alameda Trail, which is an approximately 4-mile low-stress bicycling and walking corridor that will extend between east and west sides of the Alameda island at buildout).
- Shared-use path on the east side of Wilma Chan Way extending between Atlantic Avenue in the south and Mariner Square Drive in the north and connecting to the Posey Tube path.

The Bikeway Vision network in *City of Alameda Active Transportation Plan* (December 2022) includes the following in the Project vicinity:

- Convert the existing bike lanes on Atlantic Avenue to buffered bike lanes.
- Convert the existing bike lanes on Challenger Drive to separated bike lanes.



- Complete north-south shared-use paths through the Jean Sweeney Open Space Park connecting the Cross Alameda Trail to nearby streets including Challenger Drive to the east of the Project site and to Eighth Street just south of the Project site.

The Project does not propose any modifications to the existing or proposed bicycle facilities. Considering the Project location on Atlantic Avenue and that Atlantic Avenue does not provide on-street parking, it is possible that the bike lanes may be used for passenger loading.

Recommendation 7: Install R26(S) (CA) “No Stopping Anytime” signs and paint red curb on both sides of Atlantic Avenue along Project frontage to prohibit vehicles from using the existing Class II bicycle facilities for pickups and drop-offs.

Bicycle Parking Requirements

The *City of Alameda Municipal Code (Section 30-7.6)* requires development projects to provide long- and short-term on-site bicycle parking, as summarized in **Table 6**. Long-term bicycle parking includes lockers or secured enclosures, and short-term bicycle parking includes bicycle racks.

Table 6: Bicycle Parking Requirements

Land Use	Size	Long-Term Bicycle Parking Spaces per SF	Short-Term Bicycle Parking Spaces per Unit
Commercial Recreation	33,700 SF	1 per 10,000 SF ²	1 per 2,000 SF ²
Minimum Required Bicycle Parking		3	17
Proposed Parking Spaces		2	100
<i>Minimum Requirement Met?</i>		<i>No</i>	<i>Yes</i>

Notes:

1. SF = Square Foot
2. Per *City of Alameda Municipal Code* Section 30-7.6 – Off-Street Bicycle Parking Requirements, Table B, one long-term bicycle parking space is required per 10,000 of floor area and one short-term bicycle parking space is required per 2,000 square feet of floor area for commercial recreation uses.

Fehr & Peers, 2025.

The Project would provide 100 short-term spaces and two long-term spaces, with adequate space to accommodate parking for 10 additional bikes for a total of 12 long-term bicycle parking spaces. The bicycle parking would be in the main plaza east of the Project parking lot and can be accessed from both Atlantic Avenue in the north and the Cross Alameda Trail in the south.

The *Code* requires one long-term bicycle parking space per 10,000 square feet of floor area and one short-term space per 2,000 square feet of floor area. This corresponds to three long-term and



17 short-term spaces required for the Project's 33,700 square feet of total floor area. The Project would meet *Code* requirements for short-term parking and would not meet *Code* requirements for long-term parking.

Recommendation 8: Review the final site plan to ensure that at least three long-term bicycle parking spaces are provided in accordance with *Code* requirements.

Pedestrian Access and Circulation

Pedestrian access to the Project site would be provided via Atlantic Avenue and the Cross Alameda Trail on the south side of the Project. The main entrance to the Project would be served by an entry plaza which would connect to sidewalks along Atlantic Avenue, the Cross Alameda Trail, and the Project parking lot.

The Project proposes a marked crosswalk across Atlantic Avenue just west of the Project driveway and just east of the Marina Village Research Park driveway which is on the north side of the street. The crosswalk would connect to the entry plaza through a diagonal path. Similar to the Project driveway, the crosswalk would exceed the minimum stopping sight distance for drivers on both directions of Atlantic Avenue.

Per the Federal Highway Administration *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations*, potential safety countermeasures for the mid-block crosswalk were considered. According to Table 1 of the *Guide*, high-visibility crosswalk markings, Rectangular Rapid-Flashing Beacons (RRFBs), and a pedestrian refuge island (i.e., median) are candidate treatments for this location based on the average daily traffic volume (estimated at about 4,600 vehicles per day), roadway speed limit (posted at 25 mph), and lane configuration. To better accommodate pedestrians crossing Atlantic Avenue, consider implementing the following (shown in **Figure 8**):

Recommendation 9: Install the following at the proposed crosswalk across Atlantic Avenue between the Marina Village Research Park and the Project Driveways:

- high-visibility crosswalk markings
- Rectangular Rapid-Flashing Beacons (RRFBs) on both sides of the crosswalk
- A raised center median between the Marina Village Research Park and the Project Driveways



Transit Access

AC Transit is the primary bus service provider in the City of Alameda. Although there are no transit stops adjacent to the Project site, AC Transit operates lines at the following transit stops in the Project vicinity:

- Both directions of Webster Street at Atlantic Avenue (approximately 0.2 miles, walking distance, west of the Project site):
 - Line 20: 30-minute headways on weekdays and weekends.
 - Line 51A: 15-minute headways on weekdays and weekends.
 - Line 96: 30-minute headways on weekdays and weekends.
 - Line 851: 60-minute headways every day from approximately 12:00 AM to 5:00 AM.
 - Line O: 30-minute headways on weekdays and weekends.
 - Line W: 30-minute headways on weekdays from approximately 4:30 PM to 7:00 PM.
- Atlantic Avenue/Challenger Drive (approximately 0.2 miles, walking distance, east of the Project site):
 - Line 19: 60-minute headways on weekdays and weekends

the Project would not modify access between the Project site and these bus stops.

Emergency Vehicle Access

Emergency vehicles would access the Project site through the same vehicular access points on Atlantic Avenue and use the surface parking lot to access the Project site. The Project would not modify the existing roadway network, and the streets surrounding the Project site would continue to accommodate fire apparatuses. According to the *California Fire Code* (2019), fire apparatus access roads need to be no less than 20-foot-wide and shall always be unobstructed, which the Project meets. The Project parking lot would provide two access points; thus, if one access point is blocked, emergency vehicles can use the other access points to access the site.

The nearest fire station to the project site is Alameda Fire Station No. 2 at 635 Pacific Avenue, about 0.5 miles southwest of the Project. The additional traffic generated by the Project would not affect emergency vehicle response times.

6. Conclusion and Summary of Recommendations

Per site plan review, the Project would have adequate automobile, bicycle, pedestrian, and transit access and circulation. The following recommendations would improve access and circulation for the Project and ensure compliance with City of Alameda *Code*:



Recommendation 1: Stripe a 100-foot westbound left-turn lane with a 60-foot taper along Atlantic Avenue at the Project driveway.

Recommendation 2: Along the west side of the parking lot, Install R25(C) (CA) "Passenger Loading Only" signs and paint the curb white to discourage parking.

Recommendation 3: Review the final site plan to ensure at least 50% of all parking spaces provided are "regular" spaces (8.5 feet by 18 feet) per *Code* requirements.

Recommendation 4: Review the final site plan to ensure that at least 10% of all parking spaces are equipped with an installed EV charging Station per *Code* requirements.

Recommendation 5: Review the final site plan to ensure that the Project meets the minimum ADA accessible parking requirements.

Recommendation 6: Monitor parking demand at the Project site and consider one or more of the following if parking demand exceeds capacity during regular operations and/or special events:

- Encourage visitors and staff to use non-automobile modes to travel to and from the site through communicating information about transportation options, such as including information on transportation options on the Project website, in regular communications, on promotional material for special events, and postings at the main entrance.
- Encourage site staff to park in the College of Alameda Science Annex parking lot or other lots during peak demand times
- Limit most parking spaces to 2-hours to ensure availability for visitors
- Ensure that the College of Alameda Science Annex parking lot and/or other parking lots in the Project vicinity can accommodate the Project parking demand overflow

Recommendation 7: Install R26(S) (CA) "No Stopping Anytime" signs and paint red curb on both sides of Atlantic Avenue along Project frontage to prohibit vehicles from using the existing Class II bicycle facilities for pickups and drop-offs.

Recommendation 8: Review the final site plan to ensure that at least three long-term bicycle parking spaces are provided in accordance with *Code* requirements.



Recommendation 9: Install the following at the proposed crosswalk across Atlantic Avenue between the Marina Village Research Park and the Project Driveways:

- high-visibility crosswalk markings
- Rectangular Rapid-Flashing Beacons (RRFBs) on both sides of the crosswalk
- A raised center median between the Marina Village Research Park and the Project Driveways

Please contact Sam Tabibnia (stabibnia@fehrrandpeers.com or 510-835-1943) for questions or comments.

Attachments:

Figure 1 – Site Plan

Figure 2 – Project Trip Distribution and Assignment (Non-Summer)

Figure 3 – Project Trip Distribution and Assignment (Summer)

Figure 4 – Existing Conditions Peak Hour Intersection Volumes, Lane Configurations and Traffic Controls

Figure 5 – Background No Project Conditions Peak Hour Intersection Volumes, Lane Configurations and Traffic Controls

Figure 6 – Background Plus Project Conditions (Non-Summer) Peak Hour Intersection Volumes, Lane Configurations and Traffic Controls

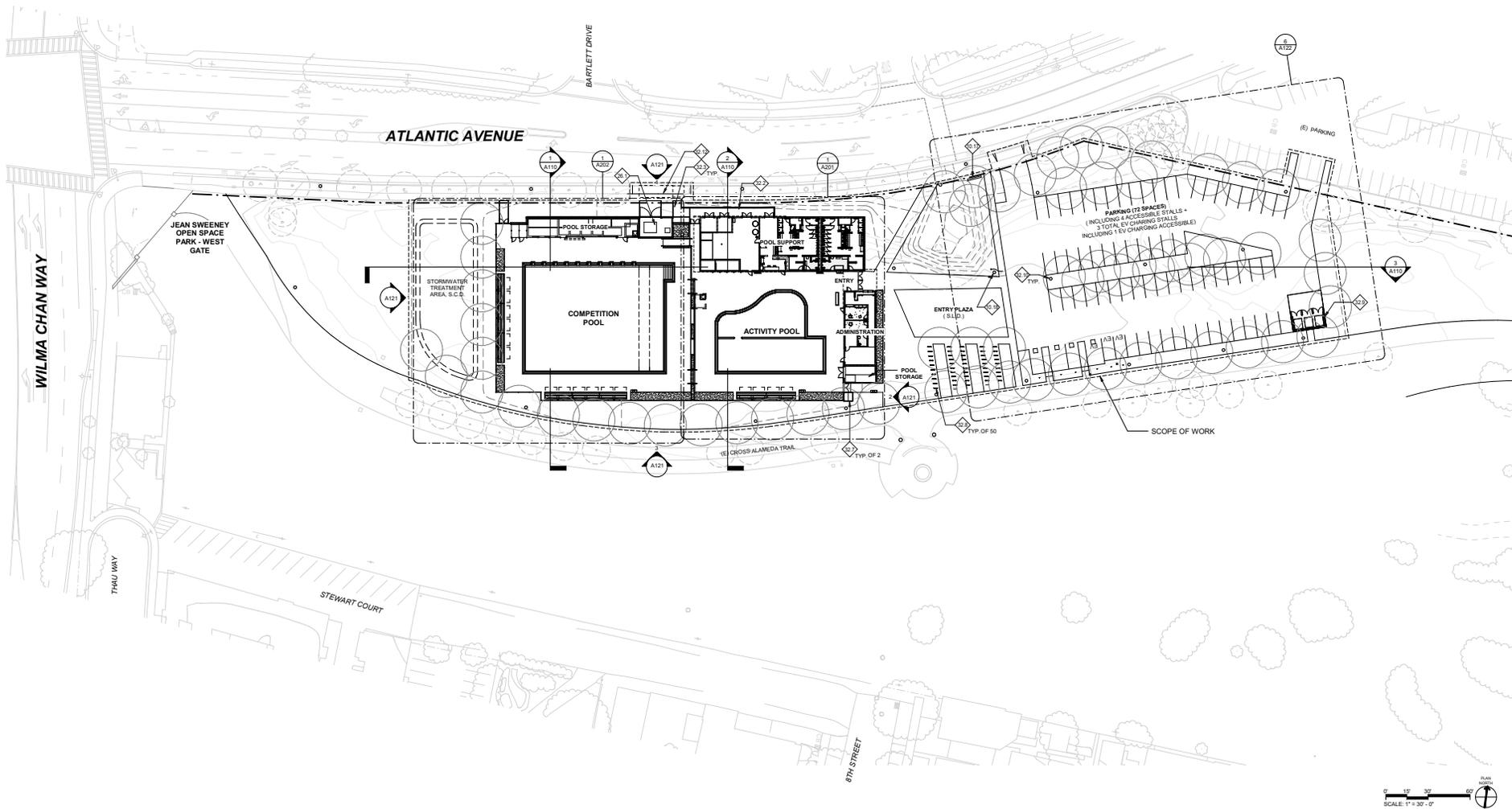
Figure 7 – Background Plus Project Conditions (Summer) Peak Hour Intersection Volumes, Lane Configurations and Traffic Controls

Figure 8 – Atlantic Avenue Conceptual Improvements

Attachment A – Planned Aquatic Center Programming

Attachment B – Intersection Volume Counts

Attachment C – LOS Calculation Sheets

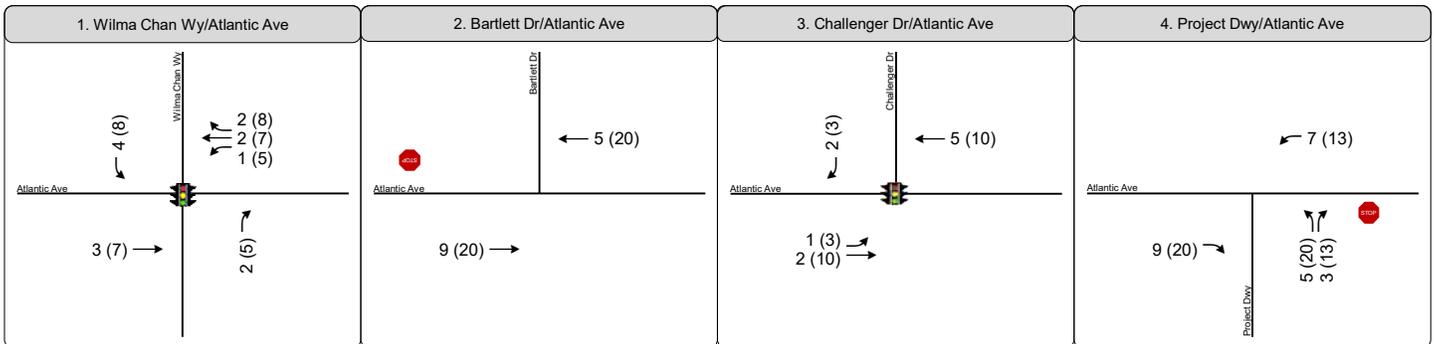


Site Plan Source: ELS Architecture + Urban Design, Feb. 14, 2025

Figure 1

Site Plan



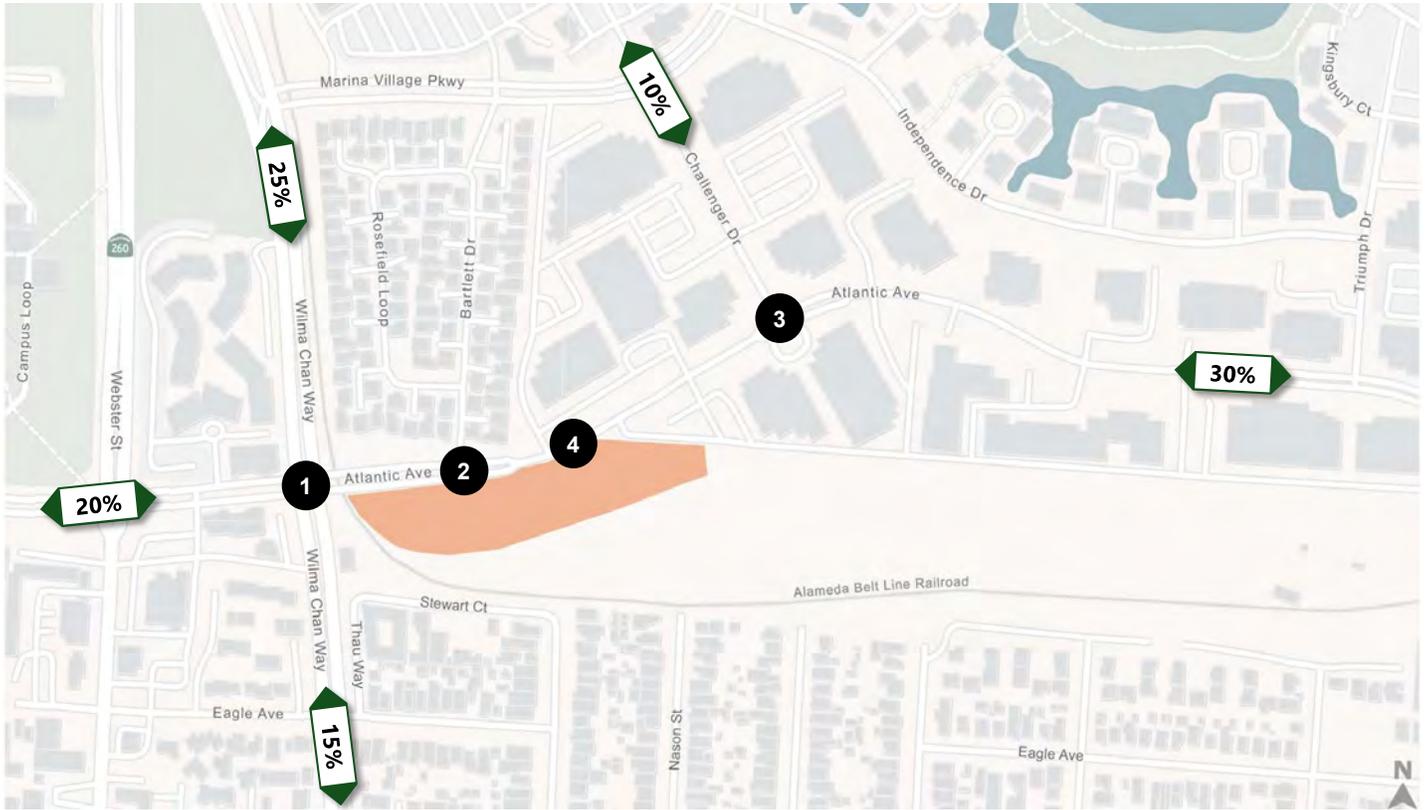


LEGEND

- Study Intersection
- AM (PM) Peak Hour Traffic Volume
- Project Trip Distribution
- Stop Sign
- Traffic Signal
- Project Site

Figure 2
Project Trip Distribution and Assignment (Non-Summer)





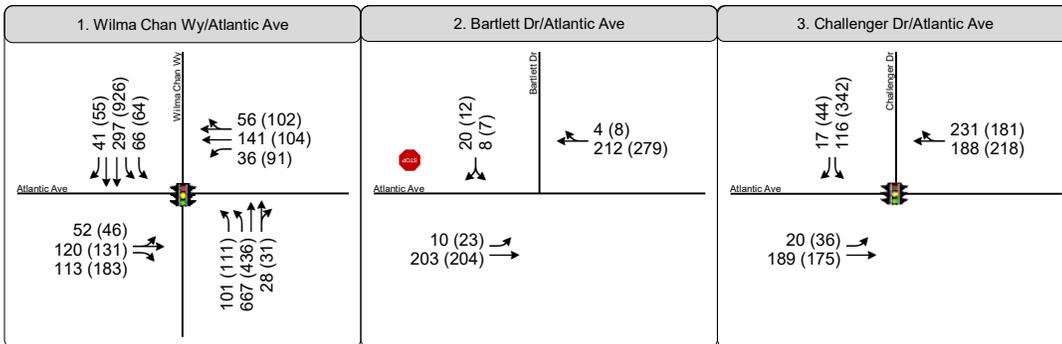
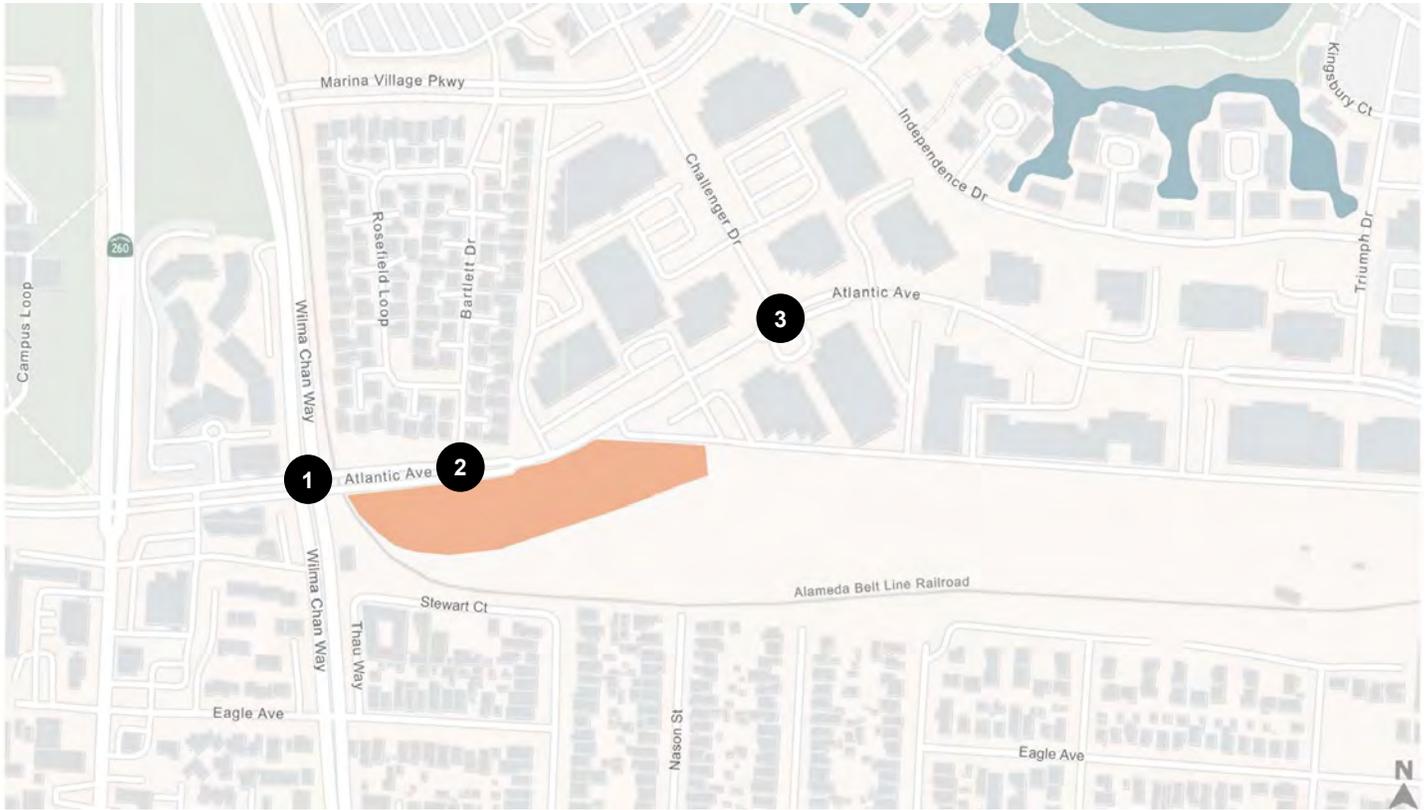
1. Wilma Chan Wy/Atlantic Ave	2. Bartlett Dr/Atlantic Ave	3. Challenger Dr/Atlantic Ave	4. Project Dwy/Atlantic Ave
<p>Diagram of intersection 1: Wilma Chan Wy (vertical) and Atlantic Ave (horizontal). Traffic signal is shown. Volumes: 56 (15) northbound, 40 (22) southbound, 32 (18) eastbound, 24 (13) westbound, 45 (12) eastbound, 34 (9) southbound.</p>	<p>Diagram of intersection 2: Bartlett Dr (vertical) and Atlantic Ave (horizontal). Stop sign on Bartlett Dr. Volume: 96 (53) westbound, 135 (36) eastbound.</p>	<p>Diagram of intersection 3: Challenger Dr (vertical) and Atlantic Ave (horizontal). Traffic signal is shown. Volumes: 23 (6) northbound, 68 (18) westbound, 16 (9) southbound, 46 (26) eastbound.</p>	<p>Diagram of intersection 4: Project Dwy (vertical) and Atlantic Ave (horizontal). Stop sign on Project Dwy. Volumes: 91 (24) westbound, 135 (36) eastbound, 96 (53) northbound, 62 (35) southbound.</p>

LEGEND

- Study Intersection
- AM (PM) Peak Hour Traffic Volume
- Project Trip Distribution
- Stop Sign
- Traffic Signal
- Project Site

Figure 3
Project Trip Distribution and Assignment (Summer)



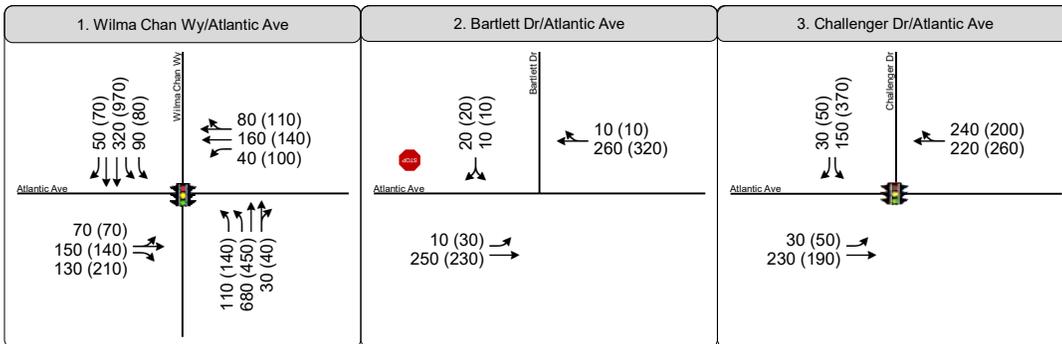
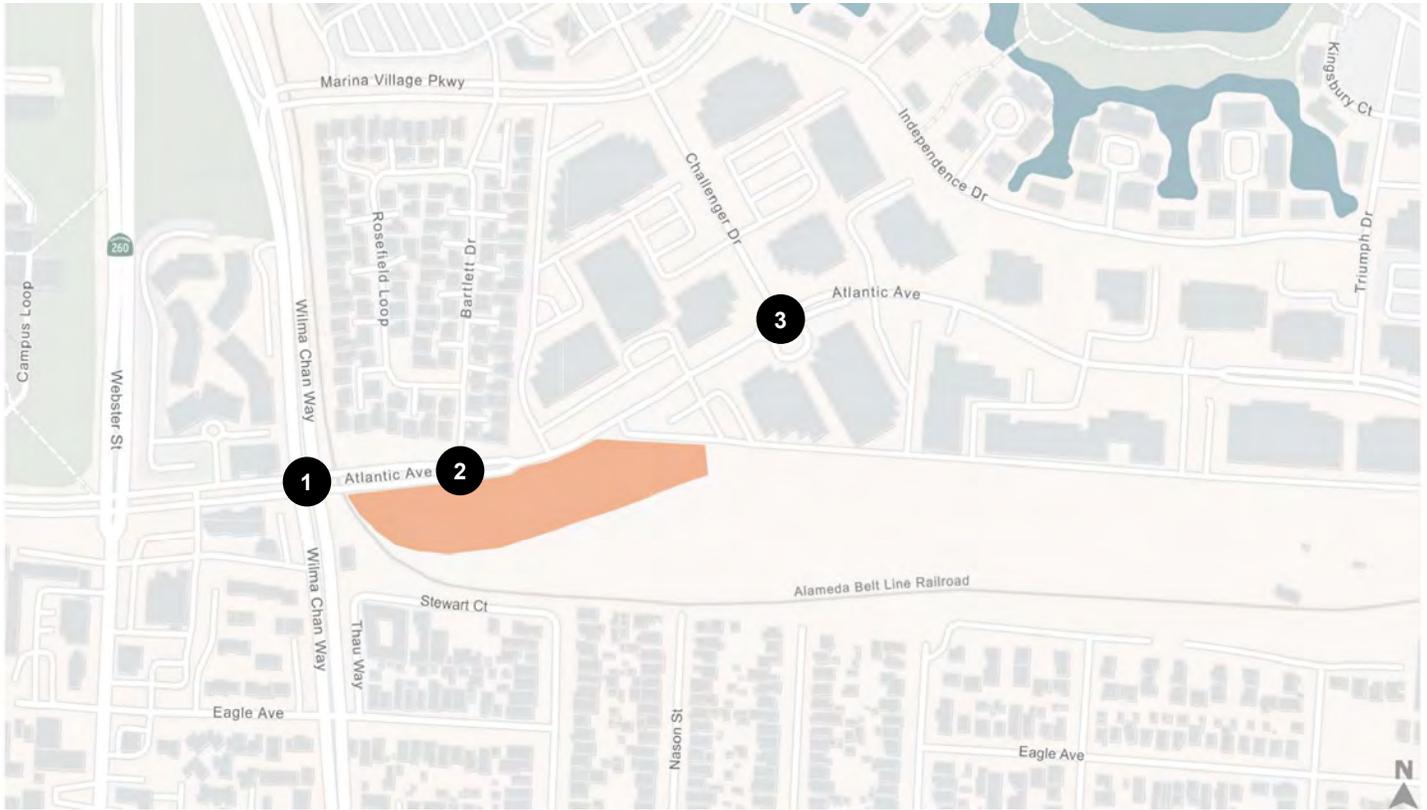


LEGEND

- Study Intersection
- AM (PM) Peak Hour Traffic Volume
- Lane Configuration
- Stop Sign
- Traffic Signal
- Project Site

Figure 4
Existing Conditions Peak Hour Intersection Volumes,
Lane Configurations and Traffic Controls



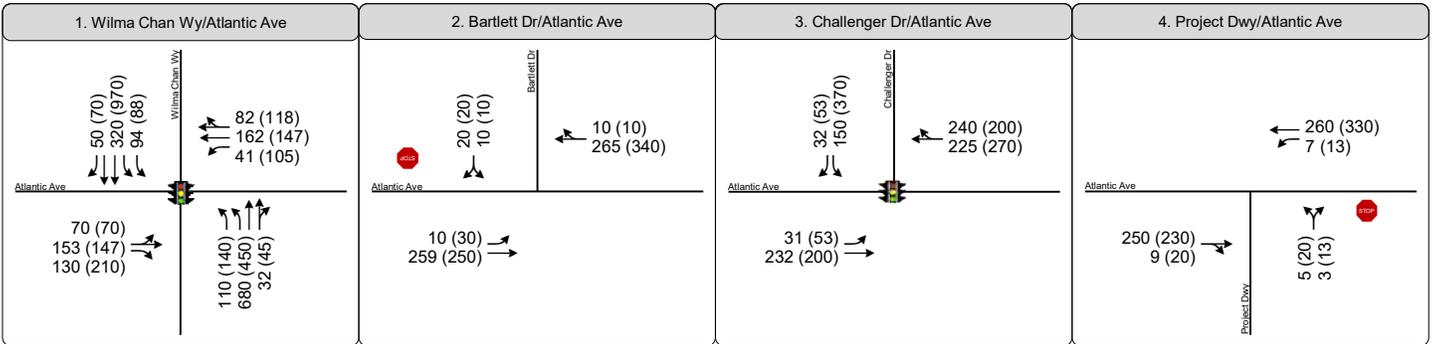
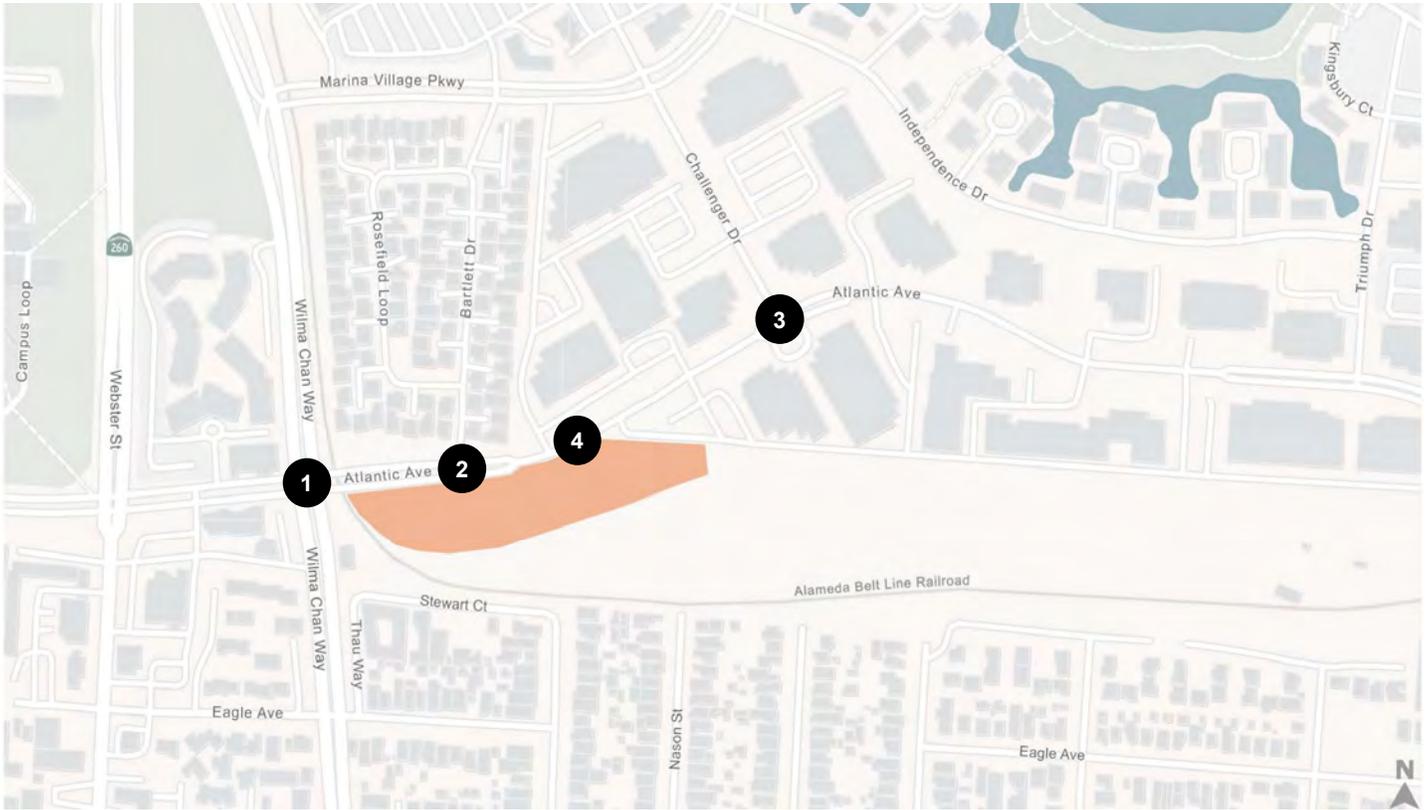


LEGEND

- Study Intersection
- AM (PM) Peak Hour Traffic Volume
- Lane Configuration
- Stop Sign
- Traffic Signal
- Project Site

Figure 5
Background No Project Conditions Peak Hour Intersection Volumes,
Lane Configurations and Traffic Controls



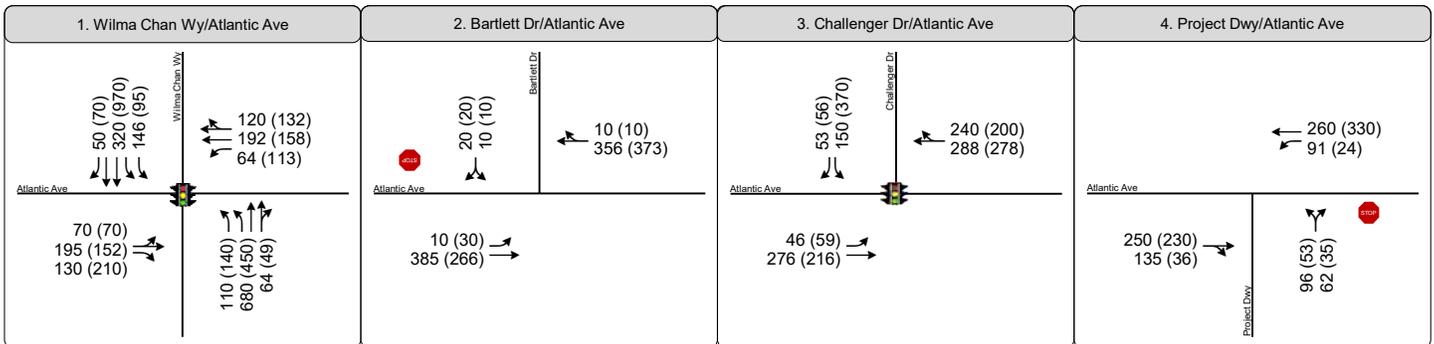
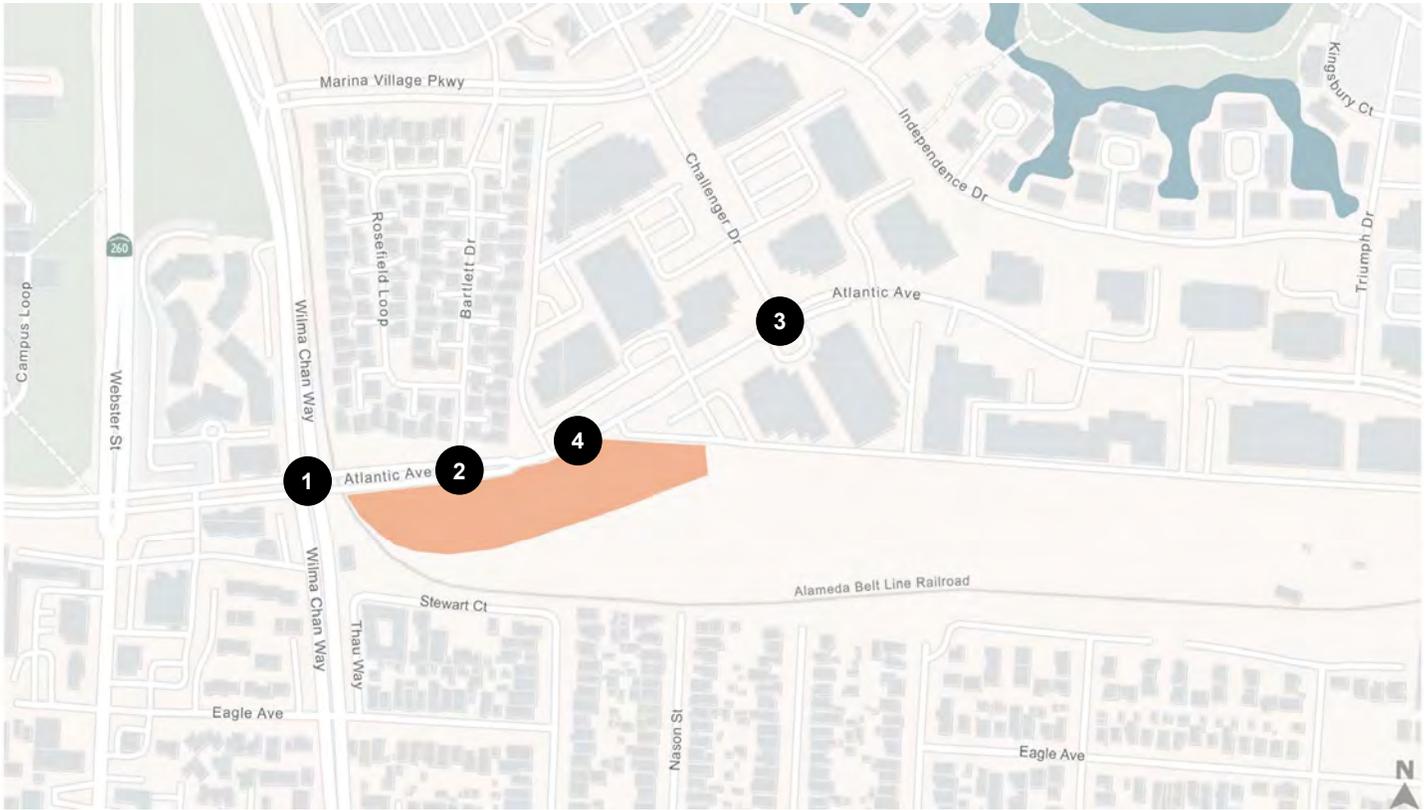


LEGEND

- Study Intersection
- AM (PM) Peak Hour Traffic Volume
- Lane Configuration
- Stop Sign
- Traffic Signal
- Project Site

Figure 6
Background Plus Project Conditions (Non-Summer) Peak Hour Intersection Volumes, Lane Configurations and Traffic Controls



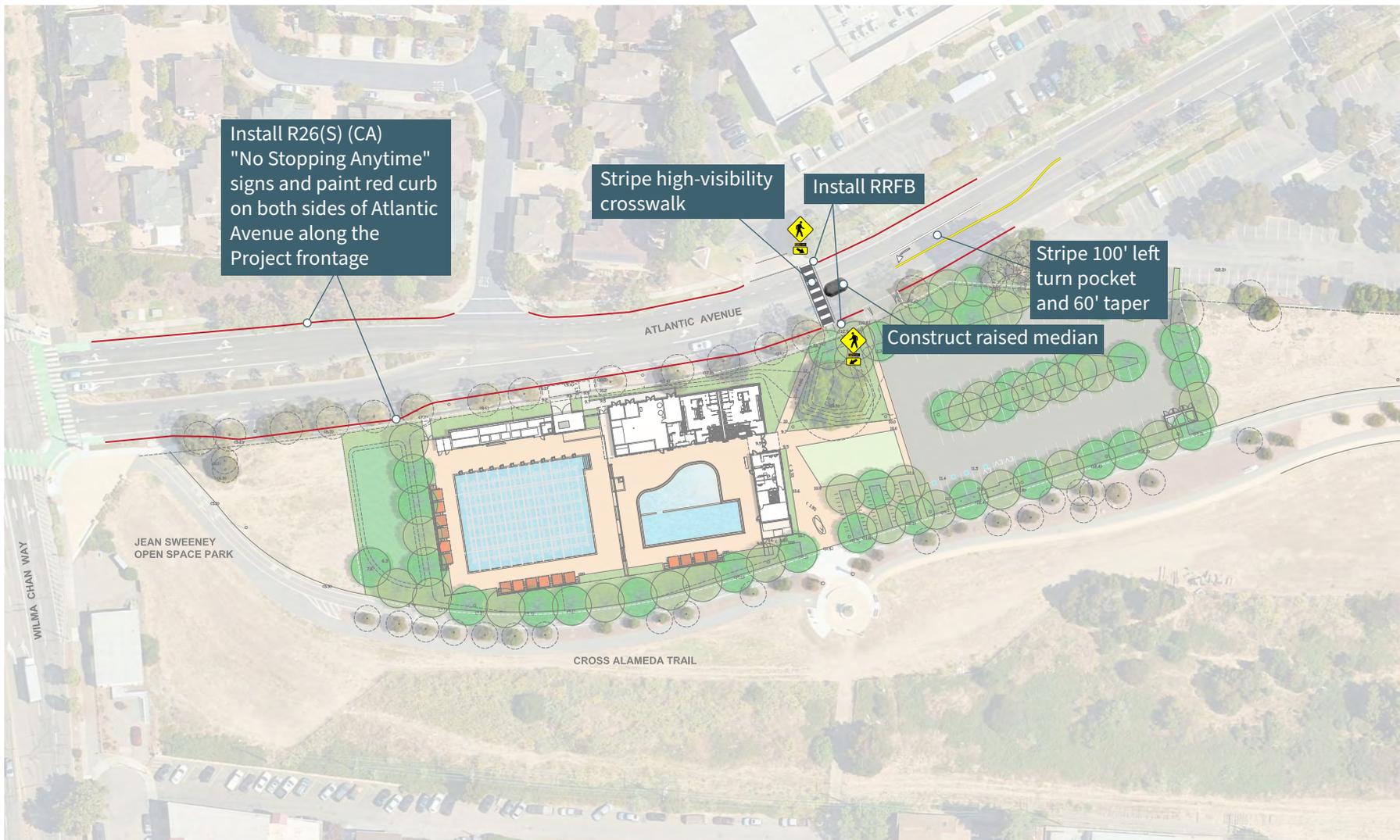


LEGEND

- Study Intersection
- AM (PM) Peak Hour Traffic Volume
- Lane Configuration
- Stop Sign
- Traffic Signal
- Project Site

Figure 7
Background Plus Project Conditions (Summer) Peak Hour Intersection Volumes, Lane Configurations and Traffic Controls





Site Plan Source: ELS Architecture + Urban Design, Feb. 14, 2025



Figure 8

Atlantic Avenue Conceptual Improvements

Attachment A
Planned Aquatic Center Programming



Fall, Winter and Spring-Main

Pool/Room	Activites	Mon-Thur	Avg	Friday	Avg	Saturday	Avg	Sunday	Avg	# Staff	Days of Week	Times of Days
Comp and Training	Lap Swim	9:30am-12pm	30	9:30am-12pm	30	5:30-7am	25	5:30-7am	25	5	Monday-Sunday	M-F 9:30-12pm, Sat & Sun 5:30am-7am
Comp	Masters	5:30am-9:30am	35	5:30am-9:30am	35	7:00-9am	35	7:00-9am	35	5	Monday-Sunday	M-F 5:30am-9:30am, Sat & Sun 7-9am
Comp	Youth Teams	4-9pm	50	4-9pm	50	9am-11am	40	9am-11am	40	5	Monday-Sunday	M-F 4-9pm, Sat & Sun 9am-11am
Comp and Training	Swim lessons- Private	2-4pm	10	2-4pm	10	8am-4pm	20	8am-4pm	20	15	Monday-Sunday	M-F 2-4pm, Sat & Sun 8-4pm
Comp and Training	Swim Lessons- Group	2-4pm	10	2-4pm	10	8am-4pm	75	8am-4pm	75	20	Monday-Sunday	M-F 2-4pm, Sat & Sun 8-4pm
Comp	Youth - Water Polo	4-9pm	40	4-9pm	40	12-6pm	40	12-6pm	40	5	Monday-Sunday	M-F 4-9pm, Sat & Sun 12-6pm
Comp	Adult - Water Polo					11am-12pm	40	11am-12pm	40	5	Monday-Sunday	Sat & Sun 11am - 12pm
Comp	Specialty Users	2-4pm	55	2-4pm	55	6-9pm	40	6-9pm	40	5	Monday-Sunday	M-F 2-4pm, Sat & Sun 6-9pm
Comp	Masters	12-2pm	45	12-2pm	45					5	Monday-Friday	M-F 12-2pm

Fall, Winter and Spring-Camps

Pool/Room	Activites	Mon-Thur	Avg	Friday	Avg	Saturday	Avg	Sunday	Avg	# Staff	Days of Week	Times of Days
Comp, Training	Break Camp-Thanksgiving	9am-4pm	50	9am-4pm	50					10	Monday-Friday	9am-4pm
Comp, Training	Break Camp-Winter Break(DEC-JAN)	9am-4pm	50	9am-4pm	50					10	Monday-Friday	9am-4pm
Comp, Training	Break Camp-Winter Break(DEC-JAN)	9am-4pm	50	9am-4pm	50					10	Monday-Friday	9am-4pm
Comp, Training	Break Camp-Feb break	9am-4pm	50	9am-4pm	50					10	Monday-Friday	9am-4pm
Comp, Training	Break Camp-Spring Break	9am-4pm	50	9am-4pm	50					10	Monday-Friday	9am-4pm

Fall, Winter and Spring - Special Events

Pool/Room	Activites	Mon-Thur	Avg	Friday	Avg	Saturday	Avg	Sunday	Avg	# Staff	Days of Week	Times of Days
Comp, Training	Swim Meets	3-7pm	500	3-7pm	500	9am -7pm	800	9am-7pm	800	10	Monday-Sunday	M-F 3-7pm, Sat & Sun 9am-7am
Comp, Training	Water Polo Meets/Tournaments	12-7pm	200	12-7pm	200	9am-7pm	800	9am-7pm	800	5	Monday-Sunday	M-F 12-7pm, Sat & Sun 9am-7am
Comp, Training	Pumpkin Patch Pool Party					9am-6pm	125	9am-6pm	125	15	Saturday and Sunday	Sat and Sun 9am-6pm
Comp, Training	Turkey Dip - Thanksgiving Day Swim	7am-3pm	75							15	Thursday	7am-3pm
Comp, Training	North Pole Swim					12-3pm	150	12-3pm	150	15	Saturday and Sunday	Sat and Sun 12-3pm
Comp, Training	Snowman Family Pool Party					12-3pm	150	12-3pm	150	15	Saturday and Sunday	Sat and Sun 12-3pm
Comp, Training	Easter Event					9-3pm	150	9-3pm	150	15	Saturday and Sunday	Sat and Sun 9am-3pm
Comp, Training	User events					9-2pm	800			10	Saturday and Sunday	Sat and Sun 9am-2pm

Summer - Main

Pool/Room	Activites	Mon-Thur	Avg	Friday	Avg	Saturday	Avg	Sunday	Avg	# Staff	Days of Week	Times of Days
Comp, Training	Lap Swim	9:30am-12pm	30	9:30am-12pm	30	5:30-7am	25	5:30-7am	25	5	Monday-Sunday	M-F 9:30-12pm, Sat & Sun 5:30am-7am
Comp	Masters	5:30am-9:30am	35	5:30am-9:30am	35	7:00-9am	35	7:00-9am	35	5	Monday-Sunday	M-F 5:30am-9:30am, Sat & Sun 7-9am
Comp	Youth Teams	4-9pm	50	4-9pm	50	9am-11am	40	9am-11am	40	5	Monday-Sunday	M-F 4-9pm, Sat & Sun 9am-11am
Comp, Training	Swim lessons Private	8am-7pm	20			8am-4pm	20	8am-4pm	20	15	Monday-Sunday	M-F 2-4pm, Sat & Sun 8-4pm
Comp, Training	Swim Lessons- Group	8am-7pm	100			8am-4pm	100	8am-4pm	75	20	Monday-Sunday	M-F 2-4pm, Sat & Sun 8-4pm
Comp	Youth - Water Polo	4-9pm	40	4-9pm	40	12-6pm	40	12-6pm	40	5	Monday-Sunday	M-F 4-9pm, Sat & Sun 12-6pm
Comp	Adult - Water Polo					11am-12pm	40	11am-12pm	40	5	Monday-Sunday	Sat & Sun 11am - 12pm
Comp	Specialty Users					6-9pm	40	6-9pm	40	5	Monday-Sunday	M-F 2-4pm, Sat & Sun 6-9pm
Comp	Masters	12-2pm	45	12-2pm	45					5	Monday-Friday	
Comp, Training	Public Swim			1-4pm	125	4-6pm	125	4-6pm	125			F 1-4pm, Sat and sun 4-6pm

Summer -Camps

Pool/Room	Activites	Mon-Thur	Avg	Friday	Avg	Saturday	Avg	Sunday	Avg	# Staff	Days of Week	Times of Days
Comp, Training	Weekly Camps	9am-4pm	100							20	Monday-Thursday	9am-4pm
Comp, Training	Intro To swim	6-7:30pm	45							2	Monday-Thursday	6-7:30pm
Comp, Training	Triathlon Camp	8-9am	30							2	Monday-Thursday	8-9am
Comp, Training	Polo Camp	9am-4pm	45							4	Monday-Thursday	9am-4pm
Comp, Training	Dive Camp	9am-4pm	30							3	Monday-Thursday	9am-4pm
Comp, Training	Aquatic Interns	9am-4pm	50	9am-4pm	50					3	Monday-Friday	9am-4pm

Summer - Special Events

Pool/Room	Activites	Mon-Thur	Avg	Friday	Avg	Saturday	Avg	Sunday	Avg	# Staff	Days of Week	Times of Days
Comp, Training	Swim Meets					9am -7pm	800	9am-7pm	800	10	Saturday-Sunday	, Sat & Sun 9am-7am
Comp, Training	Water Polo Meets/Tournaments					9am-7pm	800	9am-7pm	800	5	Saturday-Sunday	Sat & Sun 9am-7am
Comp, Training	Dive-In Movie					6-10pm	400			20	Saturday	Saturday 6-10pm
Comp, Training	City Swim Meet			4-9	150	9am-6pm	600	9am -2pm	400	20	Friday-Sunday	Friday 4-9pm, Sat 9-6am and Sun 9-2pm
Comp, Training	July 4th Swim	1-6pm	200							20	July 4th	1-6pm

Attachment B
Intersection Volume Counts



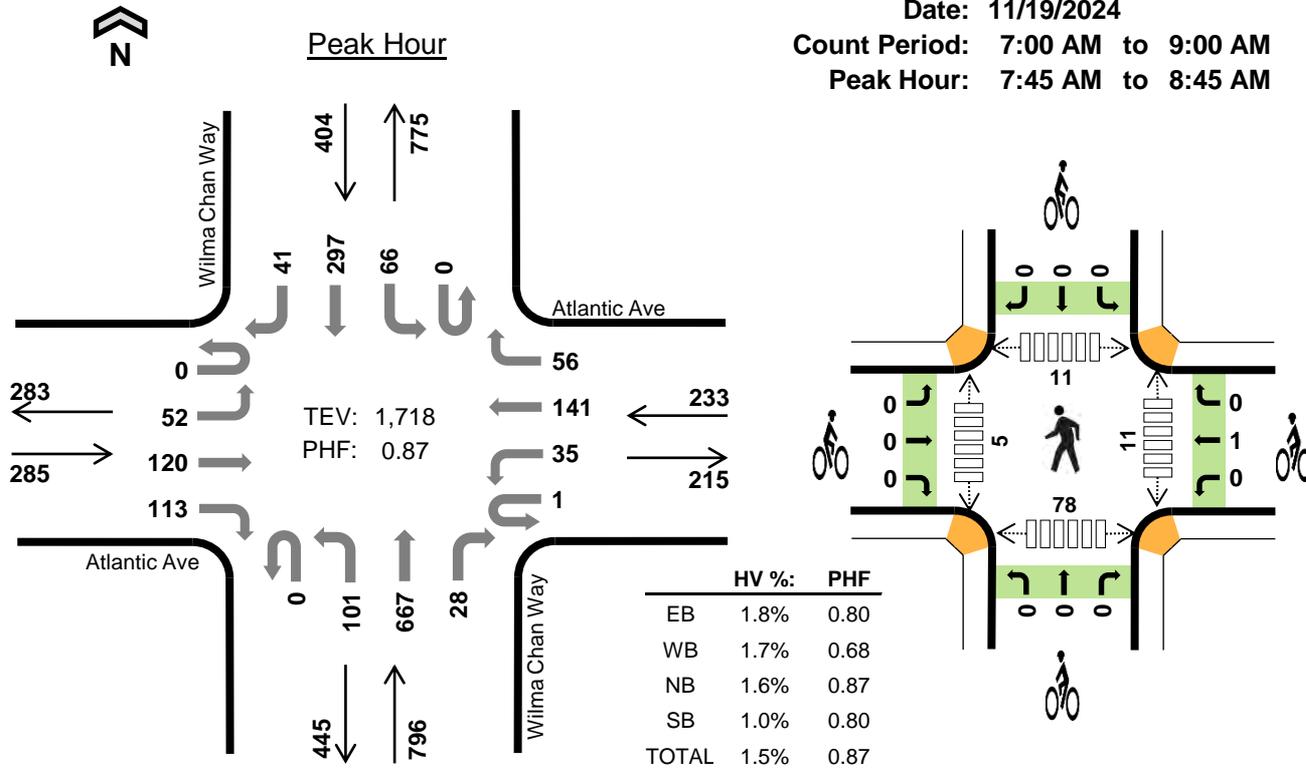
Wilma Chan Way Atlantic Ave



Date: 11/19/2024

Count Period: 7:00 AM to 9:00 AM

Peak Hour: 7:45 AM to 8:45 AM



Two-Hour Count Summaries

Interval Start	Atlantic Ave Eastbound				Atlantic Ave Westbound				Wilma Chan Way Northbound				Wilma Chan Way Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
	7:00 AM	0	8	10	11	0	6	9	15	0	10	108	0	0	5	37			4
7:15 AM	0	7	16	9	0	5	11	7	0	10	137	4	0	7	52	3	268	0	
7:30 AM	0	5	13	9	0	3	14	13	0	12	170	5	0	20	48	7	319	0	
7:45 AM	0	10	20	13	0	6	30	15	0	15	187	7	0	14	60	11	388	1,198	
8:00 AM	0	13	21	33	1	13	54	18	0	33	146	4	0	13	64	10	423	1,398	
8:15 AM	0	13	39	34	0	6	28	16	0	27	191	11	0	20	97	9	491	1,621	
8:30 AM	0	16	40	33	0	10	29	7	0	26	143	6	0	19	76	11	416	1,718	
8:45 AM	0	14	28	22	0	7	10	10	0	8	164	13	0	20	81	8	385	1,715	
Count Total	0	86	187	164	1	56	185	101	0	141	1,246	50	0	118	515	63	2,913	0	
Peak Hour	All	0	52	120	113	1	35	141	56	0	101	667	28	0	66	297	41	1,718	0
	HV	0	1	4	0	1	2	0	1	0	4	9	0	0	0	4	0	26	0
	HV%	-	2%	3%	0%	100%	6%	0%	2%	-	4%	1%	0%	-	0%	1%	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	3	1	2	2	8	0	0	0	0	0	1	2	1	5	9
7:15 AM	3	1	0	4	8	0	0	0	0	0	0	0	3	7	10
7:30 AM	1	3	0	0	4	0	0	0	0	0	2	1	2	8	13
7:45 AM	2	0	4	1	7	0	0	0	0	0	2	3	2	13	20
8:00 AM	1	2	4	1	8	0	1	0	0	1	5	0	2	31	38
8:15 AM	1	1	4	1	7	0	0	0	0	0	2	2	4	22	30
8:30 AM	1	1	1	1	4	0	0	0	0	0	2	0	3	12	17
8:45 AM	2	0	3	2	7	0	0	0	0	0	6	0	2	10	18
Count Total	14	9	18	12	53	0	1	0	0	1	20	8	19	108	155
Peak Hour	5	4	13	4	26	0	1	0	0	1	11	5	11	78	105

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Atlantic Ave				Atlantic Ave				Wilma Chan Way				Wilma Chan Way				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	1	2	0	0	0	1	0	0	0	2	0	0	0	2	0	8	0
7:15 AM	0	0	3	0	0	0	1	0	0	0	0	0	0	0	4	0	8	0
7:30 AM	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	4	0
7:45 AM	0	0	2	0	0	0	0	0	0	2	2	0	0	0	1	0	7	27
8:00 AM	0	1	0	0	1	1	0	0	0	2	2	0	0	0	1	0	8	27
8:15 AM	0	0	1	0	0	0	0	1	0	0	4	0	0	0	1	0	7	26
8:30 AM	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	4	26
8:45 AM	0	0	2	0	0	0	0	0	0	0	3	0	0	0	2	0	7	26
Count Total	0	2	12	0	1	2	5	1	0	4	14	0	0	0	12	0	53	0
Peak Hour	0	1	4	0	1	2	0	1	0	4	9	0	0	0	4	0	26	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Atlantic Ave			Atlantic Ave			Wilma Chan Way			Wilma Chan Way			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Count Total	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Peak Hour	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

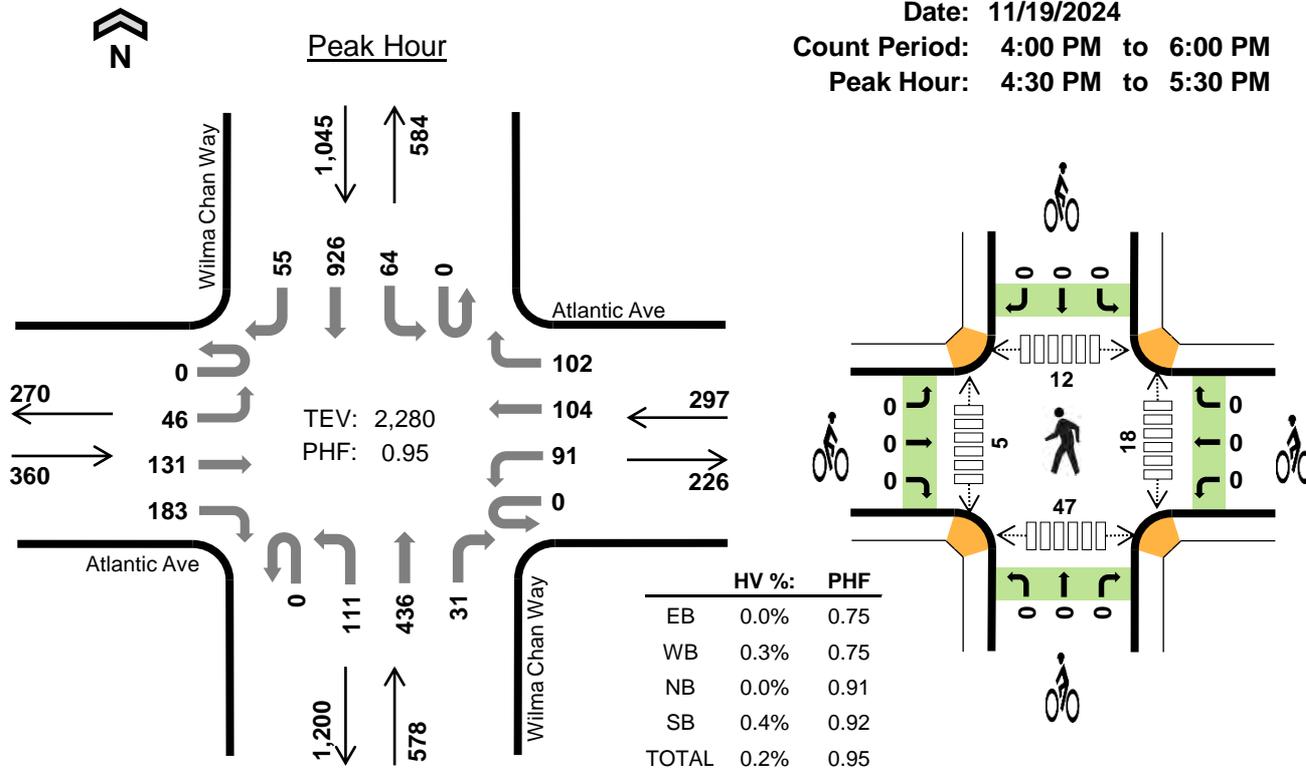
Wilma Chan Way Atlantic Ave



Date: 11/19/2024

Count Period: 4:00 PM to 6:00 PM

Peak Hour: 4:30 PM to 5:30 PM



Two-Hour Count Summaries

Interval Start	Atlantic Ave				Atlantic Ave				Wilma Chan Way				Wilma Chan Way				15-min Total	Rolling One Hour	
	Eastbound		Westbound		Northbound		Southbound		Eastbound		Westbound		Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	14	48	42	0	14	24	19	0	17	136	2	0	9	135	9	469	0	
4:15 PM	0	8	31	43	0	9	22	12	0	25	123	6	0	15	214	15	523	0	
4:30 PM	0	6	33	36	0	14	24	19	0	30	121	7	0	24	227	14	555	0	
4:45 PM	0	14	28	39	0	11	31	23	0	21	103	8	0	16	225	10	529	2,076	
5:00 PM	0	16	43	61	0	40	26	33	0	33	93	8	0	11	218	17	599	2,206	
5:15 PM	0	10	27	47	0	26	23	27	0	27	119	8	0	13	256	14	597	2,280	
5:30 PM	0	9	26	49	0	11	21	14	0	22	105	4	0	29	226	13	529	2,254	
5:45 PM	0	11	29	36	0	12	21	22	0	19	114	6	0	15	208	8	501	2,226	
Count Total	0	88	265	353	0	137	192	169	0	194	914	49	0	132	1,709	100	4,302	0	
Peak Hour	All	0	46	131	183	0	91	104	102	0	111	436	31	0	64	926	55	2,280	0
	HV	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	5	0
	HV%	-	0%	0%	0%	-	0%	1%	0%	-	0%	0%	0%	-	0%	0%	0%	0%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	1	1	2	0	0	0	0	0	4	0	1	18	23
4:15 PM	1	1	1	2	5	0	1	0	0	1	1	1	3	11	16
4:30 PM	0	0	0	1	1	0	0	0	0	0	5	2	6	5	18
4:45 PM	0	1	0	2	3	0	0	0	0	0	4	2	4	16	26
5:00 PM	0	0	0	1	1	0	0	0	0	0	5	0	0	14	19
5:15 PM	0	0	0	0	0	0	0	0	0	0	4	1	2	12	19
5:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	3	7	11
5:45 PM	1	0	0	1	2	0	0	0	0	0	1	0	2	14	17
Count Total	2	3	2	8	15	0	1	0	0	1	24	7	21	97	149
Peak Hour	0	1	0	4	5	0	0	0	0	0	18	5	12	47	82

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Atlantic Ave				Atlantic Ave				Wilma Chan Way				Wilma Chan Way				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0
4:15 PM	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	1	5	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
4:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	3	11
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	10
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	5
5:45 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	2	4
Count Total	0	0	1	1	0	1	2	0	0	1	1	0	0	0	7	1	15	0
Peak Hour	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	5	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Atlantic Ave			Atlantic Ave			Wilma Chan Way			Wilma Chan Way			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

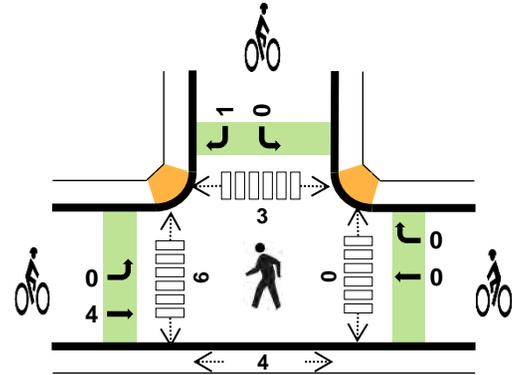
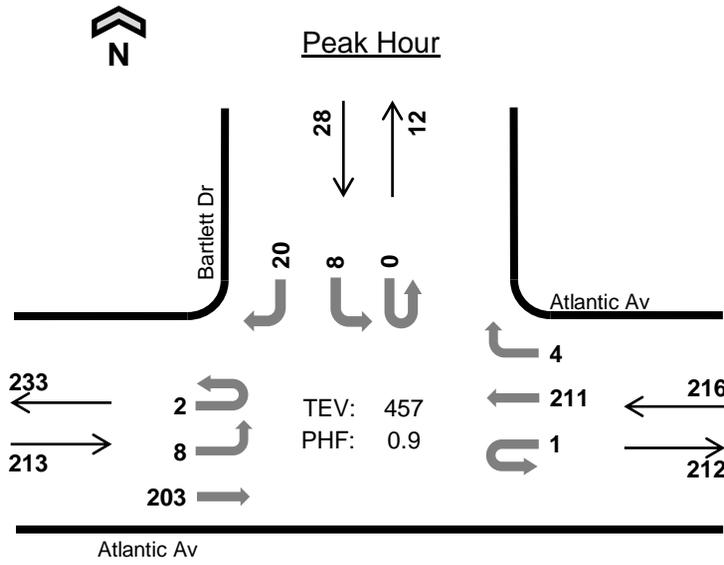
Bartlett Dr Atlantic Av



Date: 11/19/2024

Count Period: 7:00 AM to 9:00 AM

Peak Hour: 7:45 AM to 8:45 AM



	HV %:	PHF
EB	2.3%	0.75
WB	1.9%	0.71
NB	-	-
SB	0.0%	0.78
TOTAL	2.0%	0.90

Two-Hour Count Summaries

Interval Start	Atlantic Av Eastbound				Atlantic Av Westbound				n/a Northbound				Bartlett Dr Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
	7:00 AM	0	2	13	0	0	0	27	0	0	0	0	0	0	0	0			2
7:15 AM	1	1	24	0	0	0	18	0	0	0	0	0	0	1	0	3	48	0	
7:30 AM	0	2	37	0	0	0	29	1	0	0	0	0	0	1	0	1	71	0	
7:45 AM	0	0	40	0	0	0	47	1	0	0	0	0	0	2	0	7	97	260	
8:00 AM	1	3	34	0	1	0	75	0	0	0	0	0	0	2	0	7	123	339	
8:15 AM	0	4	67	0	0	0	47	1	0	0	0	0	0	4	0	4	127	418	
8:30 AM	1	1	62	0	0	0	42	2	0	0	0	0	0	0	0	2	110	457	
8:45 AM	0	6	55	0	0	0	30	0	0	0	0	0	0	1	0	1	93	453	
Count Total	3	19	332	0	1	0	315	5	0	0	0	0	0	11	0	27	713	0	
Peak Hour	All	2	8	203	0	1	0	211	4	0	0	0	0	0	8	0	20	457	0
	HV	0	0	5	0	0	0	4	0	0	0	0	0	0	0	0	0	9	0
	HV%	0%	0%	2%	-	0%	-	2%	0%	-	-	-	-	-	0%	-	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)					
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total	
7:00 AM	2	2	0	0	4	0	0	0	0	0	0	0	0	0	1	1
7:15 AM	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	1	3	0	0	4	0	0	0	0	0	0	0	1	0	1	
7:45 AM	2	0	0	0	2	1	0	0	0	1	0	0	3	0	3	
8:00 AM	0	2	0	0	2	1	0	0	1	2	0	5	0	1	6	
8:15 AM	2	1	0	0	3	1	0	0	0	1	0	1	0	2	3	
8:30 AM	1	1	0	0	2	1	0	0	0	1	0	0	0	1	1	
8:45 AM	2	0	0	0	2	0	0	0	0	0	0	1	2	0	3	
Count Total	13	9	0	0	22	4	0	0	1	5	0	7	6	5	18	
Peak Hr	5	4	0	0	9	4	0	0	1	5	0	6	3	4	13	

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Atlantic Av				Atlantic Av				n/a				Bartlett Dr				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	4	0
7:15 AM	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
7:30 AM	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	4	0
7:45 AM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	13
8:00 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	11
8:15 AM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	3	11
8:30 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	9
8:45 AM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9
Count Total	0	0	13	0	0	0	9	0	0	0	0	0	0	0	0	0	22	0
Peak Hour	0	0	5	0	0	0	4	0	0	0	0	0	0	0	0	0	9	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Atlantic Av			Atlantic Av			n/a			Bartlett Dr			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
8:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2	3
8:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
8:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Count Total	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0
Peak Hour	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

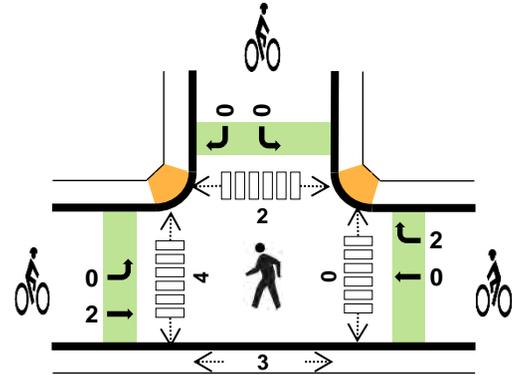
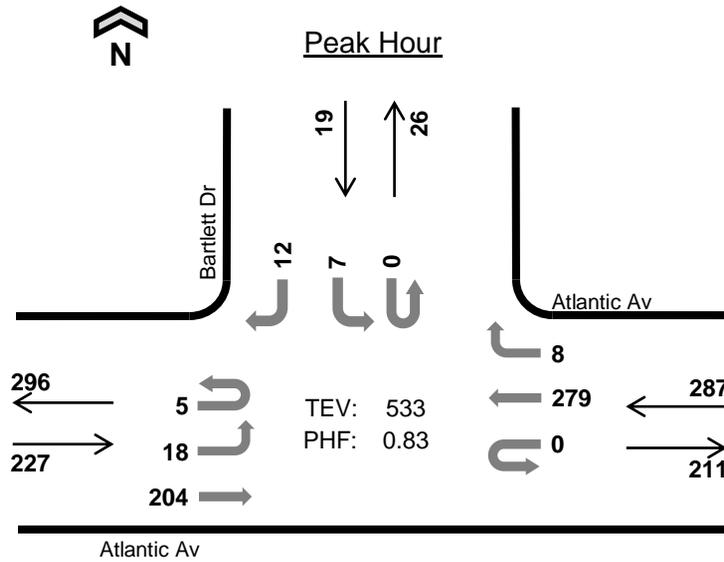
Bartlett Dr Atlantic Av



Date: 11/19/2024

Count Period: 4:00 PM to 6:00 PM

Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	0.0%	0.89
WB	0.3%	0.77
NB	-	-
SB	0.0%	0.68
TOTAL	0.2%	0.83

Two-Hour Count Summaries

Interval Start	Atlantic Av Eastbound				Atlantic Av Westbound				n/a Northbound				Bartlett Dr Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	3	56	0	0	0	53	3	0	0	0	0	0	1	0	5	121	0	
4:15 PM	2	1	50	0	0	0	38	1	0	0	0	0	0	2	0	2	96	0	
4:30 PM	1	7	56	0	0	0	58	3	0	0	0	0	0	1	0	2	128	0	
4:45 PM	1	0	51	0	0	0	64	0	0	0	0	0	0	3	0	1	120	465	
5:00 PM	3	4	55	0	0	0	90	3	0	0	0	0	0	1	0	4	160	504	
5:15 PM	0	7	42	0	0	0	67	2	0	0	0	0	0	2	0	5	125	533	
5:30 PM	1	3	52	0	0	0	46	2	0	0	0	0	0	2	0	5	111	516	
5:45 PM	2	5	43	0	0	0	47	2	0	0	0	0	0	2	0	0	101	497	
Count Total	10	30	405	0	0	0	463	16	0	0	0	0	0	14	0	24	962	0	
Peak Hour	All	5	18	204	0	0	0	279	8	0	0	0	0	0	7	0	12	533	0
	HV	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
	HV%	0%	0%	0%	-	-	-	0%	0%	-	-	-	-	-	0%	-	0%	0%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	0	0	0	3	1	0	0	4	0	1	2	0	3
4:15 PM	1	1	0	0	2	0	0	0	0	0	0	1	1	0	2
4:30 PM	0	0	0	0	0	1	1	0	0	2	0	1	0	1	2
4:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	2	1	3
5:00 PM	0	0	0	0	0	1	0	0	0	1	0	1	0	1	2
5:15 PM	0	0	0	0	0	0	1	0	0	1	0	2	0	0	2
5:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	1	3	0	0	4	5	3	0	0	8	0	6	5	3	14
Peak Hr	0	1	0	0	1	2	2	0	0	4	0	4	2	3	9

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Atlantic Av				Atlantic Av				n/a				Bartlett Dr				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	3
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Count Total	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	4	0
Peak Hour	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0

Two-Hour Count Summaries - Bikes																
Interval Start	Atlantic Av			Atlantic Av			n/a			Bartlett Dr			15-min Total	Rolling One Hour		
	Eastbound			Westbound			Northbound			Southbound						
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT				
4:00 PM	3	0	0	0	0	1	0	0	0	0	0	0	4	0		
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	2	0		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	6		
5:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	1	3		
5:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	1	4		
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2		
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2		
Count Total	3	2	0	0	0	3	0	0	0	0	0	0	8	0		
Peak Hour	0	2	0	0	0	2	0	0	0	0	0	0	4	0		

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

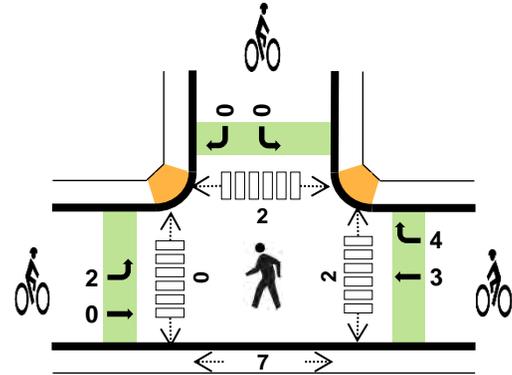
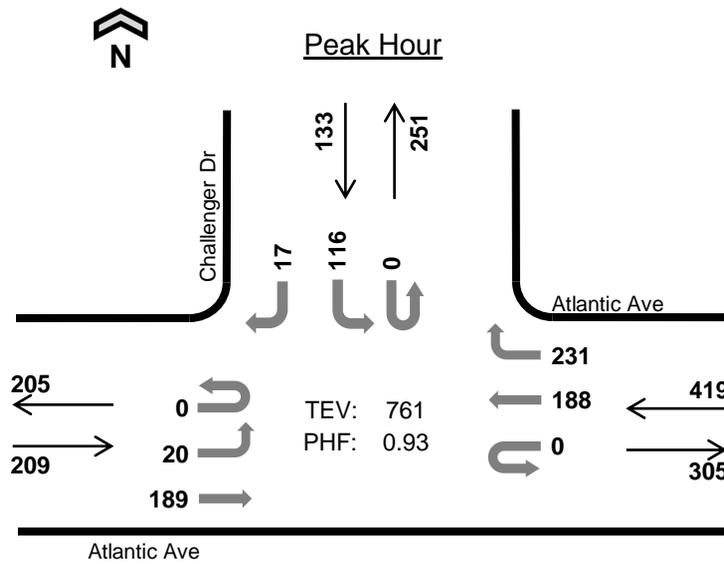
Challenger Dr Atlantic Ave



Date: 11/19/2024

Count Period: 7:00 AM to 9:00 AM

Peak Hour: 8:00 AM to 9:00 AM



	HV %:	PHF
EB	2.9%	0.78
WB	2.1%	0.76
NB	-	-
SB	3.8%	0.85
TOTAL	2.6%	0.93

Two-Hour Count Summaries

Interval Start	Atlantic Ave Eastbound				Atlantic Ave Westbound				n/a Northbound				Challenger Dr Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
	7:00 AM	0	1	11	0	0	0	27	18	0	0	0	0	0	9	0			5
7:15 AM	0	4	20	0	0	0	16	33	0	0	0	0	0	14	0	3	90	0	
7:30 AM	0	1	33	0	0	0	32	47	0	0	0	0	0	10	0	1	124	0	
7:45 AM	0	7	31	0	0	0	46	61	0	0	0	0	0	19	0	3	167	452	
8:00 AM	0	4	34	0	0	0	73	64	0	0	0	0	0	26	0	4	205	586	
8:15 AM	0	4	63	0	0	0	50	50	0	0	0	0	0	29	0	1	197	693	
8:30 AM	0	8	49	0	0	0	39	55	0	0	0	0	0	28	0	6	185	754	
8:45 AM	0	4	43	0	0	0	26	62	0	0	0	0	0	33	0	6	174	761	
Count Total	0	33	284	0	0	0	309	390	0	0	0	0	0	168	0	29	1,213	0	
Peak Hour	All	0	20	189	0	0	0	188	231	0	0	0	0	0	116	0	17	761	0
	HV	0	2	4	0	0	0	4	5	0	0	0	0	0	3	0	2	20	0
	HV%	-	10%	2%	-	-	-	2%	2%	-	-	-	-	-	3%	-	12%	3%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	2	2	0	0	4	0	0	0	0	0	1	0	2	1	4
7:15 AM	3	1	0	1	5	0	0	0	0	0	1	0	0	2	3
7:30 AM	1	2	0	1	4	0	0	0	0	0	0	0	1	0	1
7:45 AM	2	2	0	1	5	0	0	0	0	0	0	1	1	2	4
8:00 AM	1	3	0	2	6	1	1	0	0	2	1	0	0	1	2
8:15 AM	2	2	0	1	5	1	2	0	0	3	1	0	0	1	2
8:30 AM	1	3	0	1	5	0	3	0	0	3	0	0	0	2	2
8:45 AM	2	1	0	1	4	0	1	0	0	1	0	0	2	3	5
Count Total	14	16	0	8	38	2	7	0	0	9	4	1	6	12	23
Peak Hr	6	9	0	5	20	2	7	0	0	9	2	0	2	7	11

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Atlantic Ave				Atlantic Ave				n/a				Challenger Dr				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	4	0
7:15 AM	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	1	5	0
7:30 AM	0	0	1	0	0	0	2	0	0	0	0	0	0	1	0	0	4	0
7:45 AM	0	1	1	0	0	0	0	2	0	0	0	0	0	1	0	0	5	18
8:00 AM	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	2	6	20
8:15 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	1	0	0	5	20
8:30 AM	0	0	1	0	0	0	2	1	0	0	0	0	0	1	0	0	5	21
8:45 AM	0	1	1	0	0	0	0	1	0	0	0	0	0	1	0	0	4	20
Count Total	0	3	11	0	0	0	8	8	0	0	0	0	0	5	0	3	38	0
Peak Hour	0	2	4	0	0	0	4	5	0	0	0	0	0	3	0	2	20	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Atlantic Ave			Atlantic Ave			n/a			Challenger Dr			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	2
8:15 AM	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	3	5
8:30 AM	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	3	8
8:45 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	9
Count Total	2	0	0	0	3	4	0	0	0	0	0	0	0	0	0	9	0
Peak Hour	2	0	0	0	3	4	0	0	0	0	0	0	0	0	0	9	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

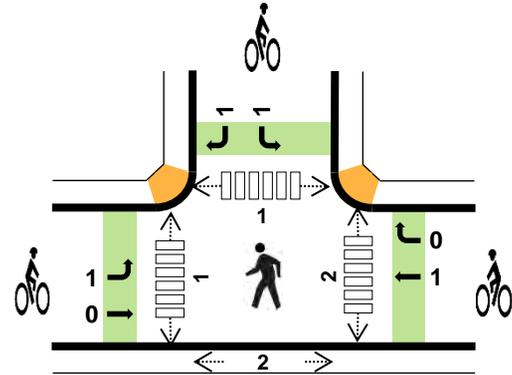
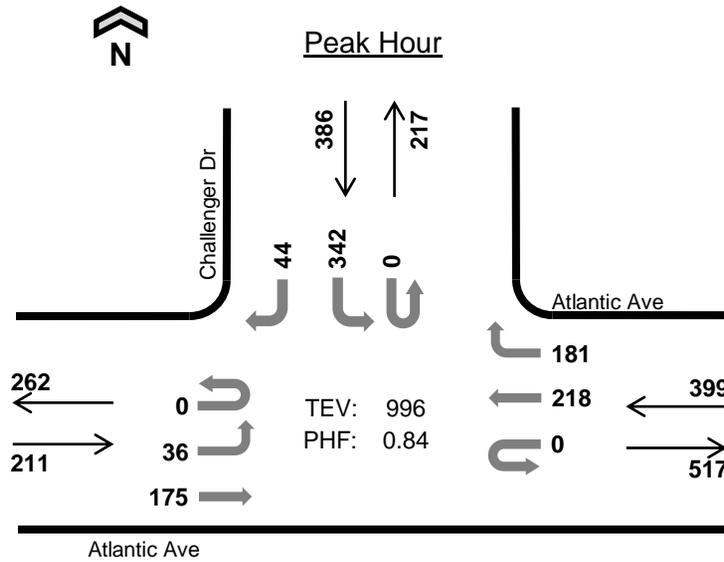
Challenger Dr Atlantic Ave



Date: 11/19/2024

Count Period: 4:00 PM to 6:00 PM

Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	0.0%	0.88
WB	0.5%	0.96
NB	-	-
SB	1.6%	0.70
TOTAL	0.8%	0.84

Two-Hour Count Summaries

Interval Start	Atlantic Ave Eastbound				Atlantic Ave Westbound				n/a Northbound				Challenger Dr Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
	4:00 PM	0	12	45	0	0	0	43	47	0	0	0	0	0	47	0			7
4:15 PM	0	10	47	0	0	0	25	43	0	0	0	0	0	60	0	4	189	0	
4:30 PM	0	9	51	0	0	0	47	54	0	0	0	0	0	68	0	9	238	0	
4:45 PM	0	7	45	0	0	0	50	48	0	0	0	0	0	80	0	6	236	864	
5:00 PM	0	13	42	0	0	0	62	42	0	0	0	0	0	118	0	20	297	960	
5:15 PM	0	7	37	0	0	0	59	37	0	0	0	0	0	76	0	9	225	996	
5:30 PM	0	2	48	0	0	0	29	26	0	0	0	0	0	64	0	18	187	945	
5:45 PM	0	3	34	0	0	0	45	32	0	0	0	0	0	43	0	7	164	873	
Count Total	0	63	349	0	0	0	360	329	0	0	0	0	0	556	0	80	1,737	0	
Peak Hour	All	0	36	175	0	0	0	218	181	0	0	0	0	0	342	0	44	996	0
	HV	0	0	0	0	0	0	1	1	0	0	0	0	0	6	0	0	8	0
	HV%	-	0%	0%	-	-	-	0%	1%	-	-	-	-	-	2%	-	0%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	2	0	2	4	0	0	0	0	0	1	0	1	2	4
4:15 PM	1	0	0	1	2	0	1	0	0	1	0	0	0	1	1
4:30 PM	0	0	0	3	3	1	0	0	1	2	2	0	0	1	3
4:45 PM	0	1	0	0	1	0	0	0	1	1	0	0	1	0	1
5:00 PM	0	1	0	2	3	0	0	0	0	0	0	1	0	1	2
5:15 PM	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0
5:30 PM	0	0	0	2	2	0	0	0	1	1	2	0	0	0	2
5:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	3	3
Count Total	1	4	0	12	17	1	2	0	3	6	5	1	2	8	16
Peak Hr	0	2	0	6	8	1	1	0	2	4	2	1	1	2	6

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Atlantic Ave				Atlantic Ave				n/a				Challenger Dr				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	4	0
4:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0
4:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	10
5:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	3	9
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	8
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	7
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	7
Count Total	0	0	1	0	0	0	1	3	0	0	0	0	0	11	0	1	17	0
Peak Hour	0	0	0	0	0	0	1	1	0	0	0	0	0	6	0	0	8	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Atlantic Ave			Atlantic Ave			n/a			Challenger Dr			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
4:30 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4	4
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
5:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	4
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3	3
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Count Total	1	0	0	0	2	0	0	0	0	0	0	2	0	1	6	0	0
Peak Hour	1	0	0	0	1	0	0	0	0	0	0	1	0	1	4	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Attachment C
LOS Calculation Sheets



HCM 6th Signalized Intersection Summary

1: Wilma Chan Wy & Atlantic Ave

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	120	113	36	141	56	101	667	28	66	297	41
Future Volume (veh/h)	52	120	113	36	141	56	101	667	28	66	297	41
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	60	138	130	41	162	64	116	767	32	76	341	47
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	71	163	313	218	305	115	244	1923	80	234	1956	870
Arrive On Green	0.13	0.13	0.13	0.12	0.12	0.12	0.07	0.55	0.55	0.07	0.55	0.55
Sat Flow, veh/h	558	1284	1585	1781	2494	938	3456	3475	145	3456	3554	1581
Grp Volume(v), veh/h	198	0	130	41	113	113	116	392	407	76	341	47
Grp Sat Flow(s),veh/h/ln	1842	0	1585	1781	1777	1655	1728	1777	1843	1728	1777	1581
Q Serve(g_s), s	14.7	0.0	10.0	2.9	8.3	9.0	4.5	17.7	17.7	2.9	6.7	1.9
Cycle Q Clear(g_c), s	14.7	0.0	10.0	2.9	8.3	9.0	4.5	17.7	17.7	2.9	6.7	1.9
Prop In Lane	0.30		1.00	1.00		0.57	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	233	0	313	218	217	202	244	983	1020	234	1956	870
V/C Ratio(X)	0.85	0.00	0.42	0.19	0.52	0.56	0.48	0.40	0.40	0.32	0.17	0.05
Avail Cap(c_a), veh/h	487	0	531	483	482	449	395	983	1020	259	1956	870
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	59.8	0.0	49.1	55.2	57.6	57.9	62.6	17.9	17.9	62.2	15.6	14.6
Incr Delay (d2), s/veh	4.0	0.0	0.4	0.2	0.9	1.1	0.5	1.2	1.2	0.3	0.2	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	0.0	4.1	1.3	3.8	3.9	2.0	7.7	8.0	1.3	2.8	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	63.9	0.0	49.5	55.4	58.5	59.0	63.1	19.1	19.1	62.5	15.8	14.7
LnGrp LOS	E		D	E	E	E	E	B	B	E	B	B
Approach Vol, veh/h		328			267			915			464	
Approach Delay, s/veh		58.2			58.2			24.7			23.4	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.5	82.5		22.3	13.9	82.1		21.7				
Change Period (Y+Rc), s	4.0	5.0		4.6	4.0	5.0		4.6				
Max Green Setting (Gmax), s	10.5	36.3		37.0	16.0	30.8		38.0				
Max Q Clear Time (g_c+I1), s	4.9	19.7		16.7	6.5	8.7		11.0				
Green Ext Time (p_c), s	0.0	3.5		1.0	0.1	1.7		1.0				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			34.5									
HCM 6th LOS			C									
Notes												
User approved changes to right turn type.												

HCM 6th TWSC
 2: Atlantic Ave & Bartlett Dr

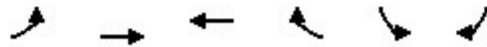
Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↗		↖	
Traffic Vol, veh/h	10	203	212	4	8	20
Future Vol, veh/h	10	203	212	4	8	20
Conflicting Peds, #/hr	9	0	0	3	3	9
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	30	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	226	236	4	9	22

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	249	0	-	0	498 256
Stage 1	-	-	-	-	247 -
Stage 2	-	-	-	-	251 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1317	-	-	-	532 783
Stage 1	-	-	-	-	794 -
Stage 2	-	-	-	-	791 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1306	-	-	-	518 770
Mov Cap-2 Maneuver	-	-	-	-	594 -
Stage 1	-	-	-	-	781 -
Stage 2	-	-	-	-	784 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.4	0	10.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1306	-	-	-	710
HCM Lane V/C Ratio	0.009	-	-	-	0.044
HCM Control Delay (s/veh)	7.8	-	-	-	10.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0	-	-	-	0.1

HCM 6th Signalized Intersection Summary 3: Atlantic Ave & Challenger Dr



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	189	188	231	116	17
Future Volume (veh/h)	20	189	188	231	116	17
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.97	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	203	202	248	125	18
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	716	1444	228	279	167	149
Arrive On Green	0.40	0.77	0.30	0.30	0.09	0.09
Sat Flow, veh/h	1781	1870	752	923	1781	1585
Grp Volume(v), veh/h	22	203	0	450	125	18
Grp Sat Flow(s),veh/h/ln	1781	1870	0	1674	1781	1585
Q Serve(g_s), s	0.5	1.9	0.0	17.9	4.8	0.7
Cycle Q Clear(g_c), s	0.5	1.9	0.0	17.9	4.8	0.7
Prop In Lane	1.00			0.55	1.00	1.00
Lane Grp Cap(c), veh/h	716	1444	0	507	167	149
V/C Ratio(X)	0.03	0.14	0.00	0.89	0.75	0.12
Avail Cap(c_a), veh/h	716	1444	0	598	588	523
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.7	2.0	0.0	23.3	30.9	29.1
Incr Delay (d2), s/veh	0.0	0.2	0.0	13.1	2.5	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.5	0.0	8.6	2.1	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	12.7	2.2	0.0	36.3	33.4	29.2
LnGrp LOS	B	A		D	C	C
Approach Vol, veh/h		225	450		143	
Approach Delay, s/veh		3.3	36.3		32.9	
Approach LOS		A	D		C	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		58.7		11.3	32.8	25.9
Change Period (Y+Rc), s		4.7		4.7	4.7	* 4.7
Max Green Setting (Gmax), s		37.5		23.1	8.0	* 25
Max Q Clear Time (g_c+I1), s		3.9		6.8	2.5	19.9
Green Ext Time (p_c), s		1.0		0.1	0.0	1.2
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			26.6			
HCM 6th LOS			C			
Notes						
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.						

HCM 6th Signalized Intersection Summary

1: Wilma Chan Wy & Atlantic Ave

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	131	183	91	104	102	111	436	31	64	926	55
Future Volume (veh/h)	46	131	183	91	104	102	111	436	31	64	926	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	138	193	96	109	107	117	459	33	67	975	58
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	63	181	322	225	224	194	244	1832	131	229	1921	854
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.13	0.07	0.55	0.55	0.07	0.54	0.54
Sat Flow, veh/h	477	1370	1585	1781	1777	1540	3456	3360	241	3456	3554	1581
Grp Volume(v), veh/h	186	0	193	96	109	107	117	242	250	67	975	58
Grp Sat Flow(s),veh/h/ln	1847	0	1585	1781	1777	1540	1728	1777	1824	1728	1777	1581
Q Serve(g_s), s	13.6	0.0	15.5	7.0	8.0	9.1	4.6	10.0	10.1	2.6	24.3	2.4
Cycle Q Clear(g_c), s	13.6	0.0	15.5	7.0	8.0	9.1	4.6	10.0	10.1	2.6	24.3	2.4
Prop In Lane	0.26		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	245	0	322	225	224	194	244	969	994	229	1921	854
V/C Ratio(X)	0.76	0.00	0.60	0.43	0.49	0.55	0.48	0.25	0.25	0.29	0.51	0.07
Avail Cap(c_a), veh/h	488	0	531	483	482	418	259	969	994	259	1921	854
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.6	0.0	50.6	56.5	56.9	57.4	62.6	16.8	16.8	62.3	20.4	15.3
Incr Delay (d2), s/veh	2.3	0.0	0.8	0.6	0.7	1.1	0.5	0.6	0.6	0.3	1.0	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	0.0	6.3	3.2	3.7	3.7	2.0	4.4	4.5	1.2	10.5	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	60.8	0.0	51.4	57.1	57.7	58.5	63.1	17.4	17.4	62.5	21.3	15.5
LnGrp LOS	E		D	E	E	E	E	B	B	E	C	B
Approach Vol, veh/h		379			312			609			1100	
Approach Delay, s/veh		56.1			57.8			26.2			23.5	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.3	81.3		23.1	13.9	80.7		22.3				
Change Period (Y+Rc), s	4.0	5.0		4.6	4.0	5.0		4.6				
Max Green Setting (Gmax), s	10.5	36.3		37.0	10.5	36.3		38.0				
Max Q Clear Time (g_c+I1), s	4.6	12.1		17.5	6.6	26.3		11.1				
Green Ext Time (p_c), s	0.0	2.2		1.1	0.1	3.9		1.1				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			33.8									
HCM 6th LOS			C									
Notes												
User approved changes to right turn type.												

HCM 6th TWSC
2: Atlantic Ave & Bartlett Dr

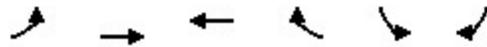
Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	204	279	8	7	12
Future Vol, veh/h	23	204	279	8	7	12
Conflicting Peds, #/hr	6	0	0	2	2	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	30	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	246	336	10	8	14

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	352	0	-	0	651 353
Stage 1	-	-	-	-	347 -
Stage 2	-	-	-	-	304 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1207	-	-	-	433 691
Stage 1	-	-	-	-	716 -
Stage 2	-	-	-	-	748 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1200	-	-	-	418 683
Mov Cap-2 Maneuver	-	-	-	-	518 -
Stage 1	-	-	-	-	695 -
Stage 2	-	-	-	-	744 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.8	0	11.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1200	-	-	-	611
HCM Lane V/C Ratio	0.023	-	-	-	0.037
HCM Control Delay (s/veh)	8.1	-	-	-	11.1
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0.1	-	-	-	0.1

HCM 6th Signalized Intersection Summary 3: Atlantic Ave & Challenger Dr



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	36	175	218	181	342	44
Future Volume (veh/h)	36	175	218	181	342	44
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.98	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	43	208	260	215	407	52
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	416	1143	290	240	454	404
Arrive On Green	0.23	0.61	0.31	0.31	0.25	0.25
Sat Flow, veh/h	1781	1870	936	774	1781	1585
Grp Volume(v), veh/h	43	208	0	475	407	52
Grp Sat Flow(s),veh/h/ln	1781	1870	0	1710	1781	1585
Q Serve(g_s), s	1.3	3.4	0.0	18.6	15.4	1.8
Cycle Q Clear(g_c), s	1.3	3.4	0.0	18.6	15.4	1.8
Prop In Lane	1.00			0.45	1.00	1.00
Lane Grp Cap(c), veh/h	416	1143	0	530	454	404
V/C Ratio(X)	0.10	0.18	0.00	0.90	0.90	0.13
Avail Cap(c_a), veh/h	416	1143	0	606	593	528
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.1	6.0	0.0	23.1	25.2	20.1
Incr Delay (d2), s/veh	0.0	0.4	0.0	14.3	11.6	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.3	0.0	9.2	7.7	1.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	21.1	6.3	0.0	37.4	36.8	20.1
LnGrp LOS	C	A		D	D	C
Approach Vol, veh/h		251	475		459	
Approach Delay, s/veh		8.8	37.4		34.9	
Approach LOS		A	D		C	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		47.5		22.5	21.1	26.4
Change Period (Y+Rc), s		4.7		4.7	4.7	* 4.7
Max Green Setting (Gmax), s		37.3		23.3	8.0	* 25
Max Q Clear Time (g_c+I1), s		5.4		17.4	3.3	20.6
Green Ext Time (p_c), s		1.1		0.4	0.0	1.1
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			30.4			
HCM 6th LOS			C			
Notes						
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.						

HCM 6th Signalized Intersection Summary

1: Wilma Chan Wy & Atlantic Ave

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	150	130	40	160	80	110	680	30	90	320	50
Future Volume (veh/h)	70	150	130	40	160	80	110	680	30	90	320	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	80	172	149	46	184	92	126	782	34	103	368	57
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	92	197	361	242	313	148	245	1760	76	242	1800	801
Arrive On Green	0.16	0.16	0.16	0.14	0.14	0.14	0.07	0.51	0.51	0.07	0.51	0.51
Sat Flow, veh/h	584	1257	1585	1781	2307	1093	3456	3468	151	3456	3554	1580
Grp Volume(v), veh/h	252	0	149	46	139	137	126	401	415	103	368	57
Grp Sat Flow(s),veh/h/ln	1841	0	1585	1781	1777	1623	1728	1777	1842	1728	1777	1580
Q Serve(g_s), s	18.7	0.0	11.2	3.2	10.3	11.1	4.9	20.1	20.1	4.0	8.0	2.6
Cycle Q Clear(g_c), s	18.7	0.0	11.2	3.2	10.3	11.1	4.9	20.1	20.1	4.0	8.0	2.6
Prop In Lane	0.32		1.00	1.00		0.67	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	289	0	361	242	241	220	245	902	935	242	1800	801
V/C Ratio(X)	0.87	0.00	0.41	0.19	0.58	0.62	0.51	0.44	0.44	0.43	0.20	0.07
Avail Cap(c_a), veh/h	487	0	531	483	482	441	395	902	935	259	1800	801
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.7	0.0	46.1	53.7	56.7	57.1	62.7	21.9	21.9	62.4	19.0	17.7
Incr Delay (d2), s/veh	5.2	0.0	0.3	0.2	1.0	1.3	0.6	1.6	1.5	0.4	0.3	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.2	0.0	4.5	1.5	4.7	4.7	2.2	8.9	9.2	1.8	3.5	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	62.8	0.0	46.4	53.8	57.7	58.4	63.3	23.5	23.5	62.8	19.3	17.9
LnGrp LOS	E		D	D	E	E	E	C	C	E	B	B
Approach Vol, veh/h		401			322			942			528	
Approach Delay, s/veh		56.7			57.5			28.8			27.6	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.8	76.0		26.5	13.9	75.9		23.6				
Change Period (Y+Rc), s	4.0	5.0		4.6	4.0	5.0		4.6				
Max Green Setting (Gmax), s	10.5	36.3		37.0	16.0	30.8		38.0				
Max Q Clear Time (g_c+I1), s	6.0	22.1		20.7	6.9	10.0		13.1				
Green Ext Time (p_c), s	0.0	3.4		1.2	0.1	1.8		1.3				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh				37.8								
HCM 6th LOS				D								
Notes												
User approved changes to right turn type.												

HCM 6th TWSC
 2: Atlantic Ave & Bartlett Dr

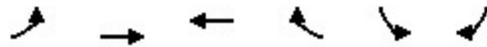
Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↖		↖	
Traffic Vol, veh/h	10	250	260	10	10	20
Future Vol, veh/h	10	250	260	10	10	20
Conflicting Peds, #/hr	9	0	0	3	3	9
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	30	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	278	289	11	11	22

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	309	0	-	0	607 313
Stage 1	-	-	-	-	304 -
Stage 2	-	-	-	-	303 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1252	-	-	-	460 727
Stage 1	-	-	-	-	748 -
Stage 2	-	-	-	-	749 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1241	-	-	-	448 715
Mov Cap-2 Maneuver	-	-	-	-	541 -
Stage 1	-	-	-	-	735 -
Stage 2	-	-	-	-	742 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.3	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1241	-	-	-	646
HCM Lane V/C Ratio	0.009	-	-	-	0.052
HCM Control Delay (s/veh)	7.9	-	-	-	10.9
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0	-	-	-	0.2

HCM 6th Signalized Intersection Summary 3: Atlantic Ave & Challenger Dr



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	230	220	240	150	30
Future Volume (veh/h)	30	230	220	240	150	30
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.97	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	32	247	237	258	161	32
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	638	1401	261	284	207	185
Arrive On Green	0.36	0.75	0.32	0.32	0.12	0.12
Sat Flow, veh/h	1781	1870	806	878	1781	1585
Grp Volume(v), veh/h	32	247	0	495	161	32
Grp Sat Flow(s),veh/h/ln	1781	1870	0	1684	1781	1585
Q Serve(g_s), s	0.8	2.7	0.0	19.7	6.1	1.3
Cycle Q Clear(g_c), s	0.8	2.7	0.0	19.7	6.1	1.3
Prop In Lane	1.00			0.52	1.00	1.00
Lane Grp Cap(c), veh/h	638	1401	0	546	207	185
V/C Ratio(X)	0.05	0.18	0.00	0.91	0.78	0.17
Avail Cap(c_a), veh/h	638	1401	0	602	588	523
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.7	2.5	0.0	22.7	30.0	27.9
Incr Delay (d2), s/veh	0.0	0.3	0.0	16.3	2.4	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.7	0.0	9.8	2.7	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	14.7	2.8	0.0	39.0	32.4	28.0
LnGrp LOS	B	A		D	C	C
Approach Vol, veh/h		279	495		193	
Approach Delay, s/veh		4.2	39.0		31.7	
Approach LOS		A	D		C	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		57.1		12.9	29.8	27.4
Change Period (Y+Rc), s		4.7		4.7	4.7	* 4.7
Max Green Setting (Gmax), s		37.5		23.1	8.0	* 25
Max Q Clear Time (g_c+I1), s		4.7		8.1	2.8	21.7
Green Ext Time (p_c), s		1.3		0.2	0.0	0.9
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			27.5			
HCM 6th LOS			C			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

1: Wilma Chan Wy & Atlantic Ave

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	140	210	100	140	110	140	450	40	80	970	70
Future Volume (veh/h)	70	140	210	100	140	110	140	450	40	80	970	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	74	147	221	105	147	116	147	474	42	84	1021	74
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	92	183	350	244	266	193	246	1698	150	237	1820	810
Arrive On Green	0.15	0.15	0.15	0.14	0.14	0.14	0.07	0.51	0.51	0.07	0.51	0.51
Sat Flow, veh/h	616	1224	1585	1781	1938	1410	3456	3300	291	3456	3554	1580
Grp Volume(v), veh/h	221	0	221	105	134	129	147	254	262	84	1021	74
Grp Sat Flow(s),veh/h/ln	1840	0	1585	1781	1777	1572	1728	1777	1814	1728	1777	1580
Q Serve(g_s), s	16.3	0.0	17.7	7.6	9.8	10.8	5.8	11.4	11.4	3.2	27.5	3.4
Cycle Q Clear(g_c), s	16.3	0.0	17.7	7.6	9.8	10.8	5.8	11.4	11.4	3.2	27.5	3.4
Prop In Lane	0.33		1.00	1.00		0.90	1.00		0.16	1.00		1.00
Lane Grp Cap(c), veh/h	275	0	350	244	243	215	246	915	934	237	1820	810
V/C Ratio(X)	0.80	0.00	0.63	0.43	0.55	0.60	0.60	0.28	0.28	0.35	0.56	0.09
Avail Cap(c_a), veh/h	486	0	532	483	482	427	259	915	934	259	1820	810
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.5	0.0	49.4	55.4	56.4	56.8	63.1	19.2	19.3	62.2	23.4	17.5
Incr Delay (d2), s/veh	2.6	0.0	0.9	0.5	0.9	1.2	2.2	0.8	0.7	0.3	1.3	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.8	0.0	7.2	3.5	4.5	4.4	2.6	5.0	5.1	1.5	12.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	60.1	0.0	50.3	55.9	57.3	58.0	65.3	20.0	20.0	62.6	24.6	17.7
LnGrp LOS	E		D	E	E	E	E	B	C	E	C	B
Approach Vol, veh/h		442			368			663			1179	
Approach Delay, s/veh		55.2			57.2			30.0			26.9	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.6	77.1		25.5	14.0	76.7		23.8				
Change Period (Y+Rc), s	4.0	5.0		4.6	4.0	5.0		4.6				
Max Green Setting (Gmax), s	10.5	36.3		37.0	10.5	36.3		38.0				
Max Q Clear Time (g_c+I1), s	5.2	13.4		19.7	7.8	29.5		12.8				
Green Ext Time (p_c), s	0.0	2.3		1.3	0.1	3.2		1.3				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			36.6									
HCM 6th LOS			D									
Notes												
User approved changes to right turn type.												

HCM 6th TWSC
 2: Atlantic Ave & Bartlett Dr

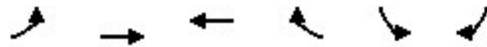
Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	230	320	10	10	20
Future Vol, veh/h	30	230	320	10	10	20
Conflicting Peds, #/hr	6	0	0	2	2	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	30	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	277	386	12	12	24

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	404	0	-	0	749
Stage 1	-	-	-	-	398
Stage 2	-	-	-	-	351
Critical Hdwy	4.12	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.218	-	-	-	3.518
Pot Cap-1 Maneuver	1155	-	-	-	379
Stage 1	-	-	-	-	678
Stage 2	-	-	-	-	713
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1148	-	-	-	363
Mov Cap-2 Maneuver	-	-	-	-	475
Stage 1	-	-	-	-	653
Stage 2	-	-	-	-	709

Approach	EB	WB	SB
HCM Control Delay, s/v	1	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1148	-	-	-	574
HCM Lane V/C Ratio	0.031	-	-	-	0.063
HCM Control Delay (s/veh)	8.2	-	-	-	11.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0.1	-	-	-	0.2

HCM 6th Signalized Intersection Summary 3: Atlantic Ave & Challenger Dr



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	50	190	260	200	370	50
Future Volume (veh/h)	50	190	260	200	370	50
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.98	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	60	226	310	238	440	60
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	326	1109	333	256	486	432
Arrive On Green	0.18	0.59	0.34	0.34	0.27	0.27
Sat Flow, veh/h	1781	1870	971	745	1781	1585
Grp Volume(v), veh/h	60	226	0	548	440	60
Grp Sat Flow(s),veh/h/ln	1781	1870	0	1716	1781	1585
Q Serve(g_s), s	2.0	3.9	0.0	21.6	16.7	2.0
Cycle Q Clear(g_c), s	2.0	3.9	0.0	21.6	16.7	2.0
Prop In Lane	1.00			0.43	1.00	1.00
Lane Grp Cap(c), veh/h	326	1109	0	589	486	432
V/C Ratio(X)	0.18	0.20	0.00	0.93	0.91	0.14
Avail Cap(c_a), veh/h	326	1109	0	608	593	528
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.2	6.6	0.0	22.2	24.6	19.2
Incr Delay (d2), s/veh	0.1	0.4	0.0	20.7	14.1	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	1.5	0.0	11.5	8.6	2.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	24.3	7.0	0.0	42.9	38.7	19.3
LnGrp LOS	C	A		D	D	B
Approach Vol, veh/h		286	548		500	
Approach Delay, s/veh		10.6	42.9		36.3	
Approach LOS		B	D		D	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		46.2		23.8	17.5	28.7
Change Period (Y+Rc), s		4.7		4.7	4.7	* 4.7
Max Green Setting (Gmax), s		37.3		23.3	8.0	* 25
Max Q Clear Time (g_c+I1), s		5.9		18.7	4.0	23.6
Green Ext Time (p_c), s		1.2		0.4	0.0	0.4
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			33.5			
HCM 6th LOS			C			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

1: Wilma Chan Wy & Atlantic Ave

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	153	130	41	162	82	110	680	32	94	320	50
Future Volume (veh/h)	70	153	130	41	162	82	110	680	32	94	320	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	80	176	149	47	186	94	126	782	37	108	368	57
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	91	201	364	244	314	151	245	1740	82	243	1789	796
Arrive On Green	0.16	0.16	0.16	0.14	0.14	0.14	0.07	0.50	0.50	0.07	0.50	0.50
Sat Flow, veh/h	575	1266	1585	1781	2298	1101	3456	3453	163	3456	3554	1580
Grp Volume(v), veh/h	256	0	149	47	142	138	126	402	417	108	368	57
Grp Sat Flow(s),veh/h/ln	1842	0	1585	1781	1777	1622	1728	1777	1840	1728	1777	1580
Q Serve(g_s), s	19.0	0.0	11.2	3.3	10.5	11.3	4.9	20.3	20.3	4.2	8.0	2.6
Cycle Q Clear(g_c), s	19.0	0.0	11.2	3.3	10.5	11.3	4.9	20.3	20.3	4.2	8.0	2.6
Prop In Lane	0.31		1.00	1.00		0.68	1.00		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	293	0	364	244	243	222	245	895	927	243	1789	796
V/C Ratio(X)	0.87	0.00	0.41	0.19	0.58	0.62	0.51	0.45	0.45	0.44	0.21	0.07
Avail Cap(c_a), veh/h	487	0	531	483	482	440	395	895	927	259	1789	796
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.5	0.0	45.8	53.6	56.7	57.0	62.7	22.3	22.3	62.4	19.3	17.9
Incr Delay (d2), s/veh	5.7	0.0	0.3	0.2	1.0	1.3	0.6	1.6	1.6	0.5	0.3	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.4	0.0	4.5	1.5	4.8	4.8	2.2	9.1	9.4	1.9	3.5	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	63.2	0.0	46.2	53.7	57.7	58.3	63.3	23.9	23.8	62.9	19.5	18.1
LnGrp LOS	E		D	D	E	E	E	C	C	E	B	B
Approach Vol, veh/h		405			327			945			533	
Approach Delay, s/veh		56.9			57.4			29.1			28.2	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.9	75.6		26.8	13.9	75.5		23.8				
Change Period (Y+Rc), s	4.0	5.0		4.6	4.0	5.0		4.6				
Max Green Setting (Gmax), s	10.5	36.3		37.0	16.0	30.8		38.0				
Max Q Clear Time (g_c+I1), s	6.2	22.3		21.0	6.9	10.0		13.3				
Green Ext Time (p_c), s	0.1	3.4		1.2	0.1	1.8		1.3				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh				38.2								
HCM 6th LOS				D								
Notes												
User approved changes to right turn type.												

HCM 6th TWSC
 2: Atlantic Ave & Bartlett Dr

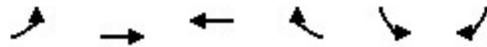
Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↗		↖	
Traffic Vol, veh/h	10	259	265	10	10	20
Future Vol, veh/h	10	259	265	10	10	20
Conflicting Peds, #/hr	9	0	0	3	3	9
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	30	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	288	294	11	11	22

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	314	0	-	0	622 318
Stage 1	-	-	-	-	309 -
Stage 2	-	-	-	-	313 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1246	-	-	-	450 723
Stage 1	-	-	-	-	745 -
Stage 2	-	-	-	-	741 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1235	-	-	-	438 711
Mov Cap-2 Maneuver	-	-	-	-	534 -
Stage 1	-	-	-	-	732 -
Stage 2	-	-	-	-	734 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.3	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1235	-	-	-	640
HCM Lane V/C Ratio	0.009	-	-	-	0.052
HCM Control Delay (s/veh)	7.9	-	-	-	10.9
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0	-	-	-	0.2

HCM 6th Signalized Intersection Summary 3: Atlantic Ave & Challenger Dr



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	31	232	225	240	150	32
Future Volume (veh/h)	31	232	225	240	150	32
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.97	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	249	242	258	161	34
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	634	1401	266	284	208	185
Arrive On Green	0.36	0.75	0.33	0.33	0.12	0.12
Sat Flow, veh/h	1781	1870	816	870	1781	1585
Grp Volume(v), veh/h	33	249	0	500	161	34
Grp Sat Flow(s),veh/h/ln	1781	1870	0	1686	1781	1585
Q Serve(g_s), s	0.9	2.7	0.0	19.9	6.1	1.4
Cycle Q Clear(g_c), s	0.9	2.7	0.0	19.9	6.1	1.4
Prop In Lane	1.00			0.52	1.00	1.00
Lane Grp Cap(c), veh/h	634	1401	0	550	208	185
V/C Ratio(X)	0.05	0.18	0.00	0.91	0.78	0.18
Avail Cap(c_a), veh/h	634	1401	0	602	588	523
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.8	2.5	0.0	22.6	30.0	27.9
Incr Delay (d2), s/veh	0.0	0.3	0.0	16.7	2.3	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.7	0.0	10.0	2.7	1.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	14.8	2.8	0.0	39.3	32.4	28.1
LnGrp LOS	B	A		D	C	C
Approach Vol, veh/h		282	500		195	
Approach Delay, s/veh		4.2	39.3		31.6	
Approach LOS		A	D		C	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		57.1		12.9	29.6	27.5
Change Period (Y+Rc), s		4.7		4.7	4.7	* 4.7
Max Green Setting (Gmax), s		37.5		23.1	8.0	* 25
Max Q Clear Time (g_c+I1), s		4.7		8.1	2.9	21.9
Green Ext Time (p_c), s		1.3		0.2	0.0	0.9
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			27.6			
HCM 6th LOS			C			
Notes						
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.						

HCM 6th TWSC
 4: Project Dwy & Atlantic Ave

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻		↻	↻	↻	
Traffic Vol, veh/h	250	9	7	260	5	3
Future Vol, veh/h	250	9	7	260	5	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	272	10	8	283	5	3

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	282	0	576 277
Stage 1	-	-	-	-	277 -
Stage 2	-	-	-	-	299 -
Critical Hdwy	-	-	4.12	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.218	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1280	-	479 762
Stage 1	-	-	-	-	770 -
Stage 2	-	-	-	-	752 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1280	-	476 762
Mov Cap-2 Maneuver	-	-	-	-	563 -
Stage 1	-	-	-	-	770 -
Stage 2	-	-	-	-	747 -

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.2	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	624	-	-	1280	-
HCM Lane V/C Ratio	0.014	-	-	0.006	-
HCM Control Delay (s/veh)	10.9	-	-	7.8	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q (veh)	0	-	-	0	-

HCM 6th Signalized Intersection Summary

1: Wilma Chan Wy & Atlantic Ave

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	147	210	105	147	118	140	450	45	88	970	70
Future Volume (veh/h)	70	147	210	105	147	118	140	450	45	88	970	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	74	155	221	111	155	124	147	474	47	93	1021	74
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	187	350	251	272	201	246	1663	164	240	1805	803
Arrive On Green	0.15	0.15	0.15	0.14	0.14	0.14	0.07	0.51	0.51	0.07	0.51	0.51
Sat Flow, veh/h	595	1246	1585	1781	1924	1423	3456	3263	322	3456	3554	1580
Grp Volume(v), veh/h	229	0	221	111	142	137	147	257	264	93	1021	74
Grp Sat Flow(s),veh/h/ln	1841	0	1585	1781	1777	1570	1728	1777	1808	1728	1777	1580
Q Serve(g_s), s	16.9	0.0	17.7	8.0	10.5	11.5	5.8	11.6	11.7	3.6	27.8	3.4
Cycle Q Clear(g_c), s	16.9	0.0	17.7	8.0	10.5	11.5	5.8	11.6	11.7	3.6	27.8	3.4
Prop In Lane	0.32		1.00	1.00		0.91	1.00		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	276	0	350	251	251	222	246	905	921	240	1805	803
V/C Ratio(X)	0.83	0.00	0.63	0.44	0.57	0.62	0.60	0.28	0.29	0.39	0.57	0.09
Avail Cap(c_a), veh/h	486	0	532	483	482	426	259	905	921	259	1805	803
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.8	0.0	49.4	55.1	56.1	56.6	63.1	19.7	19.7	62.3	23.8	17.8
Incr Delay (d2), s/veh	3.0	0.0	0.9	0.6	0.9	1.3	2.2	0.8	0.8	0.4	1.3	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	0.0	7.2	3.7	4.8	4.7	2.6	5.1	5.3	1.6	12.1	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	60.8	0.0	50.2	55.6	57.1	57.9	65.3	20.5	20.5	62.7	25.1	18.0
LnGrp LOS	E		D	E	E	E	E	C	C	E	C	B
Approach Vol, veh/h		450			390			668			1188	
Approach Delay, s/veh		55.6			56.9			30.3			27.6	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.7	76.3		25.6	14.0	76.1		24.4				
Change Period (Y+Rc), s	4.0	5.0		4.6	4.0	5.0		4.6				
Max Green Setting (Gmax), s	10.5	36.3		37.0	10.5	36.3		38.0				
Max Q Clear Time (g_c+I1), s	5.6	13.7		19.7	7.8	29.8		13.5				
Green Ext Time (p_c), s	0.0	2.3		1.3	0.1	3.1		1.4				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh				37.2								
HCM 6th LOS				D								
Notes												
User approved changes to right turn type.												

HCM 6th TWSC
 2: Atlantic Ave & Bartlett Dr

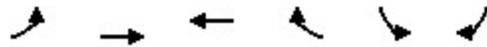
Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↗		↖	
Traffic Vol, veh/h	30	250	340	10	10	20
Future Vol, veh/h	30	250	340	10	10	20
Conflicting Peds, #/hr	6	0	0	2	2	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	30	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	301	410	12	12	24

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	428	0	-	0	797
Stage 1	-	-	-	-	422
Stage 2	-	-	-	-	375
Critical Hdwy	4.12	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.218	-	-	-	3.518
Pot Cap-1 Maneuver	1131	-	-	-	356
Stage 1	-	-	-	-	662
Stage 2	-	-	-	-	695
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1125	-	-	-	340
Mov Cap-2 Maneuver	-	-	-	-	457
Stage 1	-	-	-	-	637
Stage 2	-	-	-	-	691

Approach	EB	WB	SB
HCM Control Delay, s/v	0.9	0	12
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1125	-	-	-	554
HCM Lane V/C Ratio	0.032	-	-	-	0.065
HCM Control Delay (s/veh)	8.3	-	-	-	12
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0.1	-	-	-	0.2

HCM 6th Signalized Intersection Summary 3: Atlantic Ave & Challenger Dr



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	53	200	270	200	370	53
Future Volume (veh/h)	53	200	270	200	370	53
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.98	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	63	238	321	238	440	63
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	318	1109	343	254	486	432
Arrive On Green	0.18	0.59	0.35	0.35	0.27	0.27
Sat Flow, veh/h	1781	1870	987	732	1781	1585
Grp Volume(v), veh/h	63	238	0	559	440	63
Grp Sat Flow(s),veh/h/ln	1781	1870	0	1719	1781	1585
Q Serve(g_s), s	2.1	4.2	0.0	22.0	16.7	2.1
Cycle Q Clear(g_c), s	2.1	4.2	0.0	22.0	16.7	2.1
Prop In Lane	1.00			0.43	1.00	1.00
Lane Grp Cap(c), veh/h	318	1109	0	597	486	432
V/C Ratio(X)	0.20	0.21	0.00	0.94	0.91	0.15
Avail Cap(c_a), veh/h	318	1109	0	609	593	528
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.5	6.6	0.0	22.1	24.6	19.3
Incr Delay (d2), s/veh	0.1	0.4	0.0	21.8	14.1	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	1.6	0.0	11.9	8.6	2.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	24.6	7.1	0.0	43.9	38.7	19.3
LnGrp LOS	C	A		D	D	B
Approach Vol, veh/h		301	559		503	
Approach Delay, s/veh		10.7	43.9		36.2	
Approach LOS		B	D		D	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		46.2		23.8	17.2	29.0
Change Period (Y+Rc), s		4.7		4.7	4.7	* 4.7
Max Green Setting (Gmax), s		37.3		23.3	8.0	* 25
Max Q Clear Time (g_c+I1), s		6.2		18.7	4.1	24.0
Green Ext Time (p_c), s		1.2		0.4	0.0	0.3
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			33.7			
HCM 6th LOS			C			
Notes						
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.						

HCM 6th TWSC
 4: Project Dwy & Atlantic Ave

Intersection						
Int Delay, s/veh	0.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶		↷	↶	↷	
Traffic Vol, veh/h	230	20	13	330	20	13
Future Vol, veh/h	230	20	13	330	20	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	250	22	14	359	22	14

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	272	0	648 261
Stage 1	-	-	-	-	261 -
Stage 2	-	-	-	-	387 -
Critical Hdwy	-	-	4.12	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.218	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1291	-	435 778
Stage 1	-	-	-	-	783 -
Stage 2	-	-	-	-	686 -
Platoon blocked, %	-	-	-	-	
Mov Cap-1 Maneuver	-	-	1291	-	430 778
Mov Cap-2 Maneuver	-	-	-	-	525 -
Stage 1	-	-	-	-	783 -
Stage 2	-	-	-	-	678 -

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.3	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	602	-	-	1291	-
HCM Lane V/C Ratio	0.06	-	-	0.011	-
HCM Control Delay (s/veh)	11.4	-	-	7.8	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q (veh)	0.2	-	-	0	-

HCM 6th Signalized Intersection Summary

1: Wilma Chan Wy & Atlantic Ave

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	195	130	64	192	120	110	680	64	146	320	50
Future Volume (veh/h)	70	195	130	64	192	120	110	680	64	146	320	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	80	224	149	74	221	138	126	782	74	168	368	57
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	90	251	405	281	334	198	245	1496	142	246	1623	721
Arrive On Green	0.18	0.18	0.18	0.16	0.16	0.16	0.07	0.46	0.46	0.07	0.46	0.46
Sat Flow, veh/h	486	1360	1585	1781	2115	1255	3456	3279	310	3456	3554	1580
Grp Volume(v), veh/h	304	0	149	74	184	175	126	424	432	168	368	57
Grp Sat Flow(s),veh/h/ln	1846	0	1585	1781	1777	1593	1728	1777	1812	1728	1777	1580
Q Serve(g_s), s	22.5	0.0	10.8	5.1	13.6	14.6	4.9	23.8	23.9	6.6	8.8	2.8
Cycle Q Clear(g_c), s	22.5	0.0	10.8	5.1	13.6	14.6	4.9	23.8	23.9	6.6	8.8	2.8
Prop In Lane	0.26		1.00	1.00		0.79	1.00		0.17	1.00		1.00
Lane Grp Cap(c), veh/h	341	0	405	281	281	252	245	811	827	246	1623	721
V/C Ratio(X)	0.89	0.00	0.37	0.26	0.66	0.70	0.51	0.52	0.52	0.68	0.23	0.08
Avail Cap(c_a), veh/h	488	0	531	483	482	432	395	811	827	259	1623	721
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.7	0.0	42.8	51.8	55.4	55.8	62.7	27.2	27.2	63.5	23.1	21.4
Incr Delay (d2), s/veh	11.4	0.0	0.3	0.2	1.2	1.6	0.6	2.4	2.4	5.3	0.3	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.6	0.0	4.4	2.3	6.3	6.0	2.2	10.8	11.0	3.1	3.9	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	67.1	0.0	43.1	52.0	56.6	57.4	63.3	29.6	29.5	68.8	23.4	21.7
LnGrp LOS	E		D	D	E	E	E	C	C	E	C	C
Approach Vol, veh/h		453			433			982			593	
Approach Delay, s/veh		59.2			56.1			33.9			36.1	
Approach LOS		E			E			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	14.0	68.9		30.4	13.9	68.9		26.7				
Change Period (Y+Rc), s	4.0	5.0		4.6	4.0	5.0		4.6				
Max Green Setting (Gmax), s	10.5	36.3		37.0	16.0	30.8		38.0				
Max Q Clear Time (g_c+I1), s	8.6	25.9		24.5	6.9	10.8		16.6				
Green Ext Time (p_c), s	0.0	3.1		1.3	0.1	1.8		1.7				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			43.0									
HCM 6th LOS			D									
Notes												
User approved changes to right turn type.												

HCM 6th TWSC
2: Atlantic Ave & Bartlett Dr

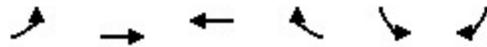
Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑	↗		↘	
Traffic Vol, veh/h	10	385	356	10	10	20
Future Vol, veh/h	10	385	356	10	10	20
Conflicting Peds, #/hr	9	0	0	3	3	9
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	30	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	428	396	11	11	22

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	416	0	-	0	864 420
Stage 1	-	-	-	-	411 -
Stage 2	-	-	-	-	453 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1143	-	-	-	325 633
Stage 1	-	-	-	-	669 -
Stage 2	-	-	-	-	640 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1133	-	-	-	316 622
Mov Cap-2 Maneuver	-	-	-	-	438 -
Stage 1	-	-	-	-	656 -
Stage 2	-	-	-	-	634 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.2	0	12
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1133	-	-	-	546
HCM Lane V/C Ratio	0.01	-	-	-	0.061
HCM Control Delay (s/veh)	8.2	-	-	-	12
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0	-	-	-	0.2

HCM 6th Signalized Intersection Summary 3: Atlantic Ave & Challenger Dr



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	46	276	288	240	150	53
Future Volume (veh/h)	46	276	288	240	150	53
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.97	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	49	297	310	258	161	57
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	583	1399	329	274	210	187
Arrive On Green	0.33	0.75	0.35	0.35	0.12	0.12
Sat Flow, veh/h	1781	1870	931	775	1781	1585
Grp Volume(v), veh/h	49	297	0	568	161	57
Grp Sat Flow(s),veh/h/ln	1781	1870	0	1707	1781	1585
Q Serve(g_s), s	1.3	3.3	0.0	22.6	6.1	2.3
Cycle Q Clear(g_c), s	1.3	3.3	0.0	22.6	6.1	2.3
Prop In Lane	1.00			0.45	1.00	1.00
Lane Grp Cap(c), veh/h	583	1399	0	603	210	187
V/C Ratio(X)	0.08	0.21	0.00	0.94	0.77	0.31
Avail Cap(c_a), veh/h	583	1399	0	609	588	523
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.3	2.6	0.0	21.9	29.9	28.2
Incr Delay (d2), s/veh	0.0	0.3	0.0	22.8	2.2	0.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.9	0.0	12.3	2.7	2.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	16.3	3.0	0.0	44.8	32.1	28.6
LnGrp LOS	B	A		D	C	C
Approach Vol, veh/h		346	568		218	
Approach Delay, s/veh		4.9	44.8		31.2	
Approach LOS		A	D		C	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		57.0		13.0	27.6	29.4
Change Period (Y+Rc), s		4.7		4.7	4.7	* 4.7
Max Green Setting (Gmax), s		37.5		23.1	8.0	* 25
Max Q Clear Time (g_c+I1), s		5.3		8.1	3.3	24.6
Green Ext Time (p_c), s		1.6		0.2	0.0	0.2
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			30.0			
HCM 6th LOS			C			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
 4: Project Dwy & Atlantic Ave

Intersection						
Int Delay, s/veh	3.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶		↷	↶	↷	
Traffic Vol, veh/h	250	135	91	260	96	62
Future Vol, veh/h	250	135	91	260	96	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	272	147	99	283	104	67

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	419	0	827 346
Stage 1	-	-	-	-	346 -
Stage 2	-	-	-	-	481 -
Critical Hdwy	-	-	4.12	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.218	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1140	-	341 697
Stage 1	-	-	-	-	716 -
Stage 2	-	-	-	-	622 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1140	-	311 697
Mov Cap-2 Maneuver	-	-	-	-	427 -
Stage 1	-	-	-	-	716 -
Stage 2	-	-	-	-	568 -

Approach	EB	WB	NB
HCM Control Delay, s/v	0	2.2	15.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	504	-	-	1140	-
HCM Lane V/C Ratio	0.341	-	-	0.087	-
HCM Control Delay (s/veh)	15.8	-	-	8.5	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q (veh)	1.5	-	-	0.3	-

HCM 6th Signalized Intersection Summary

1: Wilma Chan Wy & Atlantic Ave

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	152	210	113	158	132	140	450	49	95	970	70
Future Volume (veh/h)	70	152	210	113	158	132	140	450	49	95	970	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	74	160	221	119	166	139	147	474	52	100	1021	74
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	87	189	350	263	278	216	246	1621	177	242	1780	792
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.07	0.50	0.50	0.07	0.50	0.50
Sat Flow, veh/h	582	1259	1585	1781	1881	1460	3456	3227	352	3456	3554	1580
Grp Volume(v), veh/h	234	0	221	119	156	149	147	260	266	100	1021	74
Grp Sat Flow(s),veh/h/ln	1841	0	1585	1781	1777	1565	1728	1777	1802	1728	1777	1580
Q Serve(g_s), s	17.3	0.0	17.7	8.5	11.5	12.5	5.8	12.0	12.1	3.9	28.2	3.4
Cycle Q Clear(g_c), s	17.3	0.0	17.7	8.5	11.5	12.5	5.8	12.0	12.1	3.9	28.2	3.4
Prop In Lane	0.32		1.00	1.00		0.93	1.00		0.20	1.00		1.00
Lane Grp Cap(c), veh/h	276	0	350	263	263	231	246	892	905	242	1780	792
V/C Ratio(X)	0.85	0.00	0.63	0.45	0.59	0.64	0.60	0.29	0.29	0.41	0.57	0.09
Avail Cap(c_a), veh/h	487	0	532	483	482	425	259	892	905	259	1780	792
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.0	0.0	49.3	54.5	55.7	56.2	63.1	20.3	20.3	62.4	24.5	18.3
Incr Delay (d2), s/veh	3.4	0.0	0.9	0.6	1.0	1.4	2.2	0.8	0.8	0.4	1.3	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	0.0	7.2	3.9	5.3	5.1	2.6	5.3	5.4	1.7	12.3	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	61.4	0.0	50.2	55.0	56.7	57.5	65.3	21.1	21.2	62.8	25.8	18.5
LnGrp LOS	E		D	E	E	E	E	C	C	E	C	B
Approach Vol, veh/h		455			424			673			1195	
Approach Delay, s/veh		55.9			56.5			30.8			28.4	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.8	75.3		25.6	14.0	75.1		25.3				
Change Period (Y+Rc), s	4.0	5.0		4.6	4.0	5.0		4.6				
Max Green Setting (Gmax), s	10.5	36.3		37.0	10.5	36.3		38.0				
Max Q Clear Time (g_c+I1), s	5.9	14.1		19.7	7.8	30.2		14.5				
Green Ext Time (p_c), s	0.0	2.3		1.3	0.1	3.0		1.5				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh				37.9								
HCM 6th LOS				D								
Notes												
User approved changes to right turn type.												

HCM 6th TWSC
 2: Atlantic Ave & Bartlett Dr

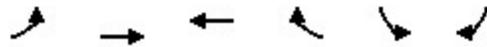
Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↗		↘	
Traffic Vol, veh/h	30	266	373	10	10	20
Future Vol, veh/h	30	266	373	10	10	20
Conflicting Peds, #/hr	6	0	0	2	2	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	30	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	320	449	12	12	24

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	467	0	-	0	855 467
Stage 1	-	-	-	-	461 -
Stage 2	-	-	-	-	394 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1094	-	-	-	329 596
Stage 1	-	-	-	-	635 -
Stage 2	-	-	-	-	681 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1088	-	-	-	314 589
Mov Cap-2 Maneuver	-	-	-	-	435 -
Stage 1	-	-	-	-	610 -
Stage 2	-	-	-	-	677 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.9	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1088	-	-	-	527
HCM Lane V/C Ratio	0.033	-	-	-	0.069
HCM Control Delay (s/veh)	8.4	-	-	-	12.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0.1	-	-	-	0.2

HCM 6th Signalized Intersection Summary 3: Atlantic Ave & Challenger Dr



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	59	216	278	200	370	56
Future Volume (veh/h)	59	216	278	200	370	56
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.98	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	70	257	331	238	440	67
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	311	1109	352	253	486	432
Arrive On Green	0.17	0.59	0.35	0.35	0.27	0.27
Sat Flow, veh/h	1781	1870	1001	720	1781	1585
Grp Volume(v), veh/h	70	257	0	569	440	67
Grp Sat Flow(s),veh/h/ln	1781	1870	0	1721	1781	1585
Q Serve(g_s), s	2.4	4.5	0.0	22.4	16.7	2.2
Cycle Q Clear(g_c), s	2.4	4.5	0.0	22.4	16.7	2.2
Prop In Lane	1.00			0.42	1.00	1.00
Lane Grp Cap(c), veh/h	311	1109	0	604	486	432
V/C Ratio(X)	0.22	0.23	0.00	0.94	0.91	0.15
Avail Cap(c_a), veh/h	311	1109	0	610	593	528
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.8	6.7	0.0	22.0	24.6	19.3
Incr Delay (d2), s/veh	0.1	0.5	0.0	22.8	14.1	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	1.7	0.0	12.3	8.6	2.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	24.9	7.2	0.0	44.8	38.6	19.4
LnGrp LOS	C	A		D	D	B
Approach Vol, veh/h		327	569		507	
Approach Delay, s/veh		11.0	44.8		36.1	
Approach LOS		B	D		D	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		46.2		23.8	16.9	29.3
Change Period (Y+Rc), s		4.7		4.7	4.7	* 4.7
Max Green Setting (Gmax), s		37.3		23.3	8.0	* 25
Max Q Clear Time (g_c+I1), s		6.5		18.7	4.4	24.4
Green Ext Time (p_c), s		1.3		0.4	0.0	0.1
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			33.8			
HCM 6th LOS			C			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC
 4: Project Dwy & Atlantic Ave

Intersection						
Int Delay, s/veh	1.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	230	36	24	330	53	35
Future Vol, veh/h	230	36	24	330	53	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	250	39	26	359	58	38

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	289	0	681 270
Stage 1	-	-	-	-	270 -
Stage 2	-	-	-	-	411 -
Critical Hdwy	-	-	4.12	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.218	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1273	-	416 769
Stage 1	-	-	-	-	775 -
Stage 2	-	-	-	-	669 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1273	-	408 769
Mov Cap-2 Maneuver	-	-	-	-	508 -
Stage 1	-	-	-	-	775 -
Stage 2	-	-	-	-	656 -

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.5	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	587	-	-	1273	-
HCM Lane V/C Ratio	0.163	-	-	0.02	-
HCM Control Delay (s/veh)	12.3	-	-	7.9	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q (veh)	0.6	-	-	0.1	-

EXHIBIT L
Perimeter Enclosure Cladding Diagram

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EXHIBIT M
Proposed Stormwater Conveyance System

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TECHNICAL MEMORANDUM

Date: 05/28/2025 **BKF Job Number:** C240076

Deliver To: Alameda County Flood Control & Water Conservation District

From: Chris McNutt, P.E.

Subject: Alameda Aquatic Center – Proposed Stormwater Conveyance System

Purpose

The purpose of this memorandum is to provide a brief summary of the requested hydrology and hydraulic calculations for this project. The provided calculations were performed to ensure that the proposed stormwater conveyance system will function adequately during the 10-year storm event.

Background

The existing site is an undeveloped ~2.33 acre site located at 800 Atlantic Avenue in the Jean Sweeney Open Space Park. The site will be accessed by a new curb cut/driveway on from Atlantic Avenue. No hydromodification/flow control will be required for this project.

The existing site slopes from East to West and has an existing storm main running along its southern boundary. The site currently drains East to West via overland release, with no existing operational stormwater infrastructure on-site. Storm crossings were built running beneath the Jean Sweeney Open Space Park trail in advance of the proposed Alameda Aquatic Center project. These crossings will be utilized to tie the proposed stormwater conveyance system into the existing main that runs along the project's southern boundary.

In the proposed condition, the site will still drain from East to West, with one "backbone" conveyance pipe running through the length of the site before it outfalls into the proposed bioretention area located on the site's western boundary.

Analysis

The proposed site has been analyzed pursuant to the Alameda County Hydrology and Hydraulics (ACHH) Manual. Because the site is <320 acres in size, the "District Rational Excel" form was used to analyze the proposed stormwater conveyance system on site. The calculations show that the proposed on-site stormwater conveyance system is sized appropriately for conveyance of the 10-year storm event. Lines are designated in the ACHH excel form and key noted in the Conveyance Calculations Key Map (Attachment B). The criteria below were used as assumptions and variables in the district excel form:

Per Chapter 5 of the Alameda County Hydrology and Hydraulics Criteria Manual:

- The design storm for secondary facilities which have tributary area of less than 50 acres will be the 10-year recurrence interval.
- C value of 0.9 is assumed for all impervious surfaces.
- The mean annual precipitation value of 20.5" was found using Attachment 6 of the ACHH Manual.

- Minimum Tc of 5 minutes.

Conclusion

Pursuant to the ACHH manual, all proposed pipes were found to be sized adequately to convey the 10-year storm event offsite and into the public storm main.

Attachments

- A. Proposed Grading, Utility, and Stormwater Management Plans
- B. Conveyance Calculations Key Map
- C. District Rational Excel Form Calculations



PROJECT:
ALAMEDA AQUATIC CENTER

JEAN SWEENEY
OPEN SPACE PARK
800 ATLANTIC AVENUE
ALAMEDA, CA 94501

PROJECT NUMBER:
202403

CLIENT:
CITY OF ALAMEDA
2226 SANTA CLARA AVENUE
ALAMEDA, CA 94501

PROJECT TEAM:
ARCHITECT:
ELS ARCHITECTURE AND URBAN DESIGN
2040 Addison Street
Berkeley, CA 94704
P: 510.549.2929

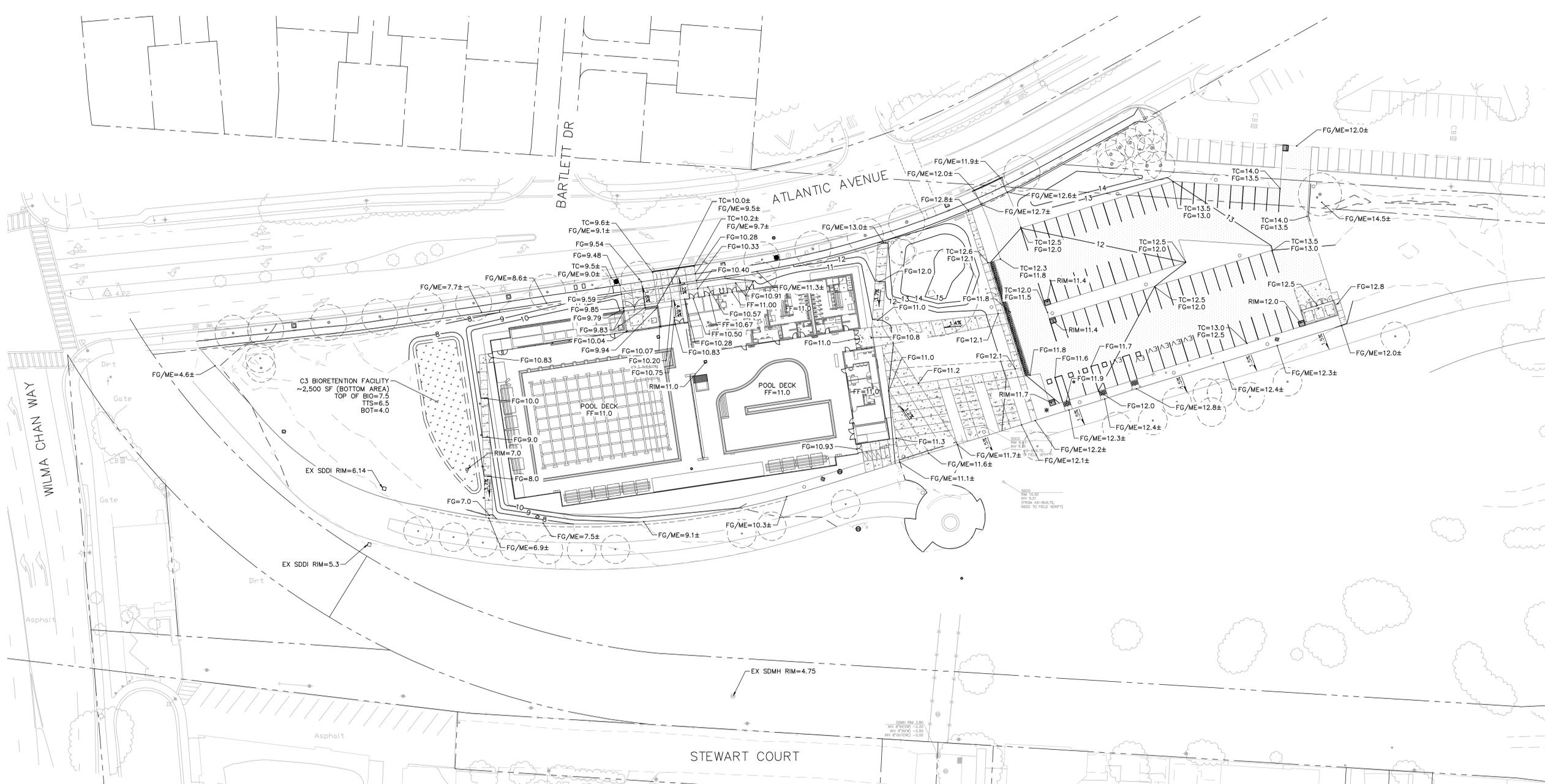
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San Francisco, CA 94111
P: 415.655.4000

AQUATICS:
AQUATICS DESIGN GROUP
2226 Faraday Avenue
Carlsbad, CA 92008
P: 760.438.8400



- NOTES:**
- CONTRACTOR SHALL VERIFY EXACT LOCATION OF ALL UNDERGROUND UTILITIES PRIOR COMMENCEMENT OF WORK.
 - ALL EXISTING UTILITY VAULTS AND BOXES TO BE PROTECTED SHALL BE ADJUSTED TO FINISHED GRADE.
 - CONTRACTOR TO CONTACT USA AT (800) 247-2600 AT LEAST 48 HOURS PRIOR TO ANY UTILITY REMOVAL OR EXCAVATION.
 - ALL WORK SHALL CONFORM TO CURRENT CITY STANDARD PLANS AND SPECIFICATIONS, UNLESS OTHERWISE NOTED AND APPROVED.
 - ALL MATERIAL SHALL COMPLY WITH LATEST AVAILABLE CITY STANDARDS OR BETTER.

ABBREVIATIONS:

AC	ASPHALT CONCRETE
BOT	BOTTOM OF BIORETENTION/BOTTOM OF WALL
BW	BACK OF WALK
C3	CONTRA COSTA COUNTY CLEAN WATER PROGRAM
EX	EXISTING
FF	FINISHED FLOOR
FG	FINISHED GRADE
FL	FLOWLINE
HP	HIGH POINT
LG	LIP OF GUTTER
LF	LINEAR FEET
ME	MATCH EXISTING
RIM	RIM ELEVATION
SDCB	STORM DRAIN CATCH BASIN
SDDI	STORM DRAIN INLET
SLP	SEE LANDSCAPE PLAN
SSWR	SANITARY SEWER
TC	TOP OF CURB
TOP	TOP OF BIORETENTION
TTS	TOP OF TREATMENT SOIL
TW	TOP OF WALL

LEGEND:

---	PROPERTY LINE
- - - - -	LIMIT OF WORK LINE
□	PROPOSED WATER METER
⊙	EXISTING STORM MANHOLE
⊙	EXISTING SANITARY MANHOLE
■	CATCH BASIN
FG=XX.XX	SPOT ELEVATION
○	AREA/PLAZA DRAIN
○	SANITARY CLEANOUT
---	PROPOSED CONTOUR (MAJOR)
- - - - -	PROPOSED CONTOUR (MINOR)
---	EXISTING CONTOUR (MAJOR)
- - - - -	EXISTING CONTOUR (MINOR)

REVISION:

NUMBER	DATE	DESCRIPTION

KEY PLAN:

ISSUE:
25% DD

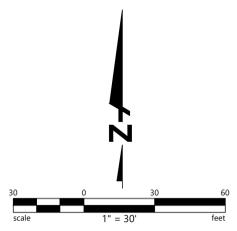
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MAY 16, 2025

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SHEET TITLE:
GRADING PLAN

SHEET NUMBER:
C4.0



PROJECT:
ALAMEDA AQUATIC CENTER

JEAN SWEENEY
OPEN SPACE PARK
800 ATLANTIC AVENUE
ALAMEDA, CA 94501

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202403

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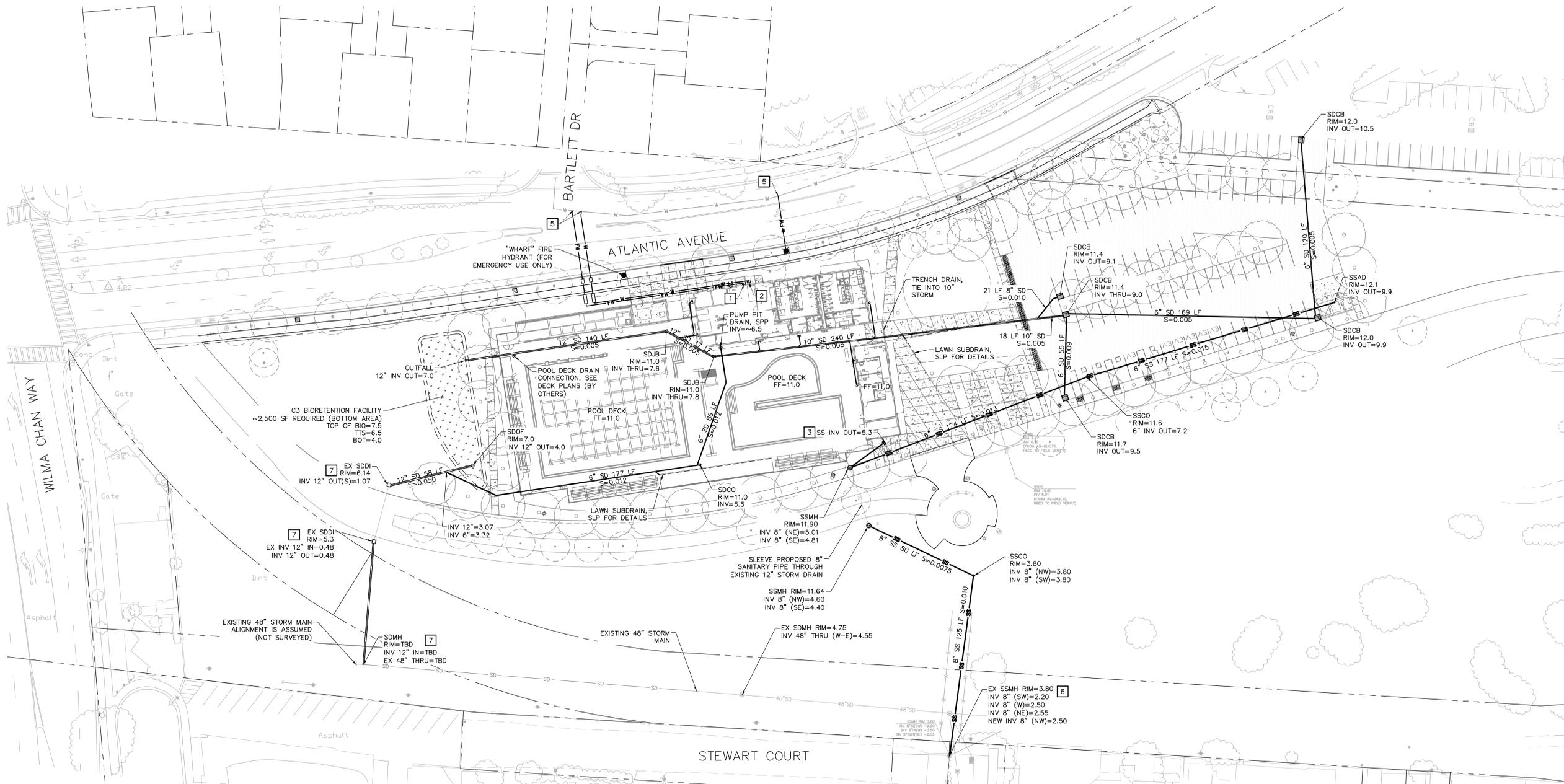
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NOT FOR CONSTRUCTION

SHEET TITLE:
UTILITY PLAN

SHEET NUMBER:
C5.0

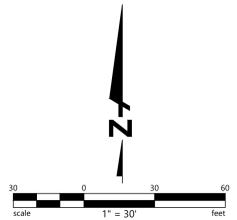


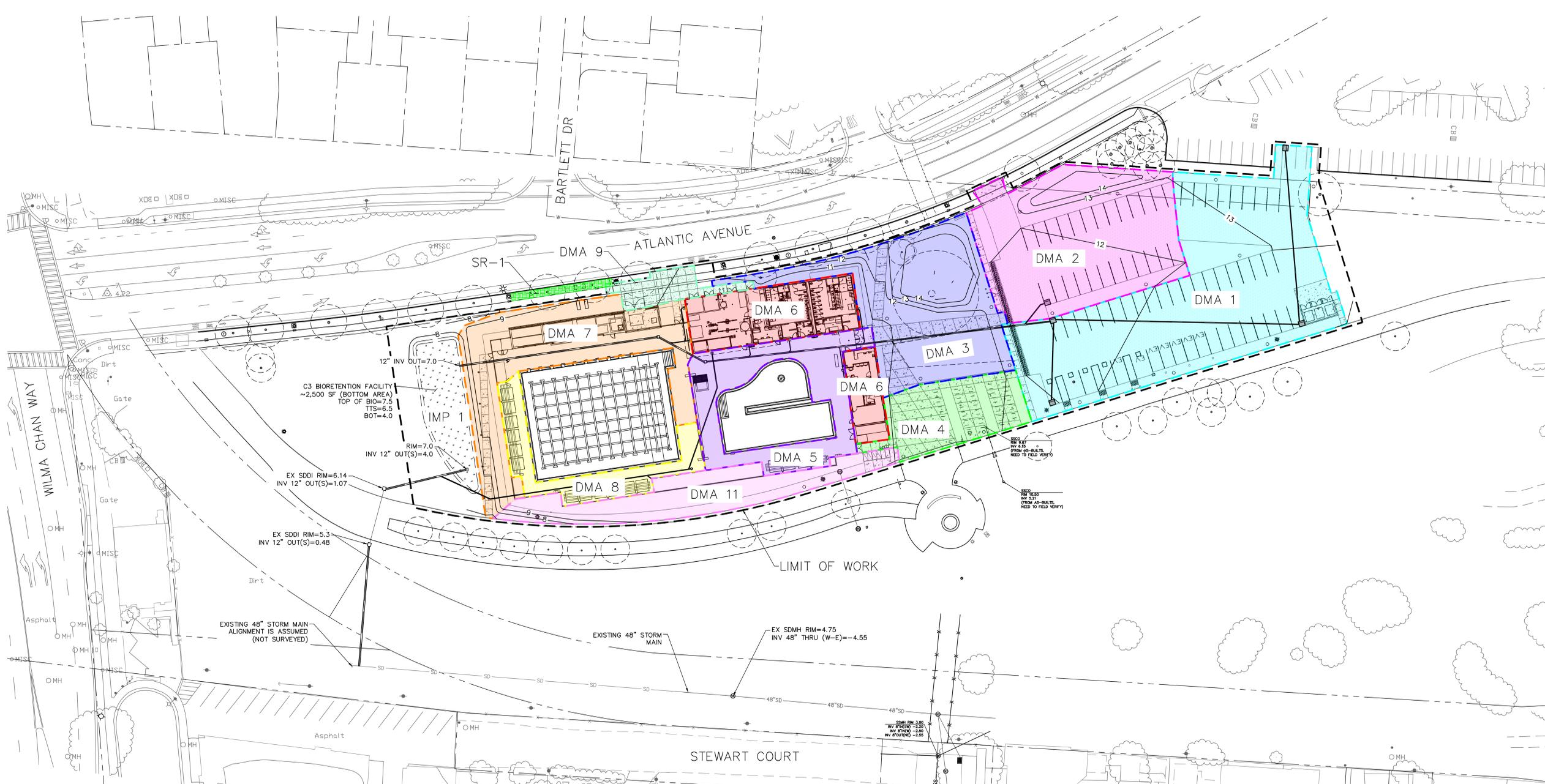
- NOTES:**
- CONTRACTOR SHALL VERIFY EXACT LOCATION OF ALL UNDERGROUND UTILITIES PRIOR COMMENCEMENT OF WORK.
 - ALL EXISTING UTILITY VAULTS AND BOXES TO BE PROTECTED SHALL BE ADJUSTED TO FINISHED GRADE.
 - CONTRACTOR TO CONTACT USA AT (800) 247-2600 AT LEAST 48 HOURS PRIOR TO ANY UTILITY REMOVAL OR EXCAVATION.
 - NON-WET UTILITIES AND UTILITIES SHOWN WITHIN THE BUILDING ON THIS PLAN AND FOR COORDINATION ONLY. CONTRACTOR TO REFER TO APPROPRIATE DISCIPLINES FOR THEIR RESPECTIVE UTILITY DESIGN.
 - ALL BUILDING DOWNSPOUTS MUST BE PIPED TO THE STORM DRAIN BUILDING LATERAL AND PIPED TO TREATMENT AREAS.
 - ALL WATER LATERALS SHALL BE LEVEL. IF A LOCAL HIGH POINT OCCURS, CONTRACTOR SHALL INSTALL BLOW OFF VALVE.
 - ALL WORK SHALL CONFORM TO CURRENT CITY STANDARD PLANS AND SPECIFICATIONS, UNLESS OTHERWISE NOTED AND APPROVED.
 - ALL MATERIAL SHALL COMPLY WITH LATEST AVAILABLE CITY STANDARDS OR BETTER.

- ABBREVIATIONS:**
- | | |
|------|---|
| C3 | CONTRA COSTA COUNTY CLEAN WATER PROGRAM |
| EX | EXISTING |
| INV | INVERT |
| RIM | RIM ELEVATION |
| SAP | SEE ARCHITECTURAL PLANS |
| SD | STORM DRAIN |
| SDCB | STORM DRAIN CATCH BASIN |
| SDDI | STORM DRAIN INLET |
| SLP | SEE LANDSCAPE PLANS |
| SPP | SEE PLUMBING PLANS |
| SSWR | SANITARY SEWER |
| TC | TOP OF CURB |
| TD | TRENCH DRAIN |
| TOP | TOP OF BIORETENTION |
| TTS | TOP OF TREATMENT SOIL |

- LEGEND:**
- | | |
|-----|-------------------------------------|
| --- | PROPERTY LINE |
| --- | LIMIT OF WORK LINE |
| --- | EXISTING STORM LINE |
| --- | NEW STORM LINE |
| --- | EXISTING SANITARY LINE |
| --- | PROPOSED SANITARY LINE |
| --- | PROPOSED WATER LINE |
| --- | PROPOSED FIRE WATER LINE |
| --- | PROPOSED WATER METER |
| --- | PROPOSED BACKFLOW PREVENTER |
| ⊙ | EXISTING STORM MANHOLE |
| ⊙ | EXISTING SANITARY MANHOLE |
| ⊙ | PROPOSED CATCH BASIN |
| ⊙ | PROPOSED AREA/PLAZA DRAIN |
| ⊙ | PROPOSED SANITARY CLEANOUT |
| ⊙ | PROPOSED FIRE HYDRANT |
| ⊙ | PROPOSED WATER VALVE |
| ⊙ | PROPOSED FIRE DEPARTMENT CONNECTION |
| ⊙ | PROPOSED STORM DRAIN JUNCTION BOX |

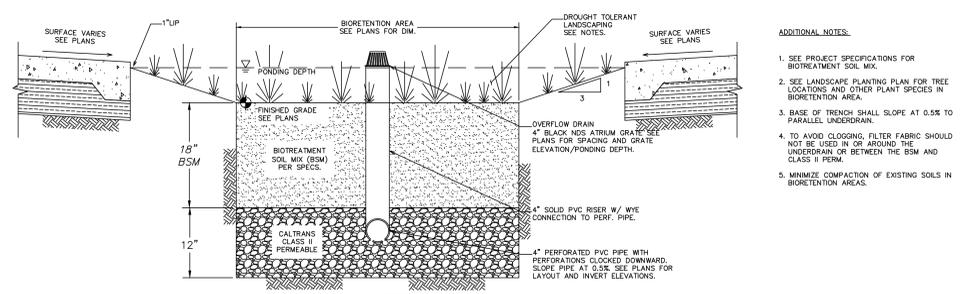
- KEYNOTES:**
- FIRE WATER POINT OF CONNECTION
 - DOMESTIC WATER POINT OF CONNECTION
 - SANITARY SEWER POINT OF CONNECTION
 - STORM DRAIN POINT OF CONNECTION
 - CONNECT TO EXISTING WATER LINE
 - CONNECT TO EXISTING SANITARY SEWER LINE
 - CONNECT TO EXISTING STORM DRAIN LINE





DMA	IMPERVIOUS AREA (SF)	PERVIOUS AREA (SF)	TREATMENT REQUIRED (SF)	DRAINS TO DMA	TREATMENT PROVIDED (SF)
DMA 1	17,311	3,306	706	IMP-1	706
DMA 2	8,685	3,992	363	IMP-1	365
DMA 3	1,915	8,614	111	IMP-1	115
DMA 4	3,358	1,014	138	IMP-1	140
DMA 5	5,811	-	232	IMP-1	235
DMA 6 (ROOF AREA)	6,105	-	244	IMP-1	245
DMA 7	5,108	4,135	245	IMP-1	250
DMA 8	3,320	-	133	IMP-1	135
**DMA 9	1,444	-	*328	SR-1	385
DMA 11	-	5,516	22	IMP-1	22
TOTAL	53,057	26,577	2,225	IMP-1	2,500

- GENERAL NOTES:**
- ALL ELEVATIONS SHOWN ARE SCHEMATIC AND BASED ON EXISTING GRADE INFORMATION.
 - ALL PROPOSED UTILITY ALIGNMENTS ARE SCHEMATIC.
- STORMWATER MANAGEMENT NOTES:**
- PER C3 STORMWATER MANAGEMENT MANUAL, THE POOL AREAS DRAINING/OVERFLOWING TO SANITARY SEWER ARE NOT CONSIDERED IMPERVIOUS AREAS.
 - *TREATMENT REQUIRED IS BASED ON C3 SIMPLIFIED SIZING METHODOLOGY FOR TREATMENT ONLY. THIS IS EQUIVALENT TO 4% OF THE PROPOSED IMPERVIOUS AREA FOR EACH RESPECTIVE DMA. 10% OF THE PERVIOUS AREA FROM EACH DMA IS ADDED TO THE TOTAL IMPERVIOUS AREA FOR TREATMENT CALCULATIONS.
 - **DMA-9 WILL BE DRAINED TO THE ADJACENT TREE WELLS THAT WILL SERVE AS A SELF-RETAINING AREA PER C3 TREATMENT REQUIREMENTS.



1 X BIORETENTION AREA WITH UNDERDRAIN

NUMBER	DATE	DESCRIPTION

KEY PLAN:

ISSUE: **25% DD**

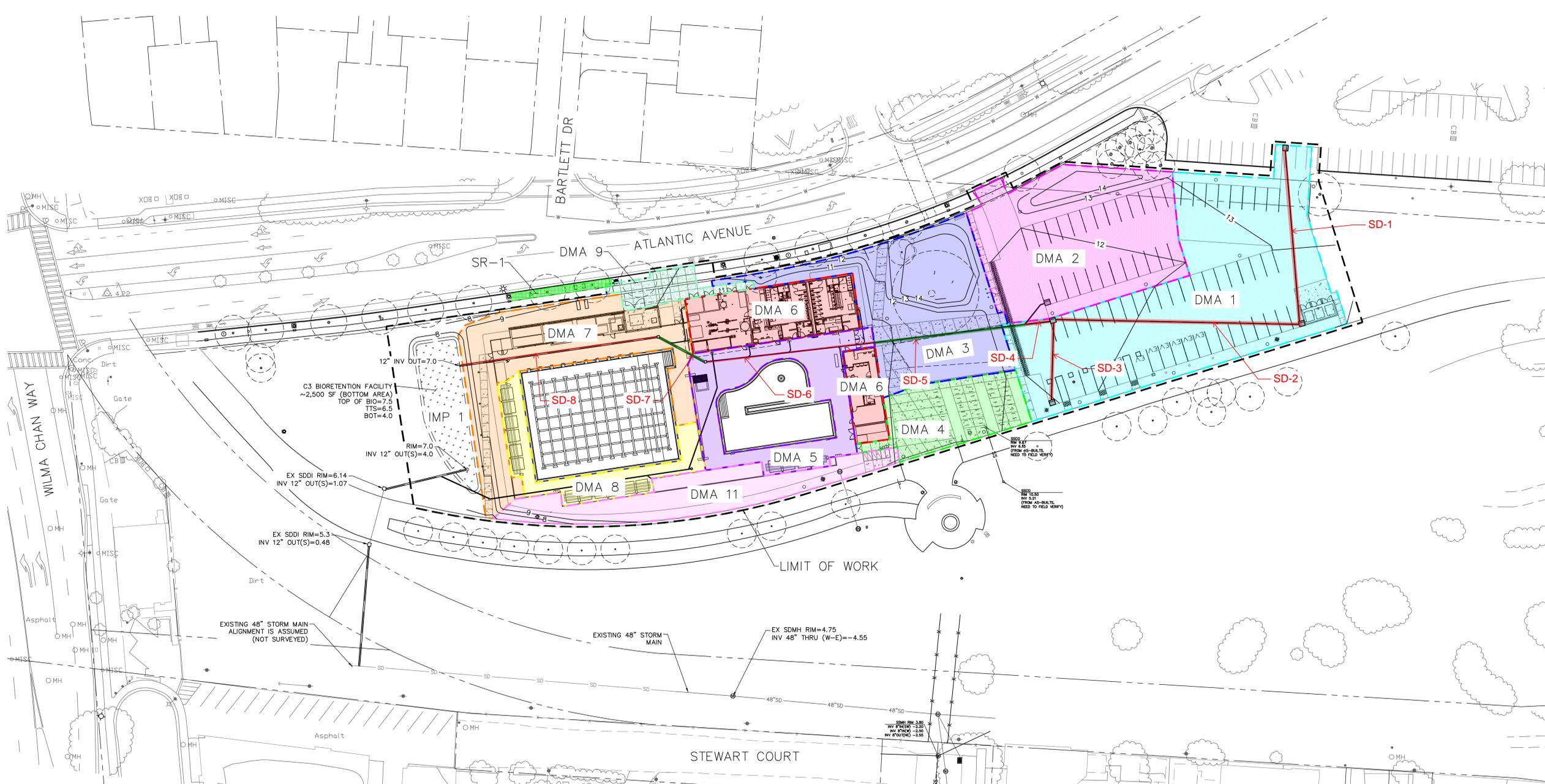
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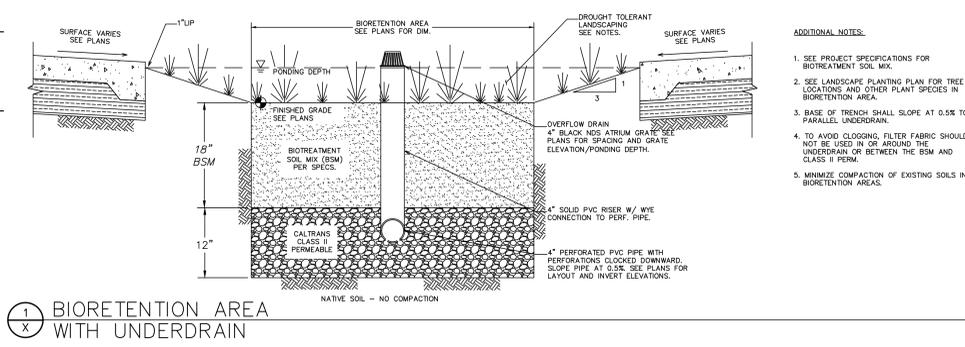
SHEET TITLE:
STORMWATER MANAGEMENT PLAN

SHEET NUMBER:
C6.0



DMA	IMPERVIOUS AREA (SF)	PERVIOUS AREA (SF)	TREATMENT REQUIRED (SF)	DRAINS TO DMA	TREATMENT PROVIDED (SF)
DMA 1	17,311	3,306	706	IMP-1	706
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 - **DMA-9 WILL BE DRAINED TO THE ADJACENT TREE WELLS THAT WILL SERVE AS A SELF-RETAINING AREA PER C3 TREATMENT REQUIREMENTS.



- ADDITIONAL NOTES:**
- SEE PROJECT SPECIFICATIONS FOR BIOTREATMENT SOIL MIX.
 - SEE LANDSCAPE PLANTING PLAN FOR TREE LOCATIONS AND OTHER PLANT SPECIES IN BIORETENTION AREA.
 - BASE OF TRENCH SHALL SLOPE AT 0.5% TO PARALLEL UNDERDRAIN.
 - TO AVOID CLOGGING, FILTER FABRIC SHOULD NOT BE USED IN OR AROUND THE UNDERDRAIN OR BETWEEN THE BSM AND CLASS II PERM.
 - MINIMIZE COMPACTION OF EXISTING SOILS IN BIORETENTION AREAS.

NUMBER	DATE	DESCRIPTION

KEY PLAN:

ISSUE: **25% DD**

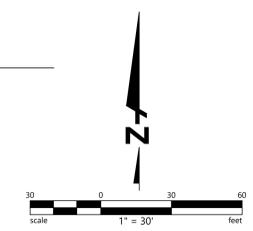
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NOT FOR CONSTRUCTION

SHEET TITLE:
STORMWATER MANAGEMENT PLAN

SHEET NUMBER:
C6.0





ALAMEDA COUNTY PUBLIC WORKS AGENCY
ALAMEDA COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT

HYDROLOGY CALCULATIONS

MAP = 20.5 in.
 Return Freq = 10 yrs.
 Initial Tc = 5 min.

DRAINAGE AREA MAP

Attachment 6 of Alameda Hydrology Manual

Initial Q = 0 cfs. (from previous pages, otherwise zero or blank)
 Sum AC = 0 acres (from previous pages, otherwise zero or blank)

FILE _____
 ZONE _____
 LINE _____
 DATE 5/21/2025
 BY CM
 CK BY CM

Description: Conveyance calculations for proposed Alameda Aquatic Center storm system.

Place an X to change defaults
 ACPWA 1993 (Otherwise defaults to ACPWA 2015)
 Neglect C' (Otherwise calculates C')

Final Time of Concentration 8.4 min.
 Final Flow 2.56 cfs

RESULTS

Point of Conc.	Area Desc	Area [ac]	C	Overland Slope[%]	C'	AC'	Sum AC'	Tc [min]	Intensity i	Q=C'iA [cfs]	Flow Used	P/C (Pw)	Length [ft]	Invert Slope[ft/ft]	Dia [in]	n	b [ft]	z [o/e]	Yn [ft]	Pipe Check	V [ft/s]	Override Velocity	Time[min]	Conduit Time[min]	Data Check
1	SD-1	0.018	0.9	0	0.9	0.02	0.02	5	3.50	0.06	0.05	1.57	120	0.005	6	0.009	0.125	1.00	0.10	9%	1.80		1.11	1.11	
2	SD-2	0.12	0.90	0	0.90	0.11	0.12	6.11	3.12137	0.39	0.39	1.57	169	0.005	6	0.009	0.125	1.00	0.30	68%	3.1		0.90	2.01	
3	SD-3	0.14	0.90	0	0.90	0.13	0.25	7.01	2.88850	0.72	0.37	1.57	55	0.005	6	0.009	0.125	1.00	0.29	64%	3.1		0.29	2.30	
4	SD-4	0.11	0.90	0	0.90	0.10	0.35	7.30	2.82179	0.99	0.99	2.61	18	0.005	10	0.009	0.167	1.00	0.39	44%	4.0		0.08	2.38	
5	SD-5	0.20	0.90	0	0.90	0.18	0.53	7.38	2.80543	1.48	1.48	2.61	116	0.005	10	0.009	0.208	1.00	0.49	66%	4.4		0.44	2.82	
6	SD-6	0.18	0.90	0	0.90	0.16	0.69	7.82	2.71478	1.87	1.87	2.61	118	0.005	10	0.009	0.208	1.00	0.58	83%	4.6		0.43	3.25	
7	SD-7	0.13	0.90	0	0.90	0.12	0.81	8.25	2.63409	2.13	2.13	3.14	37	0.005	12	0.009	0.208	1.00	0.55	58%	4.8		0.13	3.37	
8	SD-8	0.19	0.90	0	0.90	0.17	0.98	8.37	2.61122	2.56	2.56	3.14	37	0.005	12	0.009	0.250	1.00	0.62	70%	5.0		0.12	3.50	

This program was developed by Yohannes Woldemariam of Alameda County Public Works Agency. The formulas used here were specifically developed for the Alameda County Region. ACPWA makes no claim for suitability in other areas. April 14, 1994. NOTE: Updated April 2016 by Wood Rodgers.

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