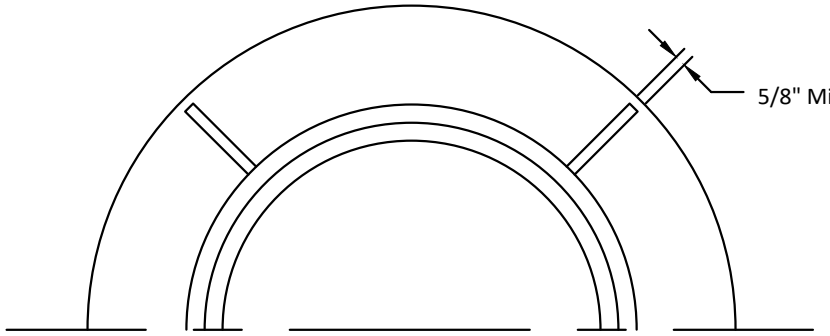
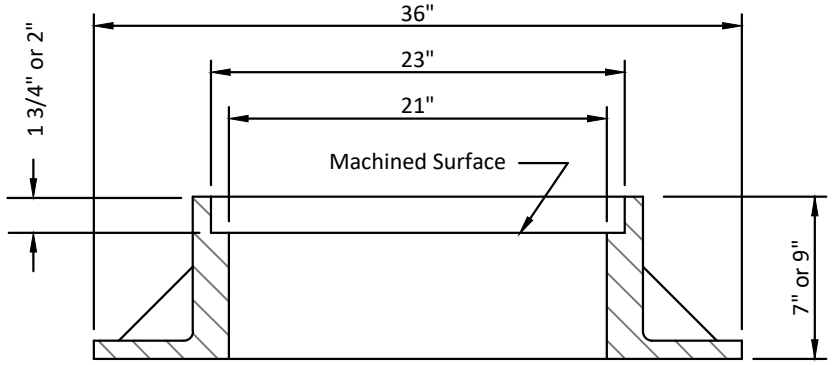


RING - HALF PLAN
N.T.S.

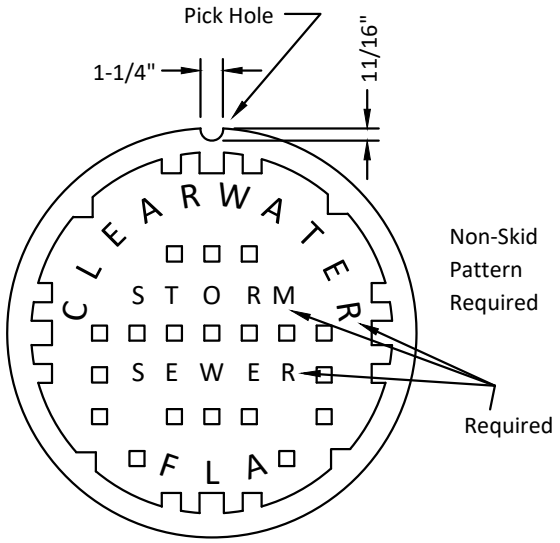
NOTES:

1. Where Roadway Base is 8" or Thicker use 9" Ring all other cases a 7" Ring is Permissible
2. Manufacturers Model of Storm Ring and Cover to be Approved by City Engineer
3. Perforated Covers, when Required Shall be Similar to Solid Covers

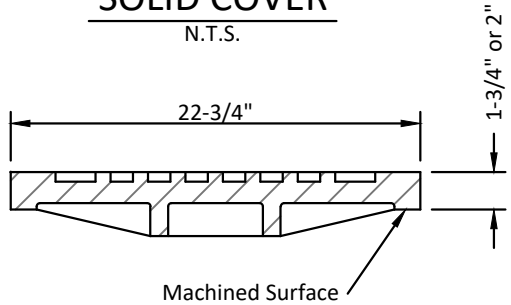


RING SECTION
N.T.S.

Minimum Weight - 7" is 232 LBS
Minimum Weight - 9" is 278 LBS



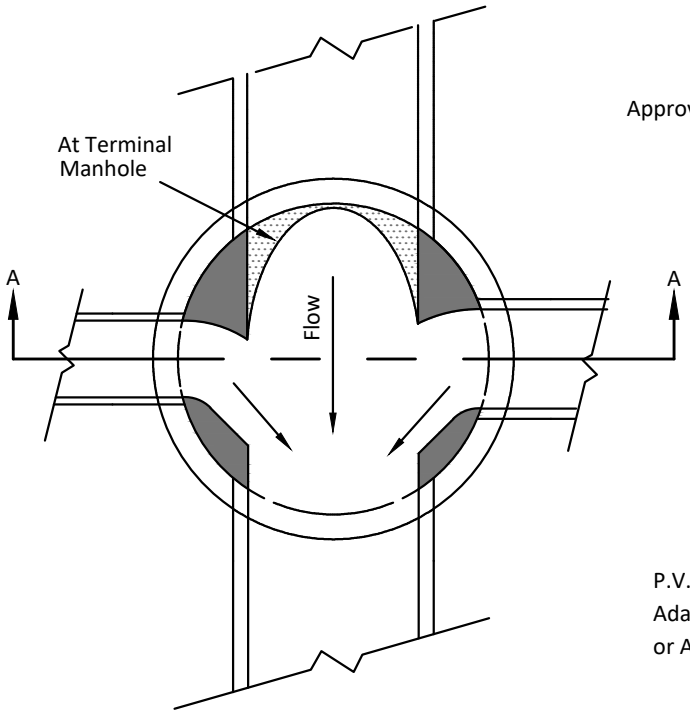
SOLID COVER
N.T.S.



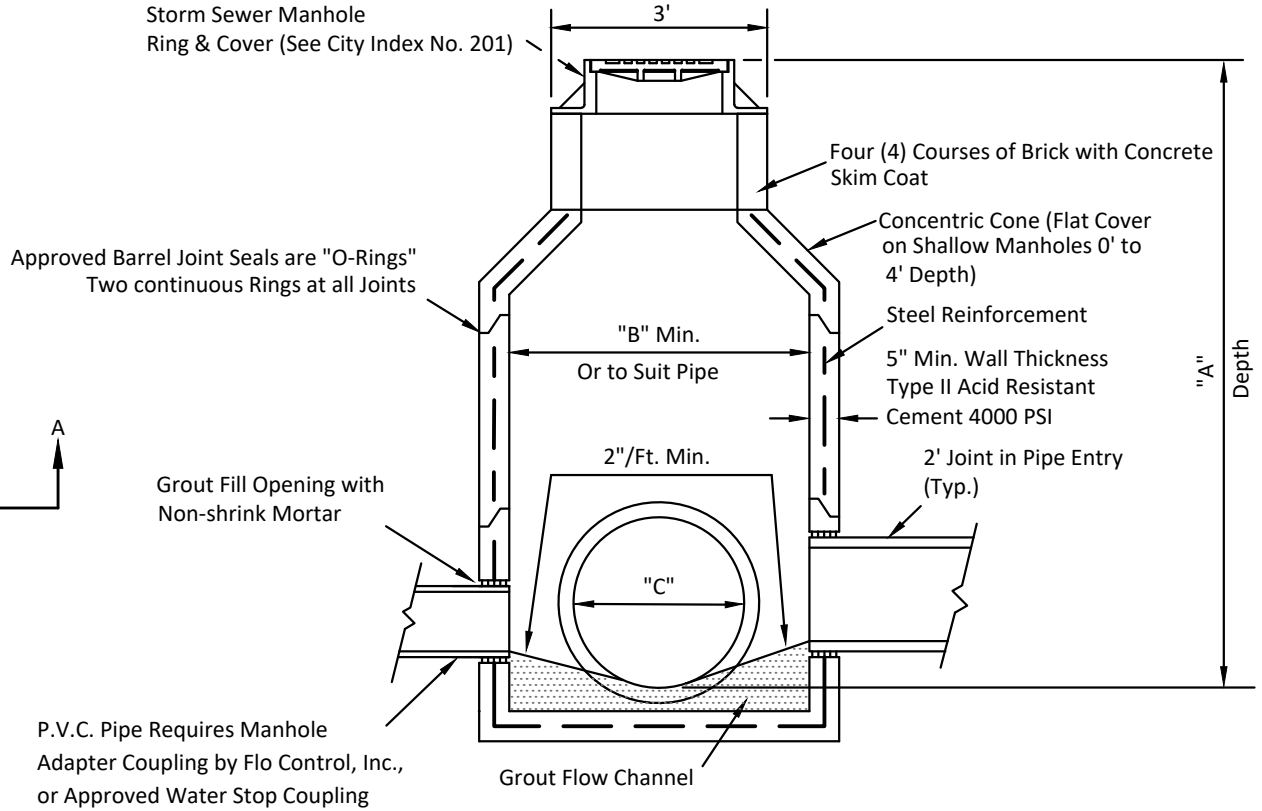
SOLID COVER SECTION
N.T.S.

Minimum Weight 128 LBS

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	STORM SEWER MANHOLE RING & COVER TRAFFIC AREAS	INDEX NO. 201 PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016



PLAN
N.T.S.



SECTION A-A
N.T.S.

	A	B	C
Shallow 0'- 4'	4' Max	3'-6"	24" Max
Standard 4.1'- 6'	6' Max	4'	30" Max
Deep 6.1'- 10'	10'	4'	48" Max
Deep 10.1'- 14'	14'	5'	48" Max

CITY OF CLEARWATER
PUBLIC WORKS - ENGINEERING
2022 DESIGN STANDARDS

200 SERIES:
STORMWATER
DETAILS

PRECAST STORM SEWER MANHOLE

INDEX NO.	PAGE NO.
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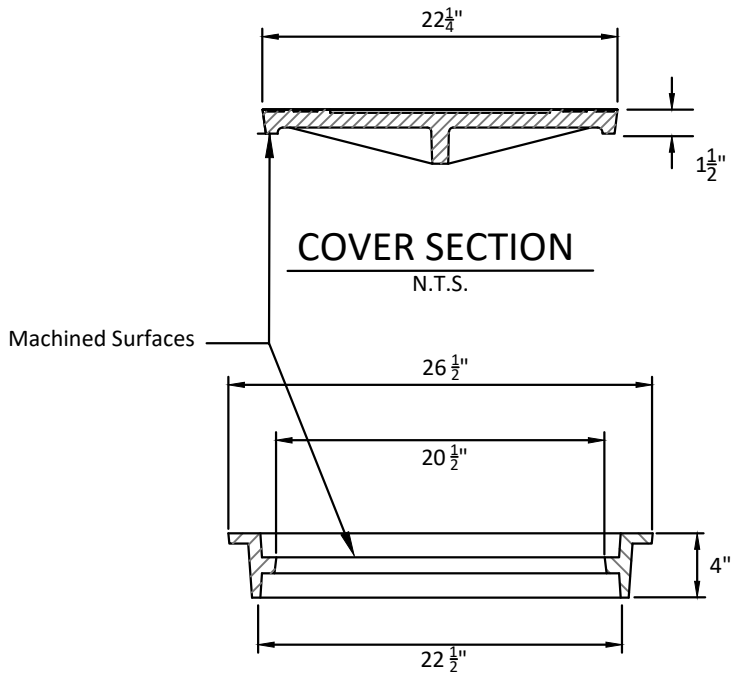
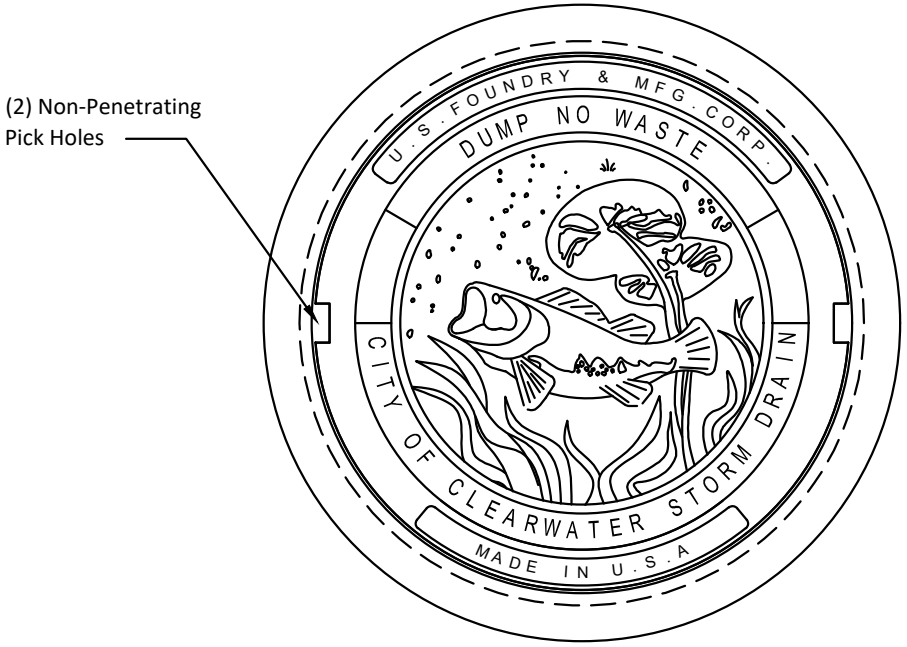
LATEST REVISION	2/22/2016



COVER SECTION
N.T.S.

RING SECTION
N.T.S.

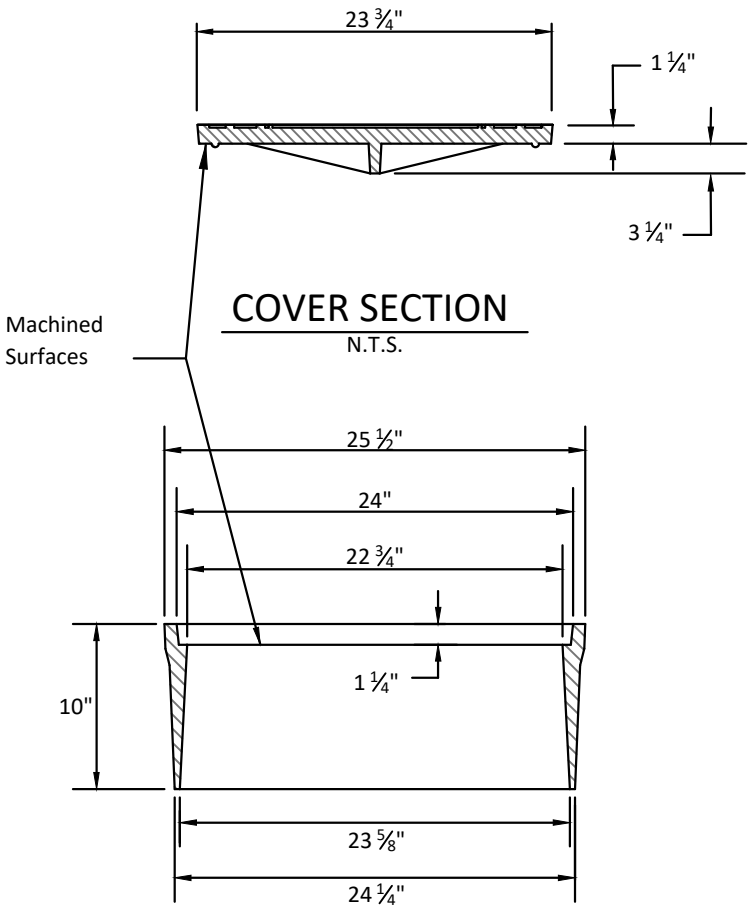


COVER PLAN
N.T.S.

NOTES:

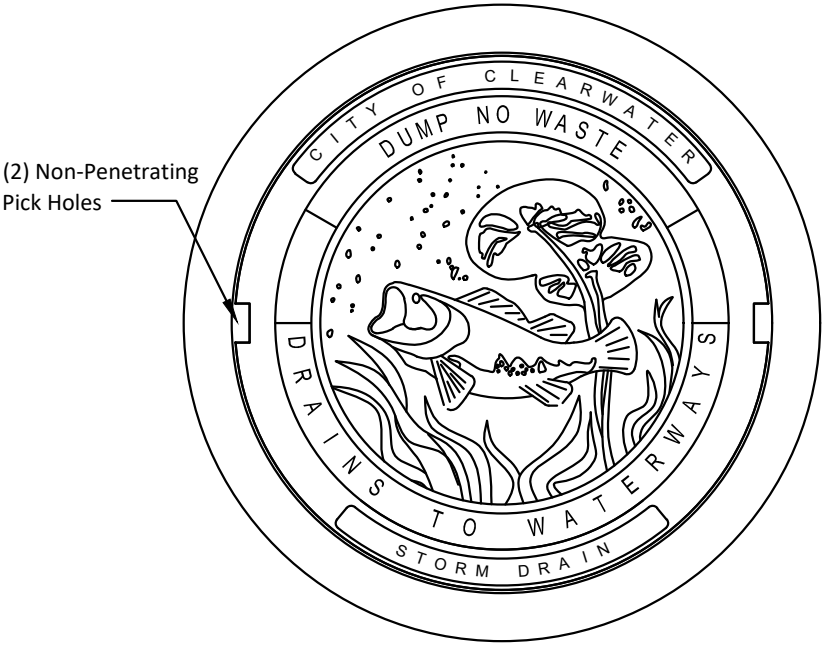
1. USF 1110 MG Cover
2. Material; ASTM-A48 Class 30B Gray Iron
3. Cover Weight: 105 LBS
4. Total Weight: 195 LBS

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	STORM SEWER INLET RING & COVER	INDEX NO. 203 PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016



COVER SECTION
N.T.S.

RING SECTION
N.T.S.

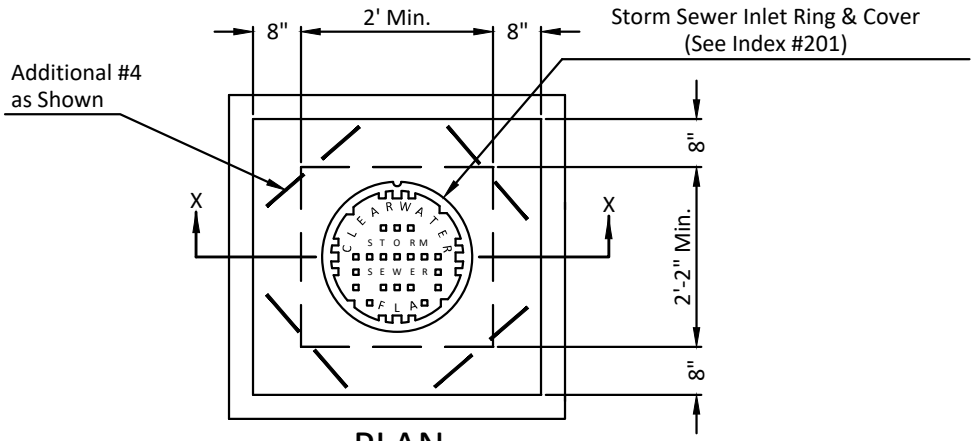


COVER PLAN
N.T.S.

NOTES:

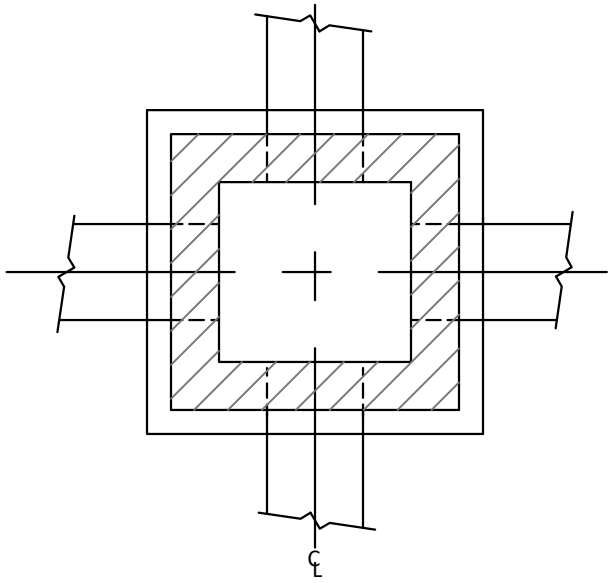
1 - USF 1182 Ring & ME Cover
2 - Material; ASTM-A48 Class 30B Gray Iron
3 - Cover Weight: 135 LBS
4 - Total Weight: 280 LBS
5 - For use with FDOT Types 1,2,3 & 4 Curb Inlets (FDOT Index 210)

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	FDOT STORM SEWER INLET RING & COVER NON-TRAFFIC AREAS	INDEX NO. 204 PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016



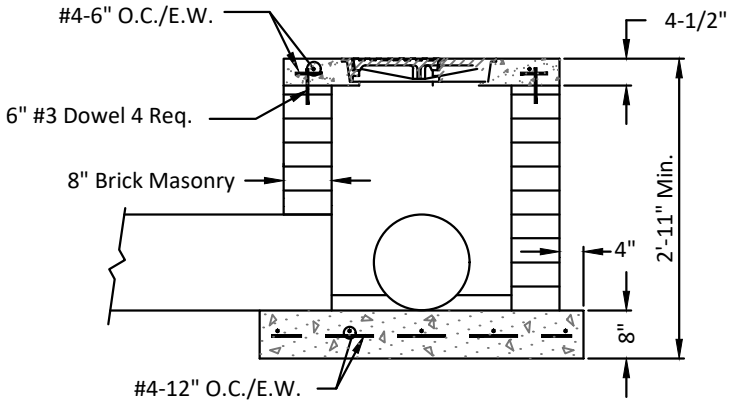
PLAN

N.T.S.



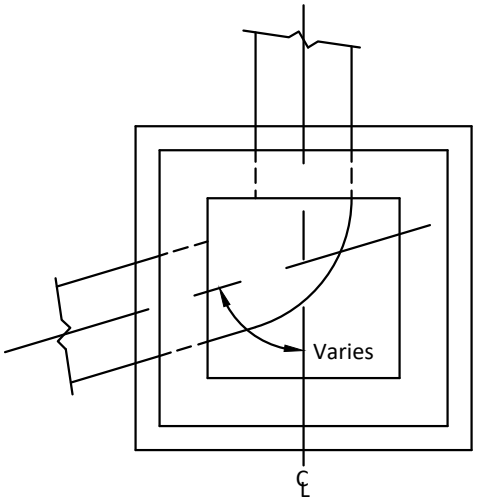
PLAN ON PIPE

N.T.S.



SECTION X-X

N.T.S.



PLAN ON PIPE

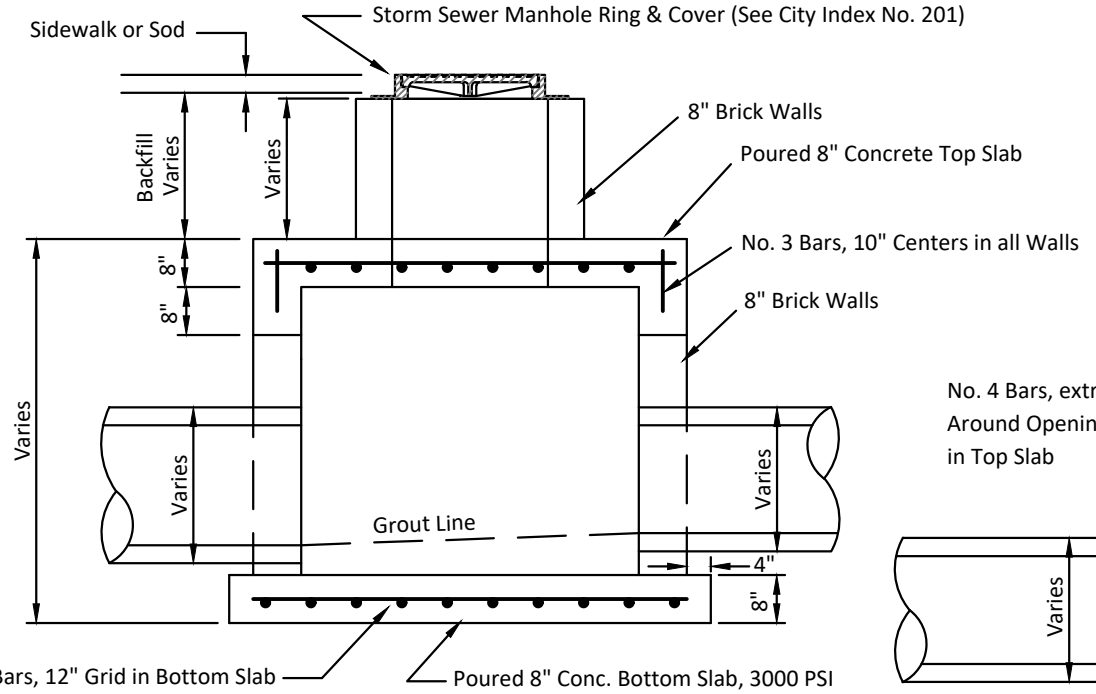
N.T.S.

Detail of Bottom Construction Grout Flow Channel

NOTES:

1. Non-Traffic Bearing
2. Champher all Exposed Edges 3/4"
3. All concrete to be 3,000 PSI with Fiber Mesh Reinforcing

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	JUNCTION BOX - NON-TRAFFIC BEARING	INDEX NO. 205 PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016

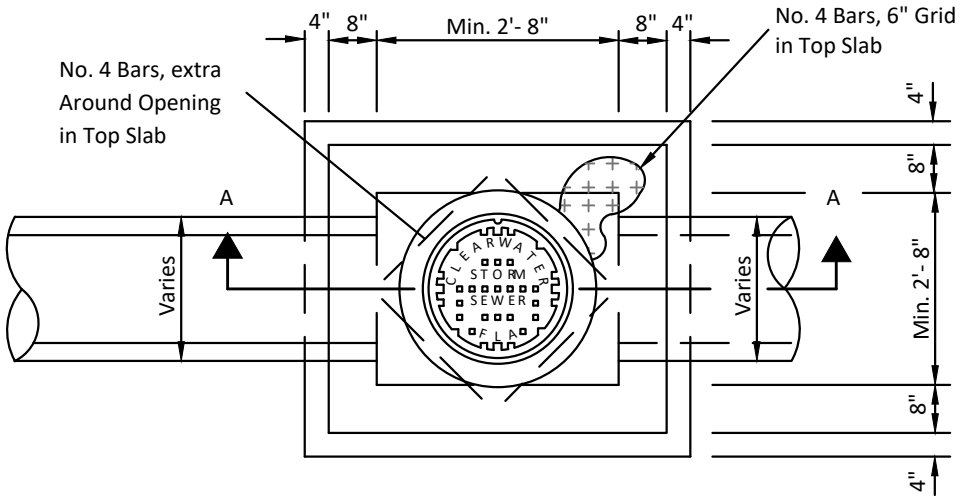


SECTION A-A

N.T.S.

NOTES:

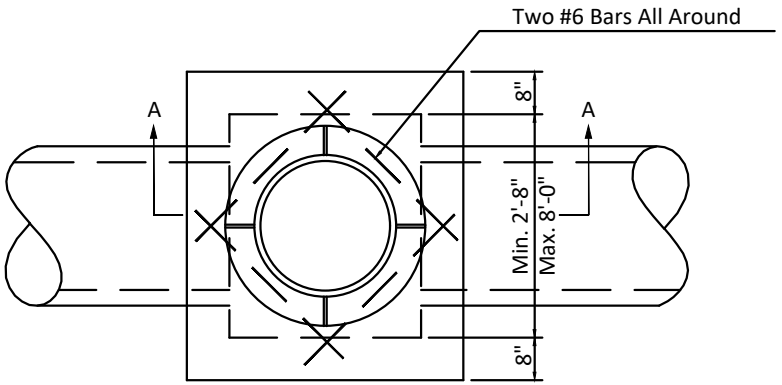
1. Storm Sewers and Manholes to be Centered in Junction Box Unless Otherwise Specified in Plans
2. All Concrete to be 3000 PSI bwith Fiber Mesh Reinforcing
3. Chamfer all Exposed Edges ¾"



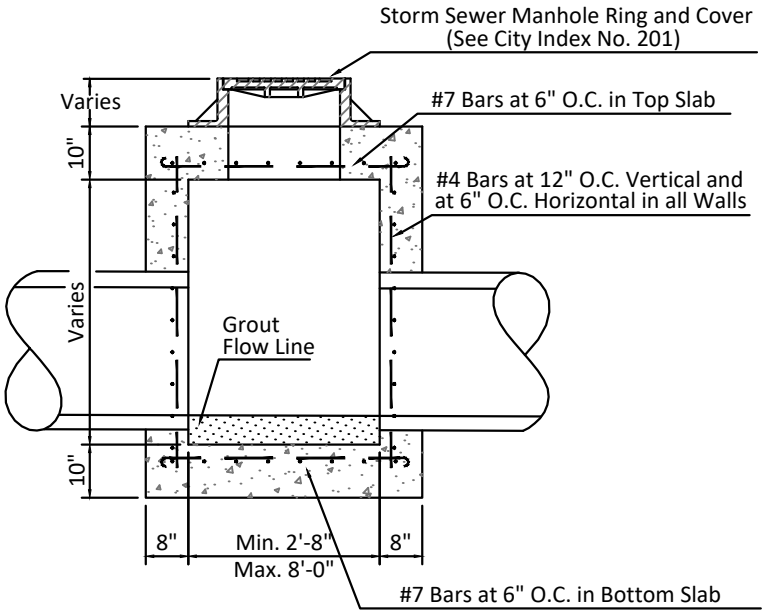
PLAN VIEW

N.T.S.

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	JUNCTION BOX - NON-TRAFFIC TYPE	INDEX NO. 206 PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016



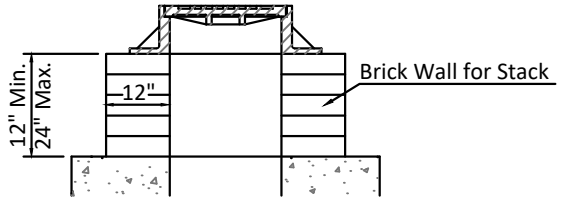
PLAN VIEW
N.T.S.



SECTION A-A
N.T.S.

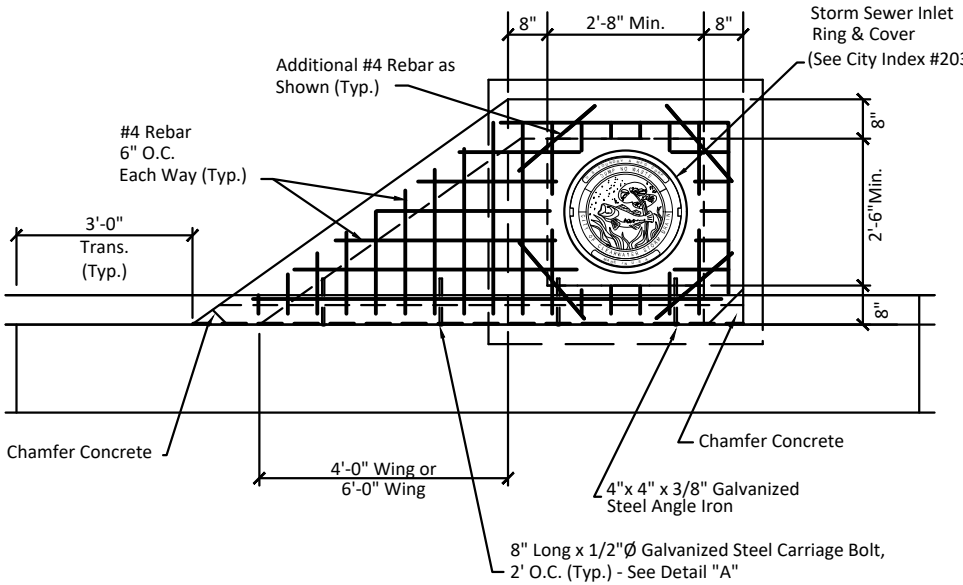
NOTES:

1. Storm Sewers and Manhole to be Centered in Junction Box Unless Otherwise Specified in Plans
2. All Concrete to be 3,000 PSI with Fiber Mesh Reinforcing
3. All Steel Bars Shall have 1 1/4" Minimum Cover Unless Otherwise Shown and Shall be Hooked Where Indicated
   Horizontal Steel Shall be Lapped a Minimum of 24 Bar Diameters at Corners
   On Precast Units, Floor Slabs may be Secured to Structure Walls by No. 4 Dowel Bars (a Minimun of 6 Dowels) Pushed into the Wet Concrete After the Floor Slab is Placed
4. Chamfer all Exposed Edges 3/4"

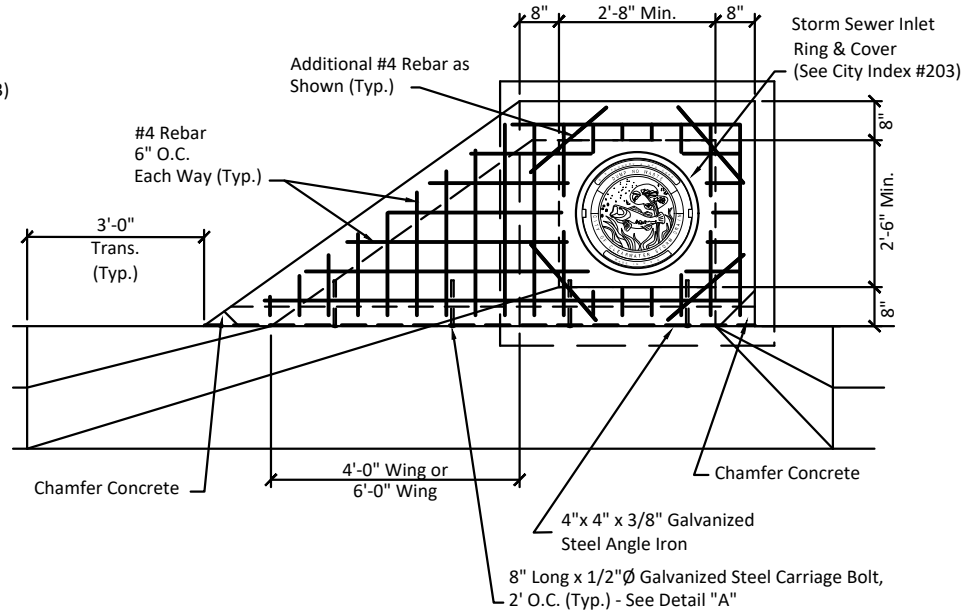


BRICK STACK (IF REQUIRED)
N.T.S.

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	JUNCTION BOX - TRAFFIC TYPE POURED CONCRETE	INDEX NO. 207 PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016



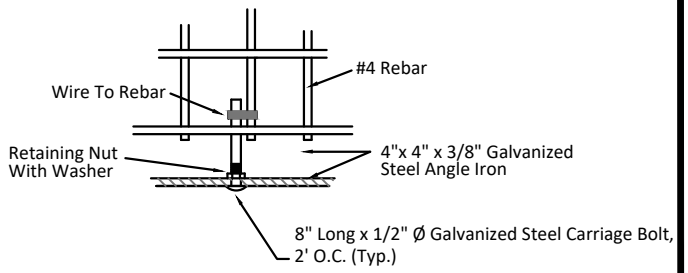
MODIFIED CURB OR TYPE 1 CURB
PLAN VIEW
N.T.S.



VALLEY GUTTER CURB
PLAN VIEW
N.T.S.

NOTES:

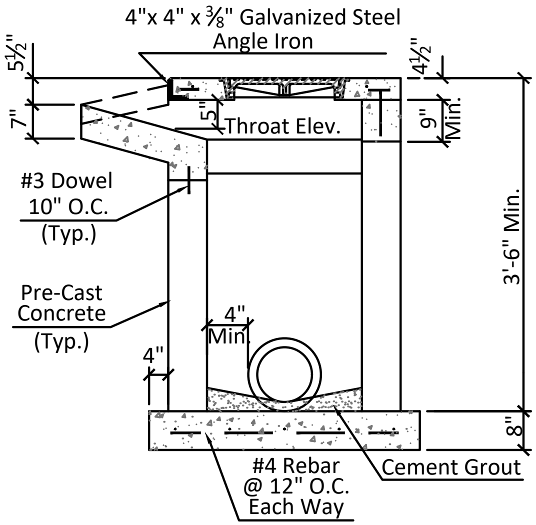
1. Non Traffic Bearing
2. When Pipe Diameter Exceeds 30", Inlets Shall not be used as Junction Boxes, Limit 3 Pipes per Inlet
3. Chamfer all Exposed Edges ¾"
4. All Concrete Shall be 3,000 PSI with Fiber Mesh Reinforcing
5. Center Support Shall be used on Double Wing Inlets - (See INDEX 209, PAGE 2 of 2, DETAIL B)



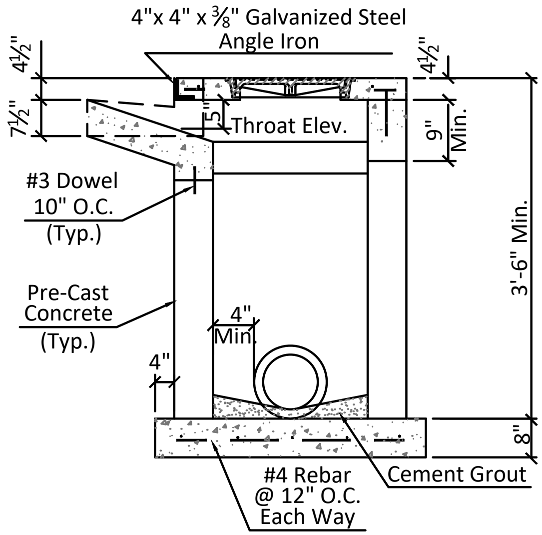
DETAIL "A"
N.T.S.

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES STORMWATER DETAILS	WING INLETS FOR MODIFIED, TYPE I & VALLEY GUTTER CURB PLAN VIEW	INDEX NO. 209 LATEST REVISION	PAGE NO. 1 OF 2 2/22/2016

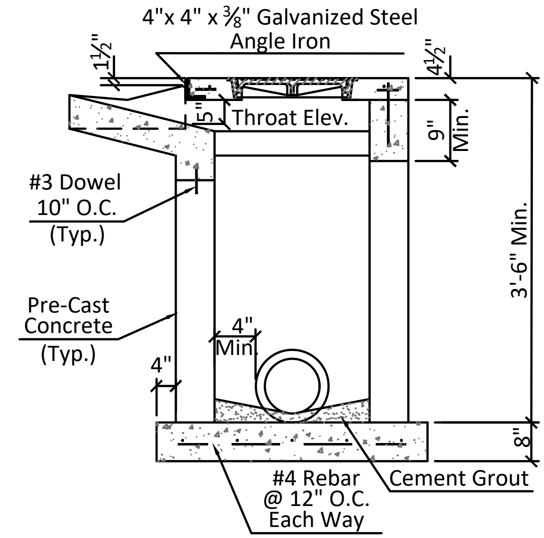
TYPICAL CROSS SECTIONS



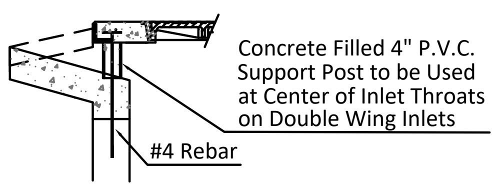
MODIFIED CURB
N.T.S.



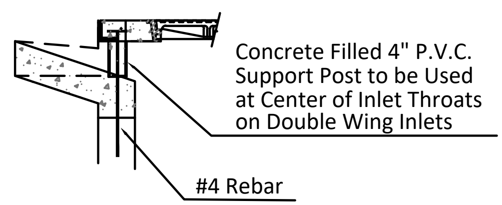
TYPE 1 CURB
N.T.S.



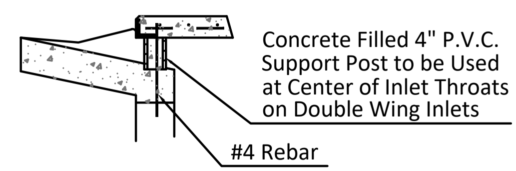
VALLEY GUTTER CURB
N.T.S.



DETAIL "B"
N.T.S.



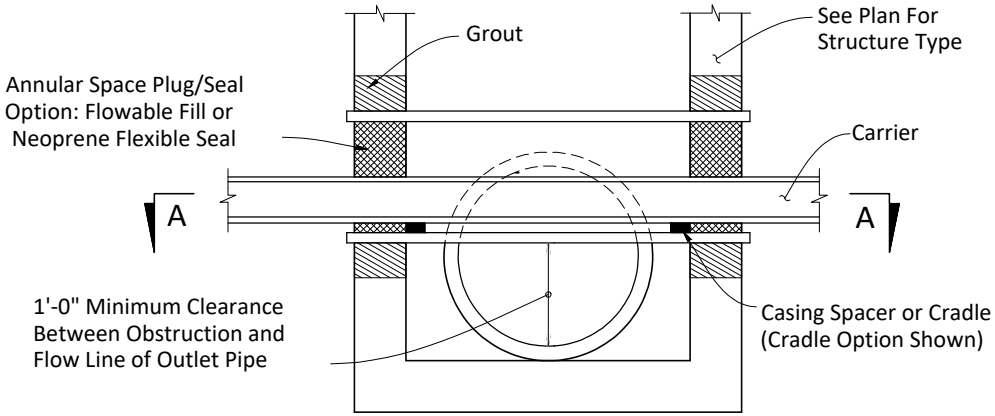
DETAIL "B"
N.T.S.



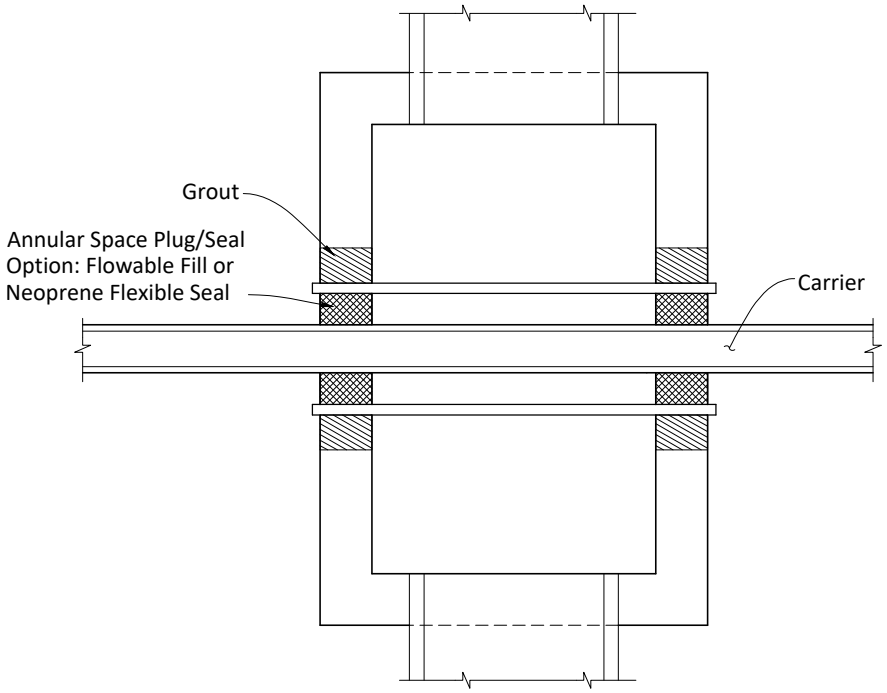
DETAIL "B"
N.T.S.

NOTES:

1. No Joints Inside of Box
2. Engineer to Provide Calculations Demonstrating that the Conflict Structure has Sufficient Hydraulic Capacity to not Restrict Flow more than a Typical Structure

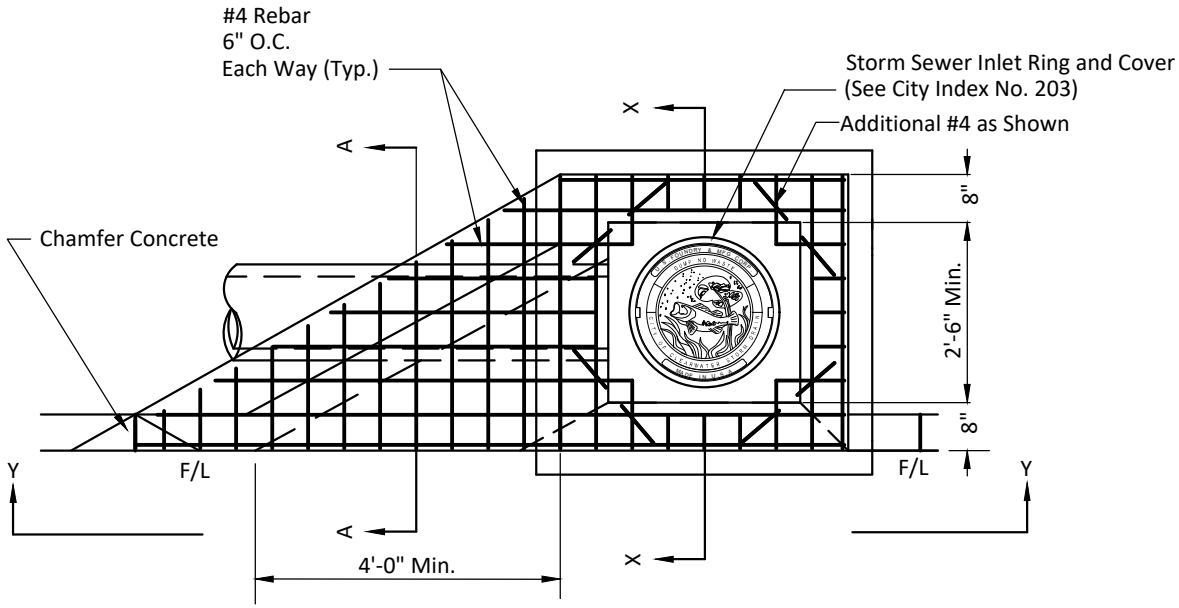


SECTION LONGITUDINAL
N.T.S.



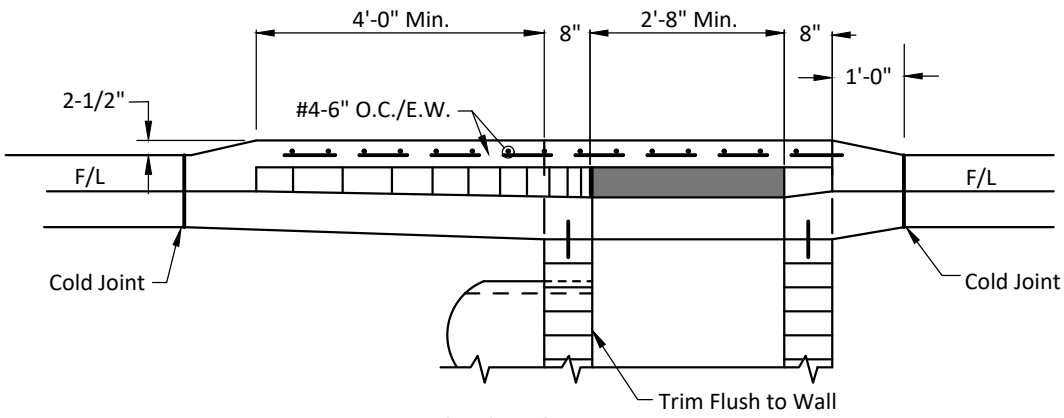
SECTION A-A
N.T.S.

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	UTILITY CONFLICT PIPES THRU STORM DRAIN STRUCTURES	INDEX NO. 210 PAGE NO. 1 OF 1 LATEST REVISION 6/12/17



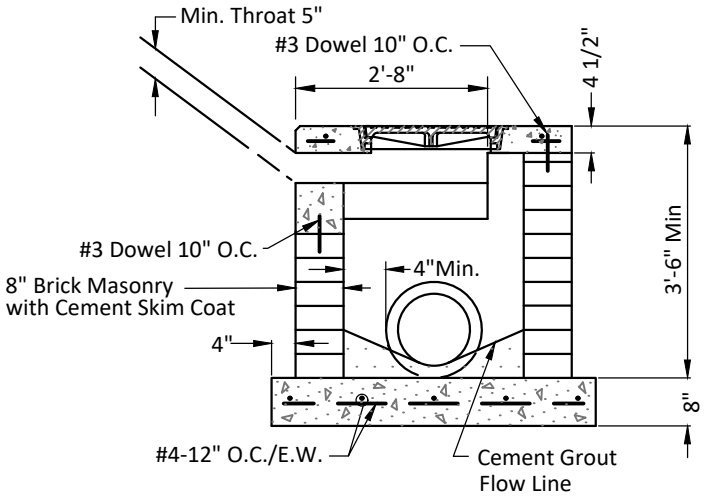
L.H. - R.H. OR DOUBLE WING INLET

N.T.S.



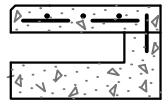
SECTION Y-Y

N.T.S.



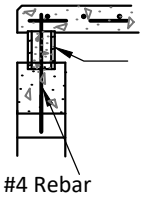
SECTION X-X

N.T.S.



SECTION X-X

N.T.S.



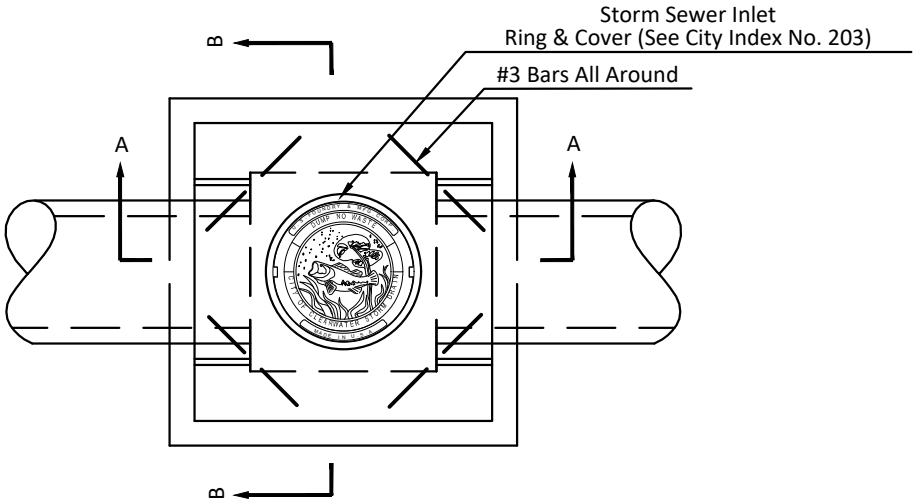
DETAIL A

N.T.S.

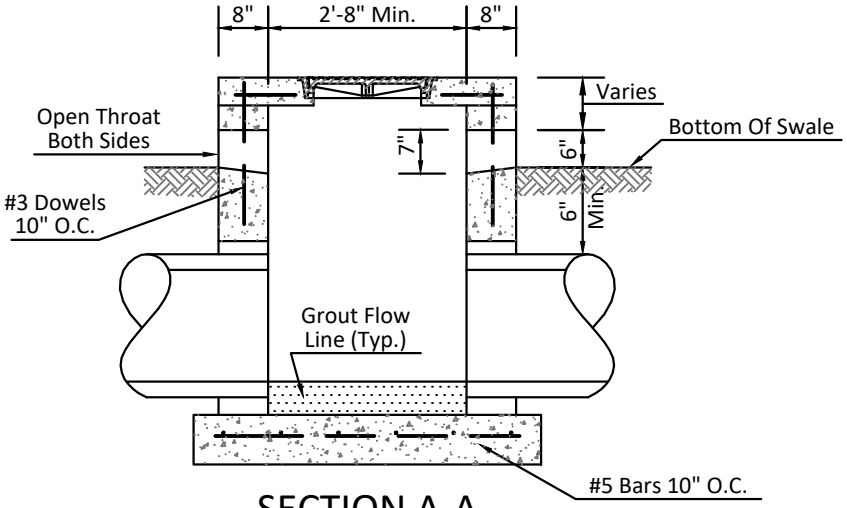
NOTES:

1. Non Traffic Bearing
2. When Pipe Diameter Exceeds 30", Inlets Shall not be used as Junction Boxes, Limit Three Pipes per Inlet
3. Chamfer all Exposed Edges ¾"
4. All Concrete 3,000 PSI with Fiber Mesh Reinforcing
5. Center Support Shall be used on Double Wing Inlets - (See Detail A)

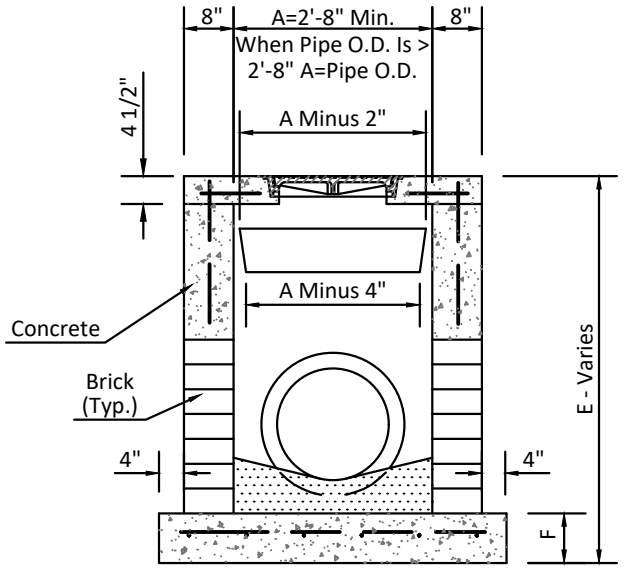
CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	TYPE F WING INLET FOR STRAIGHT CURB	INDEX NO. 212 PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016



PLAN VIEW
N.T.S.



SECTION A-A
N.T.S.



SECTION B-B
N.T.S.

Depth E	F
Shallow 0'-4'	8"
Standard 4.1'-6'	8"
Deep 6.1'-14'	12"

NOTES:

1. Non traffic bearing
2. Chamfer all Exposed Edges ¾".
3. All concrete 3,000 PSI with Fiber Mesh Reinforcing

CITY OF CLEARWATER
PUBLIC WORKS - ENGINEERING
2022 DESIGN STANDARDS

200 SERIES:
STORMWATER
DETAILS

OPEN THROAT - INLET L

INDEX NO.	PAGE NO.
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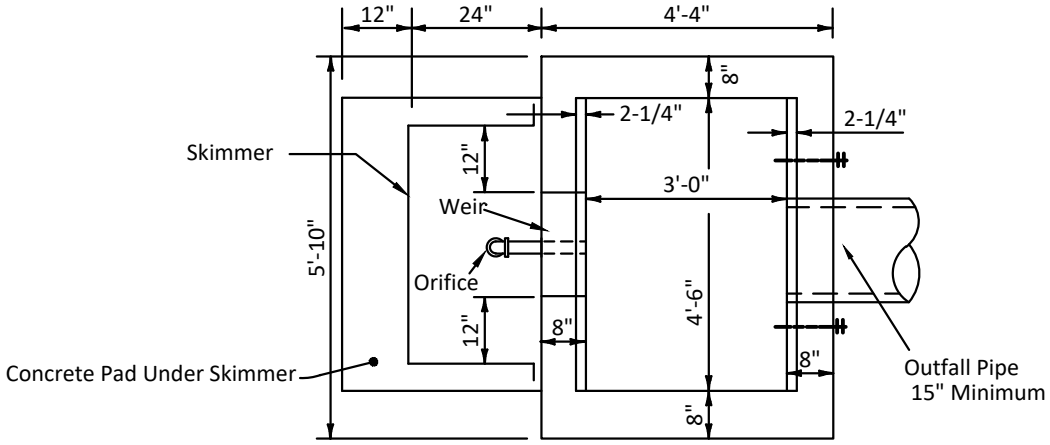
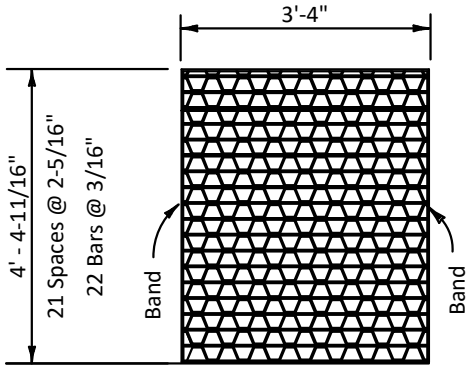
LATEST REVISION	2/22/2016



PLAN VIEW

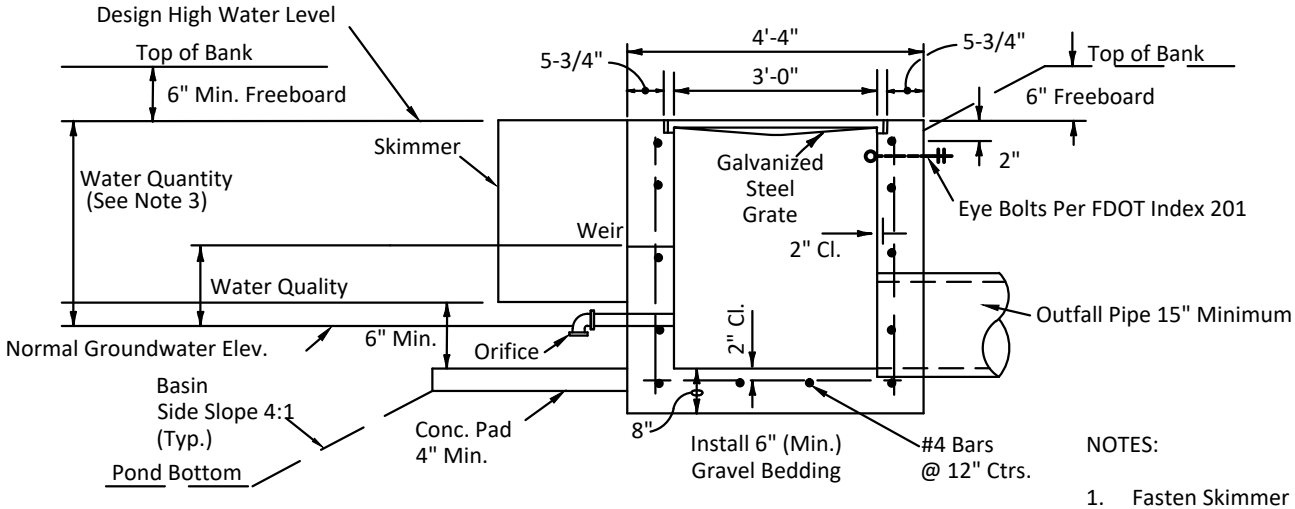
N.T.S.



TYPE E

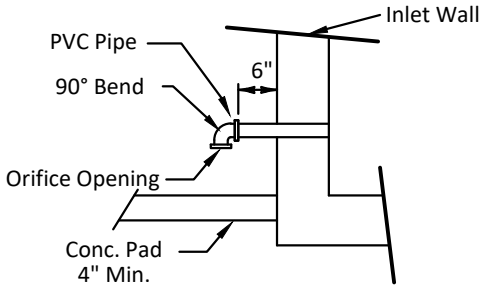
N.T.S.

Straight Bars 2" x 3/16" Reticuline Bars 1-1/4" x 3/16"
Bands 1-1/2" x 1/4" - Approx. Weight 215 Lbs.



CROSS SECTION

N.T.S.



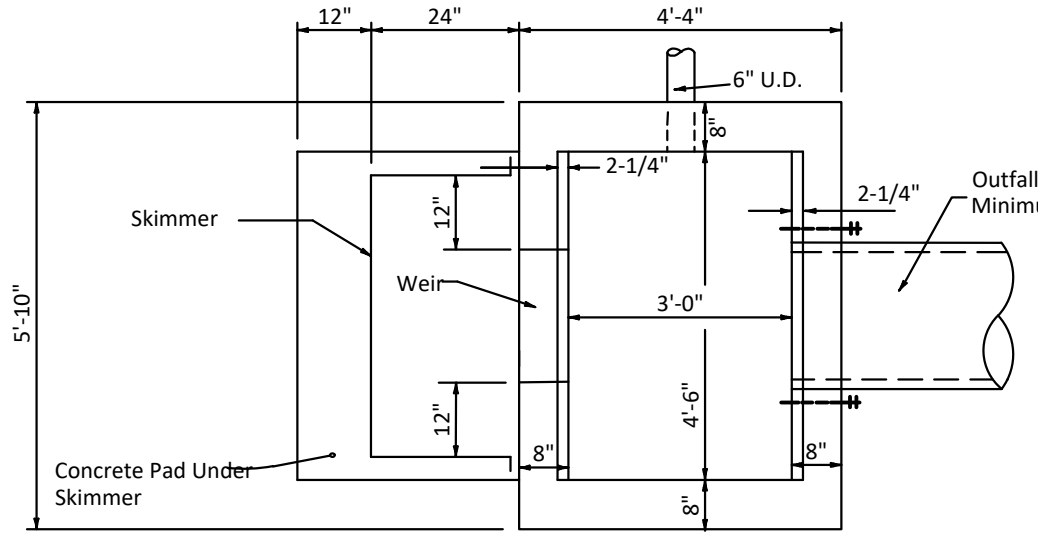
ORIFICE DETAIL

N.T.S.

NOTES:

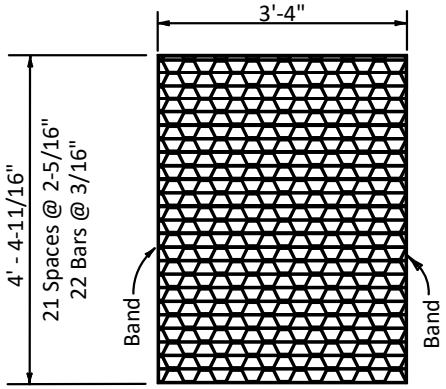
1. Fasten Skimmer with 4 Stainless Steel Bolts with Lead Anchors
2. Seal all Edges of Skimmer at Contact Points with Structure with Waterproof Caulking or Approved Equal
3. Due to the Detention Time Required for Wet Detention Systems, only that Volume Which Drains Below the Overflow Weir Elevation Within 36 Hours may be Counted as Part of the Volume Required for Water Quantity Storage

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	STORM SEWER OUTFALL CONTROL STRUCTURE FDOT TYPE E INLET (MODIFIED) WITH ORIFICE (WET POND)	INDEX NO. 214 PAGE NO. 1 OF 1 LATEST REVISION 8/16/18



PLAN VIEW

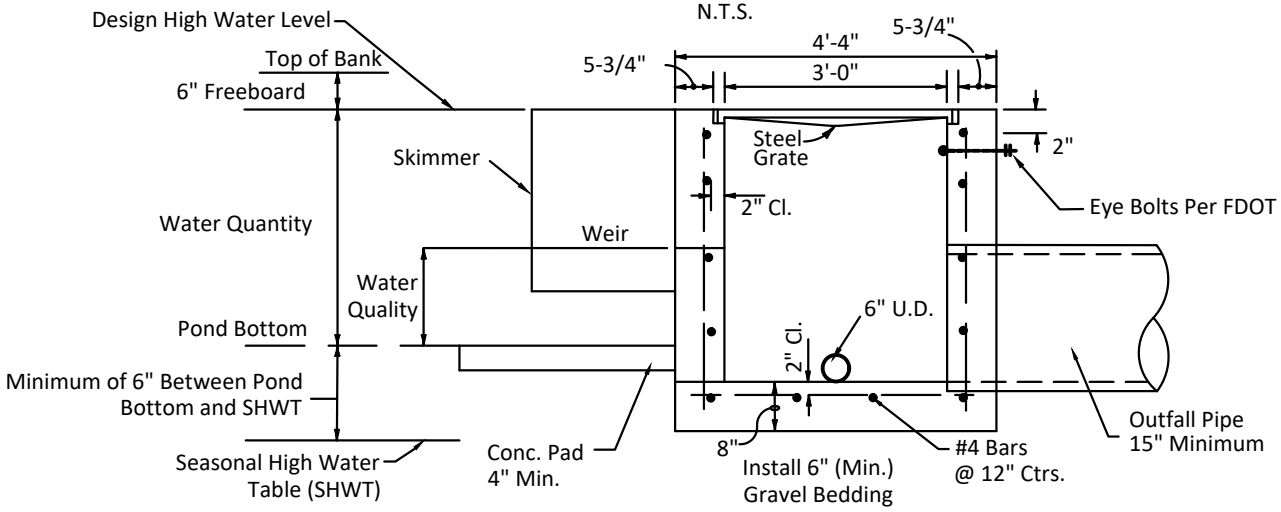
N.T.S.



TYPE E

N.T.S.

Straight Bars 2" x 3/16" Reticuline Bars 1-1/4" x 3/16"
Bands 1-1/2" x 1/4" - Approx. Weight 215 Lbs.



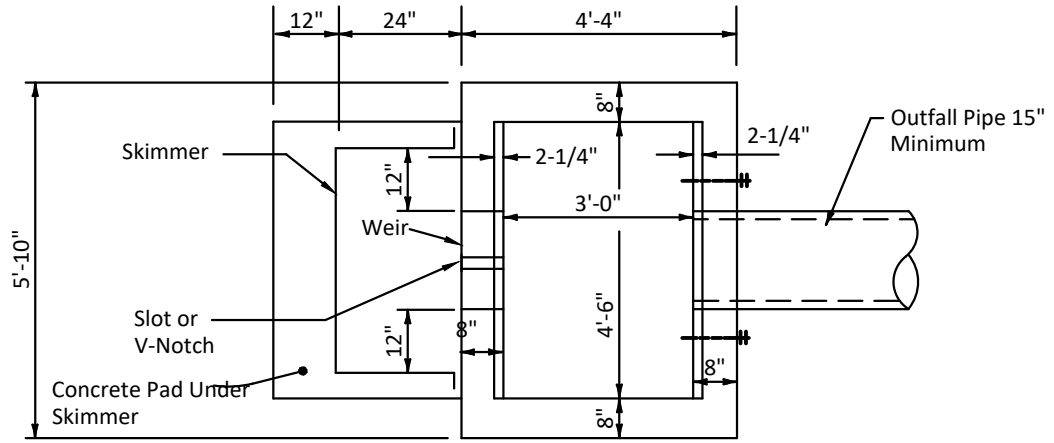
CROSS SECTION

N.T.S.

NOTES:

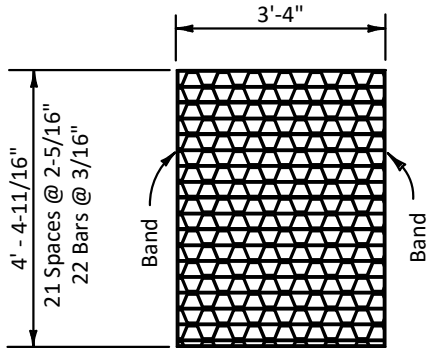
1. Fasten Skimmer with 4 Stainless Steel Bolts with Lead Anchors
2. Seal all Edges of Skimmer at 2 Contact Points with Structure with Waterproof Caulking or Approved Equal
3. Top of Underdrain Shall be Installed a Minimum of 30" Below Existing Grade

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	STORM SEWER OUTFALL CONTROL STRUCTURE FDOT TYPE E INLET (MODIFIED) WITH UNDERDRAIN (DRY POND)	INDEX NO. 215 PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016



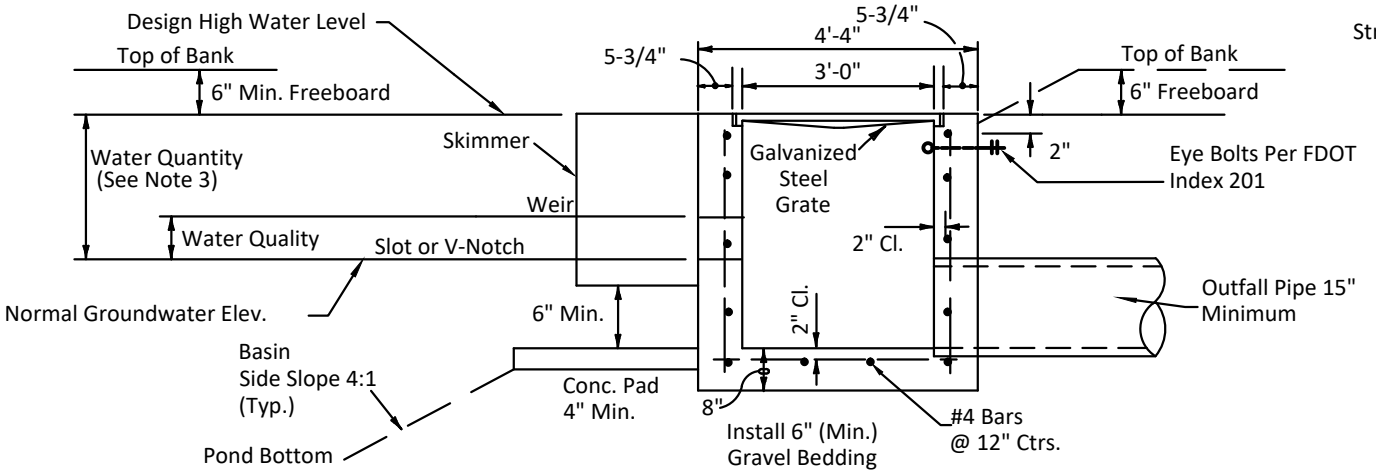
PLAN VIEW

N.T.S.



TYPE E

N.T.S.



CROSS SECTION

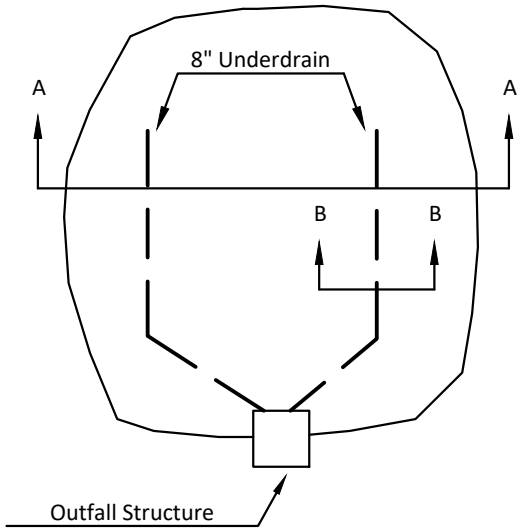
N.T.S.

Straight Bars 2" x 3/16" Reticuline Bars 1-1/4" x 3/16"
Bands 1-1/2" x 1/4" - Approx. Weight 215 Lbs.

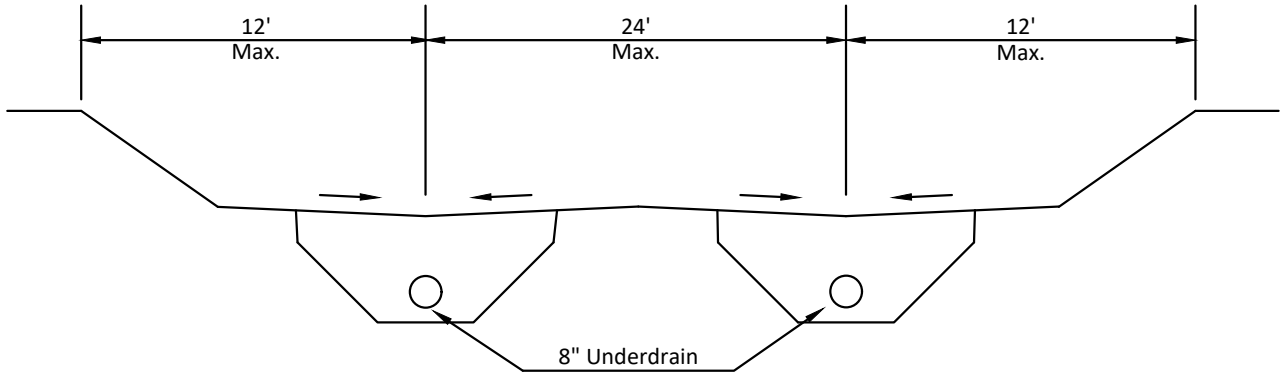
NOTES :

1. Fasten Skimmer with 4 Stainless Steel Bolts with Lead Anchors
2. Seal all Edges of Skimmer at Contact Points with Structure with Waterproof Caulking or Approved Equal
3. Due to the Detention Time Required for Wet Detention Systems, only that Volume Which Drains Below the Overflow Weir Elevation Within 36 Hours may be Counted as Part of the Volume Required for Water Quantity Storage

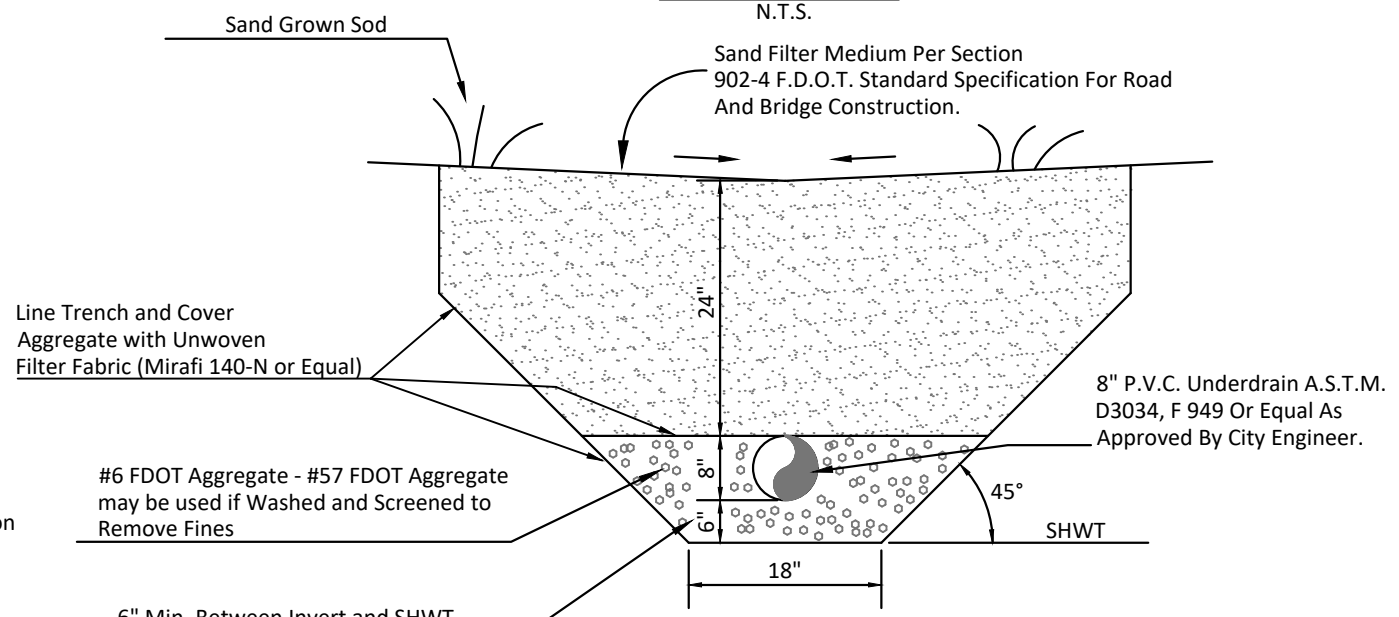
CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	STORM SEWER OUTFALL CONTROL STRUCTURE FDOT TYPE E INLET (MODIFIED) WITH SLOT OR V-NOTCH (WET POND)	INDEX NO. 216 PAGE NO. 1 OF 1 LATEST REVISION 8/16/18



DETENTION POND
N.T.S.



SECTION A-A
N.T.S.

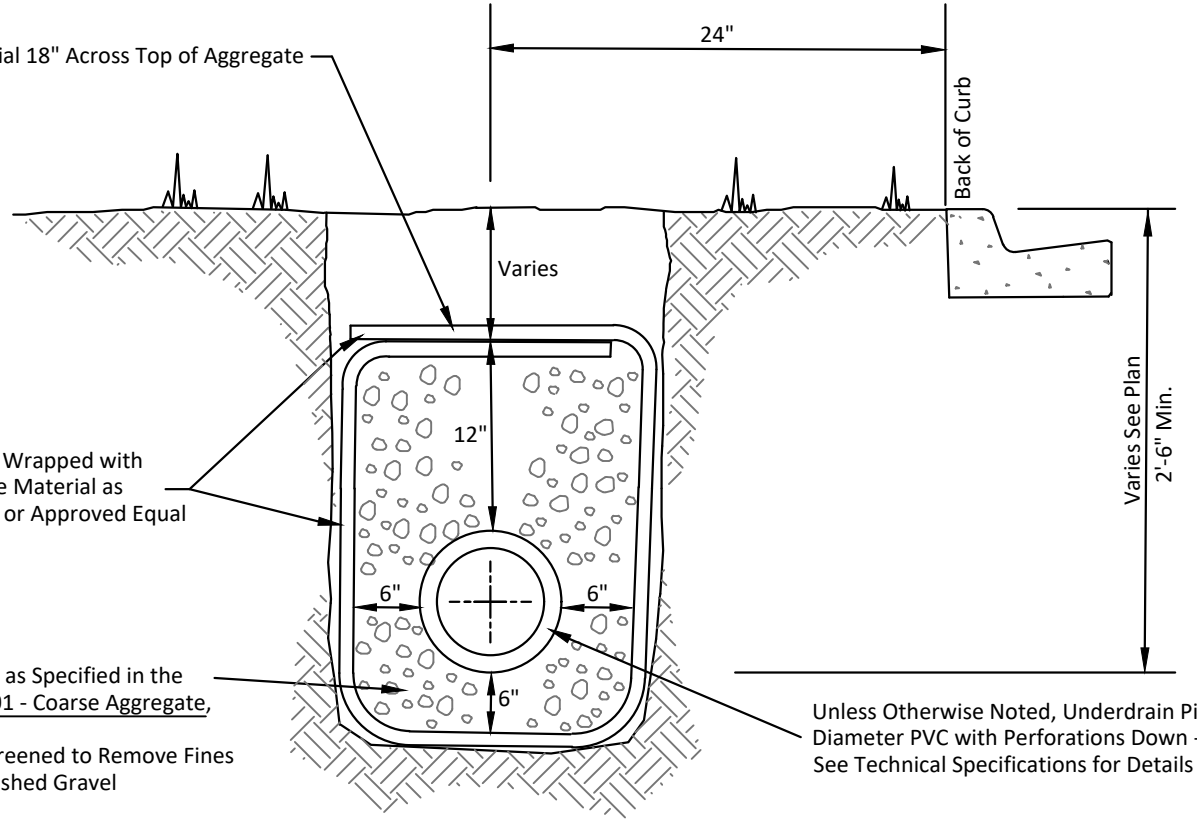


SECTION B-B
N.T.S.

NOTES:

1. Install Min. 8" Underdrain Pipe or 6" Pipe (per FDOT Requirements) if Approved by the City Engineer
2. No ADS Pipe Shall be used for Underdrain on City Projects
3. Invert of the Underdrain Pipe Shall be a Minimum of 6" Aabove the Established Seasonal High Water Table (SHWT)

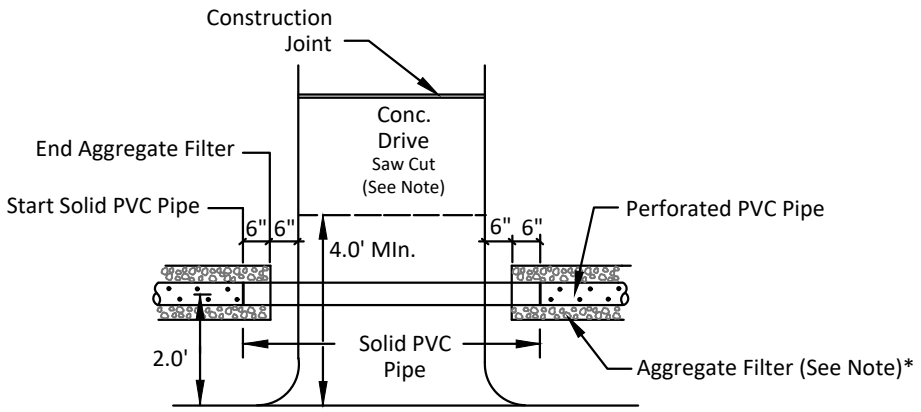
CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	UNDERDRAIN DETAIL FOR DRY DETENTION AREAS	INDEX NO. 217 PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016



Solid Pipe (w/o Perforations) is to be Used Under Drives and Roadways, with Compacted Backfill

N.T.S.

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	UNDERDRAIN DETAIL	INDEX NO. 218 / PAGE NO. 1 OF 4 LATEST REVISION 2/22/2016



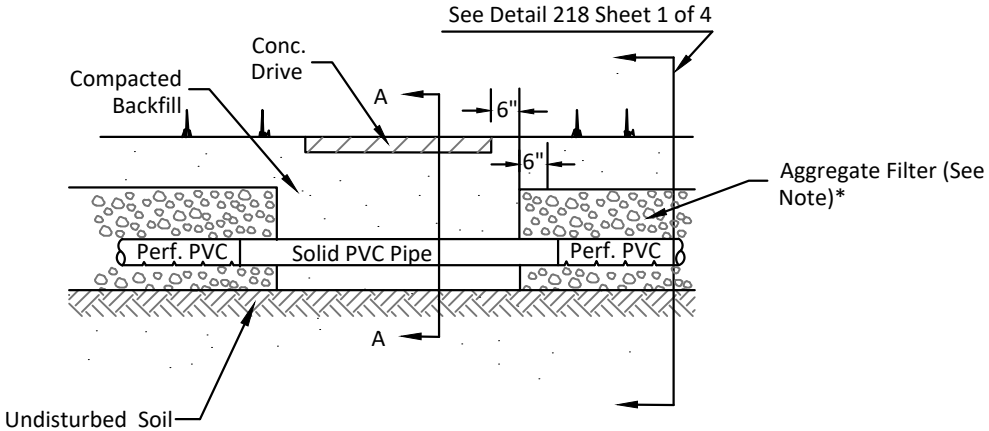
PLAN VIEW

N.T.S.

NOTE:

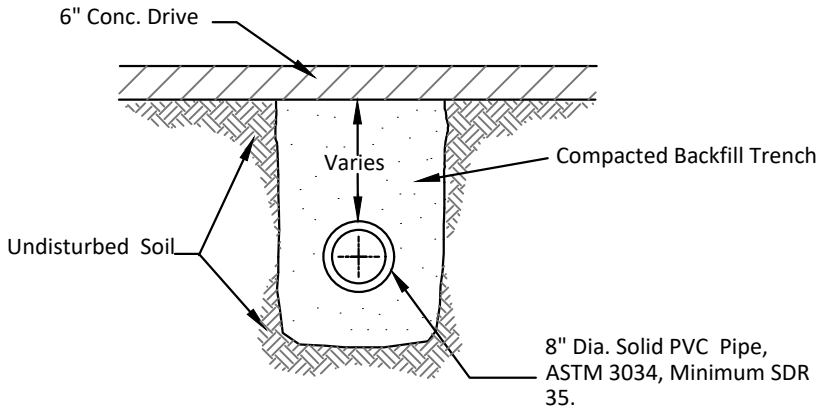
Saw Cut Drive if Nearest Construction Joint is Over 7' from Back of Curb.

* Filter Aggregate for Underdrains Shall be as Specified in the FDOT Standard Specifications, Section 901 - Coarse Aggregate, and Shall be Either #6 or #57
If #57 is Used, it must be Washed and Screened to Remove Fines
The aggregate may be Stone, Slag, or Grushed Gravel



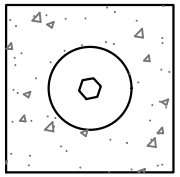
SECTION VIEW

N.T.S.

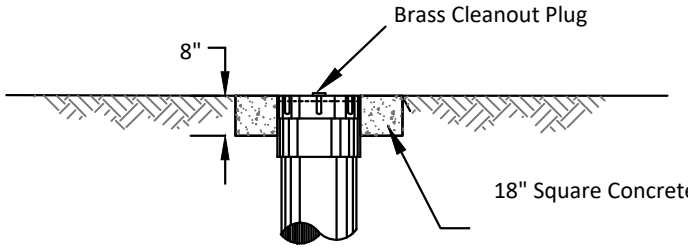


SECTION A-A

N.T.S.

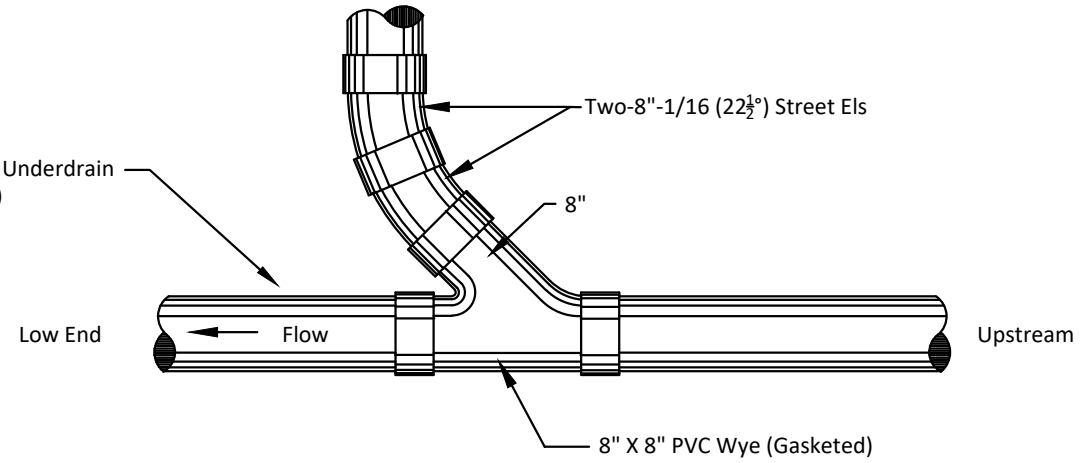


PLAN VIEW
N.T.S.



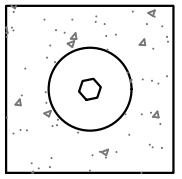
NOTES:

1. Place Cleanout Every 200' from Inlet
2. All Cleanouts are 8" Only
3. Cleanout Faces Upstream



SECTION VIEW
N.T.S.

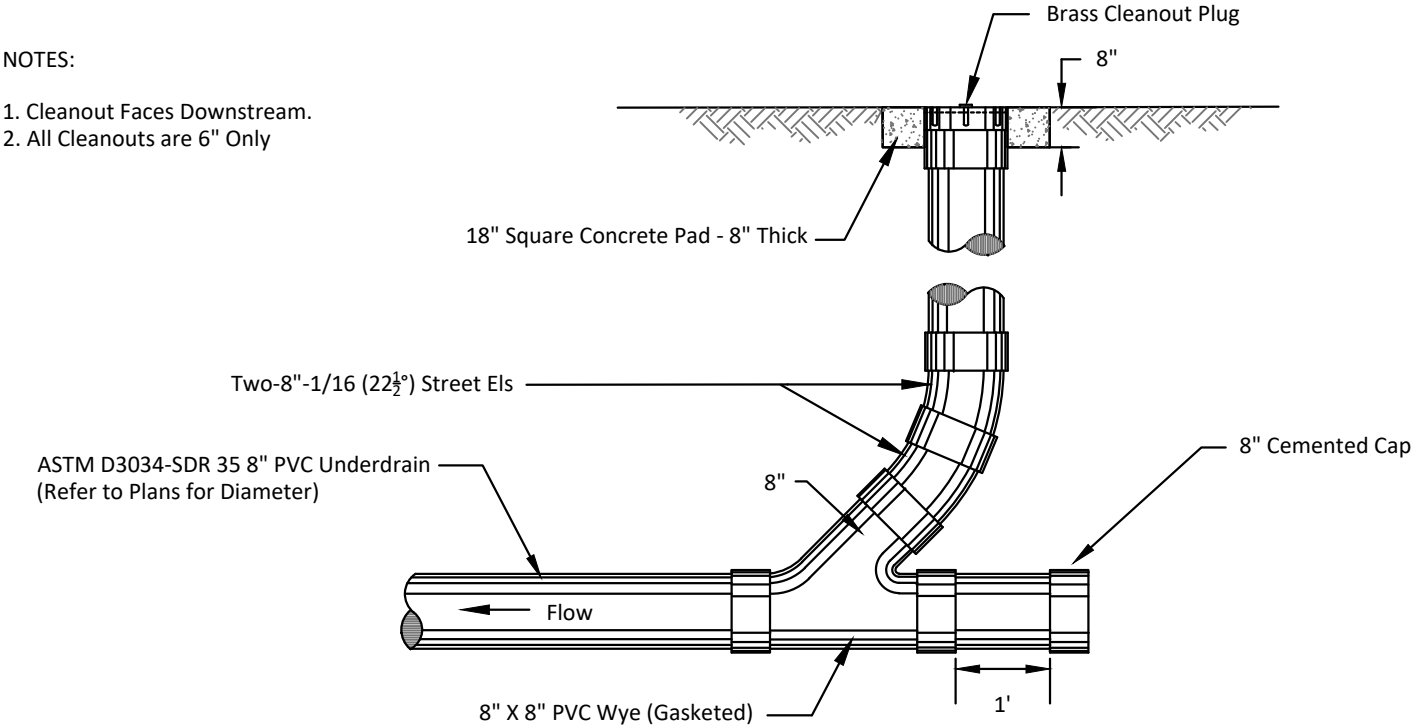
CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	STANDARD UNDERDRAIN CLEANOUT - STORM	INDEX NO. 218 / PAGE NO. 3 OF 4 LATEST REVISION 2/22/2016



PLAN VIEW
N.T.S.

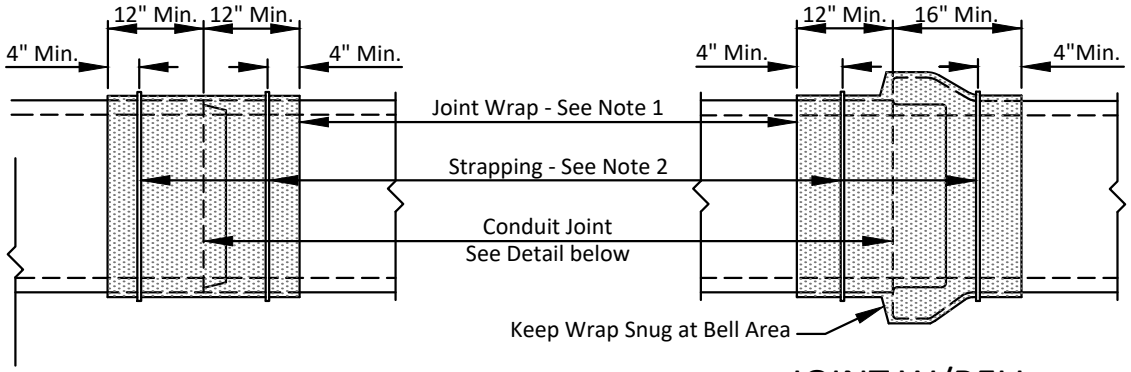
NOTES:

1. Cleanout Faces Downstream.
2. All Cleanouts are 6" Only



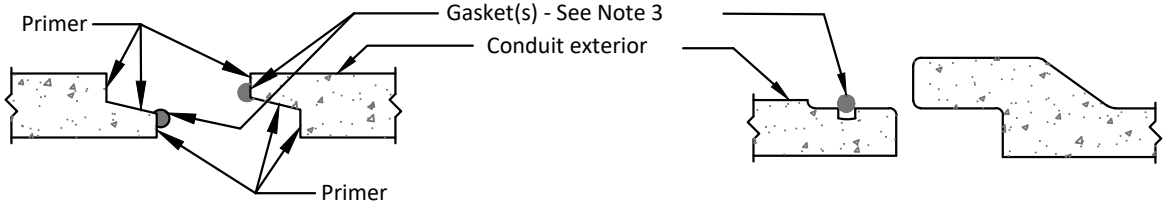
SECTION VIEW
N.T.S.

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	TERMINAL END UNDERDRAIN CLEANOUT - STORM	INDEX NO. 218 / PAGE NO. 4 OF 4 LATEST REVISION 2/22/2016



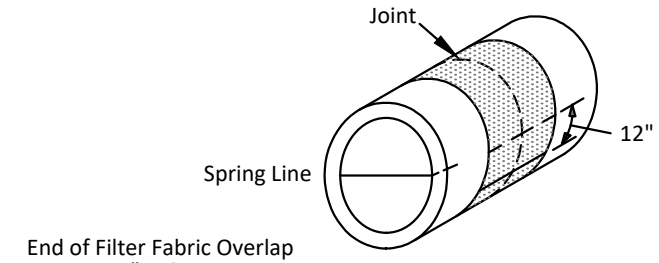
JOINT W/O BELL
SHOWING FILTER FABRIC

JOINT W/BELL
SHOWING FILTER FABRIC

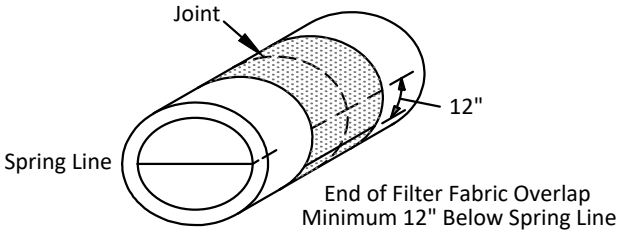


TONGUE AND GROOVE TYPE JOINT
DOUBLE GASKET
PRIOR TO PULL-UP

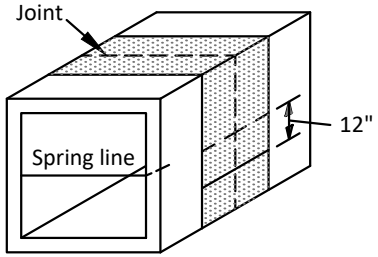
BELL AND SPIGOT TYPE JOINT
0 RING GASKET
PRIOR TO PULL-UP



ROUND PIPE



ELLIPTICAL PIPE



BOX CULVERT

ISOMETRIC VIEWS
SHOWING FILTER FABRIC

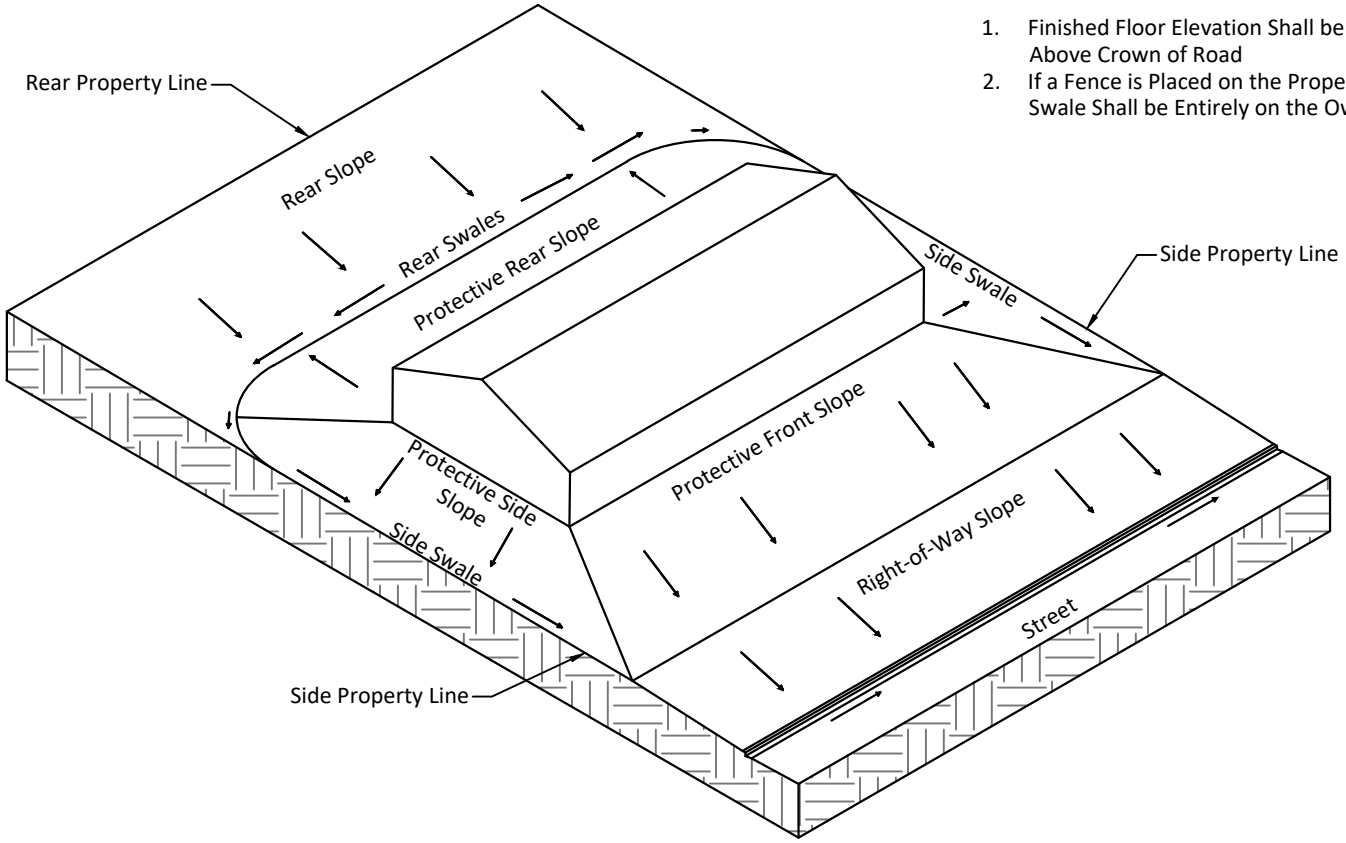
NOTES:

1. Joint Wrap Shall Conform to one of the Following:
   Filter Fabric-Mirafi 140-N as Manufactured by Mirafi Inc., or Approved Equal Minimum Width(s) as Shown Above
   Elastic Band as Manufactured by Cadilloc External Pipe Joint, Inc., or Approved Equal Width(s) as per ASTM C 877
2. Joint Wrap Shall be Held in Place as Follows: Filter Fabric - Minimum 2 Straps as Shown or as Required by the Manufacturer
3. Gasket Type Shall Conform to Pipe Manufacturer Specifications

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	CONDUIT JOINT WRAP DETAIL	INDEX NO. 227 PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016

NOTES:

1. Finished Floor Elevation Shall be a Minimum of 1' Above Crown of Road
2. If a Fence is Placed on the Property Line, then the Side Swale Shall be Entirely on the Owner's Property



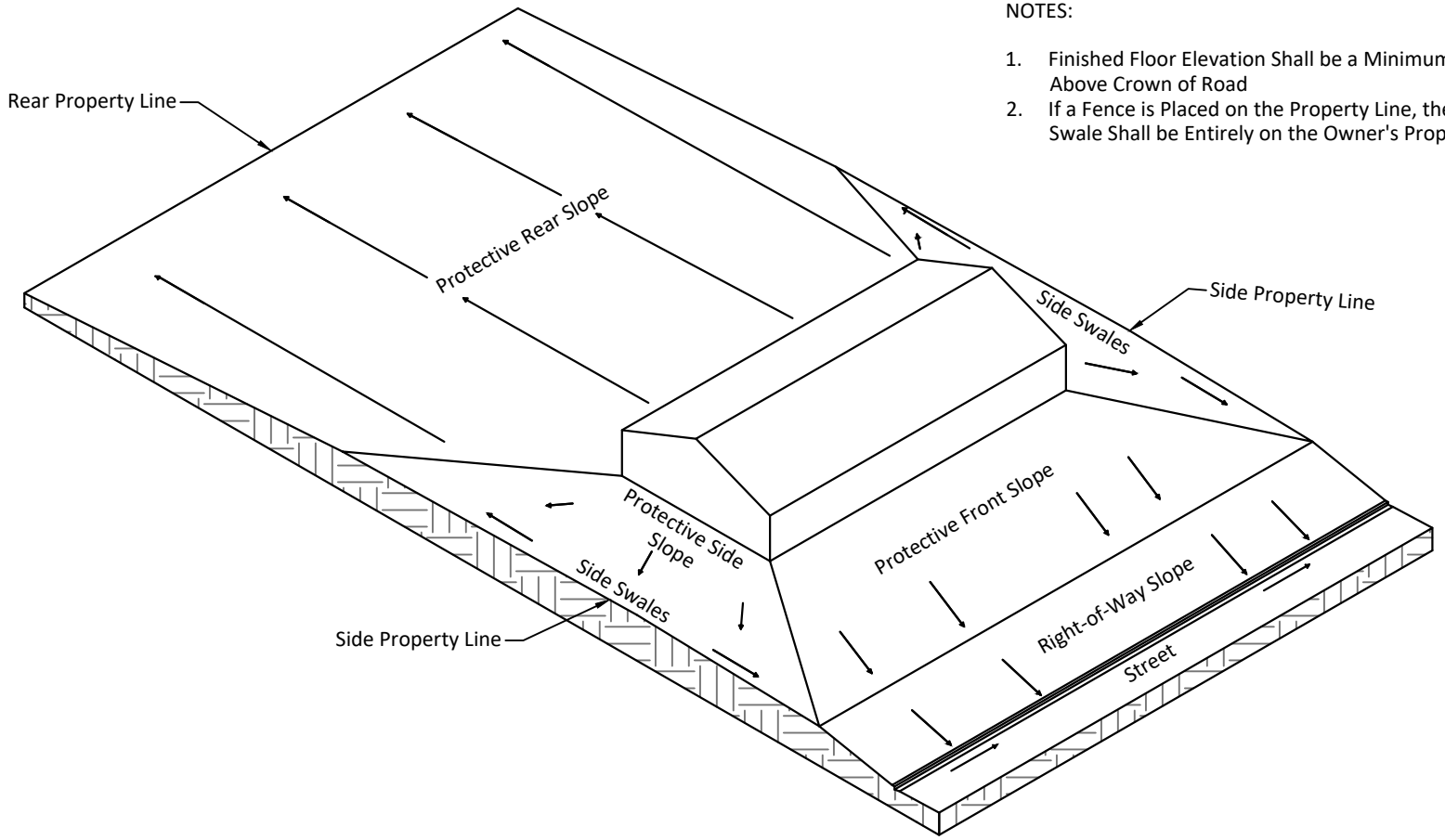
LOT GRADING TYPE "A"
LOT DRAINAGE TO STREET

N.T.S.

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	LOT GRADING - TYPE "A"	INDEX NO. 230 / PAGE NO. 1 OF 3 LATEST REVISION 4/21/2016

NOTES:

1. Finished Floor Elevation Shall be a Minimum of 1' Above Crown of Road
2. If a Fence is Placed on the Property Line, then the Side Swale Shall be Entirely on the Owner's Property

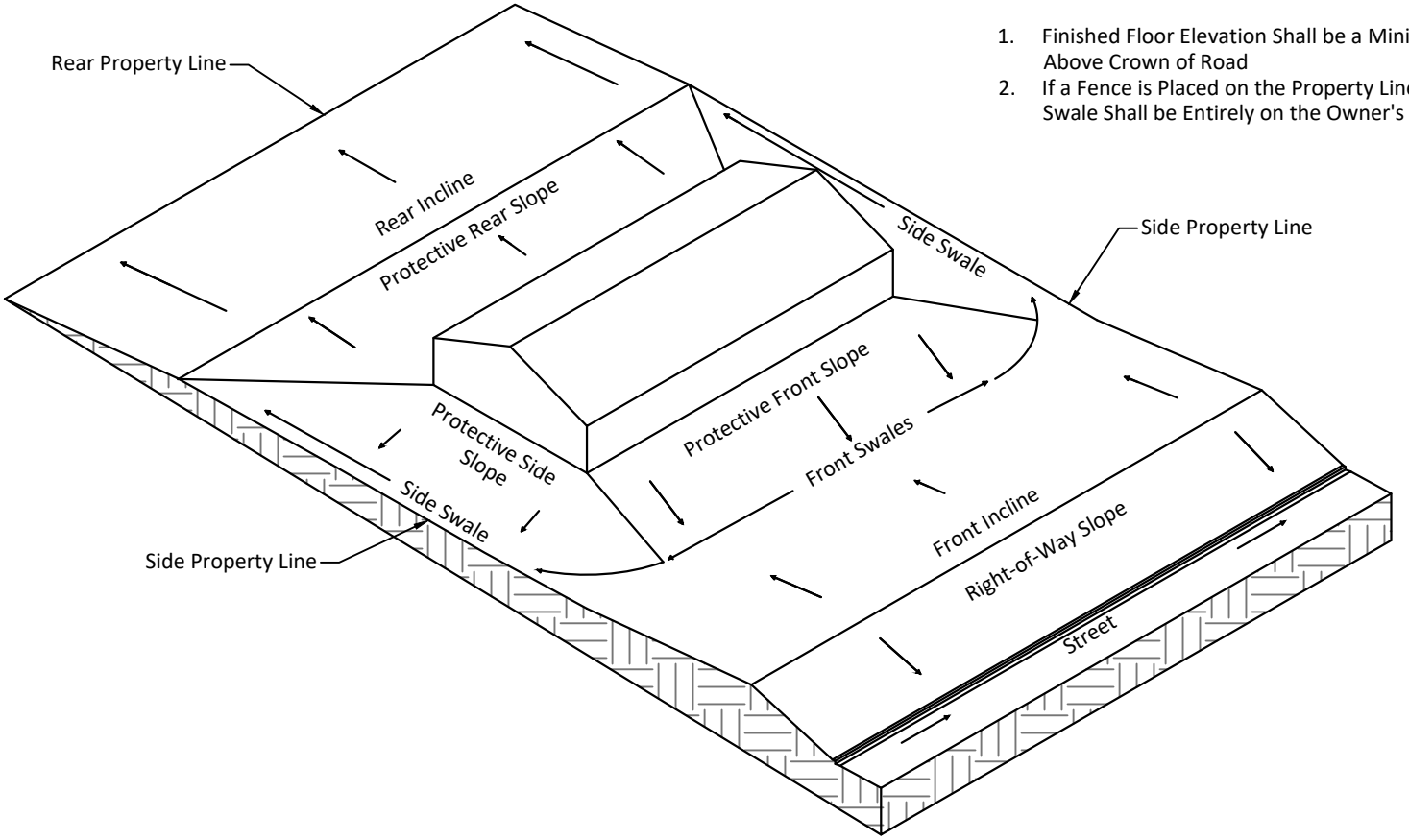


LOT GRADING TYPE "B"
LOT DRAINAGE BOTH TO STREET AND TO REAR LOT LINE

N.T.S.

NOTES:

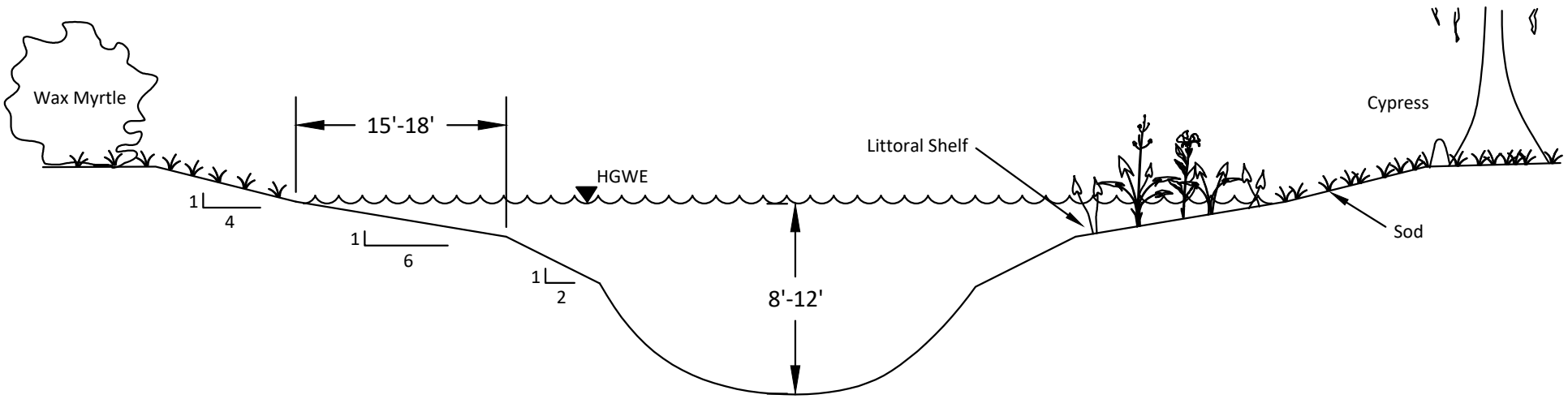
1. Finished Floor Elevation Shall be a Minimum of 1' Above Crown of Road
2. If a Fence is Placed on the Property Line, then the Side Swale Shall be Entirely on the Owner's Property



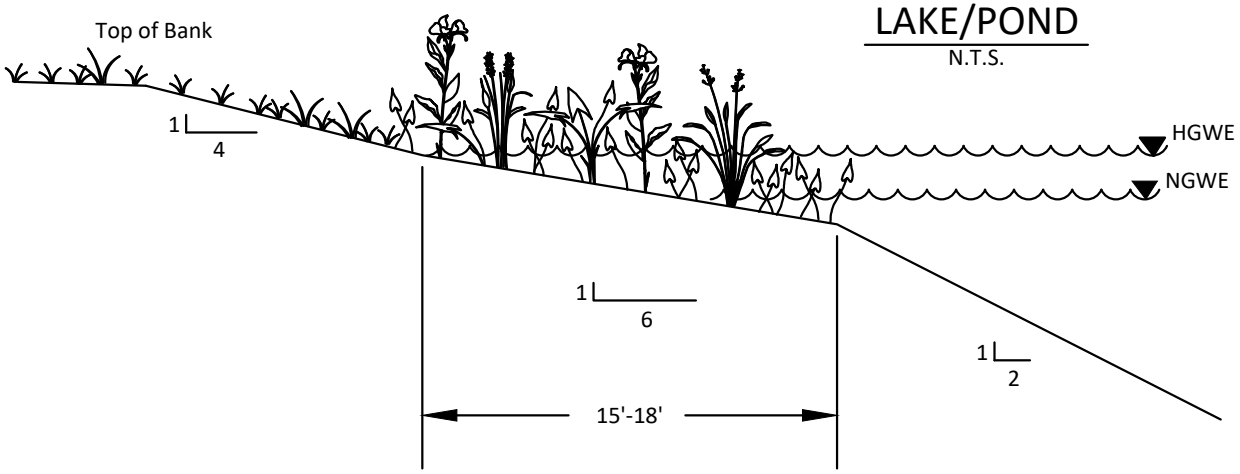
LOT GRADING TYPE "C"
LOT DRAINAGE TO REAR LOT LINE

N.T.S.

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	LOT GRADING - TYPE "C"	INDEX NO. 230 / PAGE NO. 3 OF 3 LATEST REVISION 4/21/2016



CROSS SECTION
LAKE/POND
N.T.S.

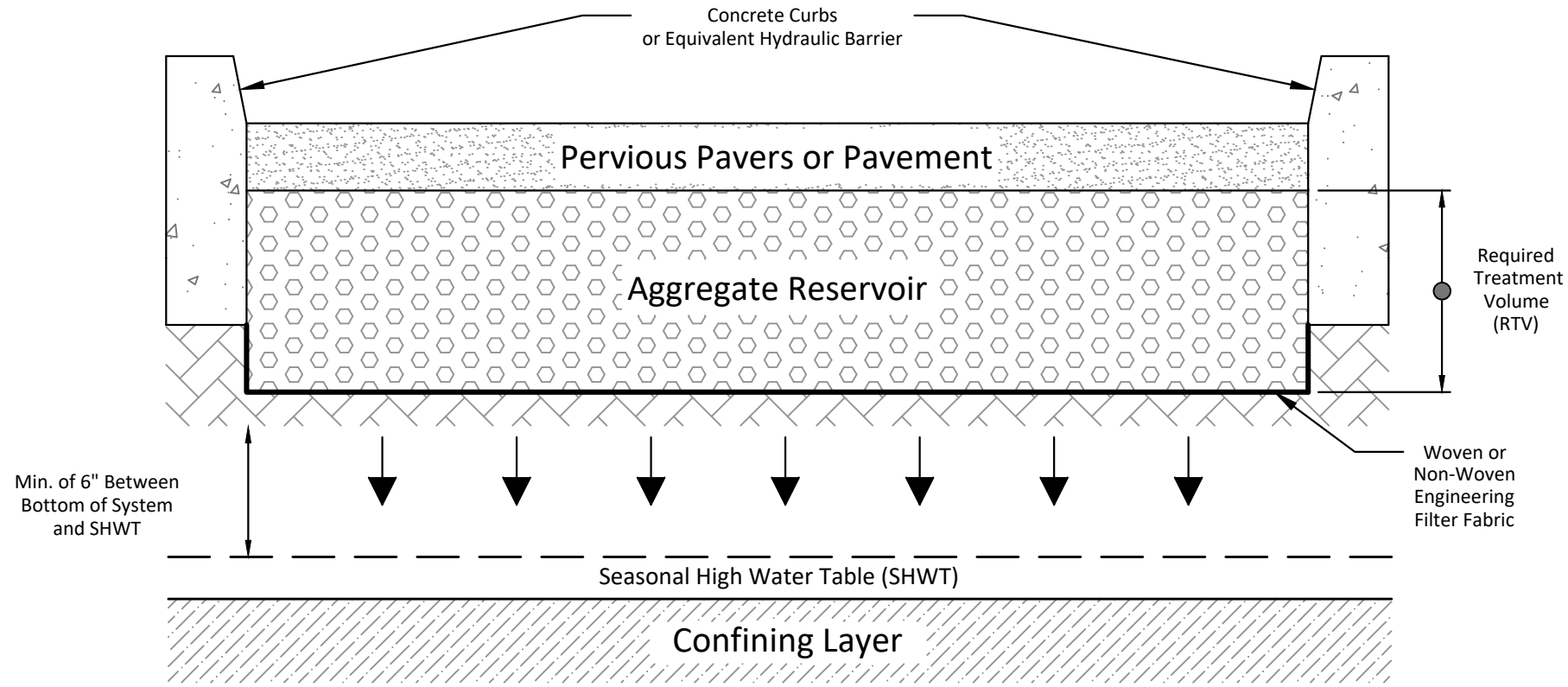


LITTORAL SHELF
N.T.S.

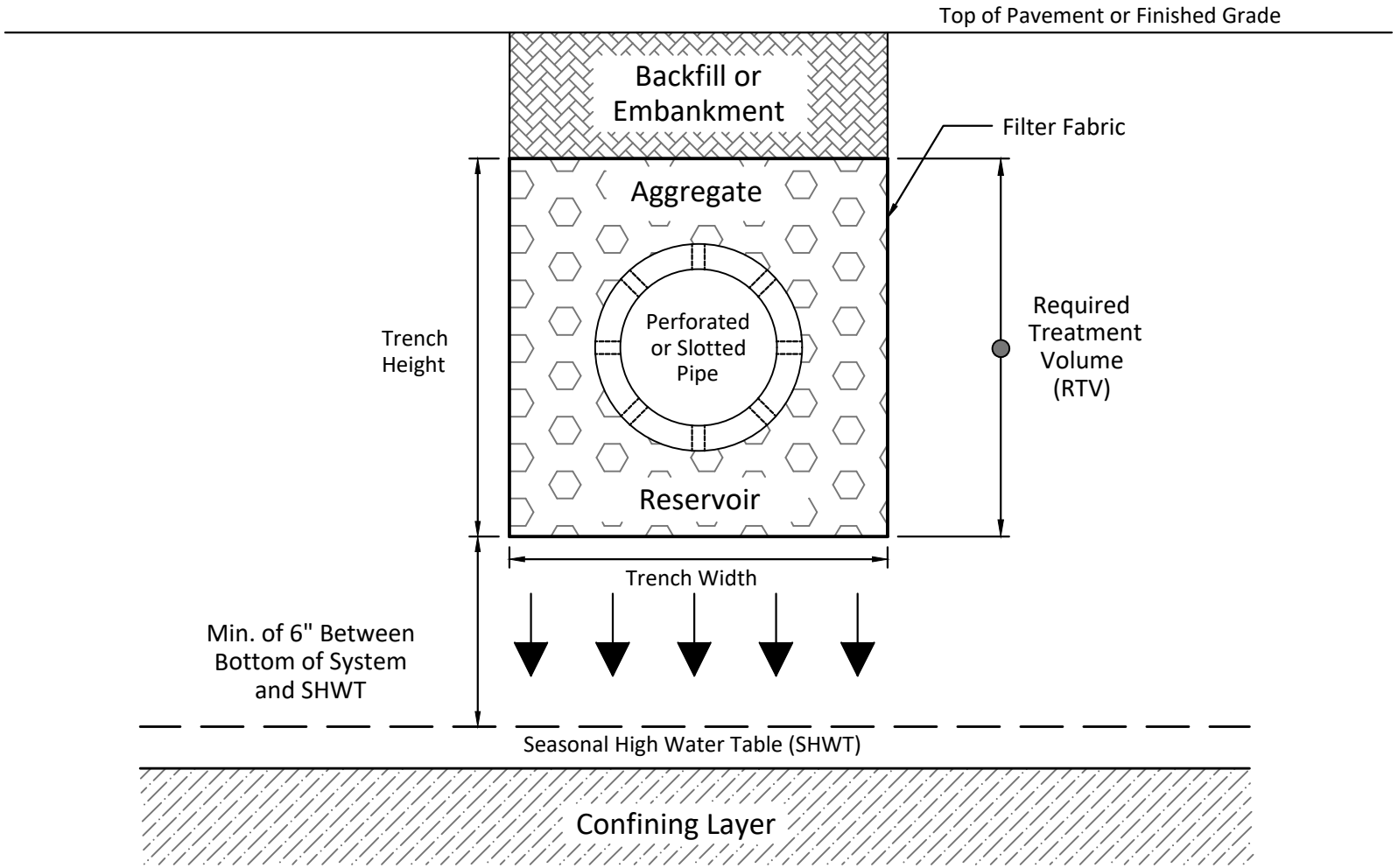
NOTES:

1. Littoral Shelf and Upland Areas to be Vegetated per City Requirements
2. Outfall Structure Shall Incorporate Subdrain with Inverts no Lower than Normal Groundwater Elevation (NGWE) Overflow shall be set at High Groundwater Elevation (HGWE)
3. There Shall be 6" of Freeboard Between the Top of the Outfall Control Structure and the Top of the Bank Elevation

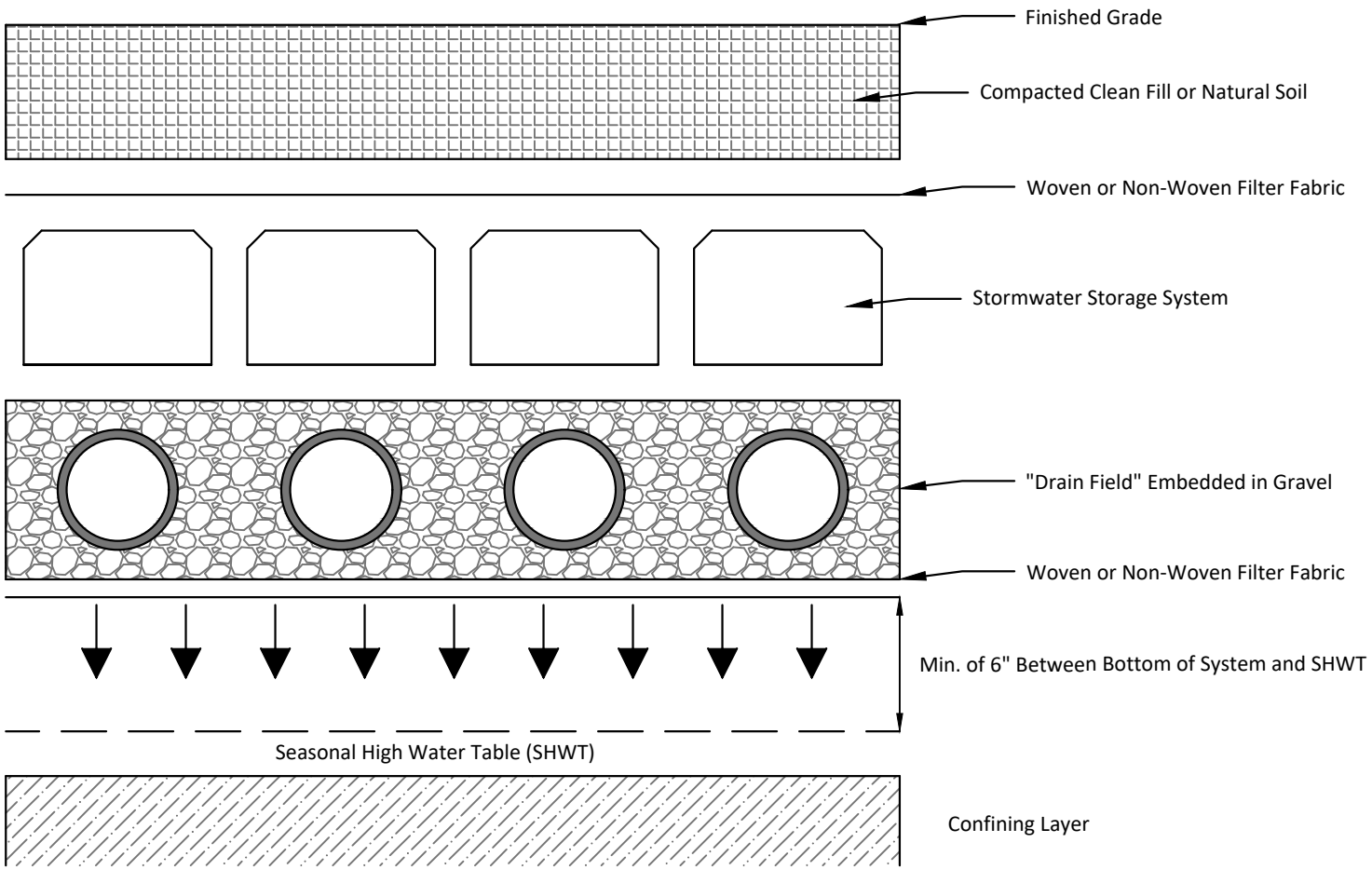
CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	WET DETENTION/RETENTION POND	INDEX NO. 231 / PAGE NO. 1 OF 1 LATEST REVISION 8/16/18



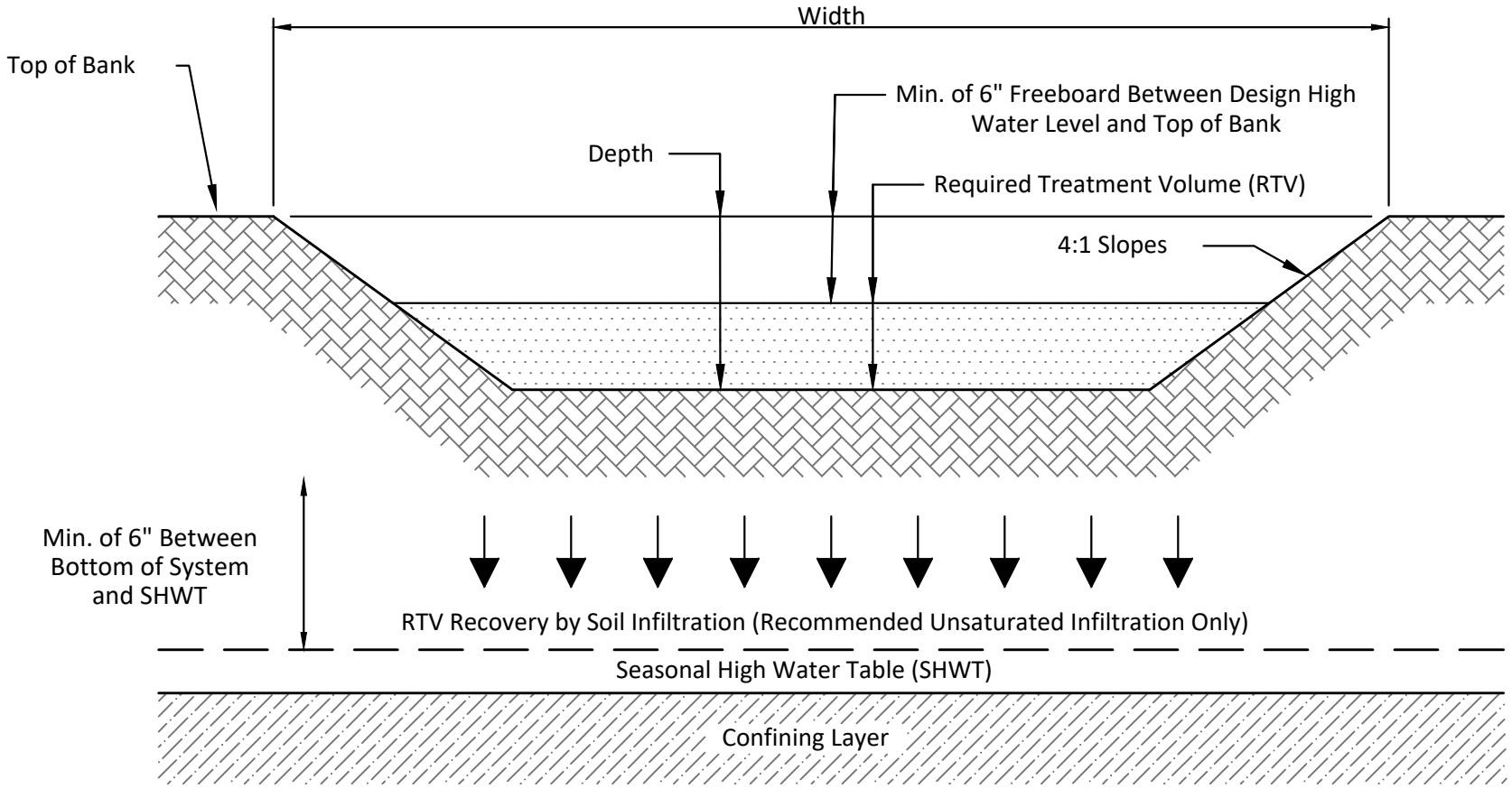
CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	TYPICAL PERVIOUS PAVERS OR PAVEMENT CROSS SECTION	INDEX NO. 232	PAGE NO. 1 OF 1
			LATEST REVISION	2/22/2016



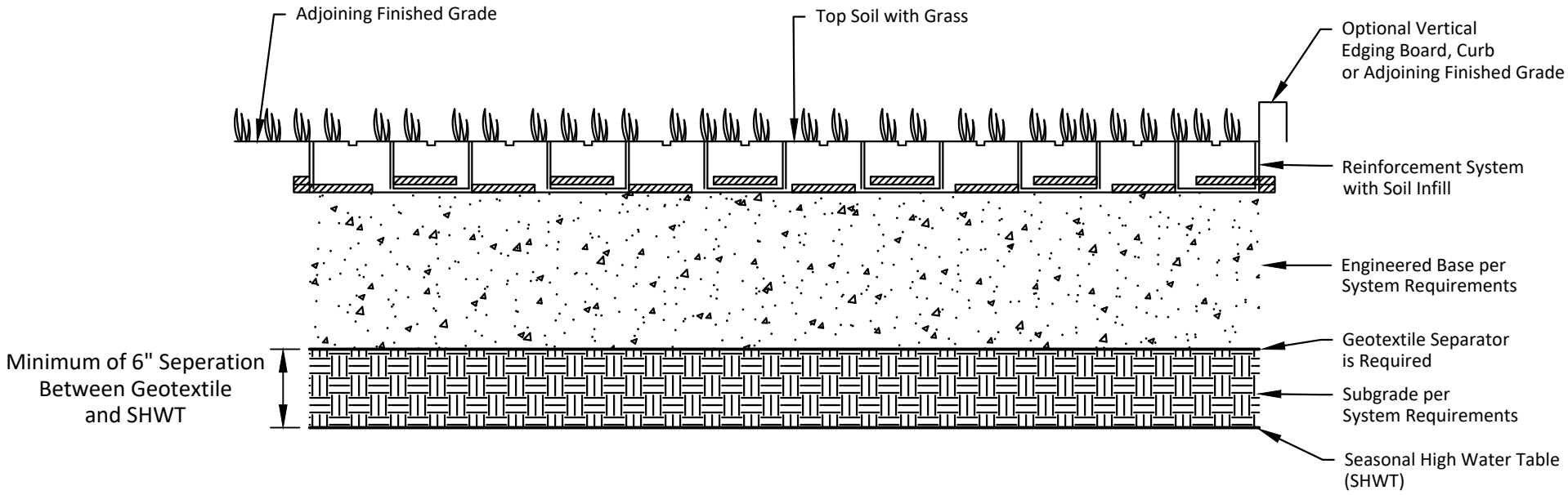
CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	TYPICAL EXFILTRATION TRENCH - CROSS SECTION	INDEX NO. 233 / PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016



CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	TYPICAL UNDERGROUND RETENTION SYSTEM CROSS SECTION	INDEX NO. 234 / PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016



CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	TREATMENT SWALE - CROSS SECTION	INDEX NO. 235 / PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016



NOTES:

1. Compressive Strength of Reinforcement System Shall Exceed H20 Loading Requirements
2. Soil Infill will be Based on Local Conditions and be Determined by the Engineer
3. Base Material Thickness and Type Shall be Provided by the Manufacturer
4. Geotextile Fabric is Required to Prevent Migration of Fines into the Subgrade
5. For Design Purposes, the Void Space in the Reinforced Grass Parking System will Receive 50 Percent Credit for Required Treatment Volume

CITY OF CLEARWATER PUBLIC WORKS - ENGINEERING 2022 DESIGN STANDARDS	200 SERIES: STORMWATER DETAILS	TYPICAL CROSS SECTION OF REINFORCED GRASS PARKING	INDEX NO. 236 / PAGE NO. 1 OF 1 LATEST REVISION 2/22/2016