

1 Make this Section a part of the Standard Specifications:

2  
3 **"SECTION 627 – HYDRODYNAMIC SEPARATOR**

4  
5 **627.01 Description.** This section describes the constructing and  
6 installing of the hydrodynamic separator.

7  
8 **627.02 Materials.**

9  
10 **(A) Hydrodynamic Separator.** The Hydrodynamic Separator  
11 (HDS) shall use a tangential inlet pipe to establish rotational flow within a  
12 cylindrical vortex chamber or to be able to treat the Water Quality Flow  
13 Rate stated here-in without re-suspending and releasing captured  
14 pollutants. The HDS shall not release captured floating pollutants during  
15 surcharge conditions.

16  
17 The HDS shall not exceed the pressure drop (head-loss) for the  
18 design flow rates specified here-in as determined by ASTM C1745 /  
19 C1745M-11.

20  
21 The HDS shall fit within the limits of excavation (area and depth) as  
22 show in the project plans and will not exceed the dimensions for the  
23 design flow rates specified here-in.

24  
25 The storage capacities for pollutants that settle (sediment) and float  
26 (oil) shall not be less than the volumes listed in Table 627.03-1 -  
27 Hydrodynamic Separator Performance Specifications. The HDS shall  
28 operate as intended and perform as specified here-in as pollutants  
29 accumulate. The storage capacity for pollutants that settle shall not reduce  
30 the volume required in the HDS for separation and for preventing re-  
31 suspension and washout, or reduce the floatables storage volume  
32 capacity.

33  
34 Minimum 24-inch openings shall provide access to the sediment  
35 storage volumes from the surface for inspection and maintenance. Two  
36 access openings shall be provided for systems larger than 4 feet in  
37 diameter or 4 feet square. Removal of pollutants from the HDS shall be  
38 possible without requiring confined space entry.

39  
40 The HDS shall be manufactured with materials typically used in  
41 storm water drainage systems that have a minimum life expectancy of 30  
42 years.

43  
44 **(1) Materials of Construction.** Materials shall be cross-  
45 linked polyethylene (XLPE) and/or Type 304 stainless steel or  
46 carbon steel powder coated in accordance with ASTM 775/ ASTM  
47 A775M with a resulting thickness of 8-12 mils. All components

shall be designed to withstand all normal loadings associated with fabrication, shipping, site installation, and normal operation of the equipment.

**(2) Precast.** Precast shall be manufactured with concrete that has attained a compressive strength of 4,000 psi after 28 days. The structure shall be reinforced to withstand an HS20-44 loading. Shiplap joints shall be sealed with butyl rubber mastic sealant conforming to ASTM C990. Slab tops shall be suitably reinforced and provided with manhole openings and covers as required. The cast iron manhole frames and covers shall be sized as per the manufacturer's drawings and shall be in accordance with ASTM A48, CL.35B and AASHTO M105. The masonry fixing bolts shall be Type 304 stainless steel.

**(3) Piping Connections.** All piping connections and ancillary items not listed herein shall be provided by the Contractor.

**(B) Other Materials.**

Culverts and Storm Drains	603
Structure Backfill Material	703.20
Trench Backfill Material	703.21
Joint Filler	705.01
Mortar for Manhole	705.08
Reinforcing Steel	709.01
Admixtures	711.03
Water	712.01
Precast Concrete Unit	712.06
Frames, Grates, Covers and Ladder Rungs	712.07
Cullet Materials for Drainage Systems	717.04

**627.03 Construction.**

**(A) General.** Furnish and install HDS, all labor materials, equipment and incidentals required to meet the following requirements and in accordance with the drawings.

95  
96 Inspect HDS and accessory equipment upon delivery for general  
97 appearance, dimensions, soundness or damage in a manner acceptable  
98 to the Engineer.  
99

100 Repair any defects or damage identified by the inspection or return  
101 the unit and supply new undamaged HDS.  
102

103 Complete required repairs or adjustments of separator in  
104 accordance with Manufacturer's recommendations. Manufacturer's  
105 Representative and Engineer will inspect repairs before installation.  
106

107 **(B) Excavation.** Excavate in accordance with requirements of Section  
108 206 - Excavation and Backfill for Drainage Facilities and this section.  
109

110 Prior to the excavation, verify bottom of excavation elevation  
111 against separator dimensions and connecting storm drain invert  
112 elevations. Adjust bottom of excavation elevation must be adjusted to  
113 insure installation in accordance with Manufacturer's Specifications.  
114

115 In the event of unsuitable material at the bottom of the excavation,  
116 remove at least 8-inches of the unsuitable material and replace it with  
117 granular borrow material approved by the Engineer.  
118

119 **(1) Unsuitable material.** Soils consisting of organic soils  
120 or materials such as peat, moss and bog, or fine-grained soils (silts  
121 or clays) and un-cemented sands.  
122

123 **(2) Compaction.** Compact material on which the HDS is  
124 to be placed must be compacted to a relative density of not less  
125 than 95 percent (AASHTO T180).  
126

127 Provide a level foundation, which fully supports the HDS meeting  
128 manufacturer's recommendations.  
129

130 **(C) Installation.** Conform to ASTM C891 and the manufacturer's  
131 recommendations.  
132

133 Lift and place separator into position in strict accordance with  
134 manufacturer's recommendations. Use equipment to lift and place the  
135 separator that is of adequate size to avoid damaging the separator. Do not  
136 drag the separator along the ground or drop during installation.  
137

138 Install HDS plumb, level and align both vertically and horizontally  
139 with inlet and outlet piping.  
140

141 Connect the inlet and outlet piping in accordance with the  
142 manufacturer's recommendations and to insure uniform flows with no  
143 obstructions.

144  
145 Provide watertight connections with inlet and outlet pipes.

146  
147 Install manhole or clean out port frames and lids, set at the grade  
148 required as necessary to be within 0.125 - 0.25 inches lower than finished  
149 grade of roadway. Provide locking manhole covers when required.

150  
151 Install anchoring systems to resist buoyancy forces.

152  
153 Provide that a manufacturer's representative inspects, prior to  
154 backfill. Complete all required post-installation testing as prescribed by the  
155 manufacturer. Make all repairs or adjustments will be made as directed by  
156 the manufacturer's representative.

157  
158 **(D) Backfill.** Backfill in accordance with requirements of Section  
159 206 - Excavation and Backfill for Drainage Facilities. Do not damage the  
160 unit during compaction.

161  
162 **(E) Culvert Cleaning.** Clean, remove, and dispose of any trash and  
163 debris resulting from construction operations from the existing and new  
164 drainage facilities in accordance with Section 603 - Culverts and Storm  
165 Drains. Cleaning shall be performed to the level of satisfaction of the  
166 Engineer.

167  
168 **(F) Manufacturer Involvement.** A representative from the  
169 manufacturer shall be on-site as required by the Engineer to ensure that  
170 the HDS is installed, maintained and performing according to the  
171 manufacturer's specifications. Upon completion of the HDS installation,  
172 the manufacturer's representative shall provide written verification to the  
173 Engineer that the installed HDS is new and authentic and is in accordance  
174 with the contract documents. The manufacturer's representative shall  
175 provide guidance and instruction on the proper maintenance and  
176 inspection procedures to the Contractor and the Engineer.

177  
178 **(G) Inspection.** After installation, the Contractor shall demonstrate  
179 that the HDS has been properly installed at the correct location, elevation,  
180 and with appropriate components. All components associated with the  
181 HDS and its installation shall be subject to inspection by the Engineer. In  
182 addition, the Contractor shall demonstrate that the HDS has been installed  
183 per contract documents and manufacturer's recommendations.

184  
185 **(H) Maintenance.** The Contractor shall be responsible to inspect  
186 and maintain the installed HDS at the interval recommended by the  
187 manufacturer. The maintenance period shall begin immediately after the

188 installation and extend for 12 months after the final inspection. In addition,  
189 the Contractor shall inspect and maintain the HDS every month (at a  
190 minimum) until a relief of maintenance is granted.

191  
192 Accumulated debris, trash or wash water shall be the property of  
193 the Contractor and shall be disposed of according to local, State and  
194 Federal regulations.

195  
196 **(I) Reporting.** The Contractor shall be responsible to monitor, track,  
197 document, and report the amount of debris removed from the HDS. The  
198 Contractor shall submit a monthly inspection and cleaning completion  
199 report with the monthly invoice to the Engineer. At a maximum, the report  
200 shall include the location of the HDS, route number, mile post, date  
201 inspected, date cleaned, amount of debris removed, and estimated  
202 percentage of trash, sediment, organics, and other pollutants within the  
203 debris removed.

204  
205 **(J) Warranty.** The manufacturer shall guarantee the HDS against all  
206 manufacturing defects in materials and workmanship for a period of five  
207 (5) years from the date of acceptance. The manufacturer shall be notified  
208 of repair or replacement issues in writing within the warranty period.

209  
210 **Performance.** Performance of the HDS shall be based on independent full-  
211 scale laboratory and/or field testing and shall adhere to the performance  
212 specifications listed in Table 627.03-1 - Hydrodynamic Separator Performance  
213 Specifications. The laboratory testing used as the basis of product performance  
214 shall be undertaken in accordance with testing protocols approved by the  
215 Engineer.

216  
217 Performance of the HDS shall be based on treating the Water Quality  
218 Flow rate (WQF) without internally bypassing and without re-suspension and  
219 washout of captured pollutants (scour). The Maximum Treatment Flow Rate(s)  
220 (MTFR-50 and/or MTFR-100) shall be greater than or equal to the WQF. The  
221 HDS shall remove greater than or equal to 80% of TSS based on the Target  
222 Particle Size (TPS) of 50 microns and/or 100 microns at MTFR-50 and MTFR-  
223 100, respectively.

224  
225 The HDS shall treat all flows without internally bypassing up to the Peak  
226 Treatment Flow Rate (PTFR). Full-scale independent laboratory scour testing  
227 shall demonstrate effluent control of less than or equal to 20 mg/L for all flows up  
228 to 150% of MTFR-100 without internal or external bypass.

229  
230 The HDS shall be capable of capturing and retaining fine silt and sand  
231 size particles. Analysis of captured sediment from full-scale field installations  
232 shall demonstrate particle sizes predominately in the 20-micron range.

The HDS shall capture and retain 100% of all floating trash and debris and remove greater than 80% of hydrocarbons up to its rated storage capacities under conditions of a catastrophic spill such as might be experienced in an automobile or truck accident spill like conditions.

**Table 627.03-1 Hydrodynamic Separator Performance Specifications**

<b>Dia. (feet)</b>	<b>Max Depth<sup>1</sup> (feet)</b>	<b>MTFR- 50<sup>2</sup> (cfs)</b>	<b>MTFR- 100<sup>2</sup> (cfs)</b>	<b>Scour Flow Rate<sup>3</sup> (cfs)</b>	<b>PTFR<sup>4</sup> (cfs)</b>	<b>Head- loss<sup>5</sup> (feet)</b>	<b>Oil Storage Cap.<sup>6</sup> (gal)</b>	<b>Sediment Storage Cap. (gal)</b>
4	4.1	1.2	1.6	2.4	3	0.68	70	141
6	5.9	3.4	4.3	6.5	8	0.95	216	424
8	7.7	6.9	8.8	13.3	15	1.1	540	939
10	9.4	12	15	23.3	25	1.2	1,050	1,757
12	11.2	19	24	38	38	1.4	1,770	2,970

**Notes:**

1. Depth measurement is from the outlet invert to top of the bottom slab.
2. MTFR-50 and MTFR-100 are the Maximum Treatment Flow Rates for removing target particle sizes of 50 microns and 100 microns, respectively.
3. Scour Flow Rates are based on testing that demonstrates retention of captured sediment having a D50 of 100. Effluent concentrations shall not exceed 20 mg/L.
4. PTFR or Peak Treatment Flow Rate is based on the HDS maintaining positive removal efficiencies and head-losses no greater than those listed above for each model.
5. Head-losses are the difference in water elevations upstream and downstream of the HDS as determined by ASTM C1745 / C1745M – 11. The head-losses listed above for any particular model are for that HDS operating at the Peak Treatment Flow Rate.

**627.04 Measurement.** Hydrodynamic separator will be paid on a lump sum basis. Measurement for payment will not apply.

**627.05 Payment.** Engineer will pay for accepted pay items listed below at contract price per pay unit, as shown in proposal schedule. Payment will be full compensation for work prescribed in this section and contract documents.

Engineer will pay for each of the following pay items when included in the proposal schedule:

**Pay Item**

Hydrodynamic Separator Structure	Lump Sum
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The Engineer will pay for excavation and backfill in accordance with and under Section 206 - Excavation and Backfill for Drainage Facilities."

**END OF SECTION 627**