Section 02631

Water Quality Treatment Device

Part 1 – GENERAL

1.01 SUMMARY

A. Section Includes: The Contractor, and/or a manufacturer selected by the Contractor and approved by the Engineer, shall furnish all labor, materials, equipment and incidentals required and install all precast concrete stormwater treatment structures and appurtenances in accordance with the Drawings and these specifications. The Water Quality Device shall provide non flow partitioned treatment that removes sediment, free-floating pollutants, and hydrocarbon particles, storing the free-floating pollutants in a separate internal device. The water quality device must not include a internal bypass partition for the redirection of flows greater than the Water Quality Flow (WQF), this means 100% of the flow entering the device during any given storm event shall be treated.

B. Referenced Sections:
   1. Section 01630 – Product Substitution Procedures & Requirements.

1.02 REFERENCED STANDARDS

A. ASTM International (ASTM):
   1. A 48-03 – Specification for Gray Iron Castings
   2. B 209-06 – Specification for Aluminum and Aluminum-Alloy Sheet and Plate
   3. C 150-07 - Specification for Portland Cement.
   4. C 595-07 - Specification for Blended Hydraulic Cements.
   5. C 857-07 – Standard Practices for Minimum Structural Design Loading for underground precast concrete utility structures
   6. C 858-07 – Specifications for underground Precast Concrete Utility Structures.
   7. C 891-90(2003) –Standard Practices for Installation of Underground Precast Concrete Utility Structures
   8. D-3977 Suspended Solids Concentration Analysis

1.03 SUBMITTALS

A. Product Drawings: Contractor shall be provided with product dimensional drawings as the basis for preparation of fabrication drawings. Included with the drawings will be a hydraulic design package detailing the site specific design of this device. Product drawings shall be submitted to the Engineer for review and approval in accordance with Section 01330.

1.04 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturers: A manufacturer that shall have been regularly engaged in the design and production of water quality devices for the physical treatment of stormwater runoff for a minimum of 5 years and be able to provide maintenance records on more than 30 systems for over 5 years demonstrating the field performance of their products.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Acceptable Manufacturers: Unless a list of approved manufacturers is provided in the specification the Water Quality Device will be provided by CrystalStream Technologies, 2090 Sugarloaf Parkway, Suite 135, Lawrenceville, GA 30045, Phone: 800-748-6945 or approved Equal in accordance with Section 01630 – Product Substitution Procedures & Requirements.

2.02 PERFORMANCE

A. Each water quality device shall adhere to the following performance specifications at the design treatment capabilities, as listed below:

TABLE 2.1			
Mark No.	Water Quality Flow Rate (cfs)	Sediment Storage (yd^3)	**Hydraulic Loading Rate(GPM/ft^2)

CFS = Cubic Feet Per Second; GPM = Gallons Per Minute

** Hydraulic Loading Rate is the Water Quality Flow Rate converted to GPM divided by the treatment surface area of the device equals GPM/ft^2

1. Water Quality Flow Rate is the maximum flow at which the system will remove 80% of the annual sediment scoured from the pervious acres of the site.

2. Unless specified by the owner, pavement washoff of sediment solids shall be assumed equal to 2000# per year per acre of pavement draining to the device. Using these values the device shall provide adequate storage to allow for a 6 month maintenance interval.

3. Product substitutions must be equal to or less than the specified Hydraulic Loading Rate defined above for each unit.

B. Each water quality device shall include a rectangular chamber with a series of aluminum baffles and filter baffle to aid in the collection and storage of sediment, free floating debris, and hydrocarbons. The water quality device will also provide a section in the chamber to separate hydrocarbons from the flow entering the device.

C. Each water quality device shall be capable of removing 80% of the net annual sediment load based on a particle size gradation as defined by the site characteristics.

D. Annual removal efficiency models shall be based on third party field testing performance data by either EPA-ETV, TAPE, or TARP, site specific hydraulics and hydrology, and local rainfall data. Individual water quality devices shall have the Design Treatment Capacity listed in Table 2.1, and shall not allow for bypass when flows exceed these flows.

E. Direct access to the internal components of the device shall be provided by a combination of cast iron grate and frame, ring and cover or aluminum hatches. Hatches shall have a minimum access opening dimension of 36 inches square to facilitate maintenance and/or repairs.

F. Water quality device shall be housed within one single rectangular structure with a sump depth not exceeding 5 feet. Sump depth is defined as the measurement from the invert of the outlet pipe to the top of the base inside the structure.

G. A trash rack or other separation device shall be provided to capture floating debris.

H. Individual Water Quality unit(s) shall have usable sediment storage capacity of not less than the corresponding volume(s) listed in Table 2.1. The system shall be designed to not allow surcharge of the upstream piping network during dry weather conditions.

2.03 PERFORMANCE VERIFICATION

A. Valid full scale field testing using (ASTM D-3977) SSC method of sampling analysis, monitored by a third party entity with experience in stormwater field monitoring is required.

B. Full Scale Laboratory testing completed by an independent laboratory to develop performance curves under known conditions is required. Laboratory Testing alone is not sufficient to provide sufficient proof of scaling methodology.

C. A list of jurisdictions served by the manufacturer should be provided to verify supply, installation, inspection, maintenance, and performance claims.

D. A list of 30 installations including owner, contractor, engineer, and jurisdiction contact information must be provided.

E. Product shall have Third Party Field testing demonstrating 40% plus effectiveness at removing phosphorus, heavy metals, and total nitrogen.

2.04 MATERIALS

A. The Water Quality Unit shall be housed in a concrete structure that conforms to ASTM C 857 and ASTM C 858 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 (MS18) loading requirements as determined by a Licensed Professional Engineer.

2. Sections shall have a shiplap or tongue and groove joint with a butyl mastic sealant conforming to ASTM C 990.

3. Cement shall be Type I, II, or III Portland Cement conforming to ASTM C 150.

4. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4000 psi or other designated suitable handling strength.

5. Pipe openings shall be sized to accept pipes of the specific size(s) and material(s), and shall be sealed by the contractor with a hydraulic cement conforming to ASTM C 595.

B. All internal components shall be of aluminum alloy in accordance with ASTM B 209.

C. Brick or masonry used to build the grate and frame or ring and cover to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in conformance with all local requirements.

D. Castings for manhole frames and covers/grates shall be in accordance with ASTM A 48, CL.30B and AASHTO M105.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Each Water Quality Unit shall be constructed according to the size shown on the Drawings as specified herein. Install at elevations and locations shown on the Drawings or as otherwise directed by the Engineer.

B. Place the precast base unit on a granular sub-base of minimum thickness of 6 inches after compaction or of greater thickness and compaction if specified elsewhere. The granular sub-base shall be checked for level prior to setting, and the precast base section of the unit shall be checked for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5% the base section shall be removed and the granular sub-base material re-leveled.

C. Prior to setting subsequent sections place bitumen sealant in conformance with ASTM C990 along the construction joint in the section that is already in place.

D. After setting the precast roof section of the Water Quality Unit, set precast concrete grade rings or bricks to bring the grate and frame, ring and cover or hatch to finished grade in accordance with local standards.

E. Holes in the concrete sections for handling or other purposes shall be plugged with a non-shrink grout or by using grout in conjunction with concrete plugs.

F. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections in place to prevent and subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections.

END OF SECTION

Section 01631

WQU Product Substitution Procedure

Part 1 – GENERAL

1.05 SUMMARY

Section Includes: General procedures for the proposal of substitutions

1.06 MATERIAL REFERENCES

A. Reference to equipment, materials, articles, or patent process by trade name or catalog number shall not be construed as limiting competition.

1. The contract documents indicate or specify materials, articles, and processes by trade, patent, proprietary name, or name of manufacturer.
2. When known to the Architect/Engineer, additional products or manufacturers acceptable to the architect/engineer are listed. *Bids shall be based only on specified or referenced products and systems.*
3. In order to establish intent and level of quality by listing products characteristics, a particular product may be listed as the "basis for design."
4. The naming of more than one manufacturer in a Section does not imply that all products of named manufacturer are acceptable for use on the project.
5. Where only one proprietary product name is specified, material or equipment of any one of the manufacturers named may be provided, *but only if full compliance with other portions of the Specification can be satisfied.*
6. Referenced manufacturers are generally listed alphabetically to avoid the implication that any one manufacturer is preferred over another.

1.07 SUBSTITUTION DURING BIDDING

B. Substitutions submitted during the Bid Period will be required to include complete product data comparing and demonstrating equivalent performance , quality, warranty, and other salient characteristics of the specified products.

1. Substitution requests with incomplete documentation will be returned without review.

C. Bidders are allowed to submit, as an attachment to the bid, voluntary substitutions for consideration. *Included in the attachment shall be a statement indicating the specific amount of the reduction in the Contract Sum should the owner accept the substitution.*
   1. Cost reduction due to voluntary substitution proposals will not be considered to determine the successful bidder.

1.08 SUBSTITUTIONS AFTER AWARD OF CONTRACT

A. Substitutions will be considered by the Owner after award of the contract only if they result in sufficient cost or time savings to the Owner over the item specified, after the impact of additional cost and time to other elements of construction and the cost of redesign is taken into account.

B. Should the contractor wish to substitute an item purported to be an equal to the one specified, the Contractor shall, within 35 days after Notice of Proceed, furnish to the Architect/Engineer the name of the manufacturer, model number, cost savings, and other pertinent data and information respecting the "or equal" item that has been proposed in the bid and that the Contractor proposes incorporating in the work. If the "or equal" item is not found by the Architect/Engineer to be, in fact, "equal or better" based on relevant product requirements, then the item specified in the contract documents shall be furnished.

1.09 SUBSTITUTION REQUEST FORM

A. Submittal of the requested information shall be accompanied by the attached Substitution Request Form. Substitution request submitted by the Contractor without the Substitution Request Form will be returned to the Contractor unprocessed.

END OF SECTION

ATTACHMENT: Substitution Request Form

Contract No. Project Name

Date: City, State

SUBSTITUTION REQUEST FORM

TO:

PROJECT:

SPECIFIED ITEM: _____ _____ _____ _____
Section Page Paragraph Description

The Contractor requests consideration of the following:

REQUESTED SUBSTITUTION:_____

PROPOSED CHANGE IN CONTRACT SUM: Deduct the Sum of _____

Attached data includes product description, specifications, drawings, photographs, performance, and test data adequate for evaluation of the request; portions of the data are clearly identified.

Attached data also includes description of changes to contract documents which proposed substitution will require for proper installation.

The Contractor states the following paragraphs are correct:

1. The proposed substitution does not affect dimensions shown on the drawings.
2. The Contractor will pay for changes to the design of Project, including engineering design, detailing, and construction cost caused by the requested substitution, unless waived by owner.
3. The proposed substitution will have no adverse affect on other work, directly related or otherwise, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts will be locally available for the proposed substitution.

The contractor further states that the function, performance, and quality of the proposed substitution are equivalent or superior to the specified item.

SUBMITTED BY CONTRACTOR:

Signature: _____

Firm: _____

Address: _____

_____

Date:_____

FOR USE BY ARCHITECT/ENGINEER:

_ Accepted ☐ _Accepted as Noted ☐

_Not Accepted ☐Received too Late ☐

Remarks: _____

Owner: _____

Date:_____