



ENGINEERING,  
INC.

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August 31, 2023

Town of Wareham  
Zoning Board of Appeals  
54 Marion Road  
Wareham, MA 02571

Attention: Nazih Elkallassi – Chairman

RE: Response to Initial Peer Review  
Special Permit, Variance, and Site Plan Review Application  
3127 Cranberry Highway  
Wareham, MA  
ZBA Case 11-23  
**G.A.F. Job No. 22-9890**

Dear Chairman Elkallassi,

G.A.F. Engineering, Inc., on behalf of our client Peter Koulouras, provides the following responses to the review comments received from Allen & Major Associates, Inc by letter dated August 23, 2023. Revised plans dated August 30, 2023 is included with the submittal.

This letter has been formatted for clarity by listing the review comment followed by our response in ***bold italics***.

#### Variance Request

The project seeks a variance in accordance with Section 1470, Variances of the Town of Wareham Zoning Bylaws. Variances can be granted "*when factors relating to soil conditions, lot shape, or topography of such land creates an impracticality or limits the location or positioning of a new structure or addition on a site or location that previously conformed to zoning requirements. An applicant must demonstrate that a literal enforcement of the By-law would involve substantial hardship, financial or otherwise, to the petitioner or appellant, and that desirable relief may be granted without substantial detriment to the public good and without nullifying or substantially derogating from the intent or purpose of such ordinance or by-law.*" The application is predicated on being granted a variance for lot frontage and area in order to allow the proposed project to proceed. The subject lot as provided on the application was created through the Approval Not Required process through the Wareham Planning Board in June 2022 as recorded at the Plymouth County Registry of Deeds at Plan Book 66 Page 398. The recorded plan specifically

identifies the project locus as "Map 8, Parcel B (not to be considered a separate building lot). The applicant and engineer for both the ANR and this variance request are the same. The application does not provide any justification as to the hardship that exists on a lot that was created within the prior calendar year that was intentionally labeled as non-buildable to now seek a variance on the property negating the premise under which the Planning Board endorsed the plan. Attorney Jillian Morton, esq. described the subject lot as being "unique" in that it is "situated with a major highway on side [Route 6/28] and the railway behind it". This is a description befitting nearly all existing lots/parcels along this corridor including the legally conforming lot that existing prior to the ANR plan.

A&M defers to the Zoning Board of Appeals as to the merits of the application as provided as to whether it meets the statutory requirements of section 1470 for granting in consideration that the "hardship" appears to be self-imposed.

#### Wareham By-Laws and Zoning By-Laws

1. The proposed project is located within the Commercial Strip Zoning District and is subject to Article 7: Design Standards and Guideline, subsection 760 Design Standards & Guidelines for Commercial Districts. No architectural plans have been submitted; therefore A&M is unable to review for compliance with subsection 764 Architectural Design Guidelines. The ZBA may consider a condition of approval requiring the architectural design of the building be in compliance with subsection 764 of the Zoning By-Laws.

***Article 7 Design standards and Guidelines section 710 General Requirements indicate that the "design guidelines are provided as recommendations but are not required" subsection 764 Architectural Design Guidelines are considered recommendations. The attached building elevations and plans illustrate the proposed building.***

2. Zoning By-Law Section 1031 requires "new projects or expansions exceeding 5,000 square feet of non- residential development or more than three multi-family dwelling units, the landscape plan shall be prepared by a registered landscape architect whose seal shall appear on the plan."

The landscape plan does not appear to have been prepared by a Landscape Architect, since no landscape seal is on the plan. The plan should be updated accordingly to comply with the Zoning By-Law.

***The landscaping plan, sheet 7 of 10 is stamped by a Registered Landscape Architect in compliance with section 1031 of the Zoning By-Law.***

3. The proposed project is proposing a new sign and will be subject to Article 11: Signs. The applicant will be required to submit to the Director of Inspectional Services a completed sign permit application, together with all supporting materials specifically building and sign dimensions, materials of which the sign is comprised, colors, attachment methods and the position of the sign.

***Signage for the project will comply with Article 11 of the Zoning By-Law. A permit for which will be applied for in advance of installation.***

#### Site Plan & Drainage Calculations

4. The Zoning Data table on the cover page should be corrected to show the maximum impervious coverage allowed by Zoning to be 65%, not 60%. The proposed project is proposing an impervious coverage of 65.9%, which exceeds the maximum allowed per Zoning. A&M understands that the proposed project is an improvement over existing conditions and is providing a reduction in impervious coverage over existing conditions, but the variance request is only for frontage and area. The cover letter states that it meets other requirements of the zoning table. The applicant and design engineer should review the plan to determine if it can reduce the impervious coverage to meet the zoning regulations.

***The Zoning Data Table on the cover sheet, sheet 1 of 10 has been revised to match the Site Data Table on the same sheet to indicate the maximum impervious area of 65%. The plans have been revised to reduce the impervious coverage from 65.9% to 63.8% and as such***

***is now compliant with the impervious coverage requirement.***

5. There is existing pavement on the southerly portion of the property that straddles the property line and extends onto lands owned by the Commonwealth of Massachusetts. Is the offsite pavement being removed as part of this application? Please confirm if an easement will be prepared for this work. As described on the record Approval Not Required plan dated June 2022, as prepared by GAF, it also depicts a fence line approximately 40-50 feet beyond the property line and seems to indicate this area was in use by the landowner. Please describe the intent of this area and whether the fence is to remain or be relocated/removed.

***No work is proposed to take place on any land other than the locus property. The plans accurately depict the limit of work.***

6. The existing conditions plan is not stamped by a Professional Land Surveyor registered in the Commonwealth of Massachusetts. The plan should be endorsed by a PLS for record.

***The existing conditions plans sheet 3 of 10 has been stamped by an RLS as suggested.***

7. The callout for the proposed sign on sheet 4 of 10, refers to note 9, which is not applicable. The design engineer should review and revise the plan accordingly.

***The callout has been revised accordingly.***

8. The design engineer should review the proposed grading. As currently designed the proposed project is directing stormwater off-site to the east and west onto abutting properties. Based on the existing contours and spot grades, no stormwater is being directed off-site. The design engineer should also review the proposed low points being created on the easterly and westerly property line, where water will be ponded and trapped. The design engineer should include all off-site areas and avoid directing runoff

off-site onto abutting properties where no runoff is directed under existing conditions.

***Landscaped areas along the east and west property lines will be bordered by steel landscape edging at the property lines. Grading adjacent to the low areas has been modified to indicate flow toward the proposed landscaped depression. Any ponding of runoff is limited to landscape areas where it will infiltrate and/or overflow to the landscape area along the south property line.***

9. The design engineer should review the grading of the landscaped berms along Cranberry Highway for flow into the state highway layout. As the applicant is required to apply for a permit through MassDOT, please provide supporting documentation that these drainage areas have been accepted by MassDOT and how they comport with MassDOT Standard Operating Procedure HMD-02-02-2-000 on drainage connections to the state highway that include sheet flow runoff conditions.

***The raised bed landscape berms are required by section 763.4 of the Zoning by-law. MassDOT has routinely approved this small amount of surface water discharge from landscaped areas particularly when all other on-site runoff is contained on-site. We have however added a linear french drain to accommodate this surface water runoff from these small, landscaped areas.***

10. The design engineer should provide a detail on the proposed steel landscape edging. The 4" reveal above existing grade will further trap existing stormwater runoff along the easterly and westerly property line. The design engineer should also review the impact that may occur to the steel edging during snow plowing activities on the two adjacent properties.

***The steel edging is ¼ inch thick steel specifically used for commercial use (see attached cut sheet). Although the adjacent properties are surfaced with a bituminous concrete surface no parking stalls or travel isles are***

**located near the proposed edging. The edging is robust enough to serve as a guiding edge for snow plowing. The detail of the steel edging is shown on sheet 9 of 10 (ground cover and shrub planting detail) and noted on the Landscape Plan sheet 7 of 10.**

11. The drainage field has been designed relying on test pits conducted on adjacent sites. No site specific data is provided in support of the soil classification or the estimated seasonal high groundwater table. In order to comply with the Massachusetts Stormwater Standards, one test pit is required for each 5,000 square feet of drainage area provided. The applicant should conduct a test pit to confirm soil conditions. The Zoning Board of Appeals may consider a condition that requires the test pit be performed at the time of general construction. The results of the test pit should be provided for record along with any changes to the site plans, if required. Site plan changes would require a modification of any permit(s) issued by the Board.

**GAF has file data from previous projects on each site adjacent to the locus and are confident with the soil classification and water table elevations. We would be amenable to confirming soil conditions at the same time of installation of the drainage system.**

12. No details on site lighting nor a photometric plan have been provided, A&M is unable to review impacts on surrounding properties or compliance with Zoning §1243 Lighting Standards or §1533 (11).

**Photometrics have been added to the Landscaping Plan sheet 7 of 10. Lighting fixture cuts are included here with.**

13. Existing watersheds and drainage calculations should be revised to include off-site areas draining onto the lot towards the existing catch basin, identified as design point #1.

**Off-site areas are prevented from entering the proposed drainage system due to the installation of steel landscaped edging. The existing condition watershed and drainage calculations have not included off-site areas in order to provide a more conservative**



**comparison of peak flow rates and volumes to the design point.**

14. The design engineer should review the proposed watersheds. Based on the proposed grading the landscape shoulders associated with Watershed 1S do not appear to drain into the pavement as intended. Portions of Watershed 2S do not appear to drain towards the landscape depression along the southerly line.

***The landscaped areas in watershed 1S are higher than the proposed pavement grade. Steel edging is specified along the property lines. Any runoff which does not infiltrate within the landscaping will flow onto the pavement and into the drainage system.***

15. The design engineer has accounted for 80% TSS removal rate for a proprietary treatment device (First Defense FDHC-3 Unit). No calculations or third-party testing data has been provided to demonstrate this removal rate. Proprietary treatment devices are typically maxed out at 50% unless documentation is provided. The design engineer should update the TSS worksheets accordingly.

***The water quality volume to discharge rate calculation previously provided indicates a flow rate of 0.29 cfs for a one-inch water quality volume over the proposed impervious surfaces. The FDHC-3 unit is rated for 80% TSS removal at 1.06 cfs which is more than 3 times the required rate. Refer to the attached data from Hydro International.***

16. The design engineer should revise the TSS calculation worksheet for the Infiltration chambers and provide two (2) sets of TSS calculation worksheets, one to demonstrate the required 44% TSS removal prior to infiltration and another for the overall TSS removal for the entire drainage system. The infiltration system only receives 80% TSS removal with the appropriate pre-treatment, therefore the design engineer cannot take additional credit for the proprietary catch basin in the overall calculation for the entire drainage system. The design engineer should update the TSS worksheets accordingly.

**The response to item #15 confirms that pre-treatment by the FDHC-3 unit is in excess of 44% and is provided prior to infiltration. We concur with the review engineer that the system as designed provides a minimum of 80% TSS removal which exceeds the requirement for a project that is considered 100% redevelopment.**

17. The project exceeds the maximum access road length of 150 feet without provisions for a fire apparatus turn around (NFPA 1 18.2.3.5.4) for dead ends. The Wareham Fire Department is the Authority Having Jurisdiction (AHJ) for fire access roadways. The design engineer should provide a vehicle movement path showing the anticipated circulation on-site. Please provide any correspondence with the Fire Department that approves the circulation path as designed.

**Access to within 50 feet of an exterior door that provides access to the interior of the building is provided. Adequate unobstructed access of less than 150 feet to the building is provided. Refer to the attached NFPA standards.**

Please contact me directly should you have any questions about this project.

Very truly yours,



William F. Madden, P.E.  
[bill@gafenginc.com](mailto:bill@gafenginc.com)

WFM/

Enclosures

cc: Peter Koulouras  
Jillian Morton, ESQ  
Allen & Major Associates, Inc.



# Building Sketches





# Landscape Steel Edging



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## COMMERCIAL STEEL LANDSCAPE EDGING

January 16, 2017

When it comes to creating, installing, and maintaining commercial and professionally landscaped residential areas, steel is the only material that should be considered for edging.

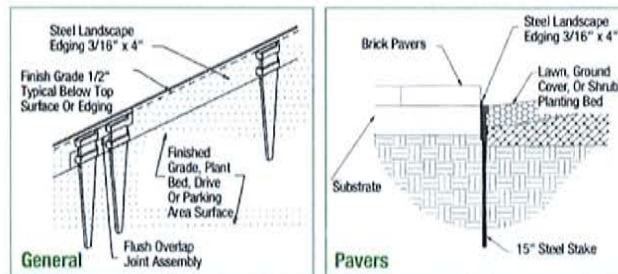
Mid City Steel offers steel landscape edging which provides a lasting landscape edging for lawns, gardens, and work sites in commercial and residential projects. Steel metal edging is ideal because of its strength, durability, and flexibility.

Mid City Steel supplies steel landscape edging to some of the largest landscaping contractors in MA, RI, & CT. For more information regarding our steel landscape edging please call 774-319-5400 to speak to a sales professional or [contact us](#).

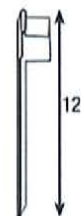


## THE DIFFERENCE OF COMMERCIAL GRADE

The steel landscape edging offered by Mid City Steel is custom designed and purpose built. We only offer commercial grade edging. Unlike home improvement centers that sell flimsy sheet metal with short nail spikes, our thinnest edging is 1/8" thick and our heavy duty is a full 1/4" thick. Our edging is measured and cut to offer flush overlap connections between lengths and slitted to take 15" supplied steel spikes to secure the edging permanently. Don't waste your time and money trying to work with inferior edging with welded spikes and thin gauge sheet metal, call Mid City Steel and give us the opportunity to show you why our edging is superior and why our motto is "We Work for You"

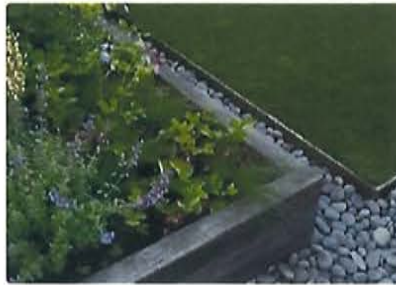


- Comers**
- preformed
  - time saver
  - crisp & clean



- Appearance** Steel Edging subtly accents landscapes with clean lines and minimal intrusion
- Durability** Steel Edging will not rot or become brittle in cold weather
- Strength** Steel Edging resists frost heave, ground movement, and withstands routine landscape maintenance with its uniform thickness and weight
- Installation** Steel Edging installs quickly and easily





**Paint Coatings & Finishes**

Colors      Black & Green  
 Mid City Steel's landscape edging is covered with a durable enamel based paint coat for maximum protection compared to powder coats which are much thinner and prove ineffective when inevitably scratched during installation. Galvanized and other colors and finishes are available upon request.

**STOCK SIZES**

Although Mid City has the network to acquire practically every available color and finish for our customers, we have found that the following sizes are the most popular and as a result we keep enough stock to be able to offer next day delivery on most orders including large commercial installations.

Thickness	Height	Length	Color
1/4"	5"	16'	Black / Green
3/16"	4"	16'	Black / Green
1/8"	4"	10'	Black



**LATEST FROM OUR NEWS / BLOG**



**COMMERCIAL STEEL LANDSCAPE EDGING**



**SNOW PLOW BLADES AND CURB PROTECTORS**



**STEEL ROOF AND FLOOR DECK**



**NEW COMI**

## GET IN TOUCH!

- [📞 WESTPORT, MA \(774\) 319-5400](tel:7743195400)
- [📞 WESTPORT, MA ANNEX \(774\) 319-5360](tel:7743195360)
- [📞 BOZRAH, CT \(860\) 373-9660](tel:8603739660)

## ADDITIONAL RESOURCES

- [Used & Surplus Steel](#)
- [Steel & The Environment](#)
- [Staff Directory](#)

## ABOUT US

If you need steel for your next project, our company is there for you. From your first phone call, you can rest assured that we will provide you with... [read more](#)

# Light Fixtures



37, 57 and 62 Watt SLIM Wall packs are designed to cover the footprint of most traditional wall packs. They are suitable for mounting heights from 20' to 30', and replace HID Wattages from 200W MH to 320W MH. These ultra-high efficiency fixtures are available in cutoff or full cutoff models.

Color: Bronze

Weight: 13.6 lbs

Project:

Type:

Prepared By:

Date:

### Driver Info

Type	Constant Current
120V	0.48A
208V	0.32A
240V	0.28A
277V	0.24A
Input Watts	47.7W

### LED Info

Watts	57W
Color Temp	4000K (Neutral)
Color Accuracy	73 CRI
L70 Lifespan	100,000 Hours
Lumens	4,881 lm
Efficacy	102.3 lm/W

## Technical Specifications

### Compliance

#### UL Listed:

Suitable for Wet Locations. Wall Mount Only.

#### IP Rating:

Ingress protection rating of IP66 for dust and water

#### IESNA LM-79 & LM-80 Testing:

RAB LED luminaires and LED components have been tested by an independent laboratory in accordance with IESNA LM-79 and LM-80.

#### DLC Listed:

This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities. Designed to meet DLC 5.1 requirements.

DLC Product Code: PCZCWC17

### Construction

#### Footprint:

Designed to replace RAB HID WP2 wall packs, both in size and footprint template, so upgrading to LED is easy and seamless

#### Cold Weather Starting:

The minimum starting temperature is -40°C (-40°F)

#### Maximum Ambient Temperature:

Suitable for use in up to 40°C (104°F)

#### Housing:

Precision die-cast aluminum housing and door frame

#### Mounting:

Die-cast back box with four (4) conduit entry points and knockout pattern for junction box or direct wall mounting. Hinged housing and bubble level for easy installation.

#### Full Cutoff:

Allows for conformance to the IDA's fully shielding requirement, emitting no light above 90 degrees.

#### Recommended Mounting Height:

Up to 25 ft.

#### Lens:

Microprismatic diffusion glass lens reduces glare and has smooth and even light distribution

#### Reflector:

Specular thermoplastic

#### Gaskets:

The unique design of the tight-lock gasket ensures no water or environmental elements will ever get inside the SLIM

#### Finish:

Formulated for high durability and long-lasting color

### Green Technology:

Mercury and UV free. RoHS-compliant components.

### LED Characteristics

#### LED:

Long-life, high-efficiency, micro-power, surface mount LEDs; binned and mixed for uniform light output and color

#### Color Stability:

LED color temperature is warranted to shift no more than 200K in color temperature over a 5-year period

#### Color Consistency:

7-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color

### Performance

#### Lifespan:

100,000-Hour LED lifespan based on IES LM-80 results and TM-21 calculations

### Other

#### Accessories:

Available accessories include polyshield and wire guard. Click [here](#) to see all accessories.

## Technical Specifications (continued)

### Patents:

The design of the SLIM™ is protected by patents pending in US, Canada, China, Taiwan and Mexico

### HID Replacement Range:

Replaces 250W Metal Halide

### Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish. RAB's warranty is subject to all terms and conditions found at [rablighting.com/warranty](http://rablighting.com/warranty).

### Buy American Act Compliance:

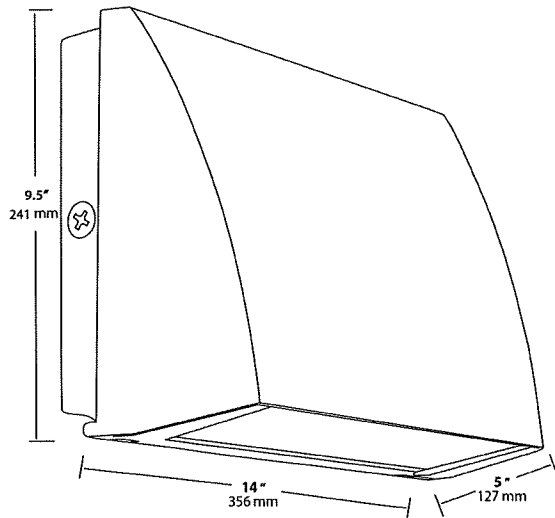
RAB values USA manufacturing! Upon request, RAB may be able to manufacture this product to be compliant with the Buy American Act (BAA). Please contact customer service to request a quote for the product to be made BAA compliant.

### Optical

#### BUG Rating:

B2 U0 G0

## Dimensions



## Features

- Covers footprint of most traditional wall packs
- Easy installation with hinged access, bubble level and multiple conduit entries
- Tight-lock gasket keeps elements out
- 100,000-hour LED lifespan
- 5-Year, No-Compromise Warranty



## Ordering Matrix

Family	Cutoff	Wattage	Color Temp	Finish	Driver Options	Options	Other Options
SLIM	FC	57	N		/D10		
	Blank = Cutoff (10 degrees) FC = Full Cutoff (0 degrees)	37 = 37W 57 = 57W 62 = 62W	Blank = 5000K Cool N = 4000K Neutral Y = 3000K Warm	Blank = Bronze W = White	Blank = Standard (120-277V) /BL = Bi-Level /D10 = Dimmable /480 = 480V	Blank = No Option /PC = 120V Button Photocell /PC2 = 277V Button Photocell /PCS = 120V Swivel Photocell /PCS2 = 277V Swivel Photocell /LC = Lightcloud® Controller	Blank = Standard USA = BAA Compliant



Color: Bronze

Weight: 31.4 lbs

Project:

Type:

Prepared By:

Date:

#### Driver Info

Type	Constant Current
120V	0.66A
208V	0.41A
240V	0.35A
277V	0.30A
Input Watts	76.80W

#### LED Info

Watts	78W
Color Temp	3000K (Warm)
Color Accuracy	70 CRI
L70 Lifespan	100,000
Lumens	8,765
Efficacy	114.1 lm/W

## Technical Specifications

### LED Characteristics

#### Lifespan:

100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations

#### LEDs:

Six (6) multi-chip, 13W, high-output, long-life LEDs

#### Color Consistency:

3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color

#### Color Stability:

LED color temperature is warranted to shift no more than 200K in color temperature over a 5-year period

#### Color Uniformity:

RAB's range of Correlated Color Temperature follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2017.

### Listings

#### DLC Listed:

This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities. DLC Product Code: P0000179T

#### IESNA LM-79 & IESNA LM-80 Testing:

RAB LED luminaires and LED components have been tested by an independent laboratory in accordance with IESNA LM-79 and LM-80.

#### UL Listed:

Suitable for wet locations as a downlight

#### Dark Sky Conformance:

Conforms to (allows for conformance to) the requirements for the IDA's "Fixture Seal of Approval" as of March 1, 2016.

### Construction

#### IES Classification:

The Type III distribution is ideal for roadway, general parking and other area lighting applications where a larger pool of lighting is required. It is intended to be located near the side of the area, allowing the light to project outward and fill the area.

### IP Rating:

Ingress Protection rating of IP66 for dust and water

#### Ambient Temperature:

Suitable For use in 40°C (104°F)

#### Cold Weather Starting:

Minimum starting temperature is -40°C (-40°F)

#### Thermal Management:

Superior heat sinking with external Air-Flow fins

## Technical Specifications (continued)

### Construction

#### Effective Projected Area:

EPA = 0.75

#### Lens:

Tempered glass lens

#### Housing:

Die-cast aluminum housing, lens frame and mounting arm

#### Mounting:

Universal mounting arm compatible for hole spacing patterns from 1" to 5 1/2" center to center. Round Pole Adaptor plate included as a standard. Easy slide and lock to mount fixture with ease. Round pole diameter must be >4" to mount fixtures at 90° orientation.

#### Reflector:

Specular vacuum-metallized polycarbonate

#### Gaskets:

High-temperature silicone gaskets

### Finish:

Formulated for high durability and long-lasting color

### Green Technology:

Mercury and UV free. RoHS-compliant components.

### Electrical

#### Driver:

Constant Current, Class 2, 2000mA, 100-277V, 50-60Hz, 1.1A, Power Factor 99%

#### THD:

4.4% at 120V, 12.4% at 277V

#### Power Factor:

99.5% at 120V, 93.5% at 277V

#### Surge Protection:

4kV

### Other

#### Patents:

The ALED design is protected by patents in the U.S. Pat. 668,370, Canada Pat. 144956, China ZL201230100154.X, and Mexico Pat. 38423. Pending patents in Taiwan.

#### BAA Compliance:

Click [here](#) for BAA compliance.

#### Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish. RAB's warranty is subject to all terms and conditions found at [rablighting.com/warranty](http://rablighting.com/warranty).

#### Equivalency:

Equivalent to 250W Metal Halide

#### Buy American Act Compliance:

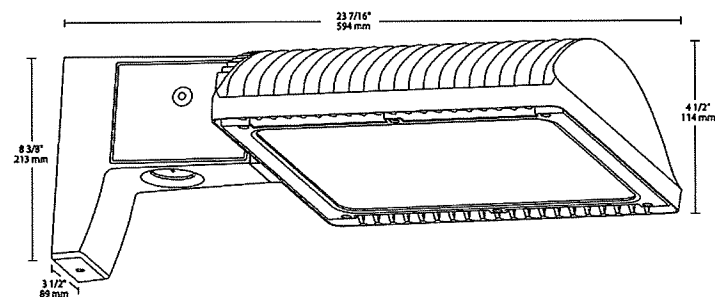
RAB values USA manufacturing! Upon request, RAB may be able to manufacture this product to be compliant with the Buy American Act (BAA). Please contact customer service to request a quote for the product to be made BAA compliant.

### Optical

#### BUG Rating:

B1 U0 G2

### Dimensions



### Features

- 66% energy cost savings vs. HID
- 100,000-hour LED lifespan
- 5-Year, No-Compromise Warranty

## Ordering Matrix

Family	Optics	Wattage	Mounting	Color Temp	Finish	Driver Options	Options	Other Options
ALED	3T	78		Y				
	4T = Type IV 3T = Type III 2T = Type II	50 = 50W 78 = 78W 105 = 105W 125 = 125W 150 = 150W	Blank = Pole mount SF = Slipfitter	Blank = 5000K (Cool) N = 4000K (Neutral) Y = 3000K (Warm)	Blank = Bronze RG = Roadway Gray W = White K = Black	Blank = 120-277V /480 = 480V /BL = Bi-Level /D10 = 0-10V Dimming	Blank = No Option /LC = Lightcloud® Controller /PCS = 120V Swivel Photocell /PCS2 = 277V Swivel Photocell /PCT = 120-277V Twistlock Photocell /PCS4 = 480V Swivel Photocell /PCT4 = 480V Twistlock Photocell /WS = Multi-Level Motion Sensor /WS2 = Multi-Level Motion Sensor 20 ft. /WS4 = Multi-Level Motion Sensor 40 ft.	Blank = Standard USA = BAA Compliant



Square steel poles drilled for 2 Area Lights at 180°. Designed for ground mounting. Poles are stocked nationwide for quick shipment. Protective packaging ensures poles arrive at the job site good as new.

Color: Bronze

Weight: 105.8 lbs

Project:

Type:

Prepared By:

Date:

### Technical Specifications

#### Listings

**CSA Listed:**

Suitable for wet locations

**Construction**

**Shaft:**

46,000 p.s.i. minimum yield.

**Hand Holes:**

Reinforced with grounding lug and removable cover

**Base Plates:**

Slotted base plates 36,000 p.s.i.

**Shipping Protection:**

All poles are shipped in individual corrugated cartons to prevent finish damage

**Color:**

Bronze powder coating

**Height:**

15 FT

**Weight:**

106 lbs

**Gauge:**

11

**Wall Thickness:**

1/8"

**Shaft Size:**

4"

**Hand Hole Dimensions:**

3" x 5"

**Bolt Circle:**

8 1/2"

**Base Dimension:**

8"

**Anchor Bolt:**

Galvanized anchor bolts and galvanized hardware and anchor bolt template. All bolts have a 3" hook.

**Anchor Bolt Templates:**

WARNING Template must be printed on 11" x 17" sheet for actual size. CHECK SCALE BEFORE USING. Templates shipped with anchor bolts and available [online](#).

**Pre-Shipped Anchor Bolts:**

Bolts can be pre-shipped upon request for additional freight charge

**Max EPA's/Max Weights:**

70MPH 14.0 ft./400 lb.  
 80MPH 10.2 ft./295 lb.  
 90MPH 7.6 ft./220 lb.  
 100MPH 5.6 ft./165 lb.  
 110MPH 4.2 ft./125 lb.  
 120MPH 3.0 ft./95 lb.  
 130MPH 2.1 ft./70 lb.  
 140MPH 1.4 ft./50 lb.  
 150MPH 0.8 ft./35 lb..

**Other**

**Terms of Sale:**

Pole Terms of Sale is available [online](#).



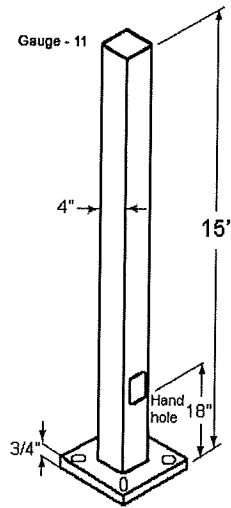
## Technical Specifications (continued)

### Other

#### Buy American Act Compliance:

RAB values USA manufacturing! Upon request, RAB may be able to manufacture this product to be compliant with the Buy American Act (BAA). Please contact customer service to request a quote for the product to be made BAA compliant.

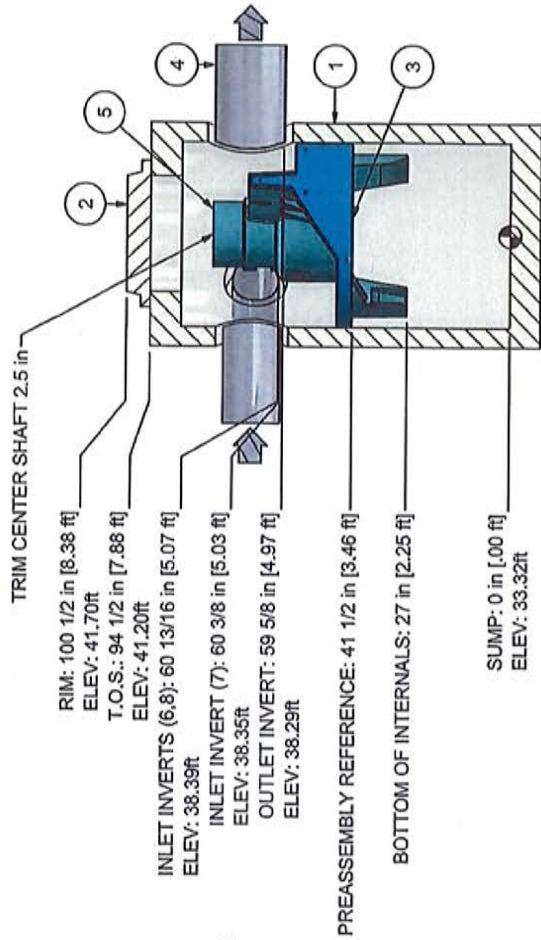
### Dimensions



### Features

- Designed for ground mounting
- Heavy duty TGIC polyester coating
- Reinforced hand holes with grounding lug and removable cover for easy wiring access
- Anchor Bolt Kit includes pole cap and base cover (sold separately)
- Custom manufactured for each application

# Water Quality Unit



SECTION A-A  
SCALE 1:30

SECTION B-B  
SCALE 1:30

**CAPACITIES:**

1. PEAK HYDRAULIC FLOW: 18.0 cfs (510 l/s)
2. SEDIMENT STORAGE CAPACITY: 0.7 cu. yd. (0.5 cu. m.)
3. OIL STORAGE CAPACITY: 191 gal. (723 liters)
4. MAXIMUM INLET/OUTLET PIPE DIAMETERS: 24 in. (600 mm)

**PRODUCT SPECIFICATIONS:**

- A. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff.
- B. The treatment system shall fit within the limits of excavation (area and depth) as shown in the project plans and will not exceed the dimensions for the design flow rates specified herein.
- C. The treatment system shall convey the Peak On-line Flow Rates of up to 18 cfs without causing upstream surcharge conditions.
- D. The treatment system shall be capable of capturing and retaining fine silt and sand size particles.

1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.
2. CONTACT HYDRO INTERNATIONAL FOR A REVIEW OF THE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.
3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.
4. CONTRACTOR IS RESPONSIBLE FOR MATERIALS AND LABOR TO BRING CASTINGS TO FINISHED GRADE.

REV	BY	DESCRIPTION	DATE
-	ASB	FIRST RELEASE	10/6/2021

PROJECTION

IF IN DOUBT ASK

DATE: 10/6/2021  
SCALE: 1:30

DRAWN BY: KSM  
CHECKED BY: [ ]

4-8 DIAMETER  
FIRST DEFENSE HIGH CAPACITY

WQS-1  
SETTLER'S GLEN  
EAST WAREHAM, MA

Patent: www.hydro-int.com/patents

**Hydro International**  
hydro-int.com

HYDRO INTERNATIONAL

WBSPT: MATERIAL

STOCK NUMBER: 1

STANDARD: 21\_12\_2008-48FDHC-1

SHEET SIZE: B  
SHEET: 1 OF 1

ITEM	QTY	SIZE (in)	DESCRIPTION	TYPE
1	1	48	I.D. PRECAST MANHOLE	
2	1	30	FRAME AND COVER (ROUND)	
3	1		LEDGER SUPPORT	
4	1	18	OUTLET PIPE (BY OTHERS)	HDPE
5	1		SEPARATION MODULE	
6	1	12	INLET PIPE (BY OTHERS)	HDPE
7	1	15	INLET PIPE (BY OTHERS)	HDPE
8	1	12	INLET PIPE (BY OTHERS)	HDPE

First Defense® Materials and Design

- A. Structures for precast stormwater treatment systems shall conform to ASTM C478, C857 and C858 and meet the following additional requirements:
  - 1. In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain HS20-44 loading requirements as determined by a licensed professional engineer.
  - 2. Sections shall have tongue and groove or ship-lap joints with butyl mastic sealant conforming to ASTM C 990.
  - 3. Cement shall be Type II or Type III Portland cement conforming to ASTM C150.
  - 4. Aggregates shall conform to ASTM C33
  - 5. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi and shall have a 28 day compressive strength of 5000 psi.
  - 6. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with hydraulic cement conforming to ASTM C595M.
- B. Internal stainless steel components shall be grade 304 stainless steel in accordance with ASTM A314.
- C. 4' & 6' diameter internal plastic components shall be rotationally molded from linear low density polyethylene.
- D. Casting for manhole frames and covers shall be in accordance with ASTM A48, CL. 35B and AASHTO M306. Castings shall be placed on top of the structure per the requirements of the project engineer.



# First Defense® High Capacity

A Simple Solution for your Trickiest Sites

## Product Profile

The First Defense® High Capacity is an enhanced vortex separator that combines an effective stormwater treatment chamber with an integral peak flow bypass. It efficiently removes sediment total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® High Capacity is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints (Table 1, next page).

## Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

## Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for "offline" arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 450% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

## How it Works

The First Defense® High Capacity has internal components designed to remove and retain gross debris, total suspended solids (TSS) and hydrocarbons (Fig.1).

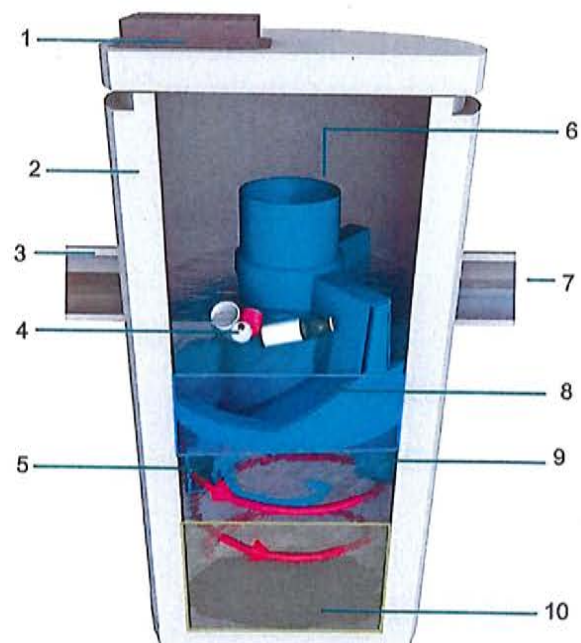
Contaminated stormwater runoff enters the inlet chute from a surface grate and/or inlet pipe. The inlet chute introduces flow into the chamber tangentially to create a low energy vortex flow regime (magenta arrow) that directs sediment into the sump while oils, floating trash and debris rise to the surface.

Treated stormwater exits through a submerged outlet chute located opposite to the direction of the rotating flow (blue arrow). Enhanced vortex separation is provided by forcing the rotating flow within the vessel to follow the longest path possible rather than directly from inlet to outlet.

Higher flows bypass the treatment chamber to prevent turbulence and washout of captured pollutants. An internal bypass conveys infrequent peak flows directly to the outlet eliminating the need for, and expense of, external bypass control structures. A floatables draw off slot functions to convey floatables into the treatment chamber prior to bypass.

## Verified by NJCAT and NJDEP

Fig.1 The First Defense® High Capacity has internal components designed to efficiently capture pollutants and prevent washout at peak flows.



## Components

- |   |                               |
|---|-------------------------------|
| 1. Inlet Grate (optional)                     | 6. Internal Bypass            |
| 2. Precast chamber                            | 7. Outlet pipe                |
| 3. Inlet Pipe (optional)                      | 8. Oil and Floatables Storage |
| 4. Floatables Draw Off Slot<br>(not pictured) | 9. Outlet chute               |
| 5. Inlet Chute                                | 10. Sediment Storage Sump     |



# First Defense<sup>®</sup> High Capacity

## Sizing & Design

This adaptable online treatment system works easily with large pipes, multiple inlet pipes, inlet grates and now, contains a high capacity bypass for the conveyance of large peak flows. Designed with site flexibility in mind, the First Defense<sup>®</sup> High Capacity allows engineers to maximize available site space without compromising treatment level.

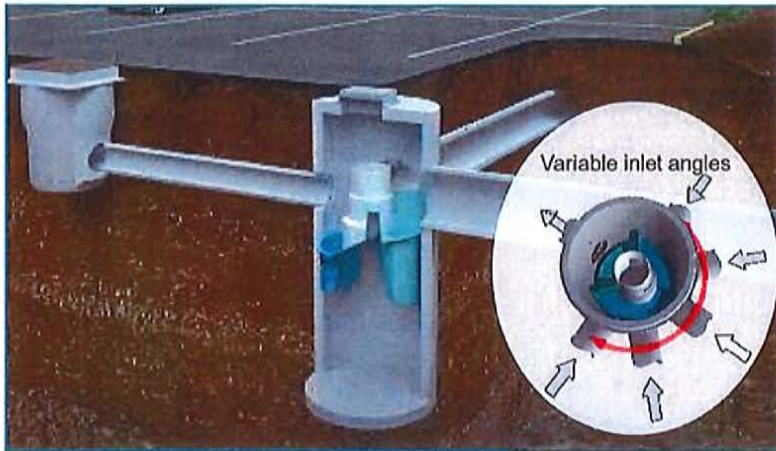


Fig 2. Works with multiple inlet pipes and grates

## Inspection and Maintenance

Nobody maintains our systems better than we do. To ensure optimal, ongoing device performance, be sure to recommend Hydro International as a preferred service and maintenance provider to your clients.

Call 1 (800) 848-2706 to schedule an inspection and cleanout or learn more at [hydro-int.com/service](http://hydro-int.com/service)

## SIZING CALCULATOR FOR ENGINEERS



This simple online tool will recommend the best separator, model size and online/offline arrangement based on site-specific data entered by the user.

Go to [hydro-int.com/sizing](http://hydro-int.com/sizing) to access the tool.



Fig 3. Maintenance is done with a vector truck

Table 1. First Defense<sup>®</sup> High Capacity Design Criteria.

First Defense <sup>®</sup> High Capacity Model Number	Diameter (ft / m)	Typical TSS Treatment Flow Rates		Peak Online Flow Rate (cfs / L/s)	Maximum Pipe Diameter <sup>1</sup> (in / mm)	Oil Storage Capacity (gal / L)	Typical Sediment Storage Capacity <sup>2</sup> (yd <sup>3</sup> / m <sup>3</sup> )	Minimum Distance from Outlet Invert to Top of Rim <sup>3</sup> (ft / m)	Standard Distance from Outlet Invert to Sump Floor (ft / m)
		NJDEP Certified (cfs / L/s)	110µm (cfs / L/s)						
FD-3HC	3 / 0.9	0.84 / 23.7	1.06 / 30.0	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	1.88 / 53.2	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC	5 / 1.5	2.34 / 66.2	2.94 / 83.2	20 / 566	24 / 600	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	4.23 / 119.8	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	7.52 / 212.9	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 - 1.8	7.40 / 2.2

<sup>1</sup>Contact Hydro International when larger pipe sizes are required.

<sup>2</sup>Contact Hydro International when custom sediment storage capacity is required.

<sup>3</sup>Minimum distance for models depends on pipe diameter.



# Technical Abstract

## First Defense® - High Capacity



### NJCAT Verified Performance Testing – OK110 ( $D_{50} = 108 \mu\text{m}$ ) Particle Sizes Range

#### Introduction

Hydro International has a state-of-the-art hydraulics and test facility that is used both to develop products and to evaluate performance. Through controlled testing using industry standard test protocols, Hydro's treatment products are evaluated under varying hydraulic and sediment load conditions. With a known drainage area or water quality flow rate, these test results are used to benchmark treatment objectives and to select the correct model size.

A common stormwater treatment goal for manufactured treatment devices is to reduce the Total Suspended Solids (TSS) concentration by at least 80%. To comply with this goal, a silica-based test sand with known particle size gradation (PSD) and density is injected into the treatment system at different flow rates. With known TSS concentrations and particle sizes before and after treatment, efficiency curves are plotted and used to predict TSS reductions for a range of particle sizes.

U.S. Silica OK110 is a common test sand that has been used by the industry but is no longer available. However, its PSD can be replicated from a blend of silica sands having a wide range of particle sizes. This abstract summarizes test results based on a particle size range similar to OK110 for the First Defense® High Capacity (FDHC). All test protocols and results have been independently verified by the New Jersey Corporation for Advanced Technology (NJCAT).

#### First Defense High Capacity (FDHC)

The FDHC (Figure 1) has patented flow modifying internal components that create a gentle swirling flow path within the Vortex Chamber. The rotating flow creates low energy vortex forces that supplement gravitational settling forces to enhance separation of pollutants.

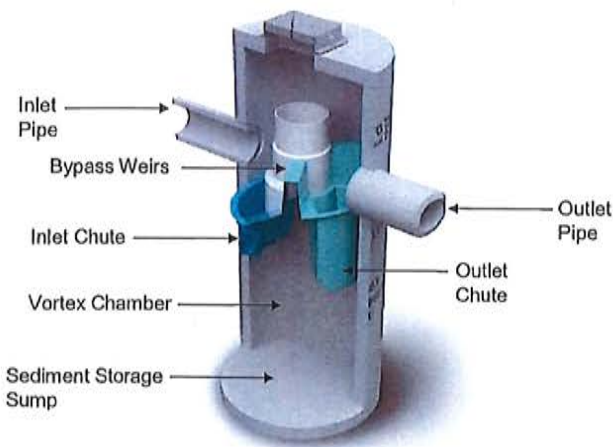


Figure 1 - First Defense High Capacity

The internal components are designed to fit into standard precast manholes and are installed to collect runoff as part of typical drainage network system. During a rain event, flow enters either from a surface inlet grate or inlet pipe. As flow enters the manhole, components divert flow and pollutants into a Vortex Chamber beneath a separation module, that includes both Inlet/Outlet Chutes and Bypass Weirs. The internal Bypass Weirs divert peak flows over the separation module and away from the Vortex Chamber where pollutants are collecting. This prevents high velocities from re-suspending captured pollutants during infrequent but large storm events.

Capable of providing high pollutant removals for a wide range of flow rates and pipe sizes, the FDHC can be installed either online or offline depending on pipes and peak flows. Its efficiency and simplicity make it economical to install and maintain.

#### Laboratory Testing Arrangement

The laboratory setup (Figure 2) consisted of a recirculating closed loop system with an 8-inch (200 mm) submersible Flygt pump that conveyed water from a 23,000 gal (87,064 L) reservoir through a PVC pipe network to the 4-ft (1.2m) FDHC. The flow rate of the pump was controlled by a GE Fuji Electric AF-300 P11 Adjustable Frequency Drive and measured by an EMCO Flow Systems 4411e Electromagnetic Flow Transmitter. Test sand was injected into the incoming flow stream using a volumetric screw feeder situated 10-ft prior to entering the test unit.

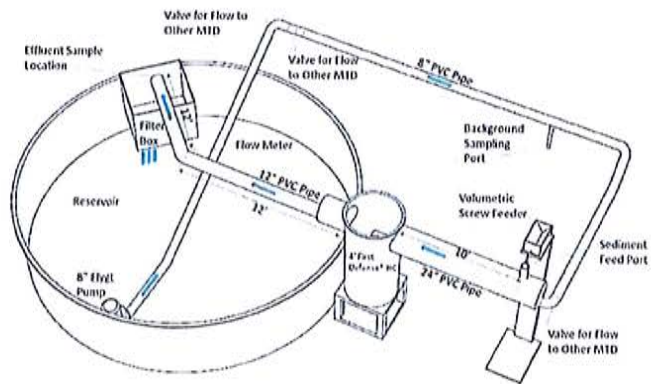


Figure 2 - Set-up of the Portland, Maine hydraulic testing facility

#### Test Sediment

The feed sediment injected into the inlet during removal efficiency testing was a blend of commercially available silica sands ranging from  $2 \mu\text{m}$  to  $1,000 \mu\text{m}$ . The PSD of the test sediment was analyzed by an independent laboratory in accordance with ASTM D 422-63. To evaluate the performance of the tested FDHC model for a particle size band similar to OK110, results were analyzed from the



# First Defense® - High Capacity

particle sizes range of 50 µm to 150 µm ( $D_{50}=108\mu\text{m}$ ). A comparison of the two gradations is shown in Figure 3, which shows the test sand gradation to be slightly finer than OK110 between 50µm and 100µm. For example, the test sand had 15% finer than 75 microns compared to the OK110 PSD that had only 3% less than 75 microns. Given finer particles are more difficult to settle, performance results based on the "OK110" particle size band of the test sand is considered conservative.

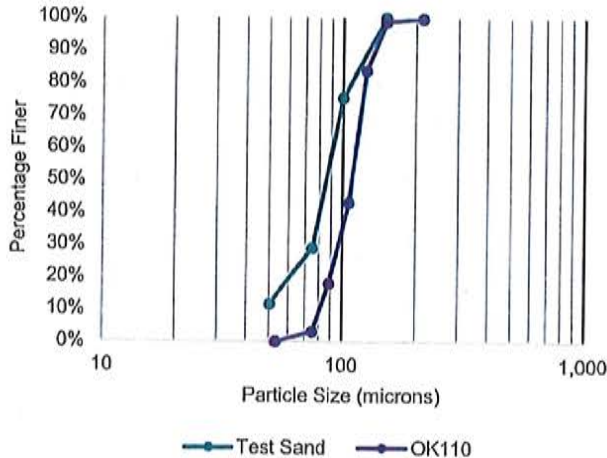


Figure 3 - Particle Size Distribution Comparison

## Removal Efficiency Testing

Removal efficiency testing with the feed sediment was conducted in accordance with Section 5 of the NJDEP Laboratory Protocol for Manufactured Treatment Devices. Five flow rates ranging from 25% to 125% of the design treatment flow rate were evaluated.

The test sediment was fed into the flow stream at a rate that was equivalent to 200 mg/L. The average influent TSS concentration was calculated using the total sediment mass and volume of water added during dosing. The influent concentration for each particle size band was calculated using the percentage of particles in each particle size band and known average inlet concentration. Three time-spaced effluent grab samples were composited and analyzed using laser diffraction (ISO 13320) to evaluate the effluent particle sizes.

Table 1 - OK110 Particle Size Range Test Results

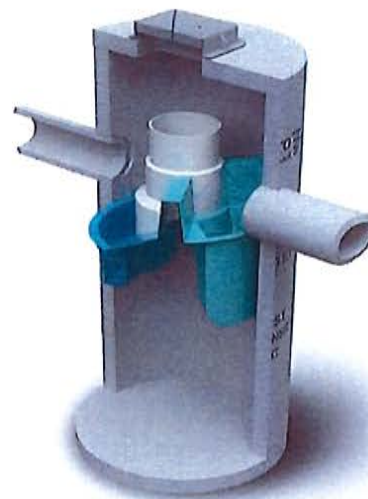
Flow cfs (L/s)	Inlet Conc. mg/L	Outlet Conc. mg/L	Removal %
0.38 (10.8)	84	4.44	95
0.75 (21.2)	83	5.50	93
1.13 (32.0)	78	4.00	95
1.5 (42.5)	83	6.57	92
1.88 (53.2)	79	8.81	89

The average effluent sediment concentration of the three composited samples was also measured for each flow rate in accordance with ASTM D3977-97. The effluent concentration for each particle size band was then calculated using the average effluent composite concentration and percentage of particles in each particle size band.

Percent removed at each of the five tested flow rates is shown in Table 1. Inlet concentrations of the OK110 particle size range varied from 79-84 mg/L compared to 4-8.5 mg/L at the outlet. As expected, the highest concentration measured at the outlet was at the highest tested flow rate of 1.88 cfs (53.2 L/s). In general, the 4-ft FDHC removed greater than 80% of the OK110 particle size range for all tested flow rates. Table 2 provides "Treatment Flow Rates" for the available models.

Table 2 - FDHC Treatment Flow Rate for > 80% TSS

Model:	FD-3HC	FD-4HC	FD-5HC	FD-6HC	FD-8HC
Size:	3 ft (900 mm)	4 ft (1.2 m)	5 ft (1.5 m)	6 ft (1.8 m)	8 ft (2.4 m)
cfs:	1.06	1.88	2.94	4.23	7.52
L/s:	29.9	53.2	83.2	119.8	212.9



For design purposes the selected model's Treatment Flow Rate must be equal or greater to the site's required Water Quality Flow Rate. The peak flow rate and maximum pipe size must be considered to determine whether an online or offline configuration is appropriate. Full removal curves are available on request.

Refer First Defense product information brochure or visit [www.hydro-int.com/us](http://www.hydro-int.com/us) for more information

# NFPA Standard



## 18.2 Fire Department Access.

18.2.1 Fire department access and fire department access roads shall be provided and maintained in accordance with Section 18.2.

### 18.2.2\* Access to Structures or Areas.

18.2.2.1 Access Box(es). The AHJ shall have the authority to require an access box(es) to be installed in an accessible location where access to or within a structure or area is difficult because of security. The access box(es) shall be of an approved type listed in accordance with UL 1037.

18.2.2.2 Access to Gated Subdivisions or Developments. The AHJ shall have the authority to require fire department access be provided to gated subdivisions or developments through the use of an approved device or system.

18.2.2.3 Access Maintenance. The owner or occupant of a structure or area, with required fire department access as specified in 18.2.2.1 or 18.2.2.2, shall notify the AHJ when the access is modified in a manner that could prevent fire department access.

### 18.2.3 Fire Department Access Roads.

#### 18.2.3.1 Required Access.

18.2.3.1.1 Approved fire department access roads shall be provided for every facility, building, or portion of a building hereafter constructed or relocated.

18.2.3.1.2 Fire department access roads shall consist of roadways, fire lanes, parking lot lanes, or a combination thereof.

18.2.3.1.3\* The provisions of 18.2.3.1 through 18.2.3.2.2.1 shall be permitted to be modified by the AHJ where any of the following conditions exists:

- (1) One- and two-family dwellings protected by an approved automatic sprinkler system in accordance with Section 13.1
- (2) Existing one- and two-family dwellings\*
- (3) Private garages having an area not exceeding 400 ft<sup>2</sup>
- (4) Carports having an area not exceeding 400 ft<sup>2</sup>
- (5) Agricultural buildings having an area not exceeding 400 ft<sup>2</sup>
- (6) Sheds and other detached buildings having an area not exceeding 400 ft<sup>2</sup>

18.2.3.1.4 When fire department access roads cannot be installed due to location on property, topography, waterways, nonnegotiable grades, or other similar conditions, the AHJ shall be authorized to require additional fire protection features.

#### 18.2.3.2 Access to Building.

18.2.3.2.1 A fire department access road shall extend to within 50 ft (15 m) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building.

18.2.3.2.1.1 Where a one- or two-family dwelling, or townhouse, is protected with an approved automatic sprinkler system that is installed in accordance with Section 13.3, the distance in 18.2.3.2.1 shall be permitted to be increased to 150 ft (46 m).

18.2.3.2.2 Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 ft (46 m) from fire department access roads as measured by an approved route around the exterior of the building or facility.

18.2.3.2.2.1 When buildings are protected throughout with an approved automatic sprinkler system that is installed in accordance with NFPA 13, NFPA 13D, or NFPA 13R, the distance in 18.2.3.2.2 shall be permitted to be increased to 450 ft (137 m).

18.2.3.3\* Multiple Access Roads. More than one fire department access road shall be provided when it is determined by the AHJ that access by a single road could be impaired by vehicle congestion, condition of terrain, climate conditions, or other factors that could limit access.

18.2.3.4 Traffic Signal Pre-emption. Where fire department apparatus are equipped with traffic signal pre-emption devices, newly installed traffic signals shall be equipped with traffic signal pre-emption.

#### 18.2.3.5 Specifications.

##### 18.2.3.5.1 Dimensions.

18.2.3.5.1.1\* Fire department access roads shall have an unobstructed width of not less than 20 ft (6.1 m).

18.2.3.5.1.1.1\* Where approved by the AHJ, the width of fire department access roads shall be permitted to be less than the minimum specified in 18.2.3.5.1.1.

18.2.3.5.1.1.2 The width of fire department access roads shall be increased when the minimum width specified in 18.2.3.5.1.1 is not adequate to accommodate fire apparatus.

18.2.3.5.1.2 Fire department access roads shall have an unobstructed vertical clearance of not less than 13 ft 6 in. (4.1 m).

18.2.3.5.1.2.1 Vertical clearance shall be permitted to be reduced where approved by the AHJ, provided such reduction does not impair access by fire apparatus, and approved signs are installed and maintained indicating the established vertical clearance when approved.

18.2.3.5.1.2.2 Vertical clearances shall be increased when vertical clearances are not adequate to accommodate fire apparatus.

18.2.3.5.2\* Surface. Fire department access roads shall be designed and maintained to support the imposed loads of fire apparatus and shall be provided with an all-weather driving surface.

##### 18.2.3.5.3 Turning Radius.

18.2.3.5.3.1 The turning radius of a fire department access road shall be as approved by the AHJ.

18.2.3.5.3.2 Turns in fire department access roads shall maintain the minimum road width.

18.2.3.5.3.3 Fire department access roads connecting to roadways shall be provided with curb cuts extending at least 2 ft (0.61 m) beyond each edge of the fire department access road.

18.2.3.5.4 Dead Ends. Dead-end fire department access roads in excess of 150 ft (46 m) in length shall be provided with approved provisions for the fire apparatus to turn around.





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## Fire Apparatus Access Roads

BY BRIAN O'CONNOR

Fire departments provide fire protection services to their jurisdictions as well as respond to a variety of other emergencies such as medical emergencies, motor vehicle accidents, hazardous material spills, electrical hazards, floods, and construction accidents. In order for these first responders to do their jobs effectively they need to be able to have access to the areas where incidents might occur, and this is where fire department access and access road requirements come in. Requirements for this topic come from Chapter 18 of NFPA 1, *Fire Code*.

When we talk about fire apparatus access roads, this includes more than just the fire lane outside of a building, it encompasses roadways and parking lots that must be traveled in order to allow access and operational setup for firefighting and rescue apparatus.

Fire engines not only need to be able to travel to their destination but when they get there, they need to be able to get close enough to any building to effectively deploy hose lines, access to fire hydrants and access fire department connections. Ladder trucks also need adequate room to setup rescue and laddering operations.

### Access Road Location Requirements

Fire department access roads must be provided so fire apparatus can drive within 50 ft (15 m) of an exterior door that allows access to the interior of the building. This 50 ft (15 m) distance can be increased to 150 ft (46 m) for one- or two-family dwellings, or townhouses, that are protected with an automatic sprinkler system.

The fire department access roads also need to be located so that any portion of the building or facility is not more than 150 ft (46 m) from fire department access roads as measured around the exterior of the building or facility. This



requirement ensures that first responders can reach most parts of the building with their hose lines. This 150 ft (46 m) distance can be increased to 450 ft in buildings that are protected with an automatic sprinkler system because a correctly installed sprinkler system reduces the fire risk to the occupants and firefighters.

If the AHJ determines that a single fire department access road can be impaired by through traffic, terrain challenges, climate conditions or anything else then multiple access roads might be required.

### Access Road Specifications

Access roads need to allow adequate access to the building and room to setup and perform manual suppression operations. Fire department access roads require 20 ft (6.1 m) of unobstructed width, 13.5 ft (4.1 m) of unobstructed vertical clearance and an appropriate radius for turns in the roads and dead ends for the vehicles apparatus to turn around. The minimum 20 ft (6.1 m) width allows for two-way vehicular traffic and for one fire apparatus vehicle to pass while another is working at a fire hydrant or conducting aerial operations while the 13.5 ft (4.1 m) vertical clearance ensures that fire apparatus can safely pass under power lines, bridges, and other obstructions. Bridges need to be designed to be able to support a load sufficient enough to carry a fully loaded fire apparatus and the vehicle load limits need to be provided at both entrances to the bridge. The grade of the road also must not exceed 1 ft (0.3 m) of elevation change every 20 ft (6.1 m) or whatever the design limits of the local fire apparatus dictate. As determined by the AHJ, certain parts of the fire department access road are required to be marked, these marked portions of the fire department access roads are called fire lanes.

### Obstructions

This next requirement is one that most people have heard of because it is typically painted in large letters in front of buildings, but I'll reiterate it here. If an area is designated as a fire lane, cars are not allowed to be parked there. In addition, the width of the rest of the fire department access road needs to be maintained and unobstructed. This means that parked vehicles need to be accounted for on roads or lots where they would normally park.

Other obstructions might include gates, doors or any other security feature. First responders must be able to access these areas in an event of an emergency. Access can be granted by installing an access box which is a listed box that usually contains items such as keys, access codes, card keys, or a remote opening device for first responders.

Fire departments must have adequate, unobstructed access to the buildings where incidents can occur in order for them to do their job properly. It is to everyone's benefit to allow fire departments easy access and the requirements in Chapter 18 of NFPA 1 help ensure this happens.

Do you have any experience with unique fire department access challenges? If so let us know about them in the comments below.

**Important Notice:** Any opinion expressed in this column (blog, article) is the opinion of the author and does not necessarily represent the official position of NFPA or its Technical Committees. In addition, this piece is neither intended, nor should it be relied upon, to provide professional consultation or services.

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