

**BERRYVILLE TOWN COUNCIL STREETS AND UTILITIES COMMITTEE**  
**MEETING AGENDA**  
**Berryville-Clarke County Government Center**  
**101 Chalmers Court, Second Floor**  
**Meeting Room A/B**  
**Called Meeting**  
**Tuesday, August 16, 2016**  
**10:00 a.m.**

<u>Item</u>		<u>Attachment</u>	
1. Call To Order	Patricia Dickinson, Chair		
2. Discussion	East Main Street Improvements		1
3. Discussion	School crosswalk at Main and Hermitage		2
4. Discussion	Review of projects in process: a. Swan Avenue Sidewalk (Safe Routes to School) b. Battletown Drive Water Main c. Academy Court Water Main		3
5. Discussion	WWTP Membrane Replacement Proposal		4
6. Discussion	Amendments to the Section 2 of the Construction Standards and Details		5
7. Closed Session	No Closed Session Scheduled		
8. Other			
9. Adjourn			

↕ Denotes an item on where a motion for action is included in the packet

# Attachment 1

**BERRYVILLE TOWN COUNCIL  
STREETS AND UTILITIES COMMITTEE  
Discussion - Safety/Capacity/Functional Improvements for East Main Street (Bus 7)  
August 16, 2016**

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VDOT staff will be in attendance at this meeting to discuss future upgrades to East Main Street.

***July 28, 2016 Staff Report***

*Improvements to East Main Street from the Norfolk Southern Railroad east to the corporate limits have been discussed at the state and local level for a number of years. This section of Route 7 Business serves as a major destination for truck traffic to industrial businesses located on the east side of Berryville including the County's industrial park and the largest employer in the community (Berryville Graphics). Recommendations for improvements to the two-lane section include:*

- *Upgrade to three lanes with turn lanes;*
- *Sidewalks;*
- *Bicycle facilities;*
- *Drainage improvements; and*
- *Safety improvements at major intersections.*

*The project has been included in the County's list of priorities since 1995.*

*Some relief on East Main Street will be realized with the completion of Jack Enders Boulevard to South Buckmarsh Street (U.S. 340) as this connection would enable truck traffic to access U.S. 340 and the Route 7 Bypass without traveling on 7 Business.*

*Main Street remains under VDOT maintenance.*

# ZACH HILLERSON

11 Battletown Drive  
Berryville, VA 22611  
zach.hillerson@gmail.com

RECEIVED

JUL 08 2016

Town of Berryville  
Attn: Mr. Keith Dalton  
101 Chalmers Ct., Suite A  
Berryville, Va 22611

Dear Mr. Dalton,

I hope this finds you and yours well. I am writing regarding two issues with the streets in town.

First, I am quite disappointed with the work that was recently completed on Battletown Drive. The gravel that was installed on the edge of the newly paved surface has made Battletown Dr. quite unattractive. While driving through Berryville I couldn't find another residential street within town limits that has gravel edging. The gravel will undoubtedly find its way into yards on both sides of the street as well as create a hazard in the middle of the road where vehicles can launch the gravel into the air. It is my hope that the gravel can be removed and dirt and grass seed be installed in its place so that Battletown Dr. can be restored to the same condition as other residential streets in town.

I am also quite concerned about the lack of sidewalks on the E. end of Berryville, specifically from the railroad tracks to Battletown Dr. on E. Main Street. Traffic has increased significantly over the past few years with the industrial park, Richmond Homes subdivision and the extra jobs at Berryville Graphics. Recently Berryville welcomed Handsome Brook Farms with 105 employees and countless delivery trucks, almost all of which will be travelling on this section of Main St.

Berryville prides itself on having a quaint downtown. We have a farmers market, music in the park, numerous restaurants and several other events throughout the year. There have been many discussions about residents patronizing local businesses yet nothing has been done about increasing the walkability to gain access to them. As a shopper, once I am in my car and driving it is just as easy to drive on Rt. 7 as it is to drive into downtown Berryville.

The section of Berryville E. of the railroad tracks is the only place within town limits that doesn't have accessibility into downtown. The walk has shifted from dangerous to treacherous and I believe it is only a matter of time before someone gets hit (and possibly killed) by a vehicle. It is my hope that sidewalks will become a priority for Berryville in the very near future. It clearly has positive ramifications on multiple fronts.

I appreciate your time and hope to hear from you,



Zach Hillerson

RECEIVED

APR 21 2016

April 19, 2016

Mr. Keith Dalton  
Town Manager  
101 Chalmers Court, Ste. A  
Berryville, VA 22611

Dear Keith,

Most organizations have experienced that one person who is the perpetual pain in the side (or lower) that just won't go away. I don't want to be that person with the Town of Berryville; however, the conditions affecting pedestrians along E. Main Street continue to deteriorate and no one is paying attention or appear to be concerned that there is an on-going threat to life and safety. It is the perfect environment for a pedestrian to be struck by a vehicle.

Walking along E. Main Street from the railroad track east to Battletown Drive and beyond to the town limits is unsafe. It is unsafe during daylight hours and out right dangerous after dark. E. Main Street is one of the busiest streets in the Town of Berryville with an abundance of both auto and truck traffic. The problem has been brought to yours, Chief White's and VDOT's attention. The Band-Aid solution VDOT installed a year ago, while inadequate then, has deteriorated and now conditions are as bad, if not worse, than before the asphalt was extended on each side of E. Main Street.

Conditions that may have been acceptable twenty or thirty years ago no longer meet minimal safety standards. I am formally requesting that the Berryville Town Council and the Town staff, in conjunction with the Virginia Department of Highways, address and fix the safety issues along E. Main Street which include uneven walking surface, inadequate pedestrian space and poor lighting.

Sincerely,



Stanley M. Kerns

# Attachment 2

## School crosswalk at Main and Hermitage

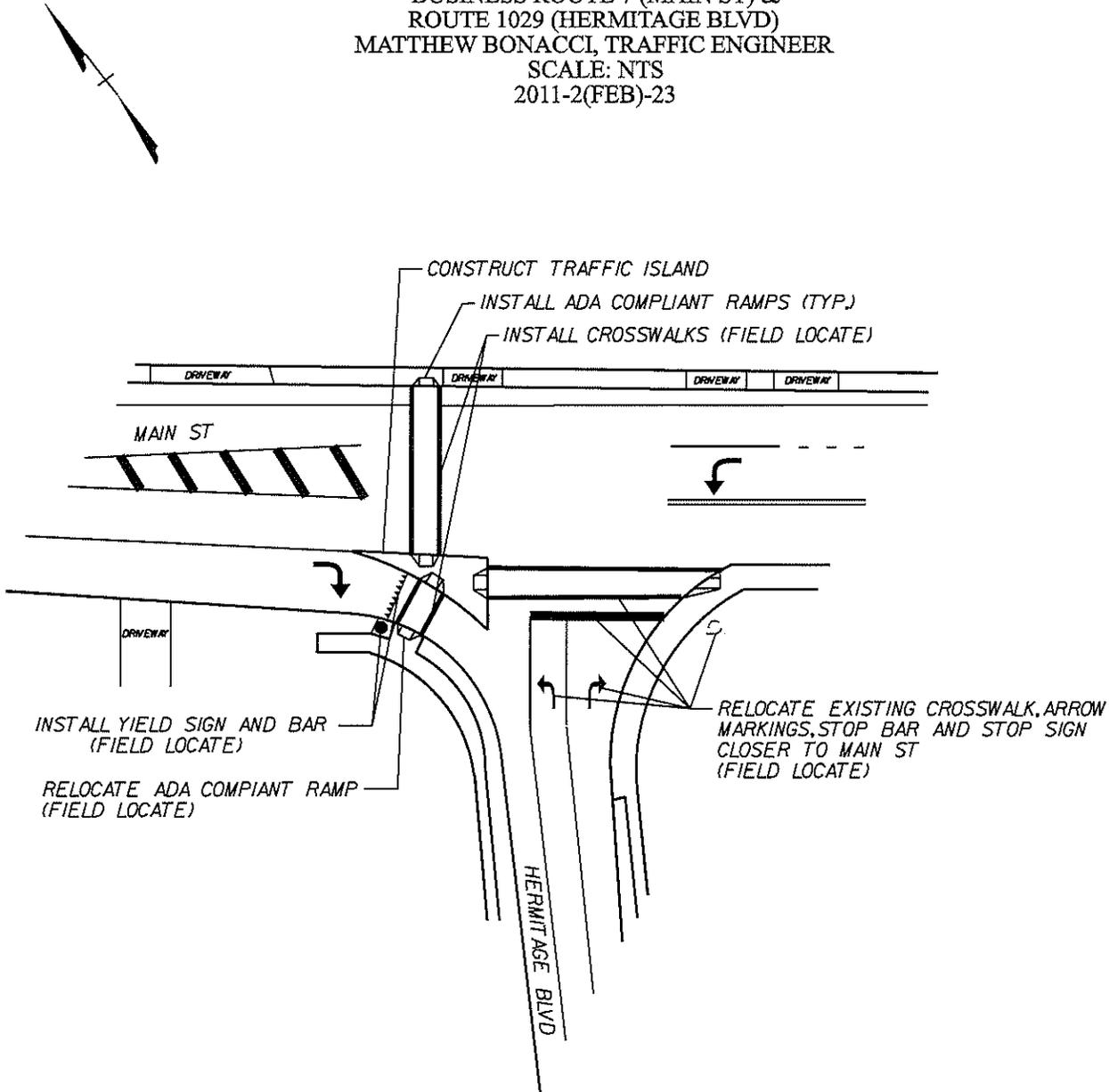
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At the last meeting of this committee on 28 July, staff provided the committee with a crosswalk plan developed by VDOT in 2011 (attached). Staff also discussed the concept of providing a crosswalk at Main and Jackson.

VDOT will be present at the meeting to discuss this matter.

VIRGINIA DEPARTMENT OF TRANSPORTATION  
NORTHWESTERN REGION TRAFFIC ENGINEERING  
INTERSECTION IMPROVEMENT CONCEPTUAL SKETCH

COUNTY OF CLARKE (21)  
TOWN OF BERRYVILLE  
BUSINESS ROUTE 7 (MAIN ST) &  
ROUTE 1029 (HERMITAGE BLVD)  
MATTHEW BONACCI, TRAFFIC ENGINEER  
SCALE: NTS  
2011-2(FEB)-23



# Attachment 3a

**BERRYVILLE TOWN COUNCIL  
STREETS AND UTILITIES COMMITTEE  
Safe Routes to School Infrastructure Project  
August 16, 2016**

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Staff has met with Pennoni Engineering representatives concerning the re-scoping, phasing, and re-bidding of the project. Per Mrs. Dickinson's request concerning the design of the facility, Mr. Mislowsky has responded in a letter included in this packet. Funding opportunities will be available through the Smart portal through the TA (Set Aside) program (formerly the TAP program). This grant cycle opens September 1, 2016.

***July 28, 2016 Staff Report***

*In late 2012, a Safe Routes to School (SRTS) stakeholder team was assembled to create a School Travel Plan (STP) in order to apply for funding for a Safe Routes to School Infrastructure grant.*

***Safe Routes to School Program***

*Safe Routes to School (SRTS) programs are sustained efforts by parents, schools, community leaders and local, state, and federal governments to improve the health and well-being of children by enabling and encouraging them to walk and bicycle to school.*

*SRTS programs examine conditions around schools and conduct projects and activities that work to improve safety and accessibility, and reduce traffic and air pollution in the vicinity of schools. As a result, these programs help make bicycling and walking to school safer and more appealing transportation choices thus encouraging a healthy and active lifestyle from an early age.*

*SOURCE: <http://www.saferoutesinfo.org/about-us>*

***School Travel Plan***

*Representatives on the team included school representatives (one each representing operations, education, and health); community representative (PTO member); local government representatives (one each representing planning and police departments); and regional government representative (transportation planner from the Northern Shenandoah Valley Regional Commission). A vision for the Travel Plan was developed as follows:*

*The Team's focus is to assure safe and efficient pedestrian and bicycle access to Johnson-Williams Middle School and encourage student, parent, and community participation in walking and bicycling to school.*

*Throughout the process, including stakeholder meetings and public input, recommendations were made for both non-infrastructure grants (page 14 of the STP, implementing a number of activities identified in the recommendation charts) and infrastructure grants (beginning on page 18 of the STP, three projects were identified and prioritized). The sidewalk was identified as the top priority. The current location*

does not meet safety standards due to its close proximity to the travel lane without curb and gutter. The handicapped ramps located on the school property, which are within the scope of the project, are not constructed to current VDOT standards.

The School Travel Plan was approved by VDOT in January of 2013 which allowed for the submission of an infrastructure application. The application was submitted and approved in November of that year with an award total of \$87,357. The process began shortly thereafter and included engineering, development of a site plan, and a number of other requisite tasks.

The bids were received and opened in April, 2016 with \$94,866 being the low bid. Staff has been working with VDOT representatives who recommended rejecting the bid, re-scoping the project, and phasing it to allow for additional funding to be sought through the SRTS program or other sources. A letter rejecting the bid was sent to the low bidder and re-scoping and phasing recommendations are identified below. Staff attended a seminar on June 20 at the Regional Commission office to obtain information on the Smart Scale (formerly HB2) and other funding opportunities. An applicant training is scheduled for July 29 which will allow localities to receive Smart Scale log-in credentials in order to access the funding portal.

#### **Current Project Costs**

Staff requested and received additional funding through the SRTS program totaling \$8,735 which will be applied to the project for a total of \$96,092.

<b>Total award:</b>	<b>\$87,357</b>
<b>Reimbursements to date:</b>	<b>\$32,704</b>
<b>Remaining funds:</b>	<b>\$54,653</b>
<b>Additional funds secured by Town for project:</b>	<b>\$8,735</b>
<b>TOTAL</b>	<b>\$63,388</b>

#### **Re-scoping and Phasing Recommendations**

In order to save money on engineering costs, Town staff has made recommendations for re-scoping and phasing include the following:

##### *Re-Scoping*

Value engineering items identified by the consulting engineers include reduction in silt fence and the option of moving smaller portions of silt fence as the project is constructed and to install conventional silt fence rather than reinforced.

##### *Phasing*

Staff is recommending that the project become a two-phased project. The first would include construction of the new facility from the location identified on the site plan to the existing sidewalk adjacent to the drop-off and the replacement of two handicapped ramps. The second phase would include the demolition of the existing sidewalk along Swan Avenue.

***Funding***

*The above recommendations will be vetted by the engineer on the project, bid documents updated, and another bid scheduled. Applications for funding the second phase will be submitted for the following cycles:*

*Smart Scale (formerly HB2) – August 1 – September 30, 2016*

*Revenue Sharing, TAP, HSIP – September 1 – November 1, 2016*

***Next Steps***

*Staff is requesting the modification of bid documents to reflect the proposed re-scoping; re-bidding the project; continue with Phase 1 and seek additional funding as identified above to complete Phase 2.*

***Recommendation***

*Town Council agree to proceed with the project as identified above. A motion and the approved School Travel Plan follow this report.*

## MEMORANDUM

**TO:** Christy Dunkle, Town of Berryville

**FROM:** Ron Mislowsky, PE

**DATE:** August 10, 2016

**SUBJECT:** Berryville SRTS Plan Design

**CC:** Karl Schaeffer

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The Swan Avenue sidewalk project was intended to meet two needs. First, provide a pedestrian walkway from the end of the sidewalk on Swan to the John Williams Middle School entrance. Second, remove the existing sidewalk on the north side of Swan and provide a gravel shoulder to allow vehicle parking. The existing sidewalk was removed because it does not extend the full length of the road, is at the same grade at the road pavement, which is an unsafe condition, and not constructed to support parked cars.

The Town and Schools intended that the new sidewalk be handicapped access accessible per state and federal requirements and be at the lowest cost possible. It was determined that the design of the path would meet VDOT sidewalk requirements and the route was selected to avoid rock and mature tree removal.

The design proposed a 10 ft. wide asphalt trail that winds through the rock ledges at the east end of the project. The walkway conforms to the ADA accessible route slope of 5% and minimizes the cut required. Across the lower areas at the west end, the design incorporates a low impact stormwater design, providing small diameter culverts and minimizing imported fill.

The gravel shoulder design also tries to keep the rock removal to as little as possible. We worked with the VDOT reviewers to keep the roadside ditch design to just what is needed to provide positive drainage flow and yet provide the necessary shoulder width for vehicle parking.

If you should have any questions or need clarification on any item, please give me a call.

## Transportation Alternatives Eligibilities

Activity	Eligible	Not Eligible
<p><u>Activity #1:</u></p> <p>Construction, planning and design of on-road and off-road trail facilities for pedestrians, bicyclists and other non-motorized forms of transportation</p>	<ul style="list-style-type: none"> <li>• Trails on and off road</li> <li>• New sidewalks</li> <li>• Rehabilitating existing sidewalks to comply with ADA standards and to improve pedestrian access</li> <li>• Other ADA pedestrian improvements including curb ramps and truncated domes</li> <li>• Bicycle lanes</li> <li>• Bicycle parking and bus racks</li> <li>• Bicycle and pedestrian bridges and underpasses</li> <li>• Rails-with-Trails</li> <li>• Equestrian trails when built along with a shared use path</li> </ul>	<ul style="list-style-type: none"> <li>• Sidewalk repair, drainage improvements or other maintenance activities</li> <li>• Circular trails / sidewalks</li> <li>• Facilities located wholly on one site or property that do not provide a connection to existing trails or sidewalks outside the site or property</li> <li>• Trails for equestrian use only</li> <li>• Recreational facilities</li> <li>• Any non-ADA compliant trail / sidewalk facility</li> <li>• Way-finding signage / program as a stand-alone project</li> <li>• Preliminary work including feasibility / location studies and master plans</li> </ul>
<p><u>Activity #2:</u></p> <p>Construction, planning and design of infrastructure-related projects and systems that will provide <b>safe routes for non-drivers</b> including children, older adults and individuals with disabilities to access daily needs</p>	<ul style="list-style-type: none"> <li>• Pedestrian and bicycle signals and crosswalks</li> <li>• Pedestrian lighting and other safety-related infrastructure</li> <li>• Safe connections to public transportation</li> </ul>	<ul style="list-style-type: none"> <li>• Bicycle and pedestrian safety / educational programs (see SRTS eligibilities for K-8)</li> <li>• Lighting fixtures intended for aesthetic purposes only (instances where adequate lighting already exists)</li> <li>• Roadway lighting</li> </ul>
<p><u>Activity #3:</u></p> <p>Conversion and use of abandoned railroad corridors for trails for pedestrians, bicyclists or other non-motorized transportation users</p>	<ul style="list-style-type: none"> <li>• Rails-to-Trails facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Projects solely to preserve abandoned railroad right of way</li> <li>• Trail facilities for motorized vehicles (ATVs, dirt bikes, snowmobiles, etc)</li> <li>• Maintenance and/or upkeep of trails (including the purchase of equipment)</li> </ul>
<p><u>Activity #4:</u></p>	<ul style="list-style-type: none"> <li>• Turnouts, overlooks and viewing areas that interpret</li> </ul>	<ul style="list-style-type: none"> <li>• Interpretation and other amenities installed without</li> </ul>

		transportation (i.e. air and space travel)
<p><u>Activity #7:</u></p> <p>Vegetation management practices in transportation rights of way</p>	<ul style="list-style-type: none"> <li>• Vegetation to improve transportation safety (could include removal of vegetation to improve sight distance)</li> <li>• Removal / management of invasive species</li> <li>• Planting of grasses or wildflowers to manage / prevent erosion along transportation corridors</li> </ul>	<ul style="list-style-type: none"> <li>• Landscaping as scenic beautification / stand-alone landscaping project</li> <li>• Landscaping off transportation rights of way</li> <li>• Gateway signage</li> </ul>
<p><u>Activity #8:</u></p> <p>Archaeological activities relating to impacts from implementation of a transportation project</p>	<ul style="list-style-type: none"> <li>• Archeological excavations and surveys related to a transportation project</li> <li>• Archeological activities required as part of a MAP-21 eligible project</li> <li>• Interpretation and display of artifacts discovered as part of a transportation project</li> </ul>	<ul style="list-style-type: none"> <li>• Archeological activities not related to a transportation project eligible under federal Title 23</li> </ul>
<p><u>Activity #9:</u></p> <p>Environmental mitigation activities to decrease the negative impacts of roads on the natural environment</p>	<ul style="list-style-type: none"> <li>• Stormwater management activities related to highway run-off that address water pollution and improve the ecological balance of local streams and rivers</li> <li>• Detention and sediment basins</li> <li>• Stream channel stabilization</li> <li>• Storm drain stenciling and river / stream clean-ups</li> </ul>	<ul style="list-style-type: none"> <li>• Drainage improvements related to poor maintenance</li> <li>• Stormwater management activities not related to highway run-off and water pollution</li> </ul>
<p><u>Activity #10:</u></p> <p>Wildlife mortality mitigation activities to decrease the negative impacts of roads on the natural environment</p>	<ul style="list-style-type: none"> <li>• Wetlands acquisition and restoration</li> <li>• Wildlife underpasses and overpasses to improve wildlife passage and habitat connectivity</li> <li>• Improvements to decrease vehicle-caused wildlife mortality</li> </ul>	<ul style="list-style-type: none"> <li>• Projects not related to the negative impacts of highway construction</li> </ul>

# Attachment 3b

## Battletown Drive Water Main Project Update

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Since the last meeting of this committee on 28 July, staff has spoken with all of the affected residents except one (staff met with that resident prior to the meeting). Staff is working to complete letters and work plans for the properties in question. Staff expects to have the work plans in the hands of the residents by 22 August.

Town crews have completed some weed eating and mowing in areas of concern and have removed the matting installed earlier.

A tree was removed from Doris Michael's yard in preparation for installation of her water lateral.

The Michael and Brown laterals are to be installed by the end of August.

After the laterals are installed the old main will be abandoned.

Staff expects work to address grass growth and shoulder material concerns to be completed in September and October.

7/28/16  
mtg

Water line Up-Grade  
Status Report  
July 21, 2016

Battletown Drive

The installation of 500lf new eight inch line was completed and put in service last month. The water laterals for 8 & 10 Battletown Drive are scheduled to installed by a contractor by August 15<sup>th</sup>. Once the laterals are installed Public Works Department will need to abandon the existing 4 inch water main. The process to abandon the main will require us to install a 2 inch water line to supply water service to 22 & 100 Battletown Drive, excavate and turn off a 2 inch corporation stop located in front of 4 Battletown Drive, and to remove a 4 inch valve located on the west side of the road near 100 Battletown Drive. This process will require a scheduled water interruption from Bel-Voi Drive to the end of Battletown Drive. I expect this project to take approximately 4 days to complete.

# Attachment 3c

## Academy Court Water Main Upgrade Project Update

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Since the last meeting of this committee on 28 July, the following has occurred:

- PW Crew completed main connection on Treadwell Street
- Installed 80' of main (between Treadwell Street and end of Academy Court )
- Provided temporary water service to homes on Academy Court
- Saw cut pavement at end of cul-de-sac to island
- Excavated island area

It is expected that the main and laterals will be installed by the end of August. Base pavement will be installed in the work area prior to winter.

7/28/16  
mtg

## Academy Court

During the week of August 1<sup>st</sup> we plan to begin the installation of 500lf of 8 inch water main from Treadwell Street going south on Academy Ct. to Academy St. We will be installing a 8 x 4 cross, Four eight gate valves, and one four inch gate valve. During this project we also will install a 8 x 8 x 8 tee and extend a joint of pipe to the east and west on Treadwell Street for future water main upgrades. Prior to construction a two inch temporary water line will be placed on top of the ground to supply water service to the six houses on Academy Street. Once this is done we will excavate and remove the existing four inch line and replace it in place with the new eight inch line, install 6 new water services and set a fire hydrant on the east side of Academy Court near the intersection of Academy Street. This project will require one scheduled water interruption. Depending on soil condition and weather we hope to have the new main installed and in service by September 1<sup>st</sup>.

# Attachment 4

# Memo

**To:** Keith Dalton, Town Manager  
**From:** Dave Tyrrell  
**Date:** July 19, 2016  
**Cc:** Jeff Cappo  
**Re:** Future Membrane Replacement Proposal

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Keith,

Last week I received the attached Budgetary Membrane Replacement Proposal from GE Water Process Technologies. While I am still digesting everything in the proposal and there are a few items I wish to negotiate with GE, namely the falling short by 300 ft<sup>2</sup> of existing membrane surface area, I wanted to get this information to you to be aware of what we are looking at for this upcoming cost.

The first item is module replacement. GE has provided the cost of new membrane modules for operating years 10 through 15 using the same pricing originally granted us for membrane replacement. In operating year 10 which is October 19, 2022 to October 18, 2023 the price per module is \$1540.00. This goes up for years 12 through 15. In year 15, which is after October 18, 2026, we will be looking at purchasing each module at full commercial price of \$1,894.00. Please note that should the inflation rate increase, these prices will also increase.

The new modules have an additional 30 ft<sup>2</sup> of surface area which will reduce the number of modules we will need to purchase. We are currently looking at the purchase of 504 of the membrane modules. This may change by a few units with negotiation. Page 9 of 27 list what GE requires of the Town to provide us with the special pricing. The total cost for the membranes, shipping to our site, and GE personnel for two weeks to help with the installation is \$965,000 plus taxes, fees, and shipping which cannot be priced until time of shipping due to the inability to know those cost this far in advance. We would be responsible for preparation and returning the shipping crates back to the factory in Hungary. I am still researching everything involved with this due to the pest controls and certifications required for the return shipping.

In addition to the membrane replacement, I am looking to upgrade the membrane aeration process to the new LEAPmbr system. This new technology eliminates the cyclic valves and can reduce power needs (not to mention all of the maintenance and time we spend on those cyclic valves) by reducing the number of blowers required to

be on line. This additional upgrade is \$102,000.00 which could pay for itself in just two or three years with reduced maintenance, power, and employee call back for cyclic valve failures. Total cost of both upgrades is \$1, 067.000.

As part of the pre-purchase to maintain the reduced membrane cost beyond the original 10 year period, GE is looking for a payment of \$90,000 per year starting in January 2017 for the next six years or \$540,000 pre-paid. This presents a problem we need to discuss since it took so long to get this proposal from GE and the 2017 budget is set. The Town will need to save an estimated \$570,000 in the same six year time frame to cover the remainder of the purchase cost, shipping, and crate return cost.

Please keep in mind that it appears the actual membrane cost is tied to inflation rates and can change even with the pre-purchase agreement. What this agreement does is extend the amount of time we can run on the original modules and still get reduced replacement cost. Also we are in need of documentation updates which GE will need to quote for us. That price has been requested.



## Budgetary Membrane Replacement Proposal

3239 Dundas Street West,  
Oakville, Ontario, Canada L6M 4B2  
Tel: 905 465 3030 Fax: 905 465 3050

<b>To:</b>	Town of Berryville, Virginia referred to here as Berryville or Buyer	<b>Date:</b>	July 11, 2016	
		<b>No. of Pages:</b>	27 including cover	
<b>Attention:</b>	David A. Tyrrell, Director of Utilities	<b>Email:</b>	<a href="mailto:dirutilities@berryvilleva.gov">dirutilities@berryvilleva.gov</a>	
<b>Plant Address:</b>	362 Parshall Road, Berryville, VA 22611 USA	<b>Telephone No.:</b>	540 955 1982	
<b>From:</b>	Matthew Stapleford, Regional Lifecycle Manager, Northeastern USA	<b>Email:</b>	<a href="mailto:Matthew.Stapleford@ge.com">Matthew.Stapleford@ge.com</a>	
		<b>Telephone No.:</b>	905 465 3030 x3454	
		<b>Cell No.:</b>	905 334 4035	
		<b>Fax No.:</b>	905 465 3050	
<b>Cc:</b>	Matt Curran, Scott Hortop			
<b>Subject:</b>	Budgetary Membrane Replacement (Full Plant): 552 x ZW500D 370ft <sup>2</sup> Modules	<b>Proposal No.:</b>	188558	
		<b>Original Project No.:</b>	U-500306	
<b>Plant Data:</b> Please provide corrections if inaccurate	Berryville Wastewater Treatment Plant, Municipal Sanitary Wastewater Treatment. 4 Trains, 3 x ZW500D 46/48M Cassettes per Train, 340ft <sup>2</sup> Modules. Substantial Completion Date: October 19, 2012.			





## Digital Leadership

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## Proposal Provisos

This proposal has been issued based on the information provided by the customer and on information currently available to GE Water & Process Technologies at the time of proposal issuance. Any changes or discrepancies in site conditions, including but not limited to changes in system influent water characteristics, changes in Environmental Health and Safety (EH&S) conditions, changes in the reissued State/Provincial Disposal System Permit, changes in Buyer financial standing, Buyer requirements, or any other relevant change or discrepancy in the factual basis upon which this proposal was created may lead to changes in the offering, including but not limited to changes in pricing, guarantees, quoted specifications, or terms and conditions.

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## 1 Introduction

GE Water & Process Technologies is pleased to present this budgetary proposal at the request of Town of Berryville, Virginia for ZW500D wastewater membrane modules to replace the full plant at the Berryville Wastewater Treatment Plant (WWTP) in Berryville, Virginia.

The membrane price is based on a forecasted guaranteed membrane replacement price in year 10 of the membrane life of the current modules.

GE is a proven leader in delivering tangible value to our clients over the life of the plant. Our measure of success is how well we deliver **solutions** that help our clients meet their critical business objectives

Through long-acquired membrane experience, GE has clearly distinguished itself from other membrane manufacturers. A mature service culture and deep technical expertise are at the ready to serve and support Berryville through this next membrane lifecycle.

**This proposal is for budgetary purposes only and does not constitute an offer of sale.**

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## 2 Scope – GE

### 2.1 Membrane Modules

Supply 552 x ZeeWeed 500D 370ft<sup>2</sup> wastewater membrane modules.

### 2.2 Cassette Refurbishment Kits

Supply 12 x ZW500D 48M cassette refurbishment kits for cassette frames with 46 modules installed. See Attachment A for additional kit details.

### 2.3 Hardware

Supply associated hardware as follows:

- 50 spare #118 EPDM permeate spigot o-rings;
- 8 spare ZW500D element end cap keys;
- 3 blank module header sets.

### 2.4 Off-Site Support

#### Documentation

The base level of documentation updates will include a trip report.

The trip report should be filed in the O&M Manual as interim documentation.

Due to the very high cost of comprehensive updating of plant documentation with each system upgrade, GE recommends planning a complete documentation update every 1-4 years to coincide with a selected system upgrade.



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GE will be pleased to develop a Documentation Update price quotation on request which may include some or all of the following scope according to its relevance:

- **O&M Manual** - Provide a fully updated version of the Operation & Maintenance Manual that indicates the changes made with this membrane replacement.
- **P&IDs** - Update the Process (Piping) & Instrumentation Drawings and reissue electronically.
- **Electrical Drawings** - Update the electrical drawings and reissue electronically.
- **Controls Documents** - Update Control Narrative (CN), Controls Logic Sequence Chart (CLSC, also known as CSC) and the Operation Sequence Chart (OSC)

### Project Management

Provide planning and off-site assistance during the membrane replacement project.

## 2.5 Membrane Module Warranty

These ZeeWeed Membrane Modules are supplied with a base 2 year Full Replacement Seller's Warranty against manufacturing defects. For details of the warranty coverage on the membrane modules supplied, please see Section 10.

Longer warranties are available on request.

## 2.6 Delivery

- ❑ **Packaging** - installed in ZW500D 30M shipping frames, bagged and crated for ocean shipment
- ❑ **DDP** - Delivery will be by standard ocean/ground on the basis of DDP Berryville WWTP, 362 Parshall Road, Berryville, VA, USA; Incoterms 2010. DDP = Delivery Duty Paid. Partial shipments will be acceptable unless otherwise specified. Where delivery cannot be accepted at this destination, Berryville shall specify an alternate, equivalent destination without delay.

Due to varying origins and availability, non-membrane items included in this proposal may be shipped separately from the membranes. Should separate shipments be required, where possible, GE will strive to provide these items on or before the delivery of the membranes.

- ❑ **Origin** - Delivery of ZeeWeed membranes and cassette refurbishment kits originates from the GE Water & Process Technologies, ZENON Membrane Products (ZEM), Bláthy Ottó u 4, Oroszlány, 2840 Hungary facility.
- ❑ **Title & Risk** - Title and risk of loss or damage to membrane modules, cassette refurbishment kits and crating shall pass to Berryville upon delivery at the named place of destination.
- ❑ **Export Documents** - All ZeeWeed membrane module shipments into the USA require clearance documentation from the EPA. GE will prepare and provide the required EPA documentation to the Carrier.
- ❑ **MPF** - Merchandise Processing Fee is a fee assessed for formal custom entries based on 0.35% of the invoice value, with a minimum of USD \$25 per formal entry and a



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maximum of USD \$485. On the basis of DDP terms, this fee will be paid by GE within the quoted price.

- ❑ **Taxes and Duty** - A US Customs duty of 3.9% applies to all ZeeWeed membranes shipped individually or in shipping frames; not in operational cassette frames. On the basis of DDP terms, this duty will be paid by GE within the quoted price. Any new duty imposed after the date of this proposal is the responsibility of Berryville. All applicable Local, State/Provincial, or Federal taxes are the responsibility of Berryville.
- ❑ **Temperature** - UF membranes cannot be allowed to freeze or overheat and may require temperature-controlled freight and handling according to the season and the planned routing. If required, the price of temperature control will be included within the firm quote on freight by GE.
- ❑ **Availability** - Delivery of membrane modules and cassette refurbishment kits is typically 20 weeks after receipt of order. Definitive Membrane Module and cassette refurbishment kit availability will be confirmed when a Purchase Order is received from Berryville and acknowledgement of a Purchase Order is issued by GE.

### 2.7 On-Site Technical Advisory Services

The proposal includes a provision for Technical Advisory Services during installation and commissioning process to Berryville's staff by 2 GE Field Service Representatives on site for 8 working days of 10 hours per day. GE strongly recommends that Berryville consider having at least one experienced person on site during this period.

Installation and commissioning of membranes will be executed one train at a time to minimize down-time and to return each train to beneficial use in a timely manner.

The following activities will be executed and completed jointly by GE personnel and plant staff:

- ❑ Remove existing membranes/cassettes;
- ❑ Strip plastic components from cassette frames and replace with cassette refurbishment kit components;
- ❑ Install the new membrane modules;
- ❑ Perform bubble test where applicable to test membrane integrity and review Trans Membrane Pressure (TMP) on the installed membranes and compare to expected values for new membranes.

**Operating Responsibility** - Berryville retains control of the work site and retains final responsibility for the installation and commissioning process.

GE will perform the services specified in the scope section of this document, but GE will not operate the system. For the purposes of this agreement, the term "operate the system" shall mean to run or control the functioning of the equipment or to otherwise conduct or manage the affairs of any aspect of water or wastewater treatment or other functions at Berryville's site, and shall include functions such as providing operators or laborers to adjust or control water treatment ("WT") equipment, wastewater treatment ("WWT") equipment or sludge management facilities ("SMF"), providing program oversight or directing on-site or contract operators/laborers to adjust or control WWT or SMF, providing personnel responsible for or providing oversight of water treatment residual quality, wastewater effluent quality, sludge quality, waste characterization, or waste disposal activities, or providing personnel with continual or daily operational responsibilities with respect to water or wastewater treatment, influent or effluent



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compliance monitoring, process monitoring, government reporting or notification, or permit compliance.

**Waiting Time** - Any overtime or waiting times required due to unforeseen site events outside the control of GE will be invoiced according to the prevailing GE Service Labor Rates Sheet, available on request.

### GE Duties for On Site Services

- GE will coordinate its work under this agreement in a reasonable manner with the operating staff of the facility.
- GE will maintain public liability and property damage insurance covering all operations undertaken by GE and its sub-contractors with a minimum limit of \$5,000,000 inclusive for any one accident or occurrence. If for any reason additional insurance coverage (e.g. General Construction/Erection All Risk, General Liability) is required above and beyond GE's standard insurance terms for on-site commissioning supervision, Berryville must inform GE in writing 60 days prior to work commencement at site. Berryville will be billed for all additional insurance costs and processing fees.
- GE will maintain Workers Compensation and Employers' Liability coverage as per statutory requirements.

## 3 ZeeWeed Configuration

Configuration Data	Existing Plant Configuration	Proposed Configuration After Replacement
Number of Trains, Plant	4	4
Number of Trains as Configured	4	4
Total Number of Cassettes Frames per Train	3	3
Total Cassette Frames in the Plant	12	12
Type of ZeeWeed Membrane	ZW500D	ZW500D
Module Surface Area, ft <sup>2</sup>	340	370
Maximum Number of Modules per Cassette	48	48
Installed Number of Modules per Cassette	46	42
Total Module Count, Train	138	126
Total Surface Area in Operation, ft <sup>2</sup> , Train	46,920	46,620
Total Module Count, Plant	552	504
Total Surface Area in Operation, ft <sup>2</sup> , Plant	187,680	186,480
% Surface Area Decrease from Existing, Plant	-	0.6

In order to drop the module count from 46 modules per cassette to 42 modules per cassette, GE assumes that Berryville treatment operations are running well and can easily manage the 0.6% drop in membrane surface area.



## 4 Price

### Contractual Basis for Membrane Replacement Price

The base price of replacement ZW-500D 340ft<sup>2</sup> membrane modules for this project is \$1,185 US per module.

GE has guaranteed this price for 10 years subject to adjustment for inflation (PPI according to US Bureau of Labor Statistics + 1%) or a maximum equivalent price per gallon of treatment capacity in the event that the module area/permeability etc. changes such that the same amount of feed water can be treated with fewer modules of the next generation design.

GMRP price escalation - calculation of the PPI begins on December 17, 2008 (Procurement Contract Agreement date) and will expire at the end of business on October 18, 2022 (10 years from start date of membrane warranty).

To benefit from Guaranteed Membrane Replacement Pricing (GMRP) within the contracted time limits, the customer must both submit a PO and accept membrane delivery with a typical 20 week lead time and must fulfill these two conditions prior to the GMRP expiry date.

Membrane replacement prices are quoted FCA, Oakville, Ontario, with packaging, freight, and taxes extra as the cost of shipping and packaging the membranes to site will depend on the quantity per shipment. Membrane replacement prices are quoted without taxes.

Adjusted Membranes Replacement Price to May 2022 (forecasted purchase date)	
Contractually Guaranteed Membrane Replacement Price USD\$	1,185.00
Initial PPI Value - Dec 2008	164.10
Forecasted PPI Value - May 2022	194.32
CPI Factor	18.42%
+1%	19.42%
Surface Area Adjustment Factor (340ft <sup>2</sup> vs. 370ft <sup>2</sup> )	8.82%
Adjusted Membrane Replacement Price for this proposal - USD\$	1,539.93
<b>This price is subject to further inflation adjustment through to the date of actual shipment of the replacement modules.</b>	

The GMRP term ends during year 10 of the module's operating life. Taking modules out of operation before their time is regrettable and not productive for Berryville and GE alike. GE would like to extend a price structure to Berryville in order that there is little pressure to replace prematurely and for both parties to achieve additional useful years out of the existing membrane modules.

Membrane Operating Year	Date Range	Module Price <sup>1</sup>
10	October 18, 2022 (End of GMRP)	1,540
11	October 19, 2022 – October 18, 2023	1,540
12	October 19, 2023 – October 18, 2024	1,600
13	October 19, 2024 – October 18, 2025	1,660
14	October 19, 2025 – October 18, 2026	1,720
15	After October 18, 2026 (commercial price)	1,894

Note 1 – Prices are FCA Oakville and do not include packaging, duties, fees or freight from Oakville to site.



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GE will provide the end of GMRP module price of USD \$1,540 for an additional year (Year 11) and then apply special module pricing to Berryville during Years 12, 13 and 14 of the operating module life so that modules can be retired when they should be and not sooner, driven by pure price pressures.

Should technological updates/upgrades to GE's ZW500 membrane or aeration technology become available between now and the time of replacement, GE will provide Berryville with the updated/upgraded equipment at no additional cost provided the upgraded technology is essentially 'drop-in' with no major structural or operating changes required.

GE requires agreement on the following terms in order to provide Berryville with the special pricing arrangement beyond Year 10.

- Agreement from Berryville to take delivery and complete installation within six months of order date;
- Special membrane price structure applies only to purchases of per train or full plant quantities (note – per train replacement may not be feasible with LEAPmbr upgrade);
- Submission of PO by Berryville with initial annual payment;
- Six annual payments of USD \$90,000 starting January 2017 and ending January 2022. Each annual payment will be put towards the full price of the replacement membrane purchase at the time of order placement. Annual payments have been calculated based on the full plant replacement price at GMRP in Year 10;
- Should early membrane replacement occur, membrane GMRP will be repriced and all submitted annual payments will be credited towards the order. Any payment overage will be credited back to Berryville while any balance owing will be invoiced with the membrane shipment;
- Should membrane replacement occur following completion of year 10, all submitted annual payments will be credited towards the order. With membrane replacement repricing at the time of order, any balance owing will be invoiced with the membrane shipment.
- Special pricing is only available for replacement membrane modules and not on modules for additional surface area or expansion;
- Only a quantity of ZW500D 370ft<sup>2</sup> modules will be supplied at this special pricing which is sufficient to match the current surface area.



The following pricing assumes full plant replacement and has been calculated for a replacement date in year 10 (final year of GMRP) or Year 11. Berryville can evaluate the total replacement package price for years 12 through 15 and beyond by replacing the unit price below with the relevant module unit price in the table above.

Qty	Item	Part No.	Unit Price	Total Price
504	ZeeWeed Membrane Modules under GMRP Replacement - ZW500D 370 ft² WW	3111047	1,539.93	776,124
12	Cassette Refurbishment Kits per Section 2.2			188,876
1	ZeeWeed Cassette Hardware per Section 2.3			
1	Off Site Support per Section 2.4			
1	On Site Technical Advisory Services (Labor + T&L) per Section 2.7			
1	Freight & Freight Insurance DDP Plant Site, INCO Terms 2010. Includes Brokerage at Canada US Border - Flat Fee, US EPA Documentation Flat Fee, US MPF Fee ~0.3464% - Merchandise Processing Fee and US Customs Duty 3.9%			
<b>All Figures are in USD.</b>			<b>Total:</b>	<b>965,000</b>
Rate/day for additional days at site if required: \$1,370.				

**LEAPmbr Upgrade Adder** = USD \$8,500/cassette x 12 cassettes = **USD \$102,000**. This adder includes LEAPmbr upgrade kits for 48M cassettes, packaging, freight to site, offsite programming/control updates and FSR on-site to supervise and assist with the aeration upgrade.

## 5 Scope - Berryville

### 5.1 Installation Preparation

- Receive, off-load, handle and provide temperature controlled storage of the equipment and materials required for Seller to perform the duties outlined in the Seller's Scope of Supply.
- Membrane must be stored in a sheltered area, protected from freezing, direct sunlight or extreme heat, and sealed as shipped until ready for use. Storage should be in a dark, dry, level area at a temperature of 5-30°C (41-86°F). Membranes have a shelf life of 1 year before requiring re-preservation and should not be stored longer than necessary prior to installation. Berryville is responsible for risk of loss of Seller's parts while in storage at the customer's plant.
- Inspect, evaluate and make repairs as required for the membrane tanks, mounting brackets, hoses and all connections prior to GE arriving at site.
- Provide all access structures (such as scaffolding) and mechanical lifting equipment including cranes, forklifts and scissor lifts.
- Assure availability of a copy of the Operating Manual, all Process and Instrumentation Drawings, and all Electrical Drawings on site and accessible for reference.
- Maintain adequate insurance coverage for the risks of fire, theft, vandalism, floods and personal injury to authorized or unauthorized visitors.



## 5.2 Installation

- ❑ Provide 3 or more plant personnel or Berryville subcontractors to work continuously with the GE Service Representative during installation and commissioning of the modules for the full duration of the site visit.
- ❑ Berryville will afford Seller's personnel free access and egress of the facility for all authorized work. Berryville will provide reasonable access to workshop facilities with standard workshop tools and equipment as is necessary to meet any repair and maintenance requirements of the system during installation.
- ❑ Provide adequate illumination and emergency lighting for all areas in which the Seller will be executing the scope of supply. Provide all site utilities such as raw water, instrument quality air, potable water and power required for operation of the proposed equipment included in this scope of supply. Assure that adequate quantities of membrane cleaning and neutralizing chemicals are on hand for wash procedures including sodium hypochlorite, sodium bisulphite, citric acid and sodium hydroxide. Supply telephone/fax/modem access while Seller's staff members are on-site.
- ❑ Provide assistance to remove cassettes from the system as required.
- ❑ Provide assistance to clean each cassette as it is removed from the system.
- ❑ Provide assistance to remove modules and plastic cassette components from the cassette frames.
- ❑ Provide assistance to install cassette refurbishment kits and place new modules into each cassette.
- ❑ Provide assistance to return the cassette to the system.
- ❑ Dispose of all retired membrane modules and cassette components.
- ❑ Retain shipping frame crating/skids.
- ❑ Dispose of all other shipping and packaging materials unless specifically requested not to do so by GE.
- ❑ At the end of the site visit, prior to departure of the GE Service Representative, Berryville will sign a Work Order that describes the hours on site and the Technical Advisory Services provided.

## 5.3 Empty Shipping Frame Preparation

All shipping frames returning to Hungary must be clean and packaged appropriately for trans-oceanic transport in shipping containers. GE can provide Berryville offsite assistance to facilitate the return of shipping frames.

All wooden packaging material used for international shipments must conform to current phytosanitary standards to reduce the risk of introduction and spread of quarantine pest species associated with the movement in international trade of wood packaging material made from raw wood.

All wood packaging material used to transport shipping frames internationally, must comply with ISPM15 which is the standard for phytosanitary measures and be properly stamped indicating compliance with the standard. Failure to comply with the standard may lead to



shipment refusal and subsequent project delays. For detailed information on ISPM15 please visit <http://www.ispm15.com>.

Whenever possible, save and re-use the wooden skids that the shipping frames arrived on for return freight purposes.

Frame Shipping Orientation: ZW1000/ZW500D shipping frames are shipped upright.

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## 6 Solution Design Notes

### 6.1 Permits

#### Regulatory Requirements

Berryville is responsible to review and report to the permit granting agency on the impact of any of the proposed changes on the regulatory permit. GE will provide the necessary manufacturer's technical support on regulatory issues.

#### Utilization

GE understands that these modules are required as replacements for currently installed modules.

These modules are offered on the basis that the membrane modules will not be used to provide expanded flow beyond the current plant flow rating. GE makes no guarantees, implied or otherwise as to the performance of these modules in any other capacity than as replacement membranes.

Replacing the current ZW500D 340ft<sup>2</sup> modules with the same number of ZW500D 370ft<sup>2</sup> modules increases the current membrane surface area by 8.8% and maintains the existing spare space for future module placement that could be used for flux remediation or for plant expansion subject to a review of the limitations of other equipment and hydraulic capacities.

### 6.2 Maintenance Notes for Replacement Membranes

At the time of any full plant membrane replacement, it is recommended to evaluate the appropriate timing of repairs or replacement of the following ancillary system components:

- Is it the right time to address any tank coating repairs which may be required?
- Are any of the aeration or permeate connection hoses, clamps, camlocks, camlock seals and couplings due for replacement?

#### Preferential Flow

Preferential flows can create a risk of over-fluxing of new modules when they are installed in the same train with older modules. The mixing of old and new modules in the same cassette also makes management of slack adjustment more difficult. GE recommends that Berryville plan membrane module replacement on a complete cassette and complete train basis wherever possible to achieve both optimal performance and best value from the new membrane modules. In this case, by replacing all membrane modules in the plant, this risk has been neutralized.

#### Membrane Slack

GE's membranes are supplied and shipped with an initial factory fiber slack designed to optimize membrane air scouring during operation as well as accommodate a degree of shrinkage.



### MLSS Concentration

MLSS concentration in the membrane tank during Annual Average, Max Month, and Max Week flows and during Max Day and Peak Hour flows must not exceed existing design concentrations with the change from 340ft<sup>2</sup> to 370ft<sup>2</sup> modules.

### Pre-Screen

Trash and non-biodegradable solids, such as hair, lint, grit and plastics may foul or damage the membranes if allowed to pass into the membrane chamber. GE recommends that an internally-fed screen with mesh or punched-hole openings less than or equal to 2 mm with no possibility of bypass or carryover be operated upstream of the new membranes to ensure effective operation and to maximize membrane life.

### Production Interruption

During installation of the ZeeWeed cassettes, trains may be shut down for extended periods of time which will affect Berryville treatment capacity. After the Purchase Order is acknowledged, GE's Project Manager for the installation will consult with Berryville to jointly develop the installation plan and work schedule with due regard for membrane delivery to the plant and plant preparation.

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## 7 Health & Safety

### Berryville

- ❑ Berryville will identify and inform Seller's personnel of any site specific hazards present in the work place that could impact the delivery of Seller's scope of supply and agrees to work with Seller to remove, monitor, and control the hazards to a practical level.
- ❑ Berryville will provide training to Seller's personnel on all site specific and standard company operating procedures and practices for performing work on site. Such training programs may include, but are not limited to, general Environmental Health & Safety (EHS), HAZOP, fire protection, drug testing, incident notice, site conduct, standard first aid, chemical receiving, electrical safety, etc. Berryville will provide a certificate of training for Seller's personnel. This program will be fully documented, training materials will be provided, and attendance list will be kept.
- ❑ If any type of lifting devices will be used on site, Berryville will provide proof of its maintenance, inspection and certification documentation upon request and will assist the GE Service Representative to complete a safety inspection checklist.
- ❑ Where confined space entry may be required, Berryville will provide early notice and will collaborate with GE in planning adequate staffing and in advising the local fire/rescue department as required.
- ❑ No time or cost provision has been made for preparations such as safety record clearances, drug testing, insurance confirmations or pre-job-training in excess of 1 hour. Prior to finalizing the Purchase Order and the work schedule, Berryville will advise GE of any pre-job or pre-mobilization requirements. Where these requirements exceed 1 hour, this time will be charged to Berryville at rates set out in the prevailing GE Labor Rate Sheet.



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Membranes shrink in length early in their lifecycle when exposed to higher temperature water. The pace of shrinkage slows with age. With the installation of new membranes, the requirements for slack adjustment start a new cycle.

Due to the wide variety of operating environments in which our products can be utilized, it is difficult to generally predict the rate of shrinkage. If membranes operate in a condition of insufficient slack for an extended period of time, irreversible damage to the fiber-urethane bond may occur. Please refer below to the recommended inspection frequencies based on your plant's membrane tank operating temperature. Visual inspections should begin during the membrane installation and be repeated over time on the same cassette. Digital pictures will allow for comparative analysis of the fiber slack over time.

Maximum Operating Temperature	Recommended Slack Inspection Frequency
0-24 °C / 32-76 °F	Every 2 years
25-30 °C / 77-86 °F	Once Per Year
>30 °C / > 86 °F	Twice Per Year

### Bubble Test Pressure

The bubble test pressure for the purchased membranes is 2 psi horizontally and 3 psi vertically.

## 6.3 Technical

### 340 to 370

Upgrading from the ZeeWeed 500D 340ft<sup>2</sup> module to ZeeWeed 500D 370ft<sup>2</sup> module offers the following advantages:

- 8.8% increase in membrane module surface area;
- Increased membrane module surface area without any changes to the overall dimensions of the module;
- No increase in chemicals for maintenance or recovery cleans due to increased surface area.

### Lifting Weight & Height

The lifting weight ranges for 500D cassettes differs slightly with 370ft<sup>2</sup> modules in place of 340ft<sup>2</sup> modules and needs to be considered to ensure that the site has adequate lifting capacity available to install and later remove the cassettes safely.

The lifting weight range for a 500D 48M cassette with 340ft<sup>2</sup> modules is 4,320 lb. to 8,962 lb.

The lifting weight range for a 500D 48M cassette with 370ft<sup>2</sup> modules is 4,457 lb. to 9,039 lb.

Cassette lifting weight ratings have a range as weights may vary due to the number of modules in the cassette and the degree of solids accumulation in an upset condition.

### Hoses & Fittings

GE has assumed for this proposal that the current aeration and permeate cassette connections for the ZW500D cassettes do not need replacing at this time. If this is not so, please advise GE and request that they be added to this proposal.



GE

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- Where certain short duration activities require two people for safety and the GE Service representative is alone at site, Berryville will cooperate as required to assure that correct safety precautions are taken.
- Berryville is responsible for the following environmental provisions:
  - Environmental use and discharge permits for all chemicals at Berryville's facility either listed in this document or proposed for use at a later date;
  - Any special permits required for Seller's or Berryville's employees to perform work related to the water treatment system at the facility;
  - All site testing, including soil, ground and surface water, air emissions, etc.;
  - Disposal of all solid and liquid waste from the Seller's System including waste materials generated during construction, start up and operation.
- Berryville is responsible for provision of health and safety facilities to Seller's Field Service Representatives to the same extent that they are provided to Berryville's own employees, including provision of:
  - Eyewash and safety showers in the water treatment area;
  - Chemical spill response;
  - Security and fire protection systems per local codes;

GE

- All work on site will be performed in accordance with applicable law and will be performed reasonably, in a clean and safe manner. The GE Service Representative will abide by the more stringent of the applicable health, safety and environmental policies and procedures of either Berryville or GE.
- GE will provide all applicable safety training required by GE policies or by state or national health and safety regulations. The GE Service Representative will have undergone Workplace Hazardous Material Information System (WHMIS) training and will come equipped with necessary Personal Protective Equipment (PPE).
- Emergencies - In emergencies affecting the safety of persons, work or property at the site and adjacent thereto, GE will act, without previous instructions from Berryville, as the situation warrants. GE will notify Berryville immediately thereafter.



## 8 Quality at GE – The Vision

We are driven by a passion for delivering on every commitment. We are dedicated to providing our customers the highest quality offerings with unparalleled customer service and responsiveness. We are committed to working through any problem in an open and honest manner—always with unyielding integrity.

### Quality Policy

At GE Water, we are committed to:

- Passionately driving customer satisfaction and loyalty by partnering with customers to help achieve their success.
- Delivering results with a sustained global compliance culture.
- Continually improving everything we do.
- Empowering our employees to engage and own Quality.

We will accomplish this by building on our strong foundation of Quality and raising the bar to the next level of success. By operationalizing Quality and engaging everyone on our team, we will create a culture where our customers, suppliers and employees feel the difference.

## 9 Terms and Conditions of Sale

### A - Specific Terms and Conditions of Sale

#### 1 Legal Entity for Contracting

ZENON Environmental Corporation is the name of the legal entity providing services and is an affiliate of GE Water & Process Technologies. Purchase Orders and Checks should be made out using the name ZENON Environmental Corporation.

Please advise us if this GE entity is not set up in your purchasing system as a vendor and you do have another GE entity set up. We are keen to make the purchase process as convenient as possible for Berryville.

**Short Form:** Where a short reference is required in this document, for convenience, we are called simply GE.

#### 2 Payment Terms

On **approved credit**, payment terms are Net 30 Days from customer receipt of invoice. Please see the Invoicing Schedule in Section 1, Price.

#### 3 Proposal Validity

Prices quoted and proposal terms are valid up to thirty (30) days after the date of issue of this proposal unless confirmed with a Purchase Order.

#### 4 Bonds

Performance or Payment Bonds are not included in the price. These bonds can be purchased on request but will be at an additional cost.

#### 5 Flight Booking

Prices quoted for installation which include airfare are either based on timely confirmation of a visit schedule or based on receipt of a Purchase Order in time to book any flights seven days in advance. Additional airfare charges related to late arrival of a Purchase Order will be extra and billed through to Berryville without mark-up.



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### 6 Purchase Order Guidelines

Please ensure that your Purchase Order has covered the following points. This will ensure accurate and prompt order entry, product delivery, invoicing and accounts receivables processing and will prevent administrative delays for all parties.

- ❑ **Legal Entity** - Please be sure your Purchase Order is issued in the name of the specific GE legal entity issuing this proposal cited above. We will be glad to work with your Purchasing department to set this entity up as an approved Supplier/Vendor. Please advise us if this GE entity is not set up in your purchasing system as a vendor and you do have another GE entity set up.
- ❑ **Hard Copy** - Our strong preference is to receive a hard copy of your Purchase Order rather than a PO number alone.
- ❑ **Proposal Number and Date** - Please reference the 6 digit Proposal Number and the Proposal Date which are found in the footer of each page.
- ❑ **Price** - State the total price you are accepting for this order.
- ❑ **Taxes** - Provide any required tax exemption certificates.
- ❑ **Ship-To Address** - Please clearly define the plant site address or delivery location and the Receiver's email & telephone. Please specify receiving hours and any special off-loading requirements.
- ❑ **Delivery Date** - Please include your requested delivery date or agreement start date.
- ❑ **Purchase Order** - Please send your Purchase Order to GE by email to [ServicePOCentral@ge.com](mailto:ServicePOCentral@ge.com)

### B – General Terms and Conditions of Sale

**Note to Purchasing Agent:** The following are GE's standard set of commercial terms & conditions, written for moderate value transactions to allow an efficient and rapid provision of services and parts. Where Master Corporate Agreement Terms or previously negotiated Terms have been agreed with GE these may be brought forward by either party and applied by mutual consent. If one or the other of these 2 Terms sets is not immediately acceptable to Berryville, please anticipate a typical 6-10 week cycle of mutual review to build agreement on changes.

1. **Exclusive Terms and Conditions.** Together with any other terms the Parties agree to in writing, these General Terms and Conditions – together with the last proposal in order of time issued by the Seller – form the exclusive terms ("Agreement") whereby Buyer agrees to purchase, and Seller agrees to sell products and equipment (jointly "Equipment") and to provide advice, instruction and other services in connection with the sale of that Equipment ("Services"). If Buyer sends to Seller other terms and conditions to which Seller may not respond, including but not limited to those contained in Buyer's purchase order, such shall not apply. This Agreement may only be revised by a change order approved in writing by both Parties. All terms not defined herein shall be defined in Seller's proposal.
2. **Equipment and Services.** The Equipment to be delivered and the Services to be provided shall be as set out in this Agreement. Unloading, handling, storage, installation, and operation of Buyer's systems or the Equipment are the responsibility of Buyer. Buyer shall not require or permit Seller's personnel to operate Buyer's systems or the Equipment at Buyer's site.
3. **Prices and Payment.** Buyer shall pay Seller for the Equipment and Services in accordance with the payment schedule (as set forth in Seller's proposal or, if applicable, in any special conditions agreed to in writing by the Parties). Unless otherwise specified in writing, payment is due net thirty (30) days from the date of Seller's invoice. Seller may require a Letter of Credit or other payment guarantee, in which case the stated amount of the guarantee will be adjusted by Buyer in the event of any currency-based adjustment to prices or payment amounts per the Payment Schedule, and Buyer shall deliver the adjusted guarantee within five (5) days of request by Seller. Buyer agrees to reimburse Seller for collection costs, including 2% (two percent) interest per month (not to exceed the maximum amount permitted by applicable law), should Buyer fail to timely pay. Buyer shall have no rights to make any deduction, retention, withholding or setoff relating to any payments due under this Agreement.
4. **Taxes and Duties.** Seller shall be responsible for all corporate taxes measured by net income due to performance of or payment for work under this Agreement ("Seller Taxes"). Buyer shall be responsible for all taxes, duties, fees, or other charges of any nature (including, but not limited to, consumption, gross receipts, import, property, sales, stamp, turnover, use, or value-added taxes, and all items of withholding, deficiency, penalty, addition to tax, interest, or assessment related thereto, imposed by any governmental authority on Buyer or Seller or its subcontractors) in relation to the Agreement or the performance of or payment for work under the Agreement other



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than Seller Taxes ("Buyer Taxes"). The Agreement prices do not include the amount of any Buyer Taxes. If Buyer deducts or withholds Buyer Taxes, Buyer shall pay additional amounts so that Seller receives the full Agreement price without reduction for Buyer Taxes. Buyer shall provide to Seller, within one month of payment, official receipts from the applicable governmental authority for deducted or withheld taxes. Buyer shall furnish Seller with evidence of tax exemption acceptable to taxing authorities if applicable, prior to execution of the Agreement by both Parties or issuance by the Seller of the order acceptance. Buyer's failure to provide evidence of exemption at time of order will relieve Seller of any obligation to refund taxes paid by Seller.

5. **Delivery, Title, Risk of Loss.** Unless otherwise specified in this Agreement, Seller shall deliver all Equipment to Buyer FCA (Incoterms 2010) Seller's facility. The time for delivery of the Equipment to Buyer shall be specified in this Agreement. Seller's sole liability for any delay in delivery of the Equipment shall be as expressly set out in this Agreement. The place of delivery specified herein shall be firm and fixed, provided that Buyer may notify Seller no later than forty-five (45) days prior to the scheduled shipment date of the Equipment of an alternate point of delivery, Buyer shall compensate Seller for any additional cost in implementing the change. If any part of the Equipment cannot be delivered when ready due to any cause not attributable to Seller, Buyer shall designate a climate-controlled storage location, and Seller shall ship such Equipment to storage. Title and risk of loss shall thereupon pass to Buyer, and amounts payable to Seller upon delivery or shipment shall be paid by Buyer along with expenses incurred by Seller. Services provided herein shall be charged at the rate prevailing at the time of actual use and Buyer shall pay any increase, and Buyer shall pay directly all costs for storage and subsequent transportation. Failure by Buyer to take delivery of the Equipment shall be a material breach of this Agreement.

Title and risk of loss to the Equipment shall be transferred from Seller to Buyer at the point of delivery upon handover in accordance with this Agreement. Title and risk of loss to the Services shall pass as they are performed.

6. **Warranties and Remedies.** Seller warrants that Equipment shall be delivered free from defects in material, workmanship and title and that Services shall be performed in a competent, diligent manner in accordance with any mutually agreed specifications. Seller's warranty does not cover the results of improper handling, storage, installation, commissioning, operation or maintenance of the Equipment by Buyer or third parties, repairs or alterations made by Buyer without Seller's written consent, influent water which does not comply with agreed parameters, or fair wear and tear.

Unless otherwise expressly provided in this Agreement, the foregoing warranties are valid for:

- a. chemicals and Services, for six (6) months from their date of delivery or the provision of Services;
- b. consumables, including filters and membranes (other than membranes for process treatment), twelve (12) months from their date of delivery;
- c. membranes for process treatment, ninety (90) days from their date of delivery;
- d. Equipment other than chemicals and consumables, the earlier of, fifteen (15) months from delivery or shipment to storage, or twelve (12) months from start-up/first use;
- e. software, ninety (90) days from the date of receipt;
- f. Equipment not manufactured by Seller, the warranty shall be the manufacturer's transferable warranty only,

Any claim for breach of these warranties must be promptly notified in writing, and Buyer shall make the defective item available to the Seller, or the claim will be void. Seller's sole responsibility and Buyer's exclusive remedy arising out of or relating to the Equipment or Services or any breach of these warranties is limited to repair at Seller's facility or (at Seller's option) replace at Seller's facility the defective item of Equipment, and re-perform defective Services. In performance of its obligations hereunder, Seller will not control the actual operation of either Buyer's systems or the Equipment at the Buyer's site.

Warranty repair, replacement or re-performance by Seller shall not extend or renew the applicable warranty period.

The warranties and remedies are conditioned upon (a) proper unloading, handling, storage, installation, use, operation, and maintenance of the Equipment and Buyer's facility and all related system in accordance with Seller's instructions and, in the absence, generally accepted industry practice, (b) Buyer keeping accurate and complete records of operation and maintenance during the warranty period and providing Seller access to those records, and (c) modification or repair of Equipment or Services only as authorized by Seller in writing. Failure to meet any such conditions renders the warranty null and void.



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The Buyer will be entitled to assign to a subsequent owner of the Equipment the warranties of the Seller under this Agreement, provided that a prior written notification is sent to the Seller and the assignment agreement contains terms and conditions which provide the Seller with the protections of the warranties and limitations on liability contained in the Agreement. Subject to Buyer's compliance with the foregoing requirement, such warranty rights are expressly assignable by the Buyer to a subsequent owner of the Equipment. Except as provided herein, Buyer is not entitled to extend or transfer this warranty to any other party. The warranties and remedies set forth in this article are in lieu of and exclude all other warranties and remedies, statutory, express or implied, including any warranty of merchantability or of fitness for a particular purpose.

Unless otherwise expressly stipulated in this Agreement, Seller gives no warranty or guarantee as to process results or performance of the Equipment, including but not limited to product quality, flow, production, capacity, membrane life, chemical consumption, regulatory compliance or energy consumption.

7. **General Indemnity.** Seller shall indemnify and hold harmless Buyer from claims for physical damage to third party property or injury to persons, including death, to the extent caused by the negligence of Seller or its officers, agents, employees, and/or assigns while engaged in activities under this Agreement. Buyer shall likewise indemnify and hold harmless Seller from claims for physical damage to third party property or injury to persons, including death, to the extent caused by the negligence of the Buyer, its officers, agents, employees, and/or assigns. In the event such damage or injury is caused by the joint or concurrent negligence of Seller and Buyer, the loss shall be borne by each Party in proportion to its negligence. For the purposes of this article (i) "Third party" shall not include Buyer or any subsequent owner of the Equipment, their subsidiaries, parents, affiliates, agents, successors or assigns including any operation or maintenance contractor, or their insurer; and (ii) no portion of the Equipment is "third party property".
8. **Compliance with Laws and Permits.** All permits, authorizations, and licenses which are required to construct, install and/or operate Buyer's facility or equipment, to use the Equipment, or to manage and dispose of any wastes, discharges, and residues resulting from Buyer's use of the Equipment, shall be obtained and maintained by Buyer at Buyer's sole expense. Buyer is responsible for compliance with all laws and regulations applicable to the storage, use, handling, installation, maintenance, removal, registration, and labeling of all Equipment after delivery of the Equipment, as well as for the proper management and disposal of all wastes, discharges, and residues.
9. **Buyer's Site Conditions.** Buyer warrants that any data furnished to the Seller concerning conditions at Buyer's site (including but not limited to any existing Buyer facility, equipment or processes, influent water or other substances to be treated or measured with the Equipment) is accurate and complete, and the Seller reserves the right to utilize the most appropriate design compatible with generally accepted engineering practices, and to make changes in details of design, manufacture and arrangement of Equipment unless precluded by any limitations specified in this Agreement. Seller shall notify Buyer of (1) any conditions at Buyer's site which materially differ from those indicated in the data furnished by Buyer, (2) any previously unknown physical conditions at Buyer's site of an unusual nature, not revealed by previous investigations and differing from those ordinarily encountered in the type of work provided for in this Agreement, and (3) the presence of any Hazardous Materials (as defined below), the existence of a contaminated soil, unexploded ordinance, or archaeological remains. If such conditions cause an increase in Seller's cost or in the time required for the performance of Seller's obligations, Seller shall be entitled to an equitable adjustment in the Agreement price and an extension in the time for performance.
10. **Hazardous Materials and Wastes.** In the event that Seller encounters any Hazardous Materials (meaning toxic substances, hazardous substances, pollutants, contaminants, regulated wastes, or hazardous wastes as such terms may be defined or classified in any law, statute, directive, ordinance or regulations promulgated by any applicable governmental entity) at Buyer's site, other than Hazardous Materials introduced by Seller or that are otherwise the express responsibility of Seller under this Agreement, Buyer shall immediately take whatever precautions are required to legally eliminate such Hazardous Materials so that the Seller's work under this Agreement may safely proceed. At no time shall Seller be deemed to have taken title to or the responsibility for the management or disposal of any wastes, Hazardous Materials, influent water, any resultant product streams, wastewater streams, discharges, cleaning materials, or any other materials or substances processed by the Equipment or otherwise located at Buyer's site. Seller does not take responsibility for and hereby expressly disclaims responsibility for the characterization or disposal of wastes, Hazardous Materials, or for the identification, selection, or management of disposal facilities for any wastes.
11. **Excusable Delays.** Seller shall not be liable nor in breach or default of its obligations under this Agreement to the extent performance of such obligations is delayed or prevented, directly or indirectly, due to causes beyond the



reasonable control of Seller, including, but not limited to: acts of God, natural disasters, unusually severe weather, fire, terrorism, war (declared or undeclared) epidemics, material shortages, insurrection, act (or omissions) of Buyer or Buyer's contractors/suppliers or agents, any act (or omission) by any governmental authority, strikes, labor disputes, transportation shortages, or vendor non-performance. The delivery or performance date shall be extended for a period equal to the time lost by reason of delay or non-performance, plus such additional time as may be necessary to overcome the effect of the delay or non-performance. If delivery or performance is delayed for a period exceeding 180 (one hundred and eighty) days, either Party may terminate this Agreement without further liability provided that Seller shall be paid an amount equal to that which would be payable to Seller under the article entitled "Termination". If Seller is delayed by any acts (or omissions) of Buyer, or by the prerequisite work of Buyer's other contractors or suppliers, Seller shall be entitled to an equitable adjustment in schedule, price and/or performance, as applicable.

12. **Emergencies.** If the safety of Seller's personnel is threatened or likely to be threatened by circumstances outside the reasonable control of Seller, including but not limited to war, armed conflict, civil unrest, riots, terrorism, kidnapping, presence of or exposure to hazardous materials, unsafe working conditions, or by the threat of such circumstances or a lack of adequate protections against such circumstances, Seller shall be entitled to take all necessary steps to ensure the security and safety of its personnel including the evacuation of personnel until such circumstances no longer apply. Any such occurrence shall be considered an excusable delay event. Buyer shall reasonably assist in the event of any such evacuation.
13. **Confidentiality, Intellectual Property.** Both Parties agree to keep confidential the other Party's proprietary non-public information, if any, which may be acquired in connection with this Agreement. Buyer will not, without Seller's advance written consent, subject Equipment to testing, analysis, or any type of reverse engineering. Seller retains all intellectual property rights including copyright which it has in all drawings and data or other deliverables (including the Equipment) supplied or developed under this Agreement. Buyer agrees that it will not file patent applications on the Equipment or any development or enhancement of the Equipment, or of processes and methods of using the Equipment, without Seller's express prior written permission. Buyer further agrees that in any event any such patents will not be asserted against Seller or its other buyers based upon purchase and use of such Equipment. Seller grants to Buyer a non-exclusive, non-terminable, royalty free license to use the intellectual property embedded in Equipment delivered to and paid for by the Buyer, as well as any drawings, design or data delivered to and paid for by the Buyer, for the purposes of owning, financing, using, operating and maintaining the relevant Equipment at Buyer's site. Such license may only be assigned to a subsequent owner of the Equipment or to an operations and maintenance subcontractor. Such license does not extend to the re-creation of the Equipment or the manufacture of spares or consumables by Buyer or third parties.

Any software Seller owns and provides pursuant to this Agreement shall remain Seller's property. Seller provides to Buyer a limited, non-exclusive and terminable royalty free project-specific license to such software for the use, operation or maintenance at Buyer's site of any Equipment purchased hereunder to which the software is a necessary component. Buyer agrees not to copy, sub-license, translate, transfer, reverse engineer, or decode the software.

Seller shall indemnify and hold harmless Buyer from any rightful claim of any third party that any Equipment or Service infringe a patent in effect in the USA, or country of delivery (provided there is a corresponding patent issued by the USA), or USA copyright or copyright registered in the country of delivery. If the Buyer notifies the Seller promptly of the receipt of any such claim, does not take any position adverse to the Seller regarding such claim and gives the Seller information, assistance and exclusive authority to settle and defend the claim, the Seller shall, at its own expense and choice, either (i) settle or defend the claim and pay all damages and costs awarded in it against the Buyer, or (ii) procure for the Buyer the right to continue using the Equipment or Service, or (iii) modify or replace the Equipment or Service so that it becomes non-infringing, or (iv) remove the infringing Equipment and refund the price. The above paragraph shall not apply to any misuse of Equipment or Equipment which is manufactured to the Buyer's design, or to alleged infringement arising from the combination, operation, or use of any Equipment or Services with other equipment or services when such combination is part of any allegedly infringing subject matter. The foregoing list of sub-sections (i), (ii), (iii), and (iv) and related terms state the entire liability of the Seller for intellectual property infringement by any Equipment or Service.

14. **Limitations on Liability.** Notwithstanding anything else contained in this Agreement, to the maximum extent permitted by law, and regardless of whether a claim is based in contract (including warranty or indemnity), extra-contractual liability, tort (including negligence or strict liability), statute, equity or any other legal theory:



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- a. THE TOTAL LIABILITY OF THE SELLER AND OF ITS INSURER FOR ALL CLAIMS ARISING OUT OF OR RELATING TO THE PERFORMANCE OR BREACH OF THIS AGREEMENT OR USE OF ANY EQUIPMENT OR SERVICES SHALL NOT EXCEED THE TOTAL PRICE PAID BY BUYER UNDER THIS AGREEMENT OR (IN THE CASE OF AN AGREEMENT FOR SERVICES WITH A TERM OF MORE THAN ONE YEAR) THE ANNUAL PRICE PAYABLE BY BUYER UNDER THIS AGREEMENT;
- b. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY LOSS OF PROFIT OR REVENUES, LOSS OF PRODUCTION, LOSS OF USE OF EQUIPMENT OR SERVICES OR ANY ASSOCIATED EQUIPMENT, INTERRUPTION OF BUSINESS, COST OF CAPITAL, COST OF REPLACEMENT WATER OR POWER, DOWNTIME COSTS, INCREASED OPERATING COSTS, CLAIMS OF BUYER'S CUSTOMERS FOR SUCH DAMAGES, OR FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL, INDIRECT, PUNITIVE OR EXEMPLARY DAMAGES;
- c. SELLER'S LIABILITY SHALL END UPON EXPIRATION OF THE APPLICABLE WARRANTY PERIOD, PROVIDED THAT BUYER MAY CONTINUE TO ENFORCE A CLAIM FOR WHICH IT HAS GIVEN NOTICE PRIOR TO THAT DATE BY COMMENCING AN ACTION OR ARBITRATION, AS APPLICABLE UNDER THIS AGREEMENT, BEFORE EXPIRATION OF ANY STATUTE OF LIMITATIONS OR OTHER LEGAL TIME LIMITATION BUT IN NO EVENT – TO THE EXTENT PERMITTED BY APPLICABLE LAW – LATER THAN FIVE (5) MONTHS AFTER EXPIRATION OF SUCH WARRANTY PERIOD.

For the purposes of this article, "Seller" shall mean Seller, its affiliates, subcontractors and suppliers of any tier, and their respective agents and employees, individually or collectively. If Buyer is supplying Seller's Equipment or Services to a third party, Buyer shall require the third party to agree to be bound by this article. If Buyer does not obtain this agreement for Seller's benefit for any reason, Buyer shall indemnify and hold Seller harmless from all liability arising out of claims made by the third party in excess of the limitations and exclusion of this article.

15. **Termination.** This Agreement and any performance pursuant to it may be terminated by either Party, and the consequences of such termination shall be as set out in the next paragraph, if the other Party
- a. becomes insolvent, makes an assignment for the benefit of its creditors, has a receiver or trustee appointed for the benefit of its creditors, or files for protection from creditors under any bankruptcy or insolvency laws; or
  - b. fails to make any payment when due or to establish any payment security required by this Agreement, or commits a material breach or defaults in its material obligations under this Agreement, and such default is not cured within thirty (30) days of written notice from the other Party.

Upon the termination of this Agreement by Buyer for cause (i) Seller shall reimburse Buyer the difference between that portion of the Agreement price allocable to the terminated scope and the actual amounts reasonably incurred by Buyer to complete that scope, and (ii) Buyer shall pay to Seller (a) the portion of the Agreement price allocable to Equipment completed, and (b) amounts for Services performed before the effective date of termination. Upon the termination of this Agreement by Seller for cause Buyer shall pay to Seller within thirty (30) days of receipt of invoice the price of all Equipment or Services delivered at the date of termination, plus an amount equal to all costs and expenses incurred in the engineering, sourcing, financing, procurement, manufacture, storage and transportation of the Equipment including materials, work in progress and any cancellation charges assessed against Seller by Seller's suppliers including reasonable overhead and profit on all such costs and expenses. Alternatively, if any schedule of termination payments has been agreed between the Parties, Buyer shall pay to Seller within thirty (30) days of receipt of invoice the amounts set out in that schedule.

Seller shall have the right to suspend performance upon written notice to Buyer in any case where Seller would have the right to terminate the Agreement under this article, without prejudice to Seller's right to terminate this Agreement for cause. Any cost incurred by Seller in accordance with any such suspension (including storage costs) shall be payable by Buyer upon submission of the Seller's invoice(s). Performance of the Seller's obligations shall be extended for a period of time reasonably necessary to overcome the effects of such suspension.

16. **Governing Law, Dispute Resolution.** This Agreement shall be governed by the substantive laws of the State of New York. In the event of a dispute concerning this Agreement, the complaining Party shall notify the other Party in writing thereof. Management level representatives of both Parties shall meet at an agreed location to attempt to resolve the dispute in good faith. Should the dispute not be resolved within thirty (30) days after such notice, the complaining Party shall seek remedies exclusively through arbitration. The seat of arbitration shall be the federal district court in Philadelphia, PA, and the rules of the arbitration will be the Commercial Arbitration Rules of the American Arbitration Association, which are incorporated by reference into this article.



Notwithstanding the foregoing, each Party shall have the right to commence an action or proceeding in a court of competent jurisdiction, subject to the terms of this Agreement, in order to seek and obtain a restraining order or injunction to enforce the confidentiality intellectual property provisions set forth in the first two paragraphs of article 13; nuclear use restrictions set forth in article 17, or to seek interim or conservatory measures not involving monetary damages.

17. **No Nuclear Use.** Equipment and Services sold by Seller are not intended for use in connection with any nuclear facility or activity, the Buyer warrants that it shall not use or permit others to use the Equipment or Services for such purposes, without the advance written consent of Seller. If, in breach of this, any such use occurs, Seller (and its parent, affiliates, suppliers and subcontractors) disclaims all liability for any nuclear or other damage, injury or contamination, and, in addition to any other rights of Seller, Buyer shall indemnify and hold Seller (and its parent, affiliates, suppliers and subcontractors) harmless against all such liability.
18. **Export Control.** Seller's obligations are conditioned upon Buyer's compliance with all USA and other applicable trade control laws and regulations. Buyer shall not trans-ship, re-export, divert or direct Equipment (including software and technical data) other than in and to the ultimate country of destination declared by Buyer and specified as the country of ultimate destination on Seller's invoice.
19. **Changes.** Each Party may at any time propose changes in the schedule or scope of Equipment or Services. All changes to the Equipment or Services shall be subject to mutual agreement via a written change order or variation, which shall only become effective once signed by both Parties. The scope, Agreement price, schedule, and other provisions will be equitably adjusted to reflect additional costs or obligations incurred by Seller resulting from a change, after Seller's proposal date, in Buyer's site-specific requirements or procedures, or in industry specifications, codes, standards, applicable laws or regulations. It shall be acceptable and not considered a change if Seller delivers Equipment (including Equipment replacement under warranty) that bears a different, superseding or new part or version number compared to the part or version number listed in the Agreement, provided that in no circumstance shall this affect any other of Seller's obligations including those set forth in article 6.
20. **Conflicts; Survival, Assignment.** If there is any conflict between this Agreement and any written proposal or quotation provided by Seller, then the terms and conditions set forth in this Agreement shall prevail. If any term or condition of this Agreement or any accompanying terms and conditions are held invalid or illegal, then such terms and conditions shall be reformed to be made legal or valid, or deleted, but the remaining terms and conditions shall remain in full force and effect, and this Agreement shall be interpreted and implemented in a manner which best fulfills Parties' intended agreement. Those provisions which by their nature remain applicable after termination shall survive the termination of this Agreement for any reason. Seller may assign or novate its rights and obligations under the Agreement, in whole or in part, to any of its affiliates or may assign any of its accounts receivable under this Agreement to any party without Buyer's consent, and the Buyer hereby agrees, by signing this Agreement, to such assignment and to execute any document that may be necessary to complete Seller's assignment or novation. This Agreement shall not otherwise be assigned by either Party without the other Party's prior written consent, and any assignment without such consent shall be void.  
  
Seller may (i) manufacture and source the Equipment and any part thereof globally in the country or countries of its choosing; and (ii) may subcontract portions of the Services, so long as Seller remains responsible for such.
21. **No Third Party Beneficiary.** Except as specifically set forth in the article entitled "Limitations on Liability" and "No Nuclear Use", this Agreement is not intended to, and does not, give to any person who is not a party to this Agreement any rights to enforce any provisions contained in this Agreement.
22. **Entire Agreement.** This Agreement embodies the entire agreement between Buyer and Seller and supersedes any previous documents, correspondence or agreements between them. No modification, amendment, revision, waiver, or other change shall be binding on either Party unless agreed in writing by the Party's authorized representative. Any oral or written representation, warranty, course of dealing, or trade usage not specified herein shall not be binding on either Party. Each Party agrees that it has not relied on, or been induced by, any representations of the other Party not contained in this Agreement.

Label: 15075-001-001-00



## 10 Seller's Warranty - ZeeWeed Membrane Module

### 2 Year Full Replacement – Standard

This schedule sets out the warranty with respect to ZeeWeed Membrane Modules ("Membrane Modules"). No other warranties, expressed or implied are made in connection with the sale of these products, including, without limitation, warranties as to fitness for any particular purpose or use or merchantability of these products. The warranty provided herein will be the exclusive and sole remedy of Buyer, and in no event will the Seller be liable for any special, direct, indirect or consequential damages, including, without limitation, loss of profits. This warranty is not transferable.

#### 1 Product

This warranty applies to only the Membrane Modules supplied under the Contract of Sale. Membrane Module means the fibers and the potted plastic headers. This warranty does not cover air piping to the Membrane Module, permeate piping from the Membrane Module, piping connection fittings, connecting hardware and cassette frames with their associated components including but not limited to spacers, aerator tubes, aerator assemblies, screen, module dummies or module blanks.

Identification: Membrane Modules are shipped by the Seller with a serial number identification which confirms their place in the cohort set of Membrane Modules covered by this Membrane Module warranty.

#### 2 Seller

ZENON Environmental Corporation is the name of the Seller and is the Seller offering this warranty. The Seller may assign this warranty to other GE affiliates.

For ZeeWeed sales in the USA, enter Seller as ZENON Environmental Corporation, for Canadian sales use GE Water & Process Technologies Canada; for all other sales use GE Water & Process Technologies.

#### 3 Buyer

Buyer means Town of Berryville, Virginia.

#### 4 Project

Project means the 552 membrane modules under this proposal number 188558.

#### 5 Contract of Sale

Contract of Sale means the sales contract governing the sale of Membrane Module(s) for the Project between Buyer and the Seller or its GE affiliate.

#### 6 Scope of Warranty

The Seller warrants that its Membrane Module(s) will be free of defects due to faulty materials or errors in manufacturing workmanship.

Regular Membrane Module inspection and normal fiber repair shall be the responsibility of Buyer.

All replacement Membrane Modules will be shipped on the basis of INCOTERMS 2010 FCA GE Manufacturing facility.

All ancillary costs including but not limited to bagging, boxing, crating, freight, freight insurance, applicable taxes, import duties, certifications, brokerage, receiving, forklift services, storage at site, re-attachment hardware, hose/clamp/camlock replacement, crane services, installation, fiber repair materials, glycerin flushing, commissioning and waste disposal are the responsibility of Buyer.

**Full Replacement** – Full Replacement means that in the case of a valid warranty claim for a Membrane Module failure, Buyer receives a replacement Membrane Module and does not pay for the value of use of the Membrane Module prior to failure.

**Prorated Replacement** – Prorated Replacement means Buyer pays for actual use of a membrane module from which Buyer has derived value over time. Prorated Replacement allows the Seller to pay reasonable compensation under warranty for any product use not enjoyed by Buyer due to premature failure.

The ratio of Full Replacement to Prorated Replacement in this Warranty is set out in Item 8 of Section 10.



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### 7 Warranty Start Date

For the original membrane modules in a plant, this membrane warranty will start on the earlier of:

- a. The date that installation of the original Membrane Module(s) has been substantially completed, or
- b. Six months from the date of shipment of the original Membrane Module(s) to Buyer.

For replacement or expansion membranes, this membrane warranty will start on the earlier of:

- a. The date of installation, or
- b. 1 month from the date of delivery to site.

### 8 Warranty Duration

**Total Warranty Duration:** a total of **24** months composed of a Base Period and an Extended Period.

**Base Period with Full Replacement:** **24** months

All purchasers of ZeeWeed Membrane Modules are entitled to this Base Period of Full Replacement warranty coverage without purchasing an extended Seller's Warranty.

**Extended Period with Full Replacement:** a total of **0** months following the Base Period

Replacement Membrane Modules are covered by warranty only to the extent of the warranty of the original Membrane Module which has been replaced. At all events, this warranty shall expire and be of no force or effect **24** months following the Warranty Start Date.

### 9 Notification of Claim

All claims filed under this warranty shall be made in writing by Buyer within 30 days of identifying a defect.

Buyer shall provide the following information:

- a. A description of the defect giving rise to the claim;
- b. Photographs showing the manufacturing defect;
- c. The serial number(s) of the Membrane Module(s) which is (are) the subject of the warranty claim; and
- d. Operating data and repair history for the life of Membrane Modules which are the subject of a warranty claim.

### 10 Verification of Claim

After receipt of written notification of a defect, the Seller will promptly undertake such investigations as, in the Seller's opinion, are necessary to verify whether a defect exists. The Seller reserves the right to require additional data as necessary to validate claims. Buyer may, in the course of these investigations, be requested to return Membrane Module(s) to the Seller for examination. The Seller may also conduct reasonable tests and inspections at Buyer's plant or premises. If the results of the investigation do not validate the defect claimed, Buyer will reimburse the Seller for all reasonable expenses associated with said investigation, including expenses for all tests, inspections, and associated travel.

### 11 Satisfaction of Claims

The Seller will have the right to satisfy claims under this warranty in a flexible manner. Such flexibility may include the repair of existing Membrane Modules or changes in operating protocols or Membrane Module replacement or by upgrading failed Membrane Modules with newer Membrane Module(s) that may embody design and efficiency improvements. Buyer consents to the supply of replacement Membrane Modules which may be of a different design than original Membrane Modules.

### 12 Operating Information

To maintain the Membrane Module warranty, membrane system operation records from initial start-up date until claim must be maintained by Buyer and made available to the Seller upon request. Records must be provided in sufficient detail to verify uninterrupted compliance with the Seller's Operations and Maintenance Manual prepared by the Seller and supplied to Buyer as part of the Contract. At a minimum, operation data must include information on feed water quality, temperatures, flows, trans-membrane pressures, aeration rates, permeate quality, cleaning intervals, cleaning chemical concentrations, elapsed time since start-up, relevant analytical data and reporting of any screen bypass events.



GE

## Water & Process Technologies

Buyer shall maintain and share access to a single reference copy in electronic form of a Membrane Module map containing the history of activity by Membrane Module. Buyer shall log its procedures performed related to a Membrane Module including relocation of Membrane Modules, repairs, replacements and any other noteworthy events.

Buyer authorizes the Seller to conduct any reasonable review of operation and maintenance records or to inspect facilities where Membrane Modules are installed, upon reasonable notice to Buyer. Such reviews and/or inspections are intended to also assist the Seller and Buyer in detection of membrane system faults and to optimize the care and operation of the Membrane Modules.

### 13 Limitation of Warranties

Occurrence of any of the following as reasonably determined by the Seller will void this warranty:

- a. A material failure to operate the membrane system in accordance with Seller's Operations and Maintenance Manual supplied to Buyer as part of the Contract, including material failure to adhere to the Seller's specified Membrane Module cleaning procedures and the use of anything other than Seller-approved Membrane Module cleaning agents.
- b. Failure to adhere to the preventive maintenance program as presented in the Seller's Operations and Maintenance Manual, in published product manuals and in specifications.
- c. Failure to adhere to all transportation and module storage recommendations outlined by Seller.
- d. Failure to ensure correct operation and/or functioning of the screening equipment.
- e. Introduction of destructive foreign materials into the Membrane Module tanks. Destructive foreign materials may include natural or human-made materials that are introduced into the membrane system influent channel or tanks originating from construction and maintenance activities or from inadequate pretreatment or from aquatic species including clams and snails or from damage to the tank or tank coating. Buyer shall be responsible to maintain correct function of the screen mechanism, to flush accumulated grit from the tank bottom and to flush accumulated foreign materials from the membrane modules.
- f. Failure to install and maintain operating data acquisition and electronic data transmission functions at the plant.
- g. Physical abuse or misuse, incorrect removal or installation of Membrane Modules by non-Seller personnel including fiber damage caused by operator error in handling of Membrane Modules or cassettes.
- h. Unauthorized alteration of any components or parts originally supplied by the Seller.
- i. Intentional damage.

### 14 Return Procedure

In the event that the return of a Membrane Module is required pursuant to this warranty, Buyer will first obtain a Return Goods Authorization (RGA) number from the Seller. Membrane Module(s) shipped to the Seller for warranty examination must be shipped freight prepaid. If Buyer desires temporary replacement Membrane Module(s) to replace those alleged to be defective and returned to the Seller for warranty examination, Buyer shall be responsible for the cost associated with any such replacements until examination of the returned Membrane Modules pursuant to this warranty is complete. Any Membrane Module examined by Seller as part of a warranty claim where the Membrane Module is subsequently found to be performing as warranted or where a Membrane Module failure is not covered under the warranty will be returned to Buyer, freight collect.

Doc Control: 174144\_020

Document: Membrane Module Budgetary Membrane Replacement - Berryville, Louisiana - 188555 - 5/01 - July 11, 2016

Doc Project: 174144\_0011\_001

Location: Berryville, LA

Commercial Release: N/A - GCA - 1885



## Attachment A 46/48M Cassette Refurbishment Kits

Description	SAP #	Job Qty. Required (12 Cassettes)
WASHER,ZW500D,PERM SADDLE,END	3040441	24
WASHER,ZW500D,PERM BTM COLLECT,76MM	3040443	132
WASHER,ZW500D,PERM BTM COLLECT,END	3040444	24
WASHER,ZW500D,PERM BTM COLLECT,STOP	3040445	156
O-RING,EPDM,226,70DUR	3033693	576
O-RING,EPDM,232,70DUR	1124642	144
O-RING,EPDM,236,70DUR	1153604	144
PLUG,CPVC,S80,MNPT,1.25	3033696	24
GUIDE,ZW500D,CASSETTE,EXTRUSION	3040448	576
NUT,TITANIUM,M10	3033662	156
WASHER,FLAT,316,M6	3033661	720
NUT,HEX,316,M8	3033659	156
NUT,LOCK,HEX,NYLON INSERT,316,M6	3033660	1248
PLATE-MARS,ZW500D,48M,KEYSD OTR SUPRT	3040497	192
BOLT,H.H.,316,M6X90MM	3033652	576
BOLT,H.H.,316,M6X50MM	3033654	624
BOLT,H.H.,316,M10X25MM	3033651	168
BOLT,H.H.,316,M10X30MM	3033650	24
BOLT,H.H.,316,M14X35MM	3033629	48
NUT,HEX,316,M10	3033658	192
NUT,HEX,316,M14	3033657	48
SPACER,H9,ZW500D,M6	3033694	24
ZW500D,M6, SPACER,H23	3033695	96
ADPTR,MARS,ZW500D,48M,KEYSD IN SUPRT	3040499	96
ADPTR,MARS,ZW500D,48M,TOP PERM SADL	3040500	144
ADPTR,MARS,ZW500D,48MBTM PERM COL	3040502	144
CLIP-MARS,ZW500D,48M,SLACK ADJ	3040504	864
BOLT,H.H.,316,M6X65MM	3033655	48
SUPPORT,MARS,ZW500D,48M,GTX-830 W/BUSH	3040506	96
SUPPORT,MARS,ZW500D,48M,GTX-830 W/O BUSH	3040507	96
PIPE-MARS,4.7 MM,DN50,ZW500D,48M,WA	3111775	144
M10 Nordlock Washer SMO254	3058496	156



GE  
Water & Process Technologies

Description (cont.)	SAP #	Job Qty. Required (12 cassettes)
ZW500D 48M Perm Adapt ins side	3111929	1152
GASKET,SADDLE,ZW500D	3135044	156
ZW500D Blank Header Set	3033393	24
TUBE,FULL,ZW500D,AERTR ASSY,HF	3040519	288
TUBE,PARTL,ZW500D,AERTR ASSY,HF,LEFT	3040520	12
TUBE,PARTL,ZW500D,AERTR ASSY,HF,RIGHT	3040521	0
PIPE,1.50,BLANK,ZW500D,W/ENDCAP,1.5"	3040522	12
SADDLE,ZW500D,AERATION	3040451	156

# Attachment 5

**BERRYVILLE TOWN COUNCIL  
STREETS AND UTILITIES COMMITTEE  
Construction Standards and Specifications Manual Update for Stormwater  
Facilities Regulations  
August 16, 2016**

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The Committee agreed to review and comment on proposed Construction Standards at the last meeting.

***July 28, 2016 Staff Report***

*Modifications to the Town of Berryville Construction Standards and Specifications Manual have been prompted by taking on maintenance responsibilities of the secondary streets within the Town. These amendments include general stormwater information, report and design guidance, easements, quantity and quality requirements, and inspecting and testing obligations. In addition to narrative updates in Section 2 Design Standards, Figures 22 through 30 illustrate Standard Details for these facilities to be added to the document. This information was gleaned from the City of Winchester Public Services Standards Manual (2012).*

**Recommendation**

Forward to Town Council for approval.

BERRYVILLE TOWN COUNCIL  
STREETS AND UTILITIES COMMITTEE  
MOTION TO APPROVE AMENDMENTS TO  
CONSTRUCTION STANDARDS AND SPECIFICATIONS MANUAL

Date: August 16, 2016

Motion By:

Second By:

I move that the Streets and Utilities Committee recommend approval of amendments to the Construction Standards and Specifications Manual in order to update Section 2 General Design Standards which regulates stormwater facilities and to add standard details reflecting updated narrative.

VOTE:

Aye:

Nay:

Absent:

## Section 2

### *General Design Standards*

#### *I. Provision for Future Growth*

The Town may require the modification of certain proposed public improvements to provide adequate capacity for the logical extension of said improvements. Proposed facilities would include, but not be limited to, water lines, booster stations, water pressure control valves, sewer lines, ~~and~~ sewer pump stations, **and streets and associated stormwater management facilities**. Costs for the provision of additional capacity or modifications as required above may be reimbursed by the Town or through agreements with other owners/developers.

#### *II. Phased Construction*

##### A. Delineation

If development is to be constructed in phases, plans shall clearly indicate by phase lines and notes, which facilities are to be constructed under each phase. Plans shall indicate locations of contour tie-ins for each phase and specific measures for phased termination of all water, sewer, storm drainage, streets and other public improvements. Construction plans for public improvements and utilities shall be designed so as to be fully functional at the completion of each phase and allow for construction of the next phase with a minimal impact to existing improvements. A temporary marker identifying the location of the utility termination shall be provided.

##### B. Bonding

Bonding of public improvements and erosion and sediment control measures as required by Town Ordinance shall be provided independently for each proposed phase.

#### *III. Drainage*

##### A. General

1. An evaluation shall be performed for all proposed drainage systems to ensure adequate hydraulic capacity for conveyance of the minimum ten-year event including, but not limited to, channels, storm water management facilities and conduits.
2. Hydraulic capacity must be verified with engineering calculations, in accordance with the procedures outlined in the *Virginia Erosion and Sediment Control Handbook*, the *Virginia Department of Transportation Drainage Manual*, *Town of Berryville Storm Water Management Ordinance*, and this manual. Submit two complete copies of drainage calculations with construction plans.

Calculations shall include a copy of the site grading and drainage plan, at the plan scale, upon which the boundaries, acreages, time of concentration paths and C-factors of the interior drainage areas shall be shown. Calculations shall

also include a map at an appropriate scale delineating the boundaries, acreages, time of concentration paths and C-factors of the drainage areas, upstream of the development, which would contribute storm water to the development.

3. Due consideration must be given to infrequent events (100-year) resulting in runoff quantities greater than minor system design capacity. The design for the major drainage system shall provide for overland relief of the 100-year event without flooding or damaging buildings and structures and without reliance upon the minor drainage system. The limits of the area affected by the 100-year event shall be represented on construction plans.
4. The drainage system shall be designed to honor all natural drainage divides and create no adverse impact on downstream properties; to account for all off-site storm water and; to convey discharge surface waters to the flow line of a natural watercourse or an existing underground or above-ground adequate conveyance system.
5. The owner or developer may not create a new discharge or concentrated storm water from a pipe, culvert, channel, or other drainage structure, onto or through lands of another, without first obtaining a permanent storm drainage easement and constructing improvements to guarantee continuity of an outfall from the point of discharge to the nearest natural or man-made watercourse.
6. If off-site downstream construction and easements are required to construct an adequate channel outfall, no plans shall be approved until such storm drainage easements, extending to the nearest natural or man-made watercourse, have been obtained and recorded. It will be the responsibility of the developer to obtain all off-site easements.
7. Energy dissipation devices and/or friction channel lining shall be used at and downstream of outfalls when discharge velocities exceed the maximum permissible as defined by the *Virginia Erosion and Sediment Control Handbook*.
8. Plans shall be prepared to preclude adverse impacts because of higher flow rates that may occur during construction.
9. Construction plans shall show the location, size, flow line elevations, profiles and details of all drainage facilities and structures, existing or proposed, including, but not limited to, swales, ditches, culverts under public streets and private drives, drop inlets, storm sewers and detention/retention ponds and pond outlet structures. Typical cross sections of all swales and ditches shall be shown.
10. Profiles of streets shall show profiles of storm sewers and cross sections of culverts together with point of intersection. Profiles shall show clearance of such drainage facilities with water mains and sanitary sewer.

B. Storm Sewer Systems

- ~~1. Design and capacity of culverts, inlets and piped storm drainage systems shall be in accordance with the requirements of the *Virginia Department of Transportation (VDOT) Drainage Manual*, latest release, *Town of Berryville Storm Water Management Ordinance*, *Virginia Department of Environmental*~~

~~Quality Storm Water Management Program and this manual. Proposed drainage facilities shall be sized for ultimate development conditions. Ultimate developed condition of currently undeveloped areas within a watershed shall be based upon the current or anticipated zoning of those areas.~~

- ~~2. Where a proposed drainage system is connected to an existing drainage system, the hydraulic gradient shall be computed through the existing system outfalls to daylight to demonstrate hydraulic capacity. System computations for the existing system will be made available by the Town to the designer for those systems for which the Town has this information. The Town Superintendent may waive this requirement when it has been previously determined that the receiving system is known to have sufficient capacity.~~
- ~~3. All storm sewer pipe within a public right of way or public drainage easement shall be reinforced concrete pipe with a minimum diameter of 15 inches or equivalent elliptical size. Storm sewer pipe which begins or ends within a public right of way or public easement shall be reinforced concrete for its entire length between terminal structures. All reinforced concrete pipe shall be Class III, or greater as conditions require. Installation shall be in accordance with VDOT Standard PB-1, joined using a tongue and groove connection with bitumastic sealant. Precast box culvert sections shall be joined using a closed-cell extruded rubber gasket, Delta Rubber "Omni-Flex" or Town approved equal.~~
- ~~4. Reinforced concrete flared end sections shall be installed at the open ends of all storm drainage pipe. Concrete endwalls may be accepted 42 inches in diameter or less subject to approval by the Town Superintendent.~~
- ~~5. Minimum cover for storm sewer pipe shall be two feet vertically from finish grade to the outside crown of pipe, except where structural correction is provided and approved. Requests for less than two feet of cover shall be recorded on the plans and clearly denoted. Test pits will be required and shall be shown on the plans for all crossings which involve gas lines, water mains, sanitary sewer crossings which have minimum clearance, and all fiber optic telephone service lines. Test pits shall be dug and clearances verified prior to installing any portion of the storm sewer system. Test pits as basis of design may be required at the discretion of the Town Engineer.~~
- ~~6. Storm manhole covers shall have the word "STORM" cast into them. (05/16)~~

#### ~~C. Final Inspection and Testing~~

- ~~1. All storm sewer lines shall be internally inspected by closed circuit television camera prior to acceptance. A copy of the inspection video and reports must be submitted to the Town of Berryville Public Works Director for review. All deficiencies noted must be corrected and an additional televised inspection must be submitted to the Town for review and approval.~~
- ~~2. Such inspection shall be made after the storm sewer has been fully backfilled and the associated roadway sub-grade construction has been completed.~~
- ~~3. The cost of these inspections shall be borne by the project's owner.~~

~~Design and capacity of culverts, inlets and piped storm drainage systems shall be in accordance with the requirements of the Virginia Department of Transportation (VDOT) Drainage. (05/16)~~

**1. General**

- A. The following minimum requirements are considered acceptable to the Town of Berryville for the collection and detention of stormwater runoff. Deviation from these may be allowed if: a) the deviation is in accordance with sound engineering standards; b) the deviation will not increase the likelihood of a system failure; c) the deviation will not adversely impact the environment or others.**
- B. As a general guideline, standards shall be those set forth in the latest editions of the Virginia Erosion and Sediment Control Handbook, the Virginia Stormwater Management Handbook, and the Virginia Department of Transportation Drainage Manual. If the standards set forth in this manual conflict for a particular application, the Director of Public Works shall determine which standard is to be applied.**
- C. When the Town of Berryville standards differ from state and/or federal requirements, the most stringent requirement shall apply.**
- D. All drawings, specifications, and engineer's reports submitted for approval shall be prepared by or under the supervision of a registered professional engineer with a current registration in the Commonwealth of Virginia in accordance with Title 54.1, Chapter 3 of the Code of Virginia, 1950, as amended. Where applicable, design may be performed under the direction of a certified Land Surveyor B, in accordance with § 54.1-408 of the above-cited code. The front cover of each set of drawings, of each copy of the engineer's report, and of each copy of the specifications submitted for review shall bear the signed imprint of the seal of the above licensed professional who prepared or supervised the preparation, and shall be signed with an original signature and date.**
- E. The engineer shall be responsible for obtaining the review and necessary approvals of all drawings and specifications by applicable Town, County, State and Federal agencies having jurisdiction. Copies of such approvals shall be submitted to the Town of Berryville Department of Public Works at the time of final approval.**

**2. Stormwater Report**

- A. All drainage calculations shall be incorporated into a stormwater report, which shall present the following information as applicable. If the necessary calculations are minimal, they can be included on the plan sheets.**
  - 1. A description of the computer software used and references to charts and tables used. Computer spreadsheets or programs created "in-house," used in lieu of standard forms or standard manual calculations, shall be substantiated, at least initially, with manual calculations showing equivalent results. Acceptance of, or request for**

**substantiation of “in-house” spreadsheets and programs will be the decision of the Director of Public Works.**

- 2. The following computations shall be shown for both pre-developed and post-developed conditions:**
  - a. The stormwater report or plan set shall show the grading plan with the boundaries, acreages, and C-factors or CN values for all drainage areas contributing storm water to the site.**
  - b. Flow paths and calculations of times of concentration.**
  - c. Runoff computations.**

### **3. Stormwater Design**

#### **A. General**

- 1. An evaluation using verifiable engineering calculations shall be performed for all proposed drainage systems including, but not limited to, channels, inlets, and conduits. At a minimum, this evaluation shall show adequate hydraulic capacity for conveyance of the ten year storm event.**
- 2. Due consideration must be given to less frequent storms, up to and including the 100-year storm event. The design of drainage systems shall generally provide for overland relief of the 100-year storm event without flooding or damaging buildings and structures.**
- 3. The drainage system shall be designed with an attempt to closely maintain existing drainage divides and must not create adverse impacts on upstream or downstream properties.**
- 4. Drainage designs must account for any off-site drainage that will be collected by the drainage system or that will flow through any part of the site. Ultimate developed condition of currently undeveloped areas within a watershed shall be based upon the current or anticipated zoning of those areas.**
- 5. All systems shall be designed to convey runoff to the flow line of a natural watercourse or to an adequate conveyance system.**
- 6. The owner or developer may continue to discharge stormwater as sheet flow (non-concentrated) onto an adjoining property if, at the same location:**
  - a. The post-development peak runoff rate based on documentation and calculations does not exceed the pre-development peak rates.**
  - b. The duration of the flow does not increase under post-development conditions.**
- 7. The owner or developer may not create a new discharge of concentrated storm water from a pipe, culvert, channel, or other drainage structure, onto or through lands of others without first obtaining a permanent storm drainage easement, and ensuring that adequate conveyance exists downstream between the point of discharge and the nearest natural or man-made waterway.**
- 8. If off-site downstream construction and easements are required to construct an adequate channel outfall, no plans shall be approved**

**until such storm drainage easement, extending to the nearest natural or man-made watercourse, has been obtained and recorded. It will be the responsibility of the developer to obtain all off-site easements.**

**B. Storm Sewer Systems**

- 1. All publicly owned storm inlets and manholes shall include inlet/invert shaping per VDOT standard IS-1.**
- 2. No concentrated flow greater than one cubic foot per second, based on the 10-year storm, shall cross a sidewalk or curb.**
- 3. Culverts and storm sewers shall be of adequate size to transport runoff from the 10-year storm, for the ultimate developed condition of the subject property. Contributions of off-site flow from permanently developed properties shall be based upon existing conditions. Contributions of off-site flow from undeveloped properties shall be calculated based upon the two-year fully developed flow (undetained) from such properties. Plans shall account for overland relief resulting from less frequent events.**
- 4. The hydraulic grade line of storm sewers for the post-developed 10-year storm shall be lower than the gutter line or grate inlet top elevation at all points.**
- 5. All publicly-owned storm sewer pipes within traffic-bearing areas shall be reinforced concrete pipe with a minimum diameter of 15 inches or equivalent elliptical size. Publicly-owned storm sewer pipe in non-traffic bearing areas may be corrugated HDPE pipe with a minimum diameter of 15 inches.**
- 6. All pipes shall terminate with flared end sections or concrete headwalls. Box culverts shall include concrete headwalls and end walls, which shall be located a minimum of 25 feet from the edge of pavement if the culvert is subject to vehicular traffic.**
- 7. The outfall conditions of pipes and culverts shall be designed to withstand the velocities produced during the 2-year storm event without erosion.**
- 8. Pipe shall not deflect between storm structures. Pipe on slopes greater than 20 percent shall be anchored.**
- 9. Minimum cover for storm sewer pipe within the right-of-way shall be according to the Town of Berryville Standard Details 22 and 24. Outside the right-of-way, the minimum cover, from finished grade to the outside crown of pipe, shall be the greater of one foot or half the pipe diameter.**
- 10. In parallel installations, under normal conditions, storm sewer pipes shall be laid at least 10 feet horizontally from water lines and sanitary sewer lines. The distance shall be measured from outside edge to outside edge.**
- 11. In general crossing situations, storm sewer pipes shall maintain a minimum vertical distance of 18 inches from water mains and 12 inches from sanitary sewer lines. In cases where this separation is**

**impossible to achieve, the water or sanitary sewer line shall be protected in accordance with the appropriate Town of Berryville utility standard. In cases where the water or sanitary sewer line is not owned by the Town of Berryville, the crossing shall be governed by the regulations of the authority which owns the utility in question.**

- 12. Test pits will be required and shall be shown on the plans for all crossings which involve gas lines, water mains 12 inches in diameter and larger, sanitary sewer crossings that have minimum clearance, and all fiber optic telephone service lines. Test pits shall be dug and clearances verified prior to installing any portion of the storm sewer system.**

#### **C. Easements**

- 1. An "easement" shall mean any area to which the Town has unlimited access for maintaining adequate drainage.**
- 2. Permanent easements shall be a minimum width of 20 feet. Wider easements may be required where more than one facility may occupy an easement, or in consideration of structure size, depth, or access requirements. The extent of drainage easements shall be dependent on upstream and downstream conditions and the scope of maintenance needed to maintain adequate drainage.**
- 3. Easements shall be recorded and the Deed Book and Page Numbers of the recordation provided to the Planning Department before approval of the as-built plans and release of the construction bonds.**
  - a. No building or other structure, including but not limited to fences and decks, shall be erected over permanent easements.**
  - b. Any plantings installed within an easement may be damaged or destroyed during the course of servicing. The Town is not liable for damage to any improvements or plantings within an easement. The Town will re-seed as necessary any bare or disturbed soil for erosion control purposes.**
  - c. Small and medium shrubs, groundcovers, or grasses may be planted within an easement. Their suitability shall be determined by their likelihood to create or entrap debris, or to obstruct natural flow.**

#### **D. Storm Inlet Design**

- 1. Drop inlets shall be sized and spaced such that a minimum of one half of the travel way in each direction shall be free from flooding at the inlet design flow.**
- 2. To properly drain sag vertical curves, it is required on roads classified as minor arterial or higher to place three inlets on each side of the road; one inlet at the low point and one flanking inlet on each side of the low point. The flanking inlets shall be placed so that they will limit the spread in the low gradient (flatter) approaches to the sag point and will act in relief of the sag inlet should it become clogged.**

3. **Drainage flowing in street gutters shall be intercepted 100 percent, at design flow, prior to entering an intersection with another public street.**
4. **Inlets which have bypass flows shall be clearly marked on the plans and bypass flow must be included in the total gutter flow contributing to the next downstream inlet.**
5. **Downstream flow for drop inlets in streets and parking areas shall be computed using the rational method and applying a rainfall intensity of four inches per hour. Design flow for grate inlets located near structures that could be damaged by flooding shall be computed using the 100-year storm and assuming 50 percent blockage of the grate. Design flow for all other grate inlets shall be the same as street inlets but must assume 50 percent blockage.**

**E. Stormwater Conveyance Channels**

1. **Channel adequacy, hydraulic capacity, maximum velocities, channel linings, and other related design variables shall be determined by the procedures outlined in Chapter 5 of the Virginia Erosion and Sediment Control Handbook, or by approved computer software.**
2. **All open channels shall be designed to contain the 10-year storm with six inches of freeboard below the banks of the channel. Contributions of off-site flow from permanently developed properties shall be calculated based upon the two-year fully developed flow (undetained) from such properties. Plans shall account for overland relief resulting from less frequent events.**
3. **Unless otherwise approved, the need, type, and dimensions of lining for erosion control shall be based on the velocity and depth of flow associated with the ten-year event.**
4. **Maximum side slope for grass lined conveyance channels shall be 3:1 (H:V) with a minimum longitudinal slope of two percent.**

**F. Stormwater Quantity**

1. **To protect downstream properties and receiving waterways from flooding, the ten (10) year post-development peak rate and velocity of runoff from the land development shall not exceed the two (2) year pre-development peak rate of runoff.**
2. **To protect downstream properties and receiving waterways from channel erosion, the two (2) year post-development peak rate and velocity of runoff from the land development shall not exceed the two (2) year pre-development peak rate and velocity of runoff.**
3. **If the land development is in a watershed for which a hydrologic and/or hydraulic study has been conducted or a stormwater model developed, the program authority may modify the requirements of items 1 and 2 above so that runoff from the land development is controlled in accordance with the findings in the study or model, or to**

**prevent adverse watershed storm flow timing, channel degradation, and/or localized flooding problems.**

- 4. The program authority may also require that the plan include additional measures to address damaging conditions to downstream properties and receiving waterways caused by the land development.**
- 5. Pre-development and post-development runoff rates shall be verified by calculations that are consistent with accepted engineering practices as determined by the program authority.**

#### **G. Stormwater Quality**

- 1. Best management practices shall be designed and sited to capture runoff from the entire land development project area and, in particular, areas of impervious cover within the land development, to the maximum extent practicable.**
- 2. Best management practices shall be designed to remove the difference between post-development and pre-development total phosphorus loads in cases where post-develop loads exceed pre-development loads. The calculation method in Appendix 5D of the Virginia Storm Water Management Handbook shall be used to perform the calculations.**

#### **4. Materials**

##### **A. Concrete Pipe**

- 1. Circular reinforced concrete culvert and storm sewer pipe shall be in accordance with ASTM C76 and be Class III minimum.**
- 2. Elliptical reinforced concrete culvert and storm sewer pipe shall be in accordance with ASTM C507.**
- 3. Gasketed joints shall be bell and spigot with rubber gasket seal in accordance with ASTM C443. Tongue and groove joints shall be sealed with mortar or pre-formed flexible sealant per ASTM C990, or other suitable sealant.**

##### **B. Corrugated Plastic Pipe**

- 1. Pipe shall be in accordance with AASHTO M294 or ASTM 2306.**
- 2. Pipe shall be joined using a bell and spigot joint meeting AASHTO M252, AASHTO M294, or ASTM F2306. The joint shall be soil-tight and gaskets, when applicable, shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.**
- 3. Fittings shall conform to AASHTO M252, AASHTO M294 or ASTM F2306. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the soil-tight joint performance requirements of AASHTO M252, AASHTO M294, or ASTM F2306.**
- 4. All installation of corrugated plastic pipe shall be per manufacturer's specifications.**

**C. Drop Inlets**

1. Standard drop inlets shall be per VDOT specifications.
2. For drop inlets in shallow conditions, structures shall be consistent with Standard Details 25A, B and C or shall be a precast or cast-in-place concrete box with a top consistent with Standard Detail 26.
3. For drop inlets requiring a manhole frame and cover for access, the manhole frame and cover shall be as manufactured by Neenah Foundry per Standard Detail 26. Frames and covers shall be manufactured in the United States.

**D. Manholes**

1. Storm manholes shall be per VDOT specifications.
2. Frames and covers shall be as manufactured by Neenah Foundry per Standard Details 27 - 30, or approved equivalent.

**5. Inspection and Testing**

**A. Concrete Pipe**

1. Concrete pipe shall be inspected visually during installation by the Director of Public Works or his/her designee.
2. After installation and backfill, all sand, dirt, and debris from the lines shall be flushed prior to inspection.
3. All lines and manholes shall be visually inspected by the Town of Berryville from every manhole by use of television cameras. The cost shall be the responsibility of the Owner/Developer as identified on the Planning and Zoning Fee Schedule, 2012, as amended.
4. The lines shall exhibit a fully circular pattern when viewed from one manhole to the next.
5. Lines which do not exhibit a true and correct line and grade, or have obstruction or structural defects, shall be corrected to meet these specifications and the barrel left clean for its entire length.

**B. Corrugated Plastic Pipe**

1. Corrugated plastic pipe shall be inspected visually during installation by the Director of Public Works or his/her designee.
2. Following installation, the contractor shall perform cleaning and video inspection of the installed plastic pipe. The processes listed below shall be followed:
  - a. The CCTV inspection must be completed per this manual and by an impartial, qualified and reputable Inspection Agency in the presence of a Town inspector. The Town reserves the right to reject an Inspection Agency.
  - b. The Owner/Developer shall provide 48 hours notice to the Town prior to televising any pipe to allow an inspector to be on site.
  - c. A written inspection report accompanied by visual recording shall be provided to the Town's Inspector at the end of each day of CCTB inspection. Visual recording shall be digital mpeg4 format.

**The written report shall be in both list form and plan view.**

**PLEASE NOTE: VHS video tapes will not be accepted.**

- d. It will be the Developer/Contractor's responsibility to demonstrate acceptable joint spacing.**
- e. Deflection visible on the CCTV monitor will be assumed to be greater than 5%. The Developer/Contractor has the right to challenge this decision by direct measurement or by the use of a GO-NO-GO Mandrel. The pipe will be rechecked for damage after use of the Mandrel.**
- f. The Developer/Contractor must repair all defects found during inspection. A follow-up CCTV inspection shall be performed by the Developer/Contractor to assure the repairs have been completed satisfactorily.**

#### *IV. Water & Sewer*

##### *A. General*

A Preliminary Design Report shall be submitted to the Town which shall describe the additions to the water distribution and sewerage collection systems, and at a minimum shall include:

1. Number of units, with the estimates for water usage and wastewater production.
2. Hydraulic calculations for the proposed water system and existing water system to insure that adequate pressure and volume can be sustained to the new development without reducing pressure or volume in other areas of the existing system.
3. Hydraulic calculations for the proposed sewerage collection system and all existing lines or pump stations that may be impacted.

##### *B. Design Practices*

###### *1. Scope*

- a. This section is included for the clarification, information and benefit of the engineering design community, to act as a guide to the practices of the Town. This section is a compilation of a variety of typical practices to be followed in the layout and design of water distribution and wastewater collection systems of the Town. The information contained in this section must be applied in conjunction with the regulations of the Commonwealth of Virginia Department of Environmental Quality, Virginia Department of Health Waterworks Regulations and the other sections of this manual.
- b. Many criteria listed are minimums. Additional separations and clearances are to be furnished as practical to optimize each design. Attention shall be given to locating utilities so as to facilitate their re-excavation. The Town will consider factors such as depth and magnitude of facility in determining the adequacy of each design, and may relax or increase dimensional requirements accordingly. In general, a design is to be sought which minimizes length of piping and number of appurtenances, while providing a system which minimizes maintenance costs.

- c. Because of the wide variety of situations that arise, it is impossible to address all scenarios. The Town reserves the right to exercise engineering judgement and will have the final decision on the acceptability of design.
  - d. The Town reserves the right to amend or modify this document without notice and to interpret the meaning of all statements made herein.
2. Water Distribution
- a. Design Flows
    - (i) Fire Flows. The water distribution system piping and any extensions thereof shall have adequate capacity to supply the normal (average) and peak hour demands of all customers – domestic, public, commercial and industrial – while maintaining a pressure of not less than 30 pounds per square inch at all points of delivery. In addition, the piping system shall be capable of delivering on the day of maximum customer demand, flows required for fire protection to at least one (1) point within 300 feet of each building being served or proposed to be served by such system and extension, while maintaining a residual pressure of not less than 20 pounds per square inch at the point of service. Flows required for fire protection shall be a minimum of 750 gpm for Single Family Detached Dwelling developments, 1,500 gpm for Attached Residential or Apartment (3 stories or less), and 2,000 gpm for Commercial and Industrial developments.
    - (ii) Daily Demands. The following criteria will be used in estimating demands for water and accomplishing hydraulic design of the system.
      - (a) Average day, maximum day and peak hour demands to be used in system hydraulic design will be estimated using the following parameters:
        - 1. Residential Population  
=  $N$  = number of dwelling units x 2.75
        - 2. Average daily water demand of residential population in gallons per day (g.p.d.)  
=  $R = N \times 100$
        - 3. Average daily commercial and industrial water demand in g.p.d.  
=  $C$  = number of commercial and industrial employees x 100\*  
\*NOTE: Appropriate additional water demand allowance shall be made for commercial and/or industrial establishments of types having water demands in excess of 100 g.p.d. per employee.
        - 4. Average daily school water demand in g.p.d.  
=  $S$  = number of staff employees and students x 20
        - 5. Average daily water demand in g.p.d.  
=  $A = R + C + S$
        - 6. Maximum daily water demand in g.p.d.

$$= M = A \times 2$$

7. Peak hour demand in g.p.m. is calculated using the formula provided in the Waterworks Regulations 12 VAC 5-590-690

$$= Q = 11.4 \times N^{0.544}$$

- (iii) Distribution piping design will be based upon providing flows and service pressures in accordance with these standards from the supply design gradient (HGL) furnished by the Town. Hydraulic design of distribution piping will be based on pipe carrying capacities consistent with head losses determined in accordance with the following:

<u>Pipe Diameter</u>	<u>Hazen-Williams Coefficient "C"</u>
6"	100
8"	110
10"	115
12" or greater	120

### 3. Wastewater Collection

#### a. Design Flows

##### (i) Tributary Population

- (a) Sewer systems, which provide for a complete watershed, shall be designed and sized assuming the entire watershed to be completely developed according to present or planned land use designation whichever requires the greater capacity.
- (b) Sewer systems initially developed for only a part of a complete watershed shall be sized to provide for the entire watershed. Otherwise, if acceptable to the Town, physical provision shall be made for future increased capacity. Proper modification to allow for the characteristics (i.e. domestic, commercial and industrial wastes, and ground water infiltration) of the area under consideration shall be made.

##### (ii) Capacities

- (a) In determining the required capacities of sanitary sewers, the following factors shall be considered:
- (1) Maximum hourly quantity of domestic sewage.
  - (2) Additional maximum sewage or waste from industrial plants and commercial areas.
- (b) New sewer systems shall be designed on the basis of an average per capita flow of sewage from the equivalent population served of not less than 100 gallons per capita per day. Lateral and submain sewers shall be designed for a minimum of 400% of the average flow, main and trunk sewers shall be designed for a minimum of 250% of the average flow, and interceptors shall be designed for a minimum of 200% of the average flow.

- (c) Computations shall use a roughness coefficient (n) in the Mannings Formula of 0.014. However, other values may be used for situations where sufficient engineering justification can be demonstrated.
- (d) The 100 gallons per capita per day figure is assumed to cover normal infiltration, but an additional allowance shall be made where conditions are especially unfavorable.
- (e) The minimum allowance for flow from single-family detached residences shall be based on 3.5 people per home. For single-family attached residences or dwelling units in multifamily structures, a basis of 3 people per unit may be used.
- (f) Unless evidence is presented to prove a different flow from industry at ultimate development, the minimum allowance for industrial flow shall be determined by providing an equivalent population of 40 persons per acre or one (1) equivalent population per employee, whichever is the greater, in the industrial area. "Area" shall include the entire area zoned for industry, except public road, street, and highway rights-of-way, flood plains on which construction is prohibited, and "green zones" separating industrial from residential areas, on which construction is prohibited.
- (g) The minimum allowance for flows from commercial areas shall be determined by providing an equivalent population of 30 persons per acre, or one-half (1/2) equivalent population per employee, whichever is the greater, in the commercial area. "Area" shall include entire area zoned for commercial development, including off-street parking and landscaped areas, but excluding the rights-of-way of public roads, streets and highways, flood plains of streams on which construction is prohibited and "green zones" 100 feet or more wide separating commercial from residential areas, on which construction is prohibited.
- (h) Sewer size shall not be less than eight inches in diameter, except under the following condition:
  - 1. Laterals serving six connections or fewer on cul-de-sacs or as sidewalk collector lines may be six inches in diameter.

(i) Minimum Gravity Sewer Slopes  
Sewer Size Minimum Slope in Feet per 100 Feet

<u>Nonsettled Sewage</u>	
3 inch .....	Not Allowed
4 inch .....	Not Allowed
6 inch .....	0.49
8 inch .....	0.40
10 inch .....	0.28
12 inch .....	0.22

14 inch .....	0.17
15 inch .....	0.15
16 inch .....	0.14
18 inch .....	0.12
21 inch .....	0.10
24 inch .....	0.08
27 inch .....	0.067
30 inch .....	0.058
36 inch .....	0.046

All sewer shall be nonsettled unless pre-approved by the Director of Public Works.

- (j) Minimum flow velocities of 1.3 fps and 2 fps are required for settled and non-settled sewage, respectively.
- (k) Special provisions must be made to protect against internal erosion when flow velocities exceed 15 fps.
- (l) A minimum sewer burial depth to protect against freezing shall be 24".
- (m) In cases where the above criteria are not applicable, an alternate design procedure may be submitted to the Town for approval. A description of the procedure used and justification for the modifications for sewer design proposed shall be included with the Design Analyses and plans submitted for approval.

*V. Easements*

Where the Town of Berryville permits the construction of water, sewer, or storm water improvements (town utilities) outside of the public right-of-way, the following shall apply:

- A. Town utilities approved such that they will not be in the public right-of-way shall be located in easements conveyed to the Town of Berryville. Such easement shall include language and conditions as required by the Town and will be approved by the Town prior to recordation.
- B. Easements shall be located so as to provide access to all parts of the utility without interference from abutting buildings, fences, and other private improvements.
- C. Easements shall not be centered on property lines but shall run parallel to boundary lines to the greatest degree practical. Easements may straddle boundaries, provided that the associated channel or pipeline is offset from the boundary.
- D. Easements must remain clear of buildings, trees, fences, and other improvements, and underground structures other than the designated utility. Fence sections may be erected across an easement section so long as the section contained within the easement is a gate through which personnel and equipment may enter the

property. Trees planted in and/or improvements erected within a utility easement that are damaged or destroyed in the course of utility inspection, maintenance, or reconstruction will not be replaced or paid for by the Town of Berryville.

- E. Easements shall be a minimum of twenty (20) feet in width; however, the Town reserves the right to require wider easements as deemed necessary.
- F. Town utility easements are exclusive. Other utilities may only cross the town's easement, and such crossings must be at or near a 90-degree angle.

*VI. Submission of Calculation Data in Digital Format*

- A. Engineering calculations used in the design of public improvements shall be submitted to the Town in digital format for review.
- B. Submissions for water system design shall be on a master development plan that includes the locations of the water mains. The plan(s) shall be paper drawings or provided in an AutoCad compatible format. In addition, the plans shall be a scale accurate drawings referenced to the State Plane Coordinate System.
- C. Submissions for sanitary sewer system design should be provided in Microsoft Excel format, or Heastead input/output files.
- D. Submissions for storm drain system, and storm water management design should be provided in Microsoft Excel format, or Heastead input/output files, or Soil Conservation Service TRT -20 or 55 format.

*VII. Transferring of Pump Station Ownership*

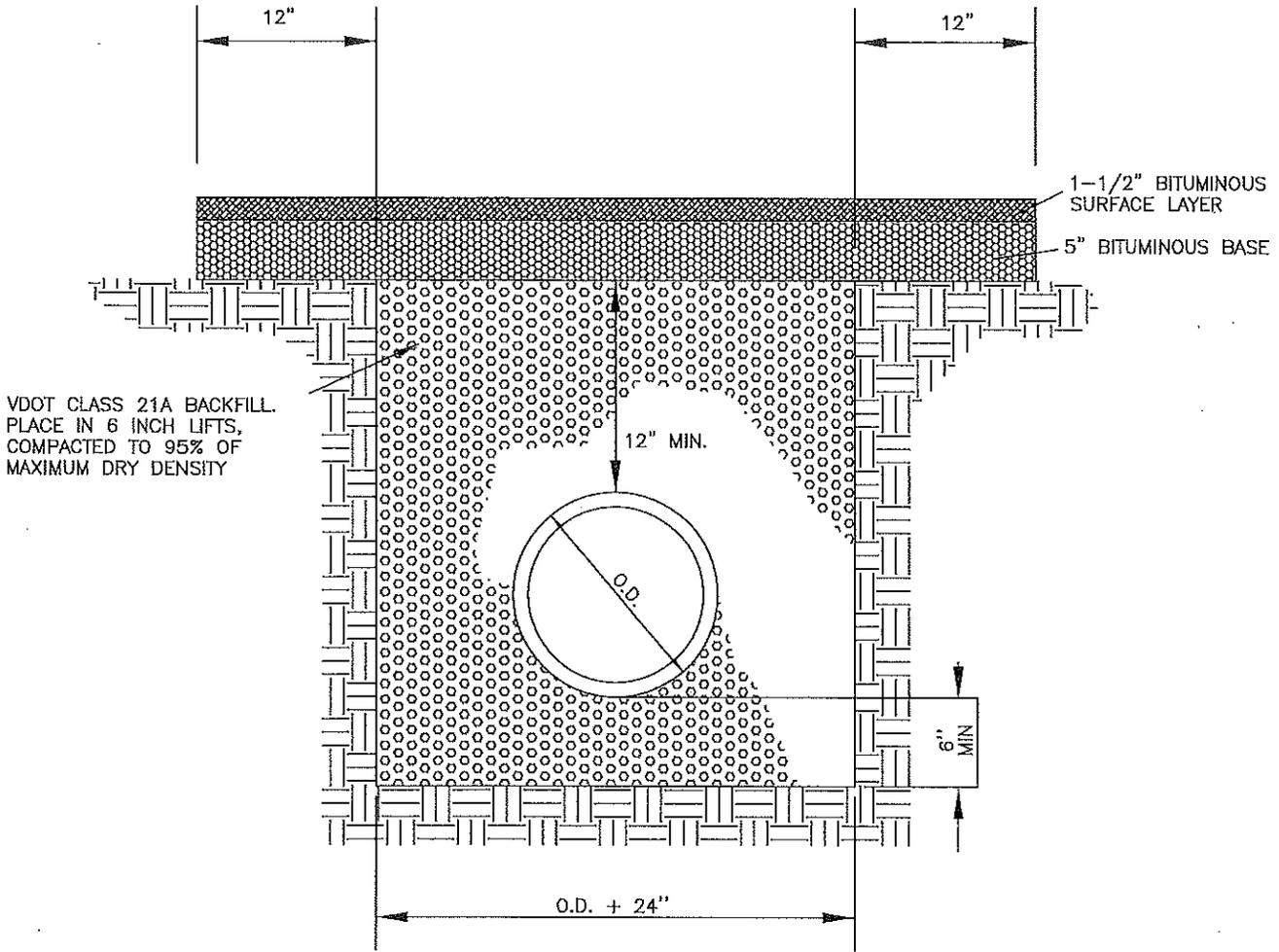
- A. Ownership of pump stations will occur only after final acceptance in writing of a completed project.
- B. The developer will be responsible for any maintenance as a result of construction defects of said facilities for one year from the date of Final Acceptance.

*VIII. Streets and Related Improvements in the Public Right-of-Way*

- A. All activity performed in the public right-of-way requires an approved permit from VDOT or the Town of Berryville. VDOT maintains public primary roadways (Business Route 7 and SH 340). The Town of Berryville maintains public secondary roadways.
- B. All work performed under a permit issued by the Town of Berryville must be performed in accordance with the following as applicable:
  - 1. Berryville Town Ordinances
  - 2. Berryville Construction Standards and Specifications
  - 3. VDOT Road and Bridge Standards, current edition
  - 4. VDOT Road and Bridge Specifications, current edition
  - 5. Manual on Uniform Traffic Control Devices (MUTCD) including the VDOT supplement
  - 6. VDOT Manuals on Planting and Irrigation in the Right-of-Way
  - 7. VDOT Land Use Permit Manual
  - 8. Virginia Erosion and Sediment Control Handbook

- C. Right-of-way dedication and acceptance of public streets not maintained by VDOT shall be evidenced by authorized signatures on the deed of dedication or other instrument deemed acceptable by the Town of Berryville.
- D. In order to obtain guarantee of performance to assure timely completion and competent construction of physical improvements, the applicant is required to post a bond or other acceptable surety as identified in Article VII. Performance Surety, of the Town of Berryville Subdivision Ordinance and Article III, Section 314.8 Construction and Bonding of the Town of Berryville Zoning Ordinance.
- E. Performance bonds shall be submitted to the Town of Berryville for review and approval for those streets in the Town's system (secondaries).
- F. Dedication and acceptance of public streets shall be in compliance with VDOT Memorandum SR-50-93, Guide for Additions, Abandonments, and Discontinuances, current edition.

- \* WHERE THE TRENCH BOTTOM IS ROCK, IT SHALL BE EXCAVATED TO A MINIMUM OF 8" BELOW THE BOTTOM OF THE PIPE AND BACKFILLED WITH BEDDING MATERIAL FREE OF ROOTS, DEBRIS & STONES
- \* WHERE SUBGRADE IS UNSTABLE, PIPE SHALL BE BEDDED ON A MINIMUM OF 8" BEDDING MATERIAL

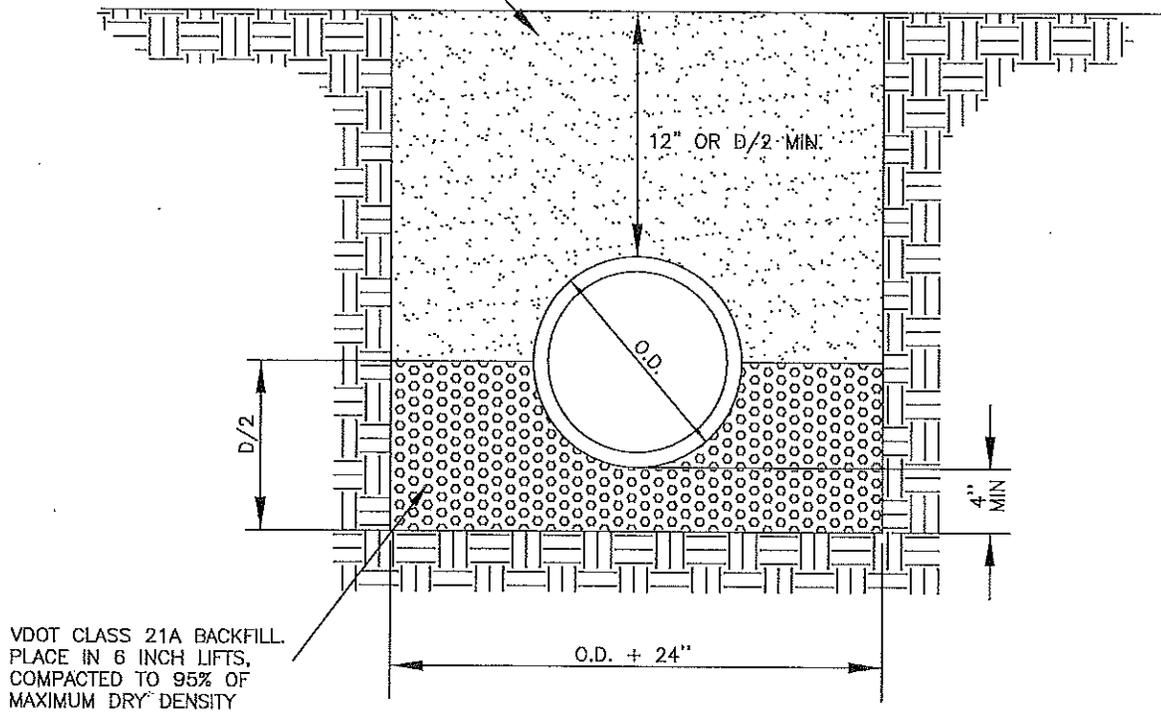


## CONCRETE STORM DRAIN BEDDING WITHIN TRAFFIC AREAS (RCP)

Figure 22

- \* WHERE THE TRENCH BOTTOM IS ROCK, IT SHALL BE EXCAVATED TO A MINIMUM OF 8" BELOW THE BOTTOM OF THE PIPE AND BACKFILLED WITH BEDDING MATERIAL FREE OF ROOTS, DEBRIS & STONES
- \* WHERE SUBGRADE IS UNSTABLE, PIPE SHALL BE BEDDED ON A MINIMUM OF 8" BEDDING MATERIAL

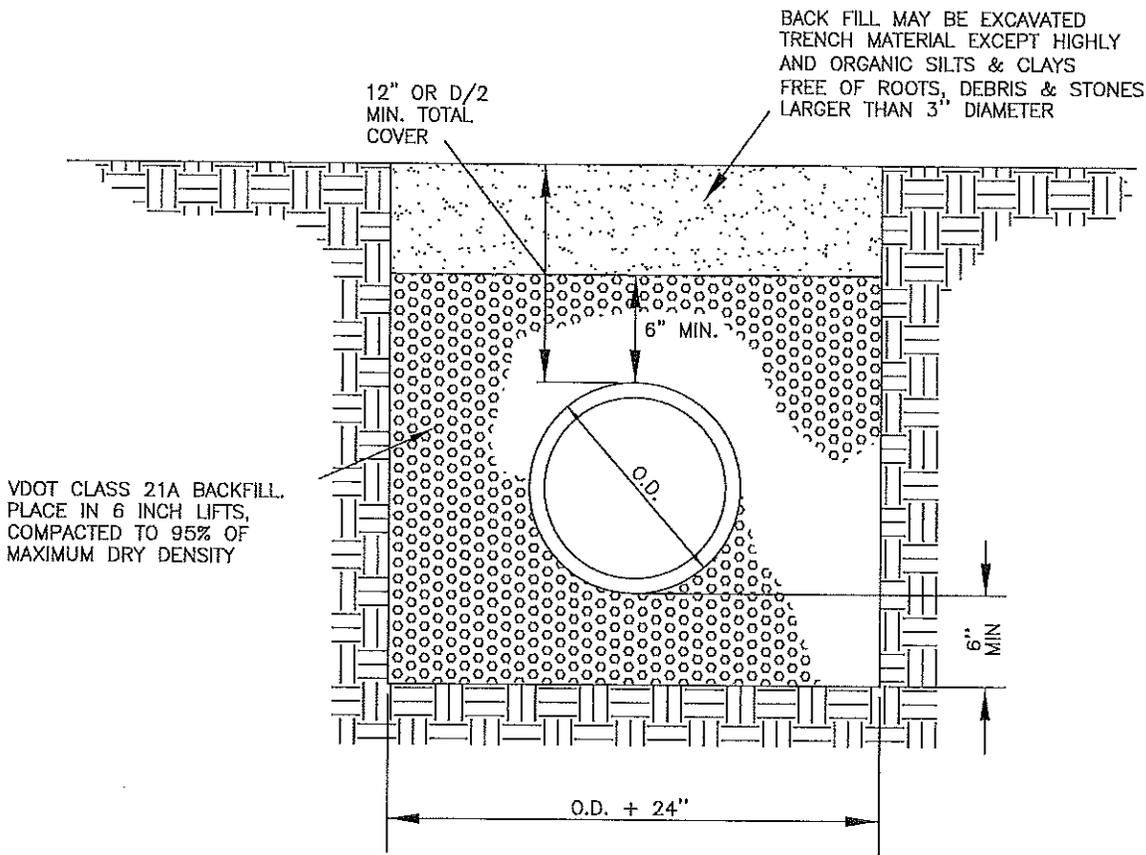
BACK FILL MAY BE EXCAVATED TRENCH MATERIAL EXCEPT HIGHLY AND ORGANIC SILTS & CLAYS FREE OF ROOTS, DEBRIS & STONES LARGER THAN 3" DIAMETER



## CONCRETE STORM DRAIN BEDDING OUTSIDE TRAFFIC AREAS (RCP)

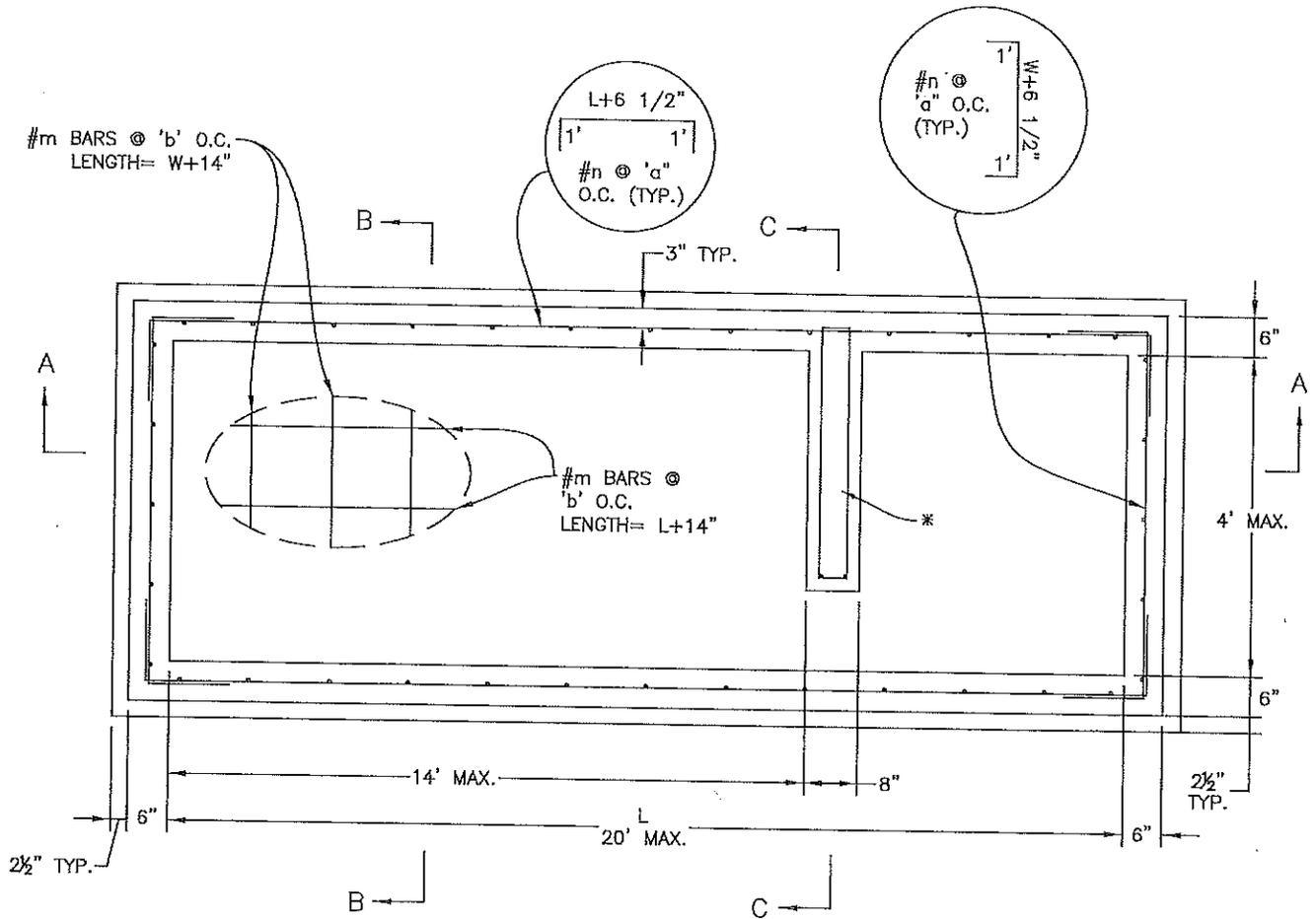
Figure 23

- \* WHERE THE TRENCH BOTTOM IS ROCK, IT SHALL BE EXCAVATED TO A MINIMUM OF 8" BELOW THE BOTTOM OF THE PIPE AND BACKFILLED WITH BEDDING MATERIAL FREE OF ROOTS, DEBRIS & STONES
- \* WHERE SUBGRADE IS UNSTABLE, PIPE SHALL BE BEDDED ON A MINIMUM OF 8" BEDDING MATERIAL
- \* HDPE PIPE MUST BE INSTALLED PER MANUFACTURERS SPECS



**CONCRETE STORM DRAIN BEDDING  
WITHIN EASEMENT OR NON-TRAFFIC AREAS  
(CORRUGATED HDPE)**

Figure 24



PLAN VIEW  
TOP SLAB REMOVED

\* CENTER WALL TO BE USED WHEN THROAT LENGTH EXCEEDS 14' (SEE SEC. C-C)

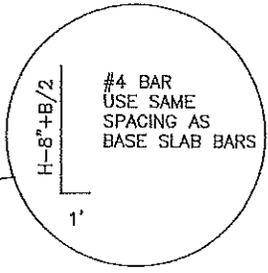
NOTES:

1. CONCRETE TO BE 4,000 PSI MIN.
2. STEEL TO BE GRADE 60
3. DOWEL HOLES PROVIDED TO PREVENT SETTLEMENT OF ADJACENT CONCRETE
4. WEEP HOLES PROVIDED
5. STEPS PROVIDED WHEN HEIGHT IS 4' OR GREATER
6. GUTTER PAN/THROAT FACE TO BE POURED IN FIELD

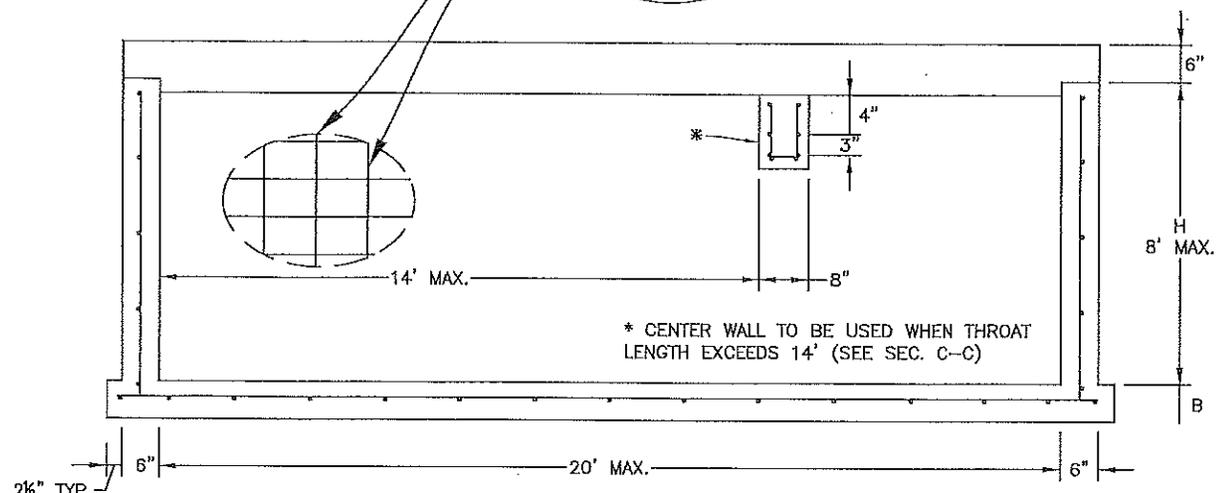
BAR SPACING				
L	HORIZ.		BASE	
	n	a	m	b
>16'	5	6"	4	12"
>12'	5	9"	4	12"
>8'	4	9"	4	16"
≤8'	4	14"	4	16"

DI-3A, 3B, 3C (SHALLOW)

Figure 25A

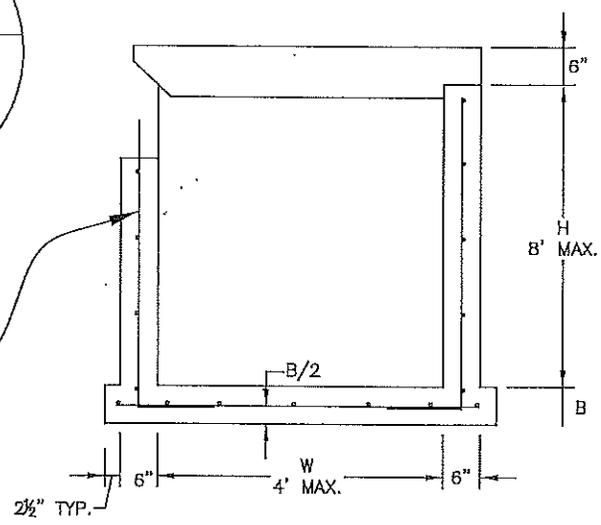
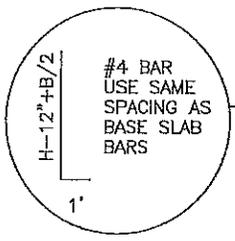
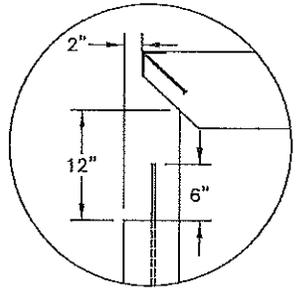


NOTES:  
PLACE ADD'L VERT. & HORIZ. BARS  
ON EITHER SIDE OF OPENINGS.  
PLACE (2) #5 DIAGONALS AROUND  
OPENING, BENDING AS NECESSARY  
NEAR WALL EDGES. DIAGONAL  
LENGTH TO BE OPENING SIZE + 24".

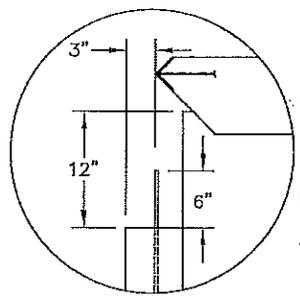


SEC. A-A

SLAB THICKNESS		
H	L	B
>7'	>14'	8"
>7'	≤14'	6"
≤7'	≤L MAX	6"

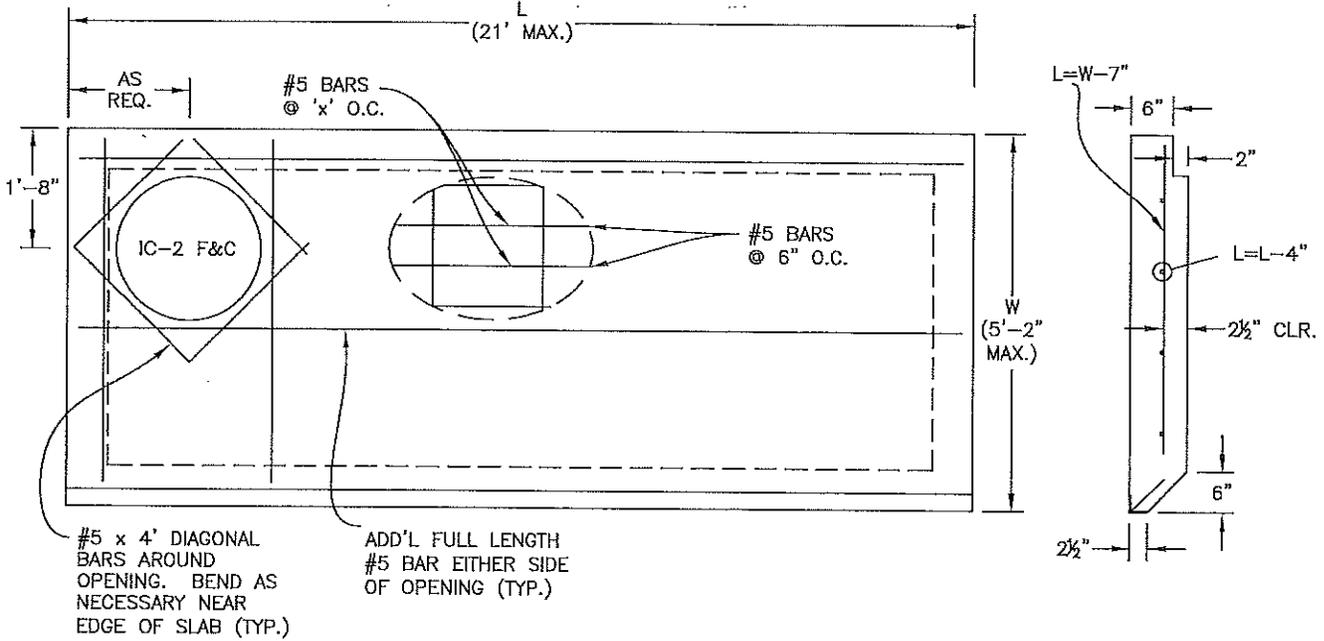
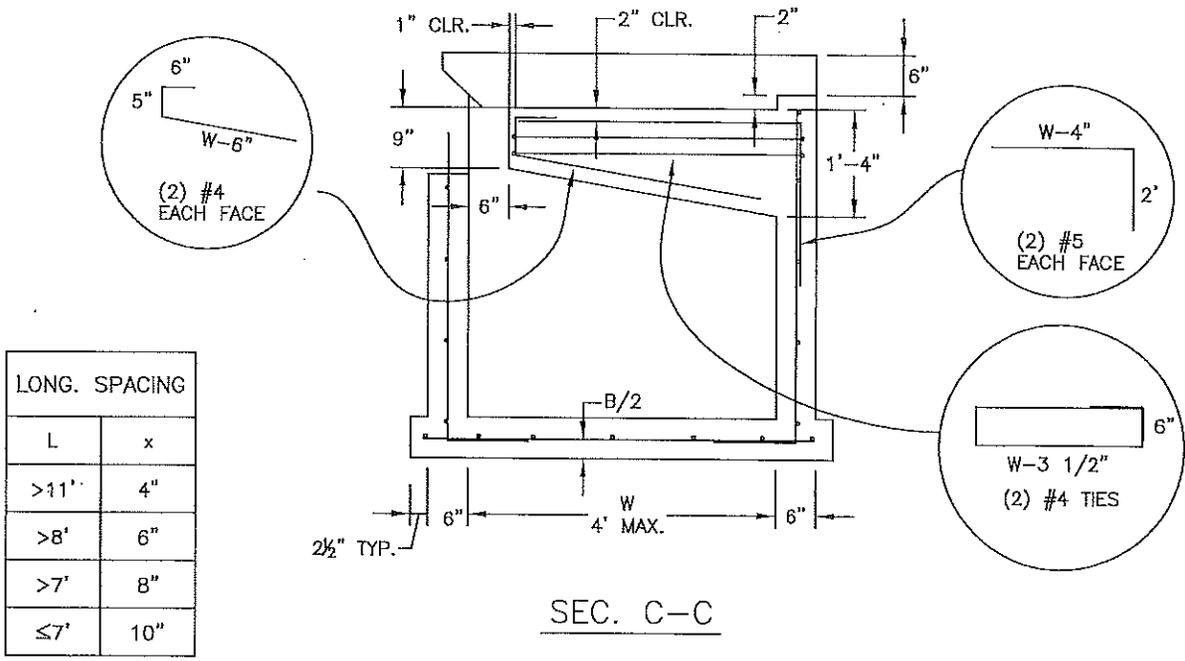


SEC. B-B



FOR USE WITH  
CG-3 AND CG-7  
CURB AND GUTTER

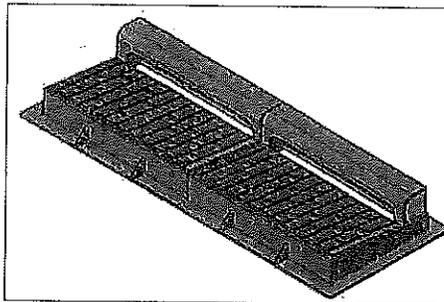
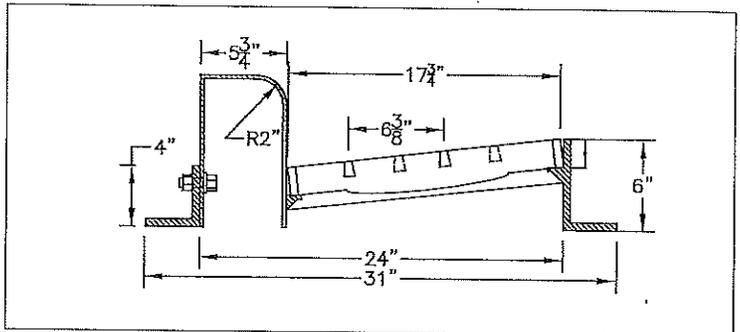
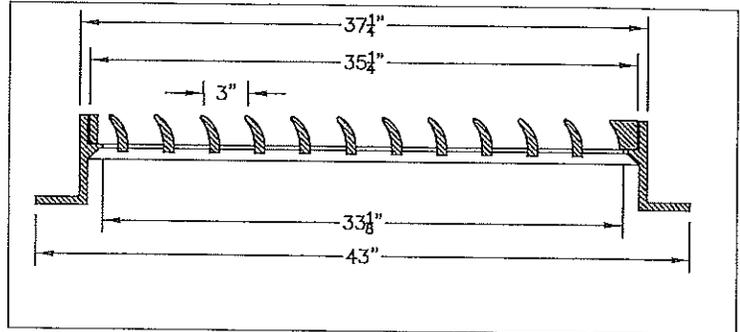
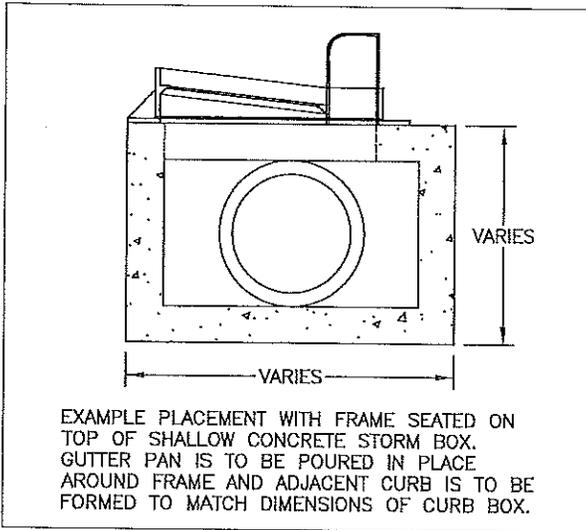
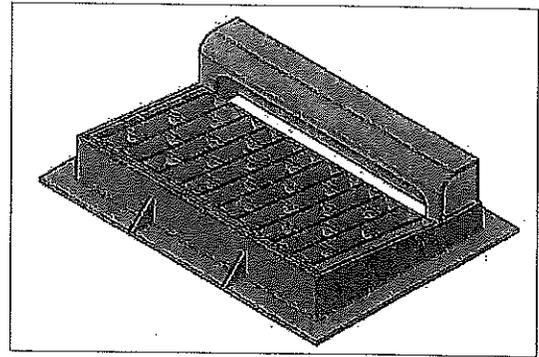
**DI-3A, 3B, 3C (SHALLOW)**  
Figure 25B



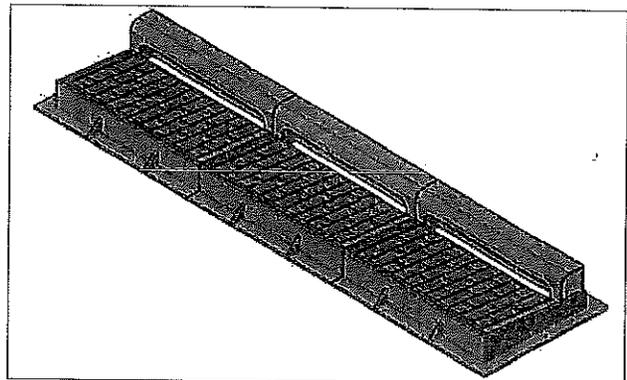
TOP SLAB

**DI-3A, 3B, 3C (SHALLOW)**  
**Figure 25C**

COMBINATION INLET FRAME, GRATE, AND CURB BOX MFG. BY NEENAH FOUNDRY  
 MODEL NUMBER R-3295  
 TYPE "L" GRATES



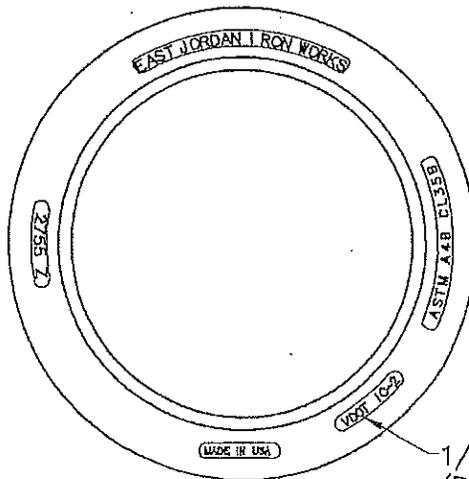
MODEL NUMBER R-3295-2  
 FOR DUAL INLET SITUATIONS



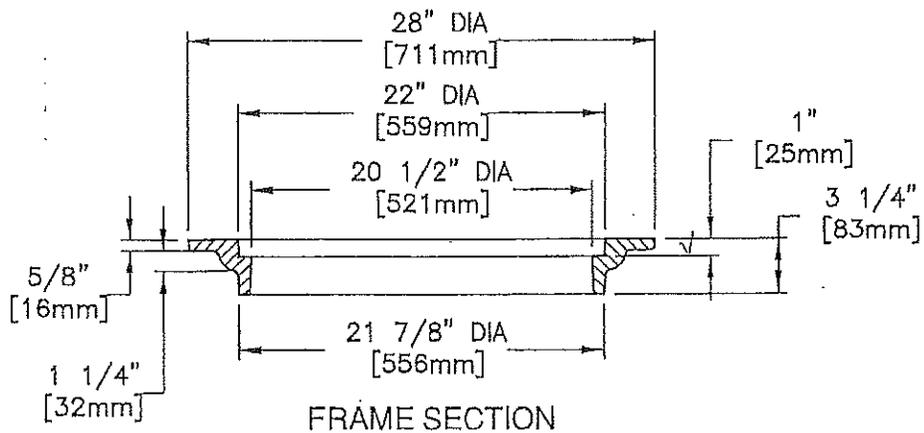
MODEL NUMBER R-3295-3 FOR THREE INLET SITUATIONS. ADD'L MIDDLE UNITS CAN BE ADDED FOR INCREASED LENGTH

## MODIFIED DI-1 (SHALLOW)

Figure 26



PLAN VIEW

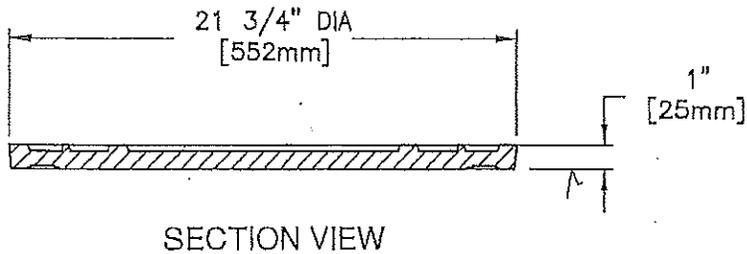
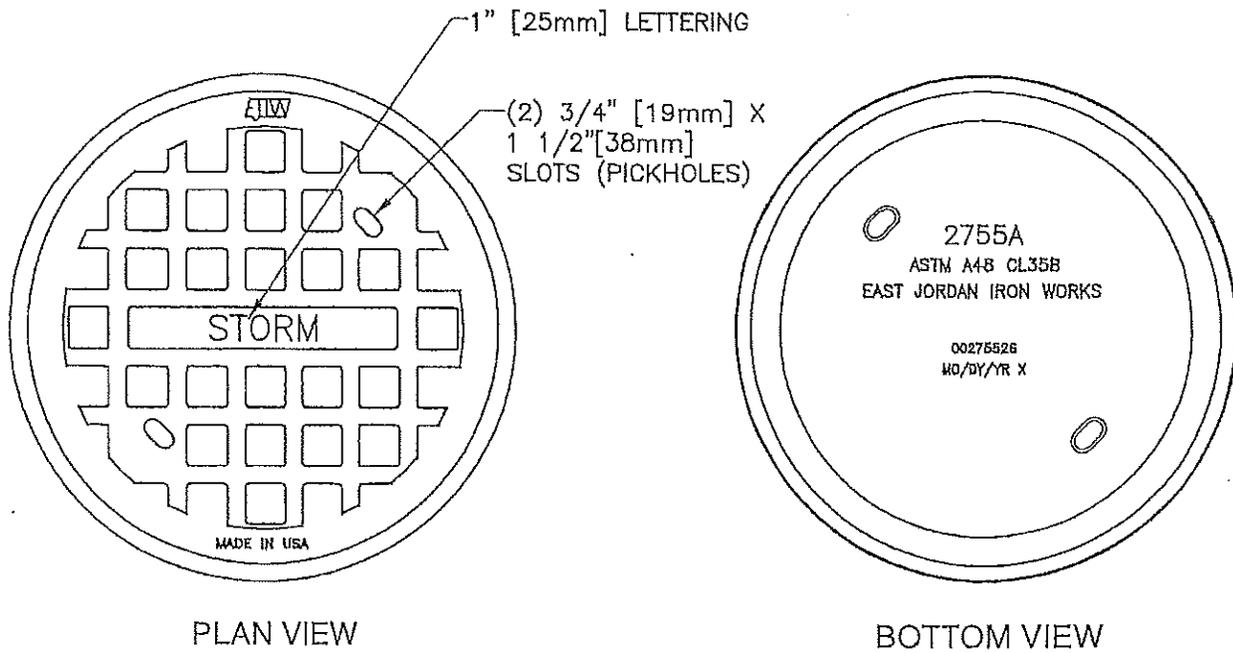


FRAME SECTION

✓ MACHINED SURFACE

**28" MANHOLE FRAME  
HEAVY DUTY RATING**

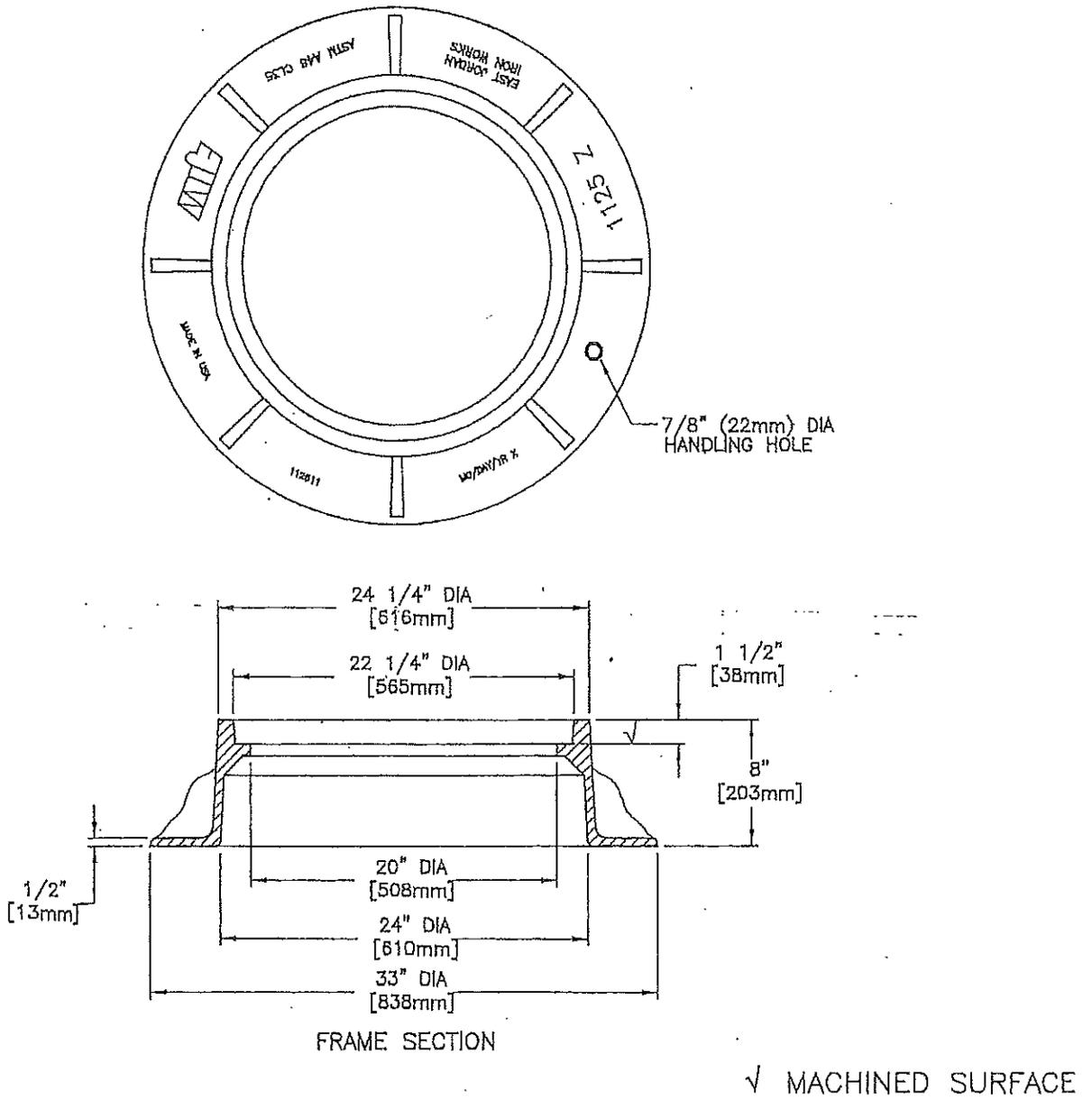
Figure 27A



√ MACHINED SURFACE

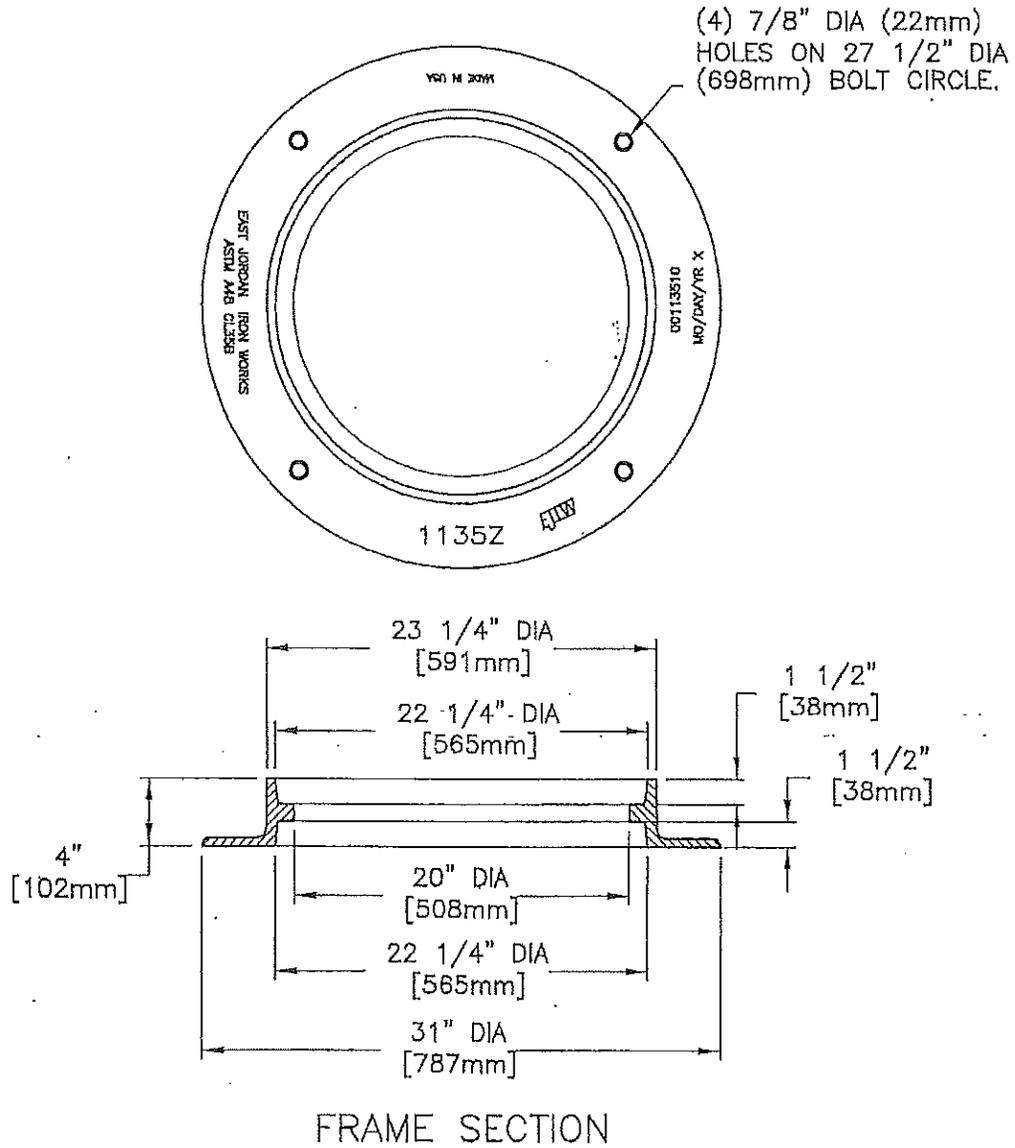
**21<sup>3/4</sup>" SPECIAL LETTERED COVER  
HEAVY DUTY RATING**

Figure 27B



**24<sup>1/4</sup>" MANHOLE FRAME  
HEAVY DUTY RATING**

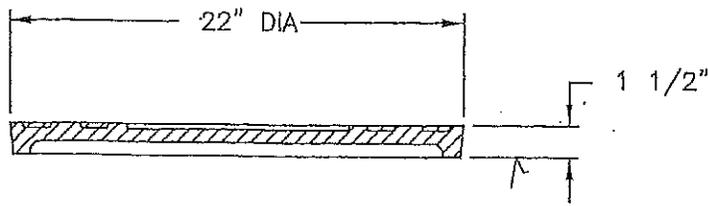
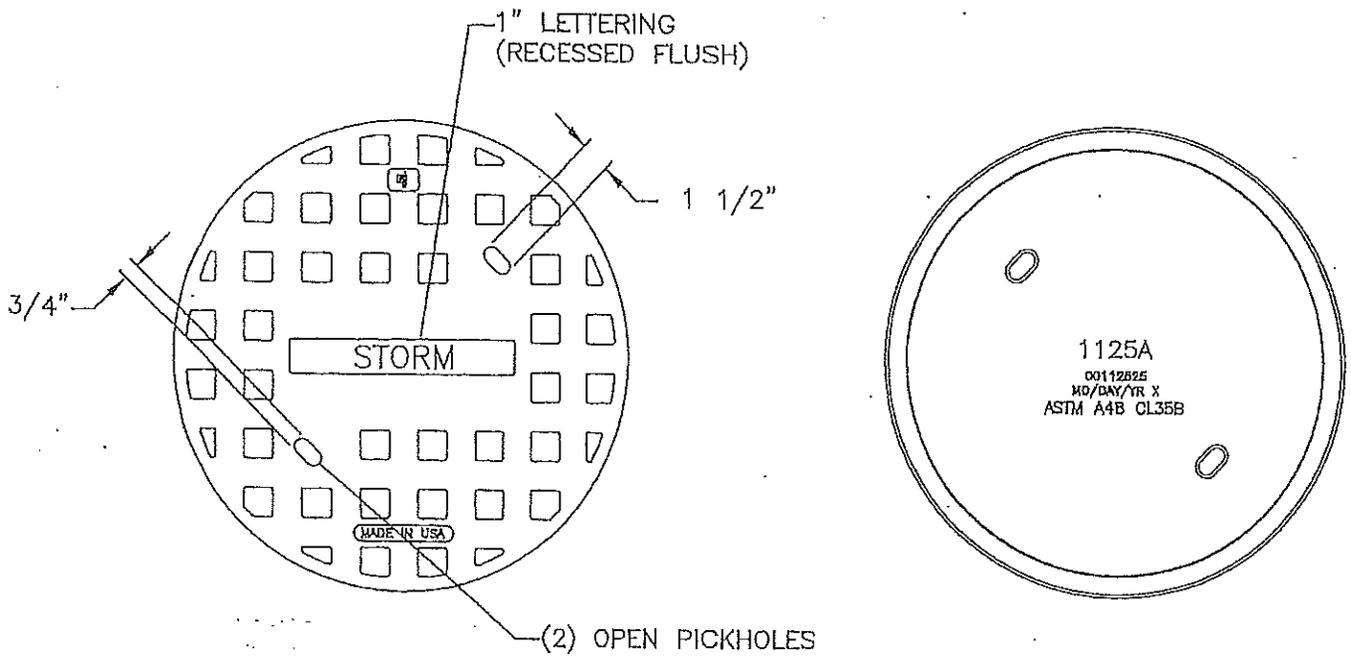
Figure 28



NOTE: FRAME IS REVERSIBLE  
AND CAN BE INSTALLED AS A  
TOP FLANGE UNIT.

**23<sup>1</sup>/<sub>4</sub>" MANHOLE FRAME  
HEAVY DUTY RATING**

Figure 29



COVER SECTION

**1125A STORM MANHOLE COVER  
FITS 4" AND 8" FRAMES  
HEAVY DUTY RATING**

**Figure 30**