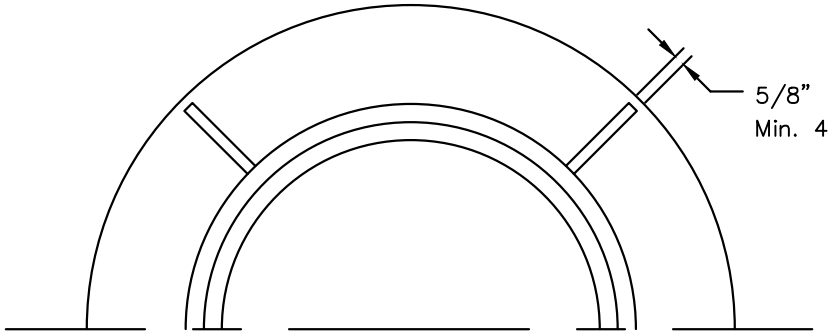
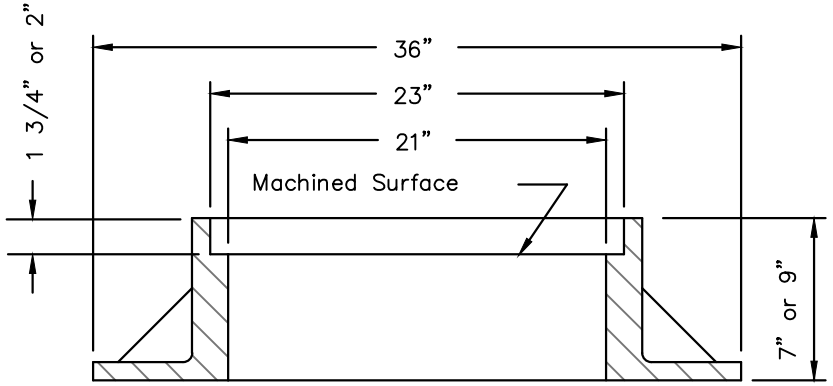


RING – HALF PLAN

N.T.S.

NOTES

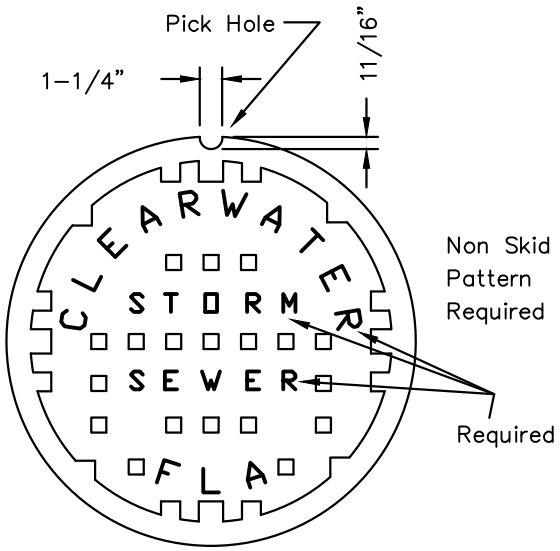
1. Where roadway base is 8" or thicker use 9" ring, all other cases 7" ring is permissible.
2. Manufacturers model of storm ring and cover to be approved by City Engineer.
3. Perforated covers, when required shall be similar to solid covers.



RING SECTION

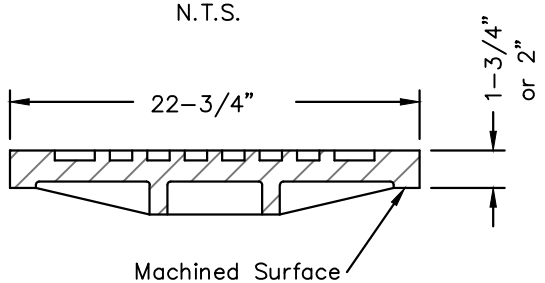
N.T.S.

Minimum Weight 7" 232 lbs.
9" 278 lbs.



SOLID COVER

N.T.S.



SOLID COVER SECTION

N.T.S.

Minimum Weight 128 lbs.

DATE	REVISION DESCRIPTION	APP
6/2/15	TITLE CHANGE	S.R.

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
DETAILS

STORM SEWER MANHOLE
RING & COVER
TRAFFIC AREAS

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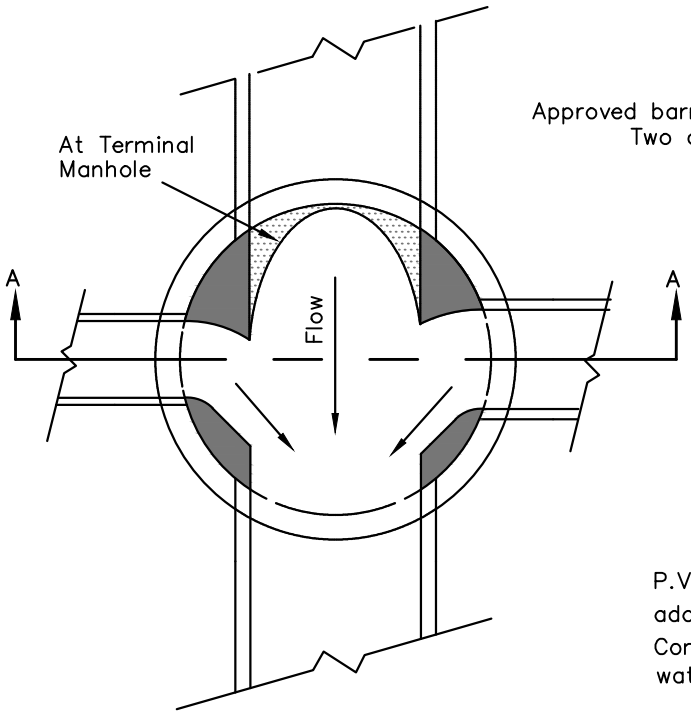
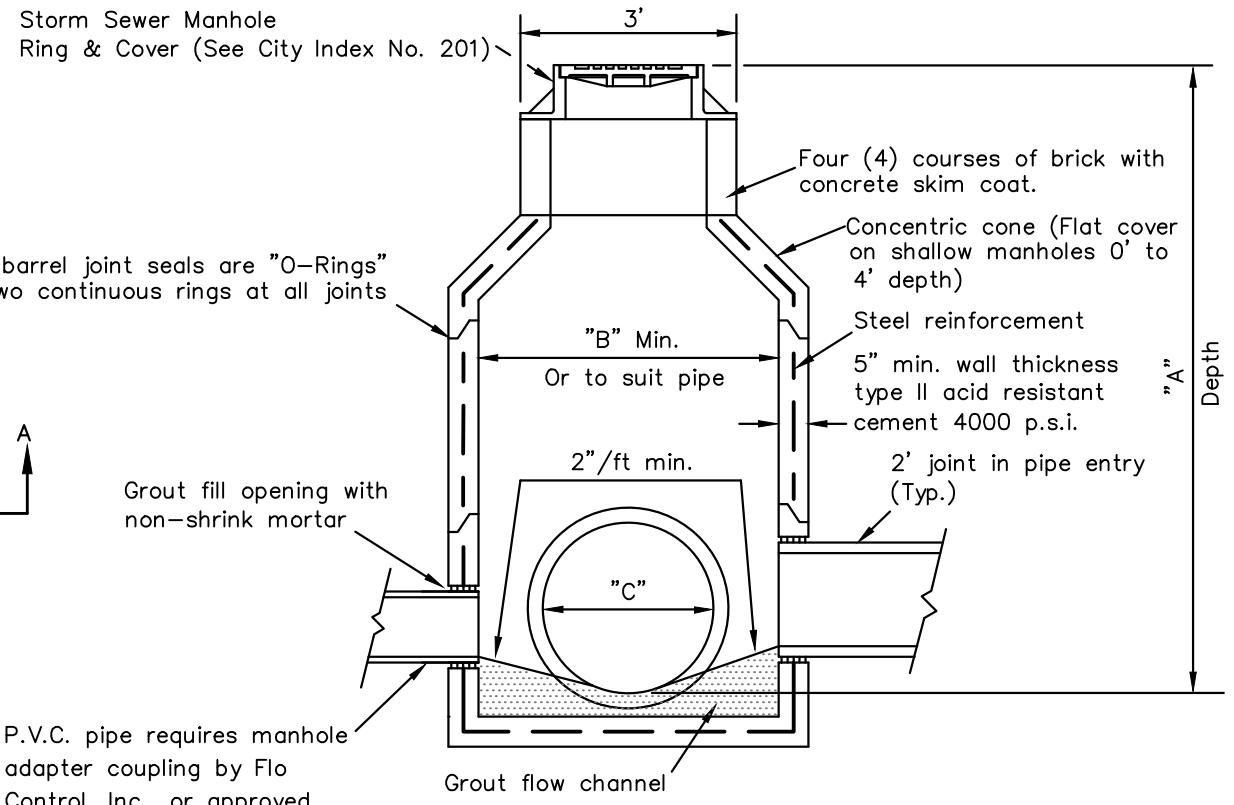
LATEST REVISION	2/22/2016



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

DATE	REVISION DESCRIPTION	APP
6/2/15	ADDED/EDITED NOTES	S.R.

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM DETAILS

PRECAST STORM SEWER MANHOLE

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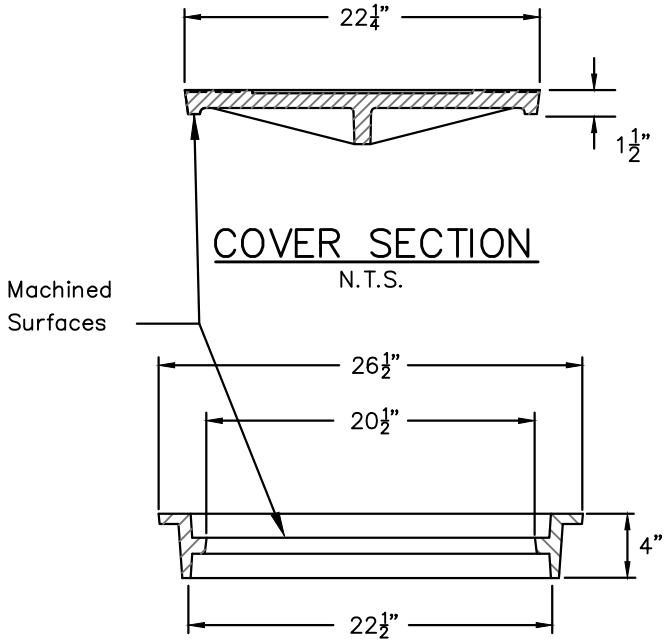
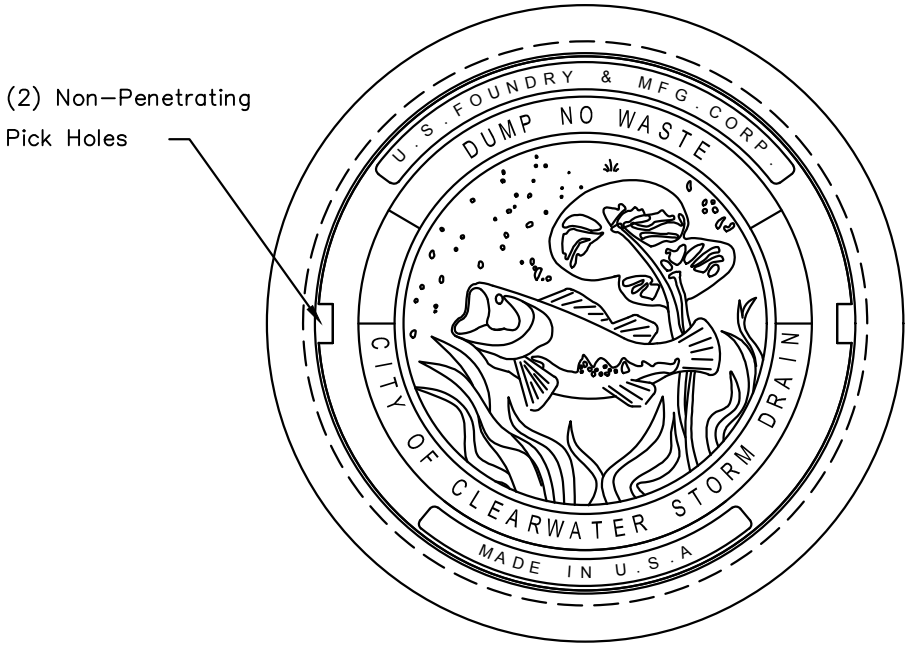
PAGE NO. 1 OF 1
LATEST REVISION 2/22/2016



COVER SECTION
N.T.S.

RING SECTION
N.T.S.



COVER PLAN
N.T.S.

NOTES:

1. USF 1110 MG cover.
2. Material; ASTM–A48 Class 30B gray iron.
3. Cover weight: 105 lbs.
4. Total weight: 195 lbs.

DATE	REVISION DESCRIPTION	APP

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
DETAILS

STORM SEWER INLET
RING & COVER

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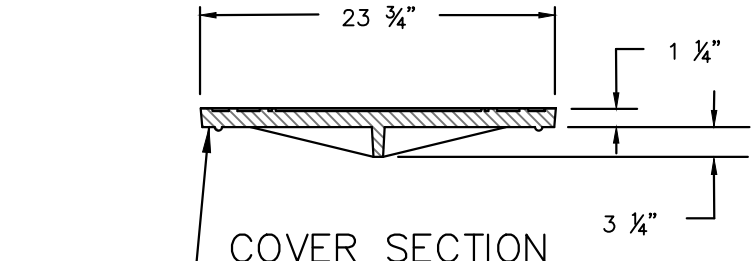
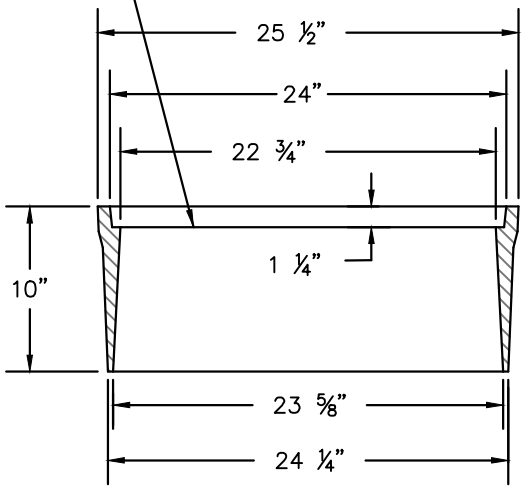


COVER SECTION
N.T.S.

Machined Surfaces



RING SECTION
N.T.S.

(2) Non–penetrating pick holes

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)

DATE	REVISION DESCRIPTION	APP
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CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM DETAILS

FDOT STORM SEWER INLET RING & COVER NON–TRAFFIC AREAS

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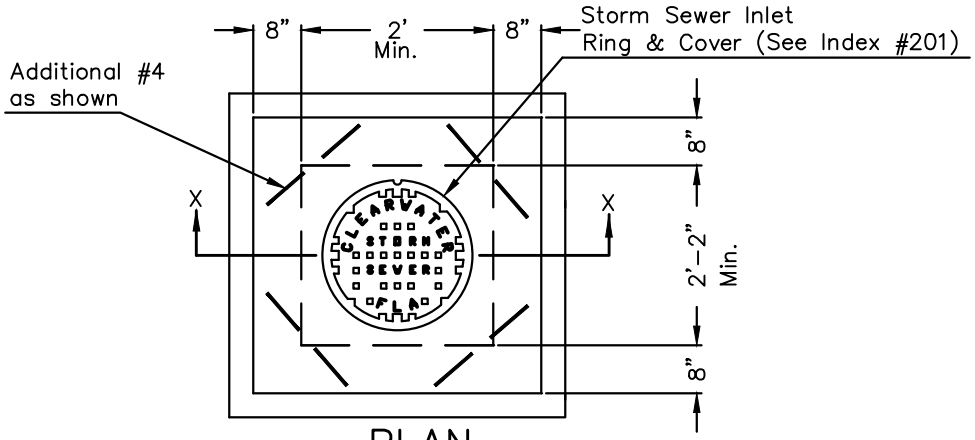
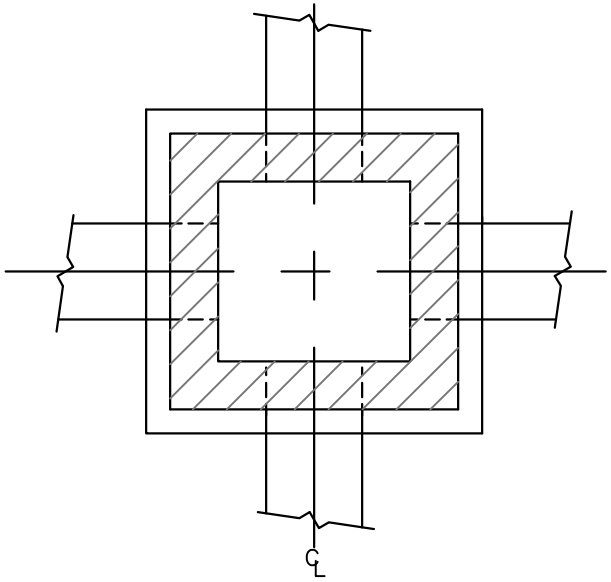


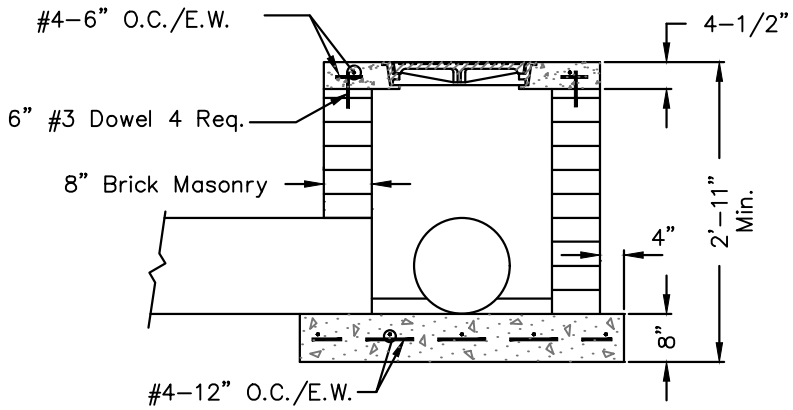
PLAN

N.T.S.



PLAN ON PIPE

N.T.S.

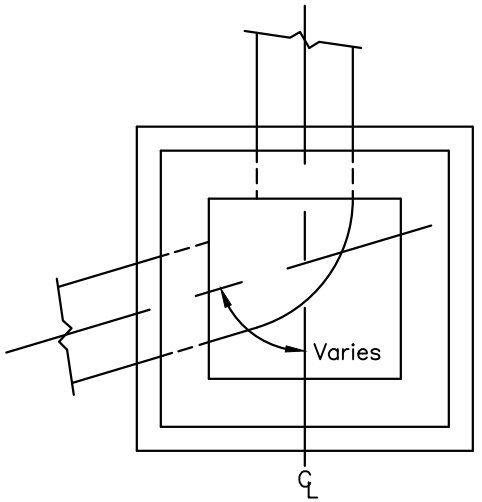


SECTION X-X

N.T.S.

NOTES:

1. Non traffic Bearing
2. Champher all exposed edges 3/4"
3. All concrete to be 3,000 p.s.i., with fiber mesh reinforcing.



PLAN ON PIPE

N.T.S.

Detail of bottom construction
Grout flow channel

6/3/15	EDITED DRAWINGS	S.R.
DATE	REVISION DESCRIPTION	APP

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
DETAILS

JUNCTION BOX
NON-TRAFFIC BEARING

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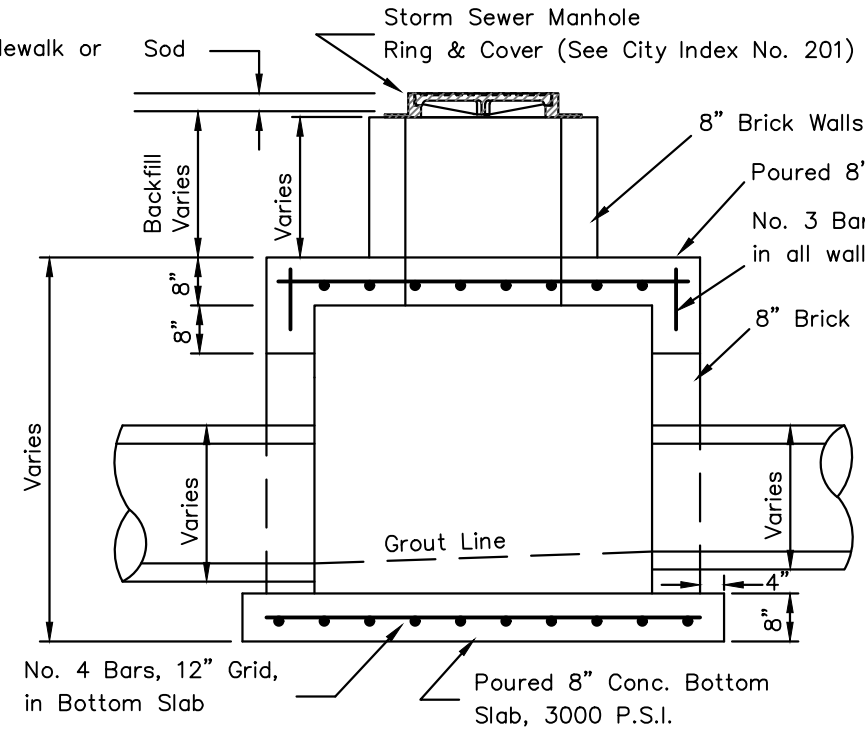
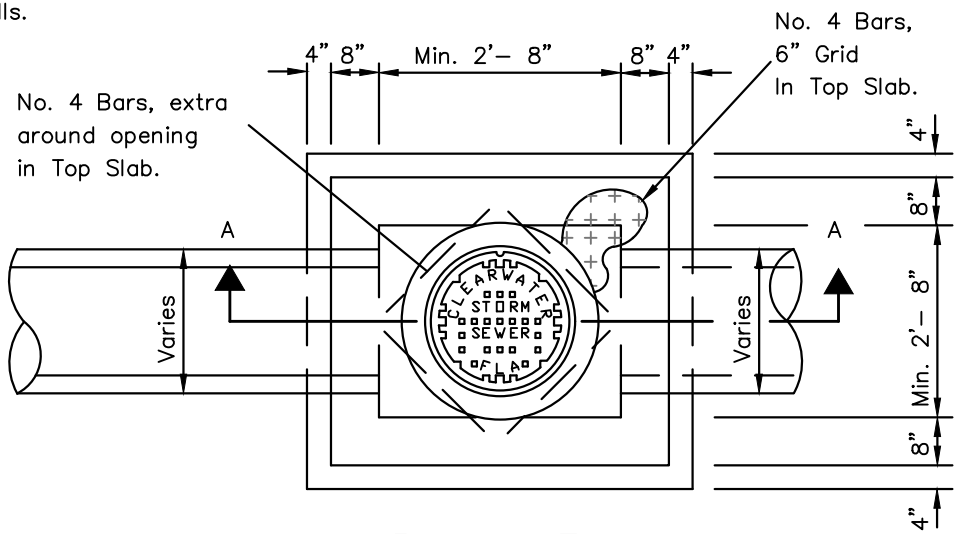


SECTION A–A

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 P.S.I., with fiber mesh reinforcing.
3. Chamfer all exposed edges ¾".



PLAN VIEW

N.T.S.

DATE	REVISION DESCRIPTION	APP
6/3/15	EDITED NOTES	S.R.

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
DETAILS

JUNCTION BOX
NON–TRAFFIC TYPE

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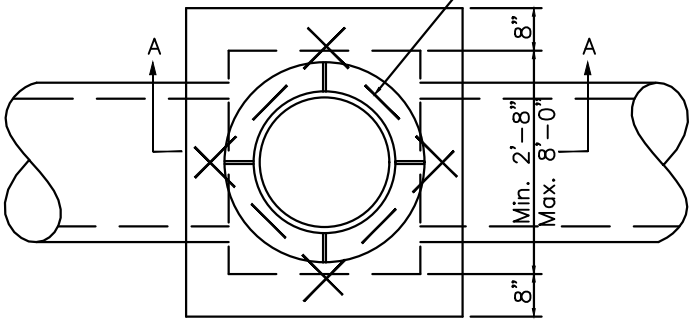
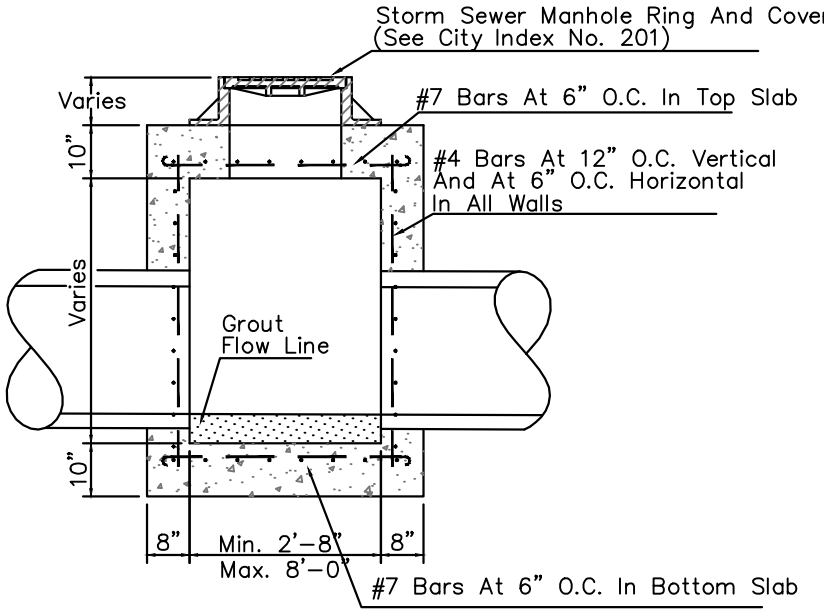


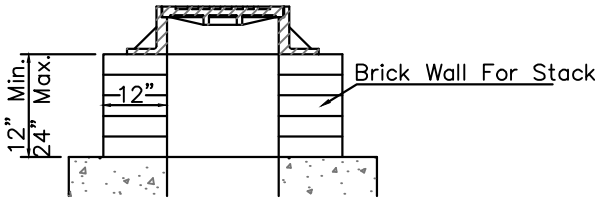
PLAN VIEW
N.T.S.

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".



SECTION A-A
N.T.S.



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

6/3/15	EDITED NOTES	S.R.
DATE	REVISION DESCRIPTION	APP

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
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JUNCTION BOX – TRAFFIC TYPE
POURED CONCRETE

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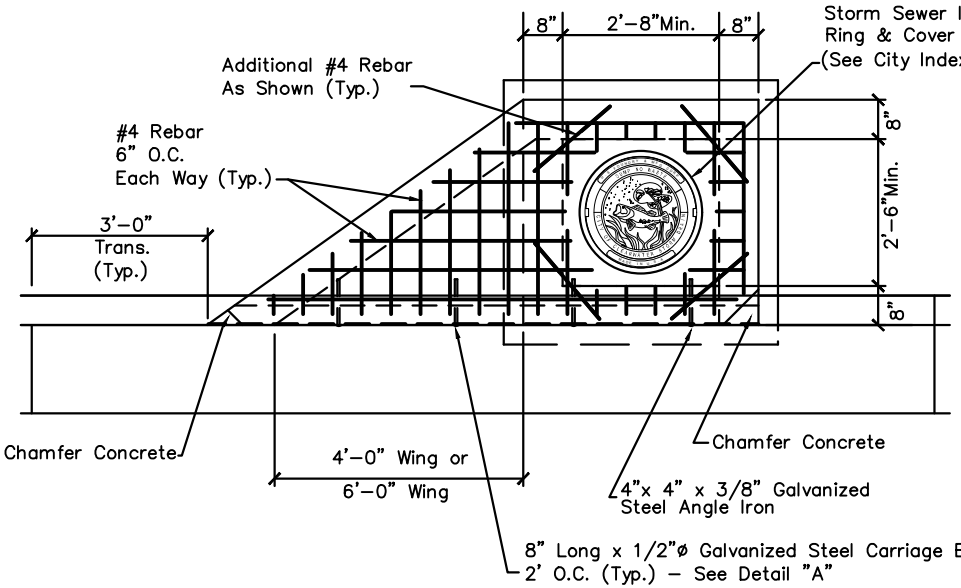
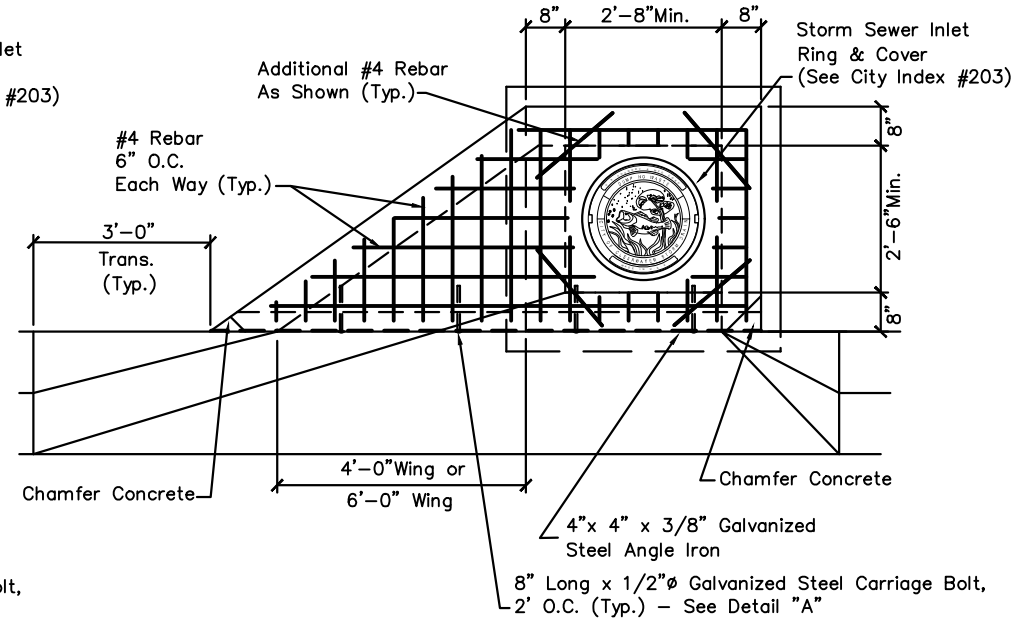


MODIFIED CURB OR TYPE 1 CURB
PLAN VIEW

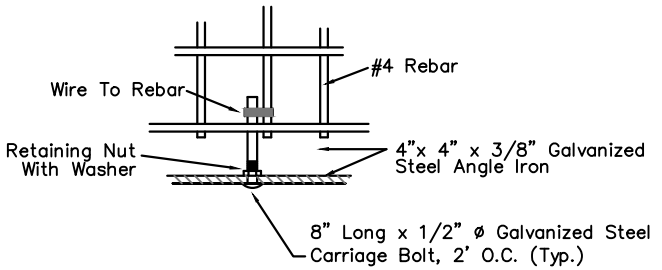
N.T.S.



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.

6/5/15	COMBINED PLAN VIEWS	S.R.
DATE	REVISION DESCRIPTION	APP

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
DETAILS

WING INLETS FOR
MODIFIED, TYPE I & VALLEY GUTTER CURB
PLAN VIEW

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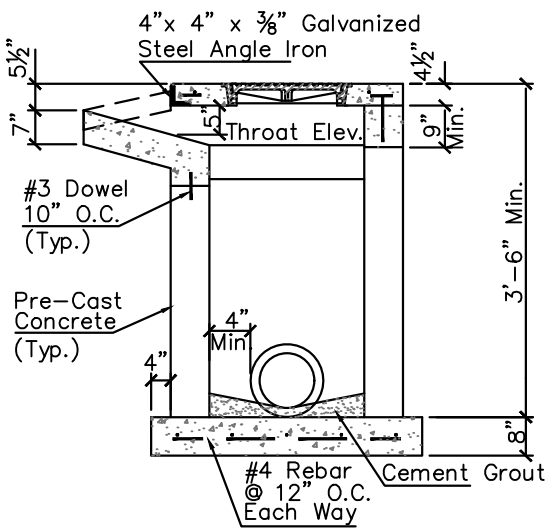
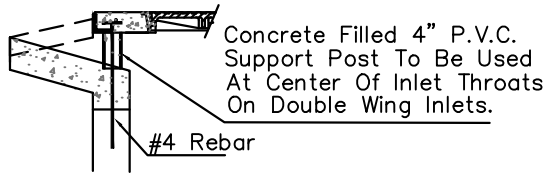
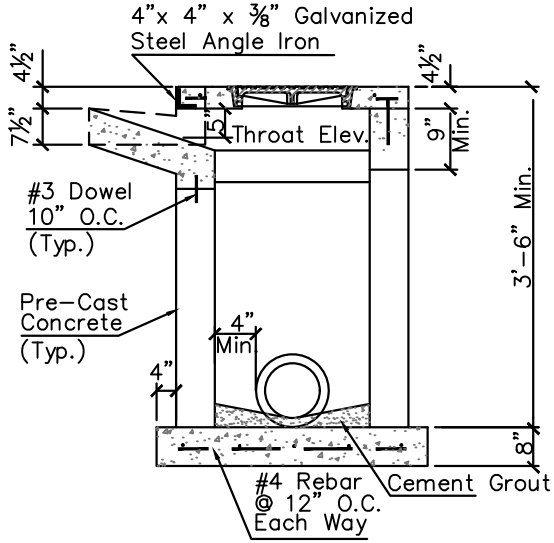
TYPICAL CROSS–SECTIONS



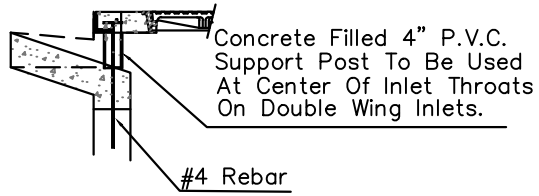
MODIFIED CURB
N.T.S.



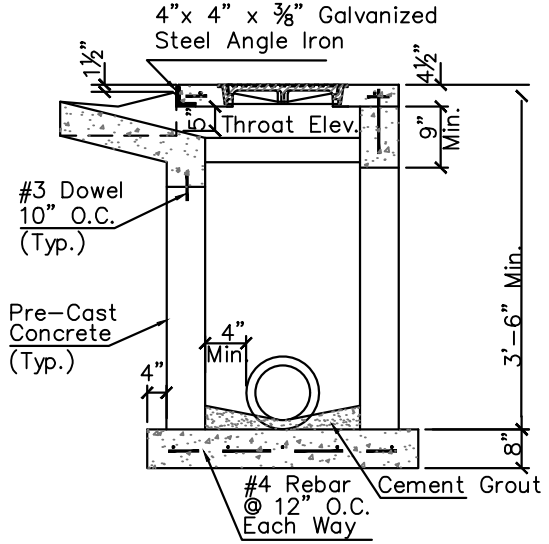
DETAIL "B"
N.T.S.



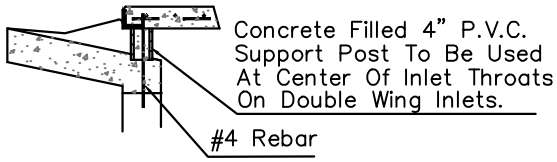
TYPE I CURB
N.T.S.



DETAIL "B"
N.T.S.



VALLEY GUTTER CURB
N.T.S.



DETAIL "B"
N.T.S.

6/5/15	COMBINED CROSS SECTIONS	S.R.
DATE	REVISION DESCRIPTION	APP

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
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WING INLETS FOR
MODIFIED, TYPE I & VALLEY GUTTER CURB
CROSS SECTIONS

INDEX NO.	PAGE NO.
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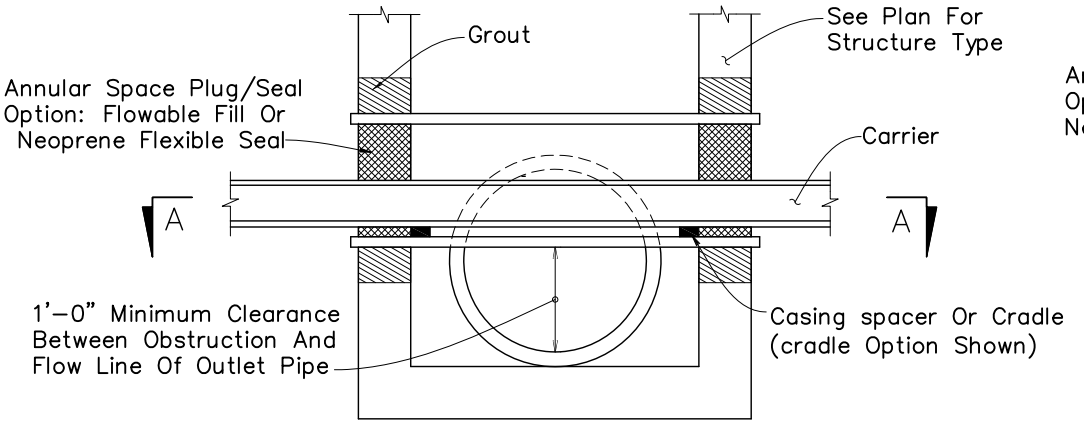
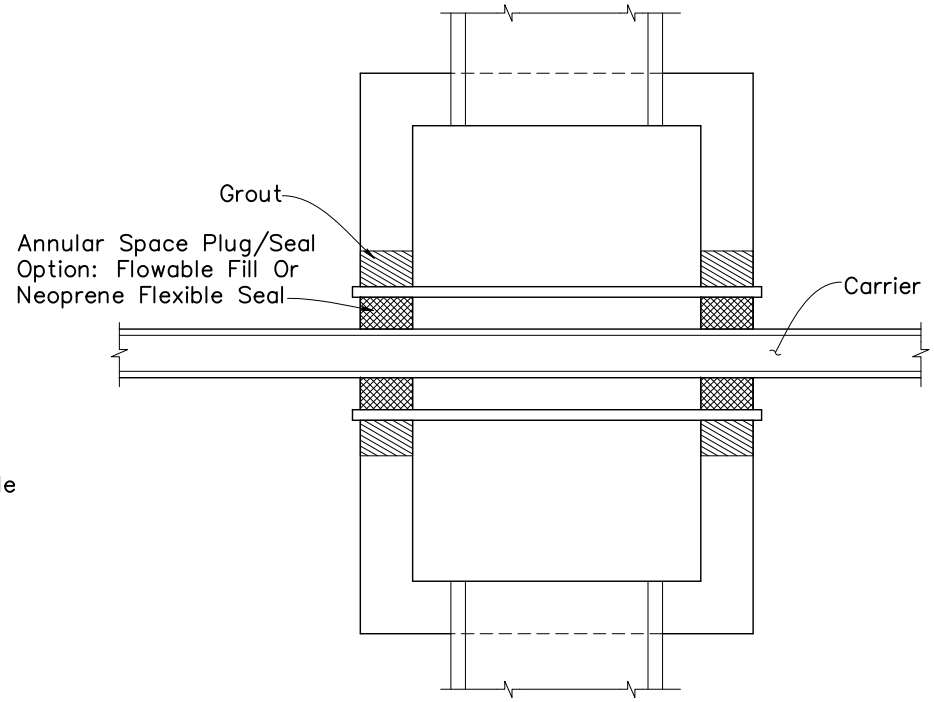
Notes:
1. No joints inside of box
2. Engineer to provide calculations demonstrating that the conflict structure has sufficient hydraulic capacity to not restrict flow more than a typical structure



SECTION LONGITUDINAL

N.T.S.



SECTION A–A

N.T.S.

DATE	REVISION DESCRIPTION	APP

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM DETAILS

UTILITY CONFLICT PIPES THRU STORM DRAIN STRUCTURES

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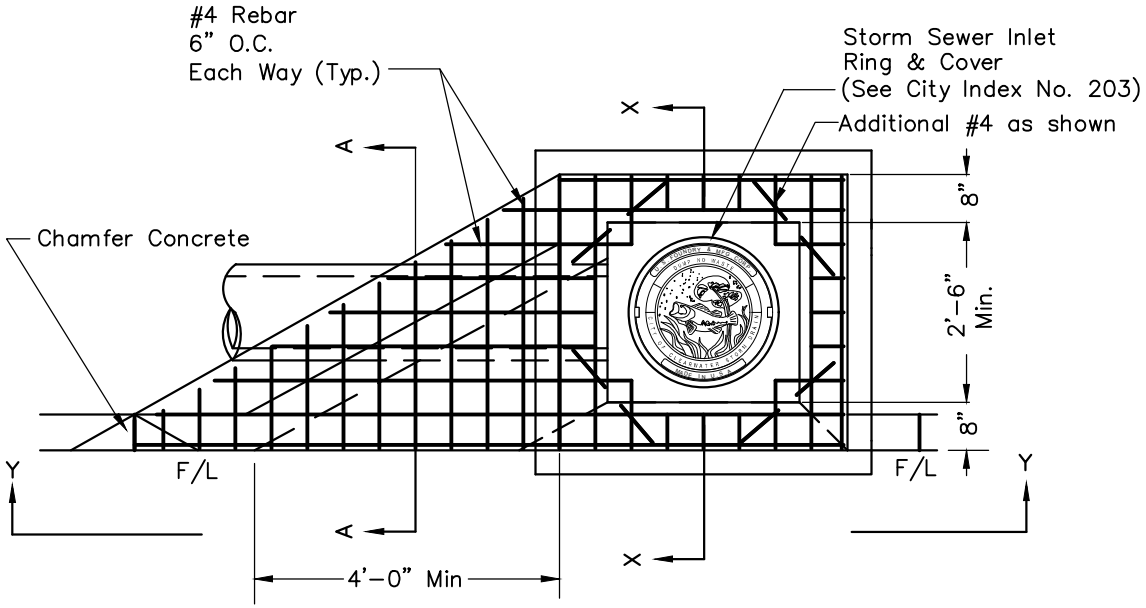
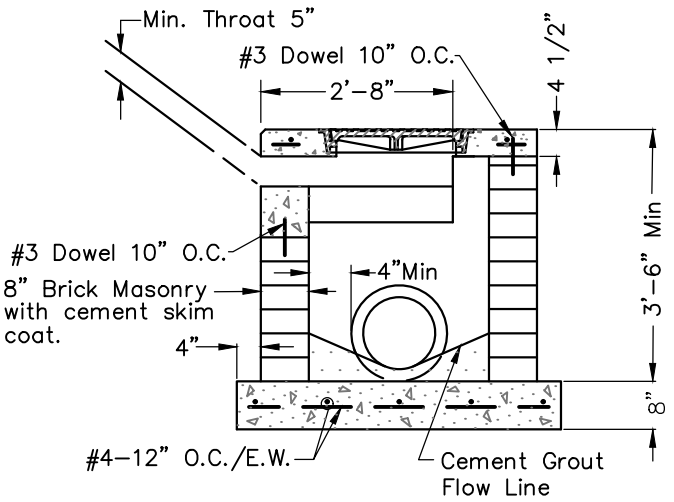


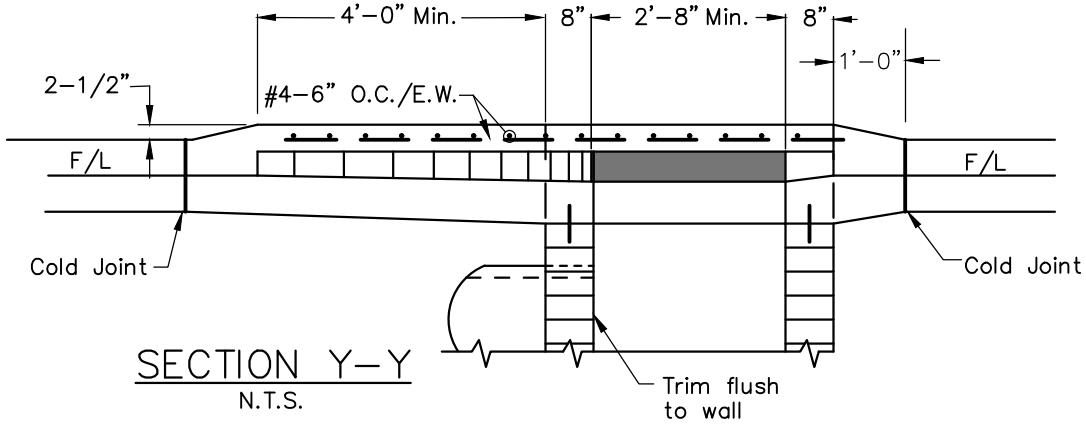
L.H. – R.H. OR DOUBLE WING INLET

N.T.S.



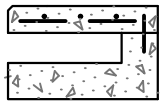
SECTION X–X

N.T.S.



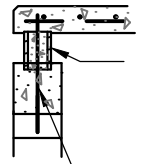
SECTION Y–Y

N.T.S.



SECTION A–A

N.T.S.



Concrete filled 4" p.v.c. support post to be used at center of inlet throats on double wing inlets.

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).

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6/3/15	EDITED DRAWING/NOTES	S.R.

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM DETAILS

TYPE F WING INLET FOR STRAIGHT CURB

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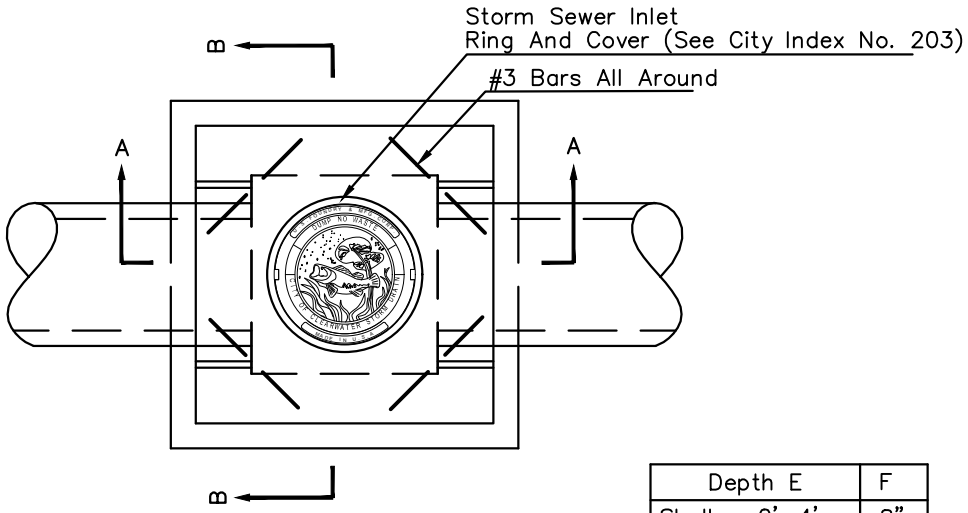
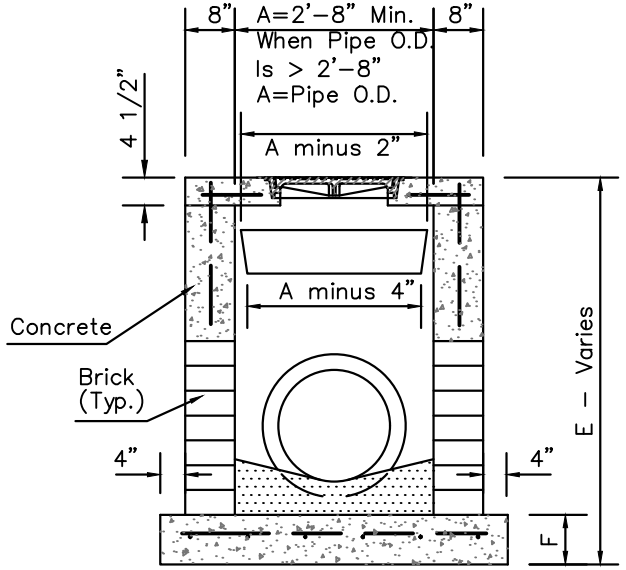
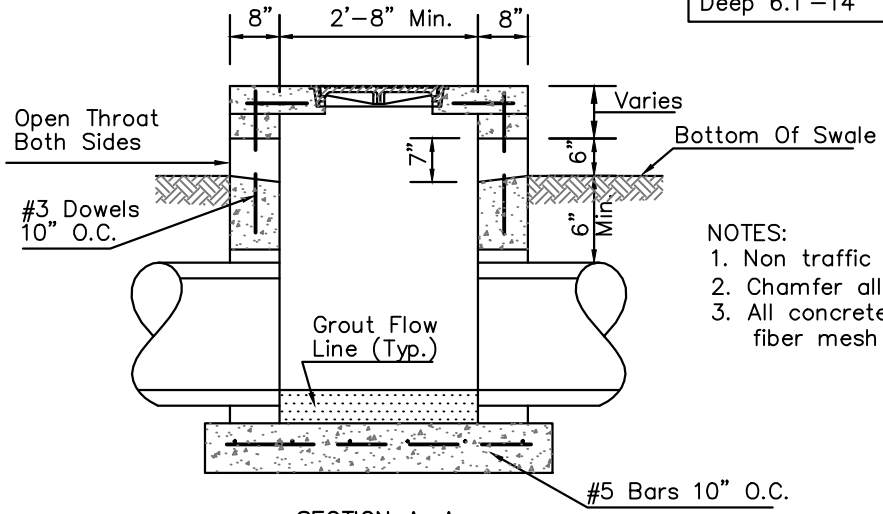


PLAN VIEW
N.T.S.

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



SECTION B–B
N.T.S.



SECTION A–A
N.T.S.

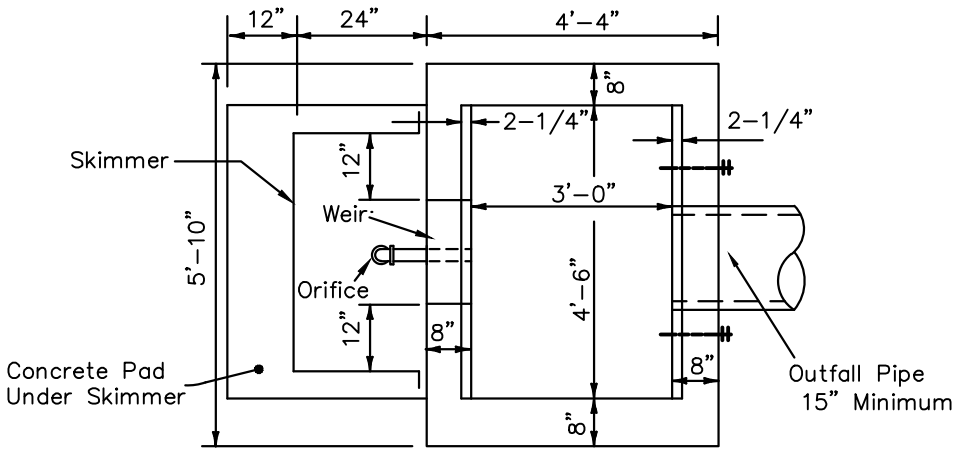
NOTES:
1. Non traffic bearing.
2. Chamfer all exposed edges ¾".
3. All concrete 3,000 psi, with fiber mesh reinforcing.

DATE	REVISION DESCRIPTION	APP
6/3/15	EDITED NOTE	S.R.

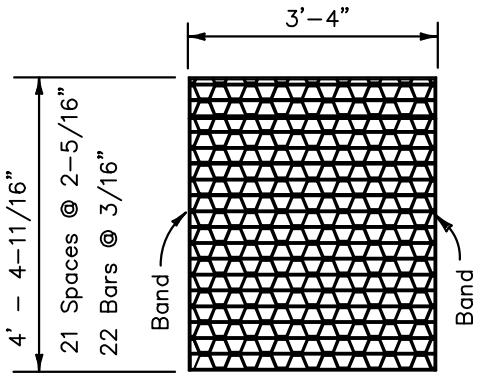
CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
DETAILS

OPEN THROAT
INLET L

INDEX NO.	PAGE NO.
213	1 OF 1
LATEST REVISION	2/22/2016

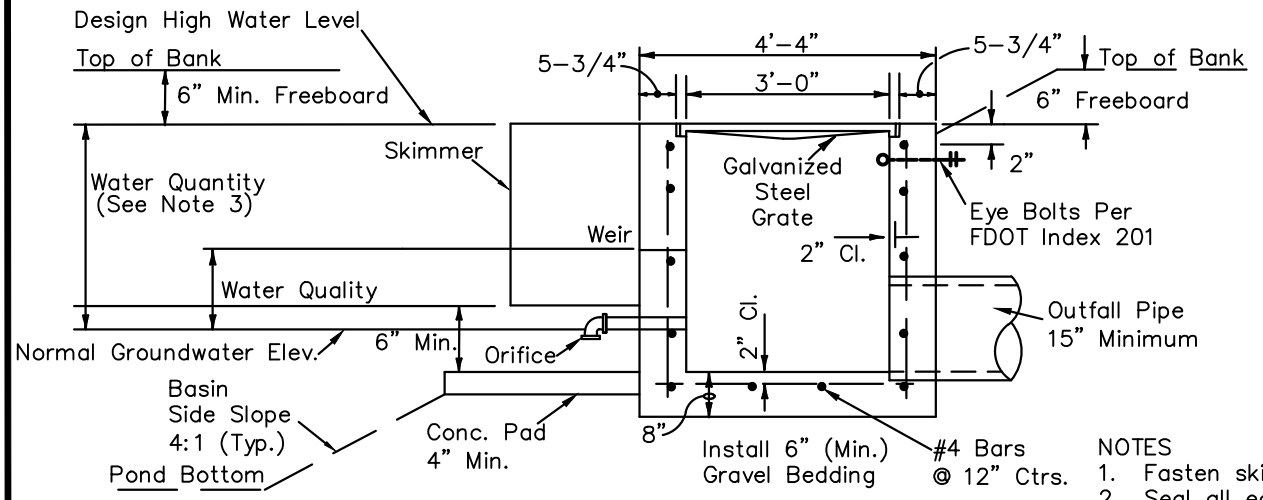


PLAN VIEW
N.T.S.

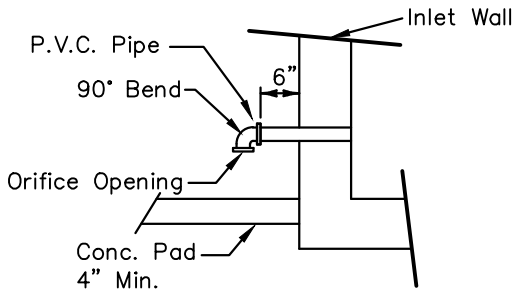


TYPE E
N.T.S.

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

DATE	REVISION DESCRIPTION	APP
8/16/18	EDITED CROSS SECTION & ADDED NOTE 3	J.S.
6/16/15	EDITED CROSS SECTION	S.R.

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
DETAILS

STORM SEWER OUTFALL CONTROL STRUCTURE FDOT TYPE E INLET (MODIFIED) WITH ORIFICE (WET POND)

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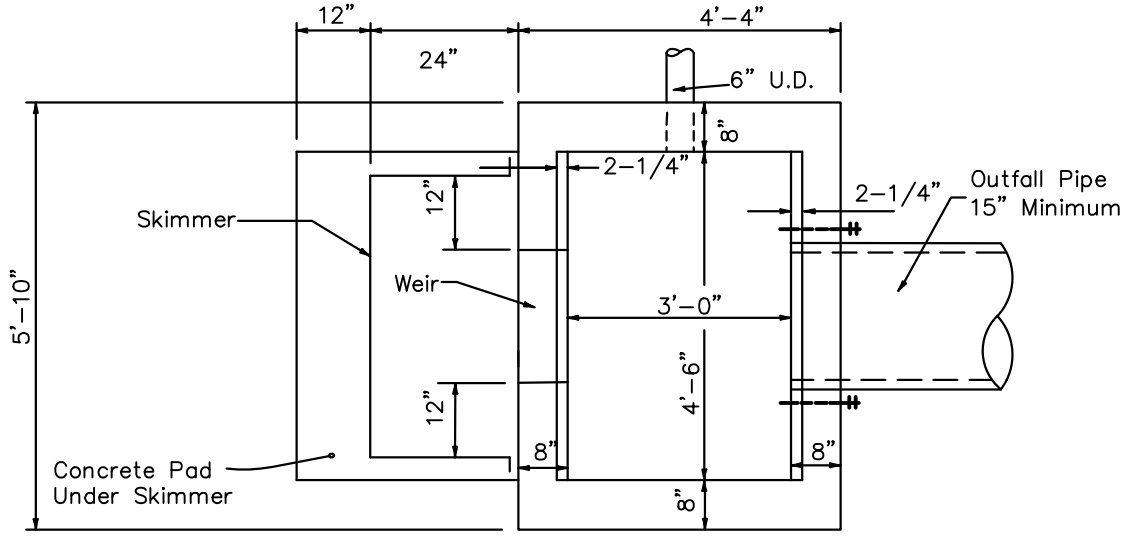
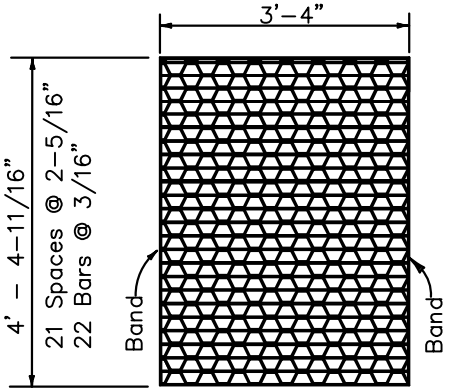
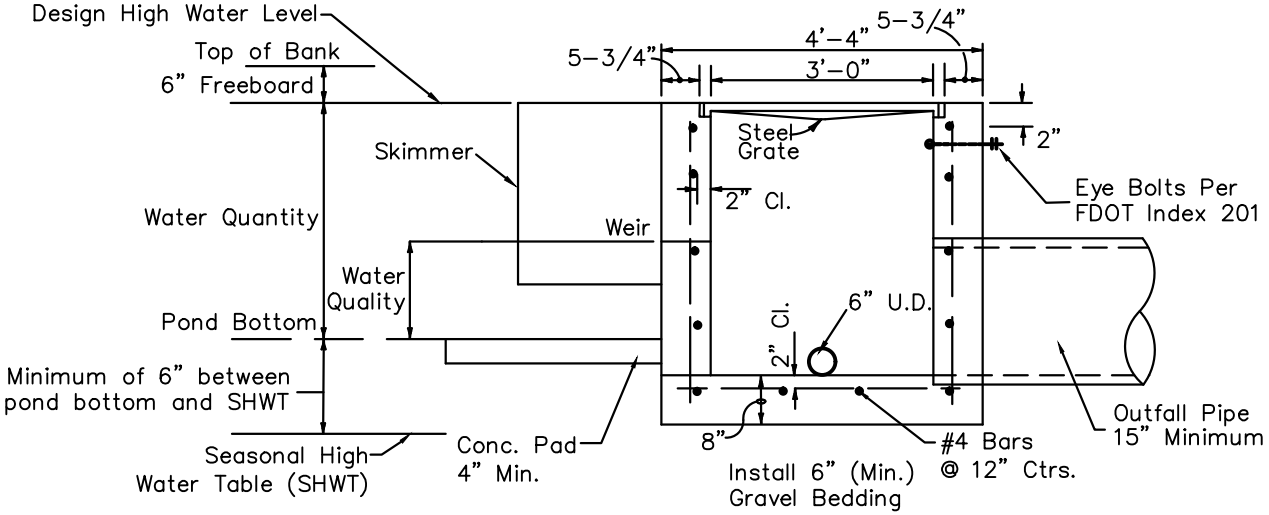


PLAN VIEW
N.T.S.



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.

DATE	REVISION DESCRIPTION	APP
6/18/15	EDITED DRAWING	S.R.

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
DETAILS

STORM SEWER OUTFALL CONTROL STRUCTURE FDOT TYPE E INLET (MODIFIED) WITH UNDERDRAIN (DRY POND)

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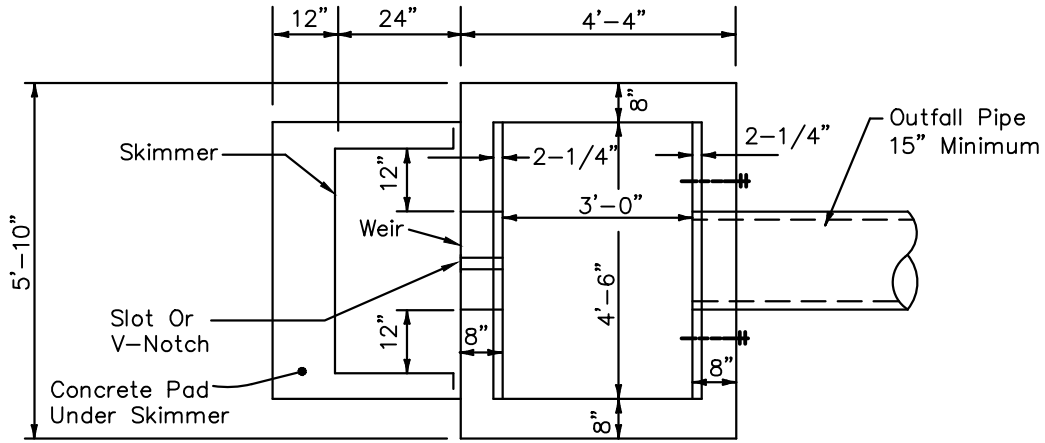
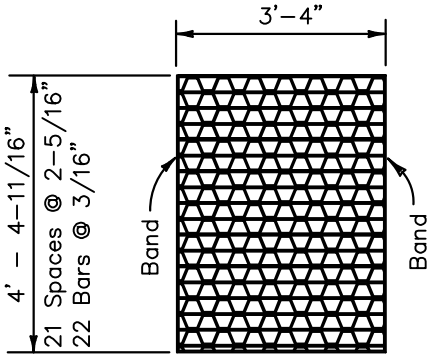
LATEST REVISION	2/22/2016

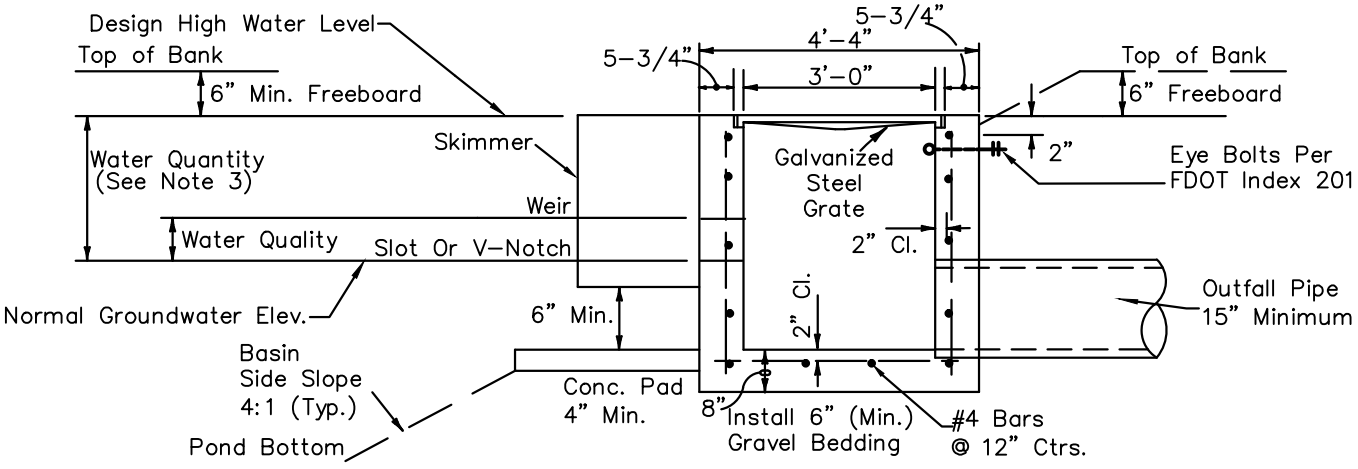


PLAN VIEW
N.T.S.



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.

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

DATE	REVISION DESCRIPTION	APP
8/16/18	EDITED CROSS SECTION & ADDED NOTE 3	J.S.
6/16/15	EDITED DRAWING	S.R.

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
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STORM SEWER OUTFALL CONTROL STRUCTURE FDOT TYPE E INLET (MODIFIED) WITH SLOT OR V–NOTCH (WET POND)

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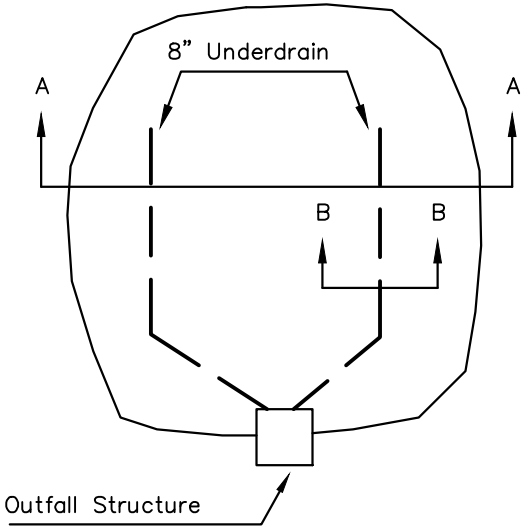
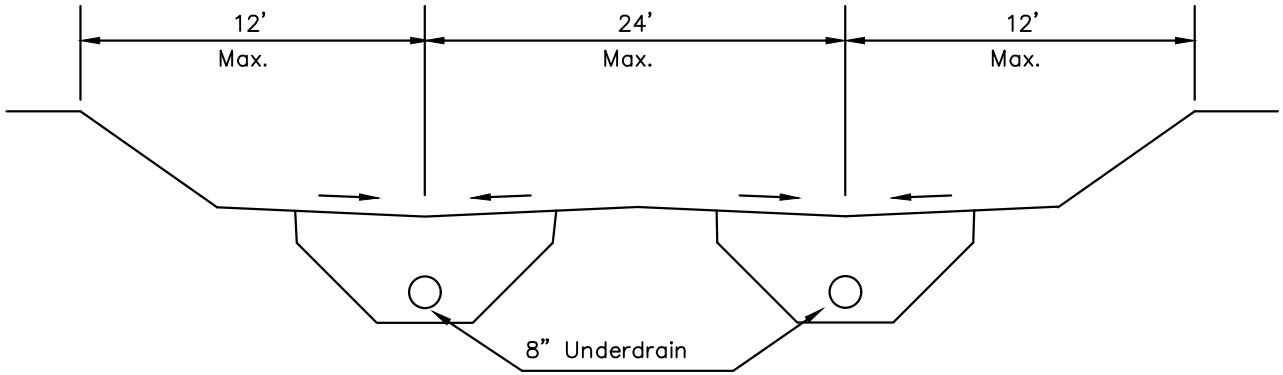
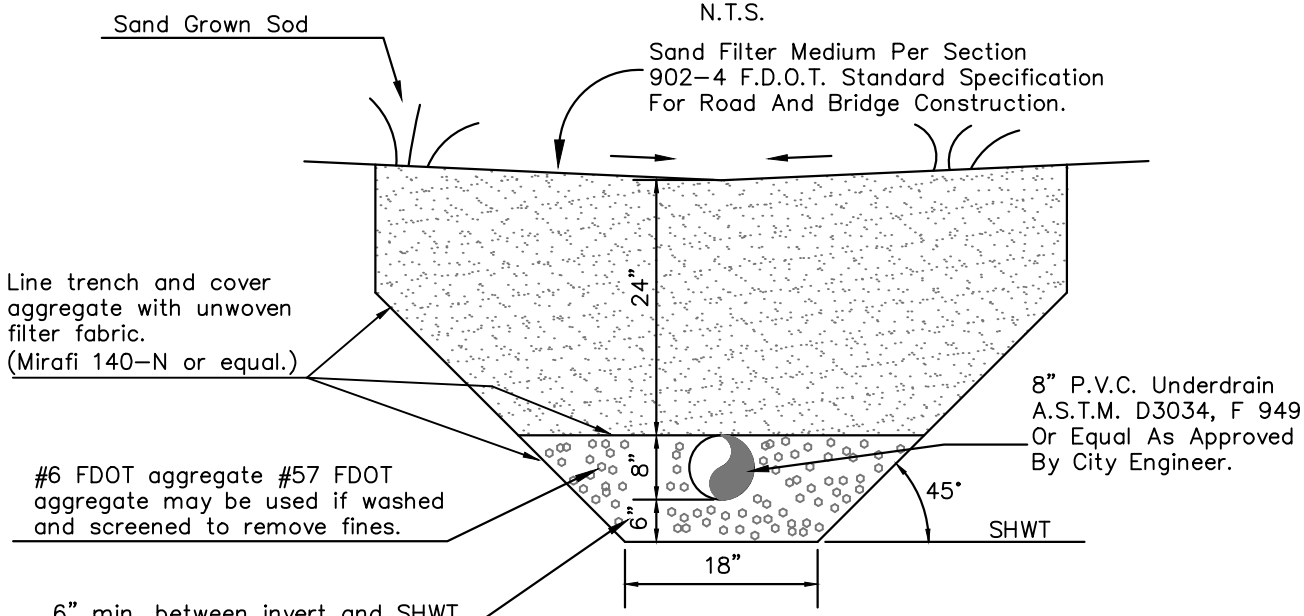


DETENTION POND
N.T.S.

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" above the established Seasonal High Water Table (SHWT).



SECTION A–A
N.T.S.



SECTION B–B
N.T.S.

6/16/15	CHANGE 8" UD.	S.R.
DATE	REVISION DESCRIPTION	APP

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
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UNDERDRAIN DETAIL FOR DRY DETENTION AREAS

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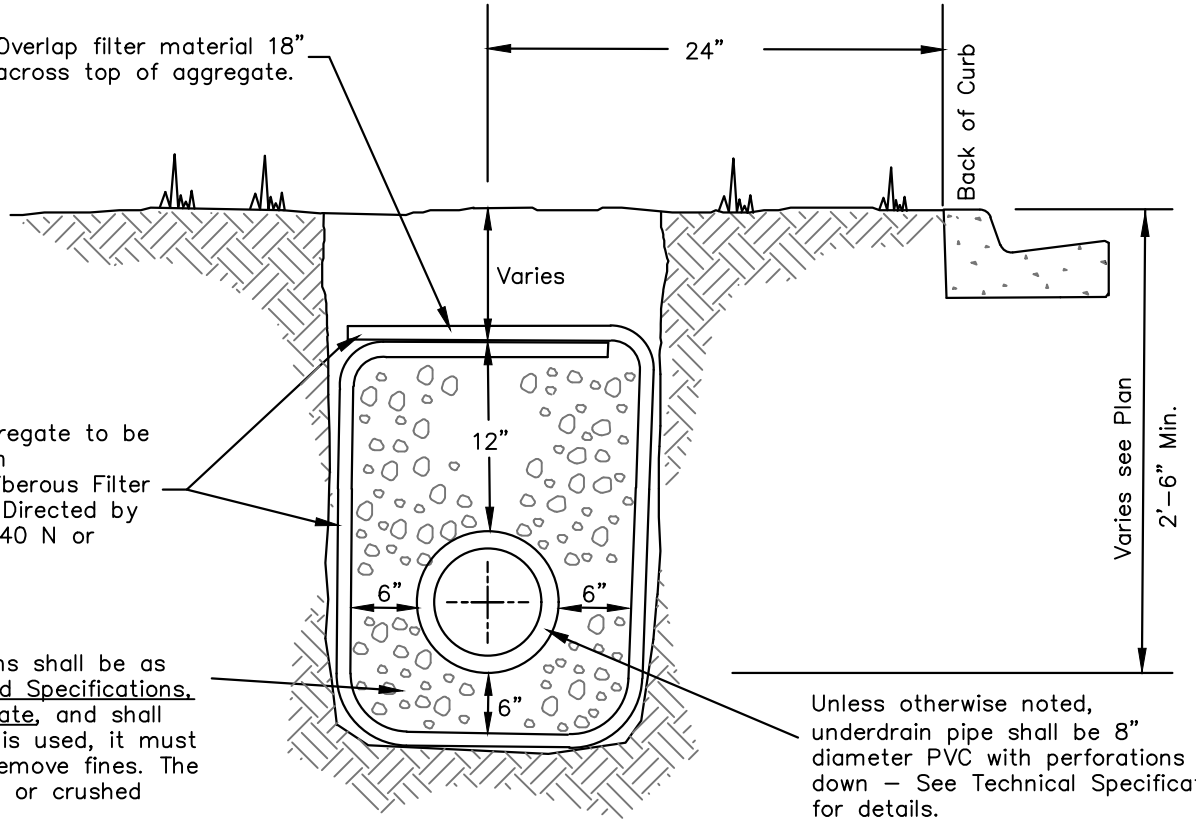

Perimeter of aggregate to be fully wrapped with Non-Degrading Fiberous Filter Type Material as Directed by Engineer, Mirafi 140 N or approved equal.

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 crushed gravel.

Solid pipe (w/o perforations) is to be used under drives and roadways, with compacted backfill.

Unless otherwise noted, underdrain pipe shall be 8" diameter PVC with perforations down – See Technical Specifications for details.

N.T.S.

DATE	REVISION DESCRIPTION	APP
6/3/15	CORRECTED TEXT/COMBINED SERIES	S.R.

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ENGINEERING DEPARTMENT
STORM DETAILS

UNDERDRAIN DETAIL

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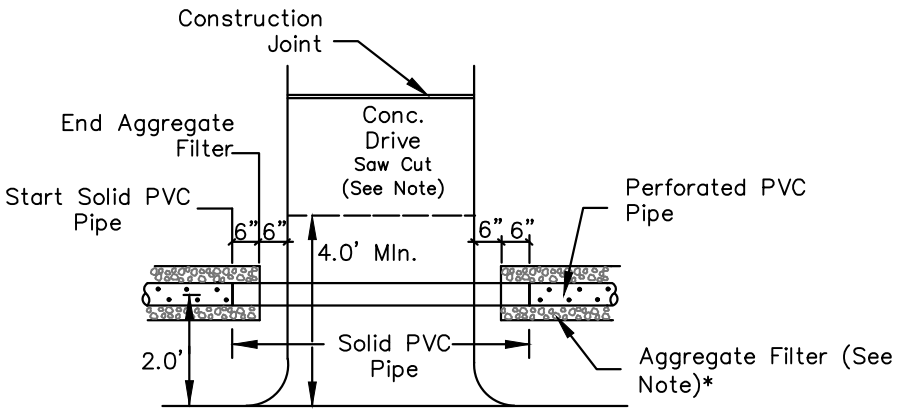
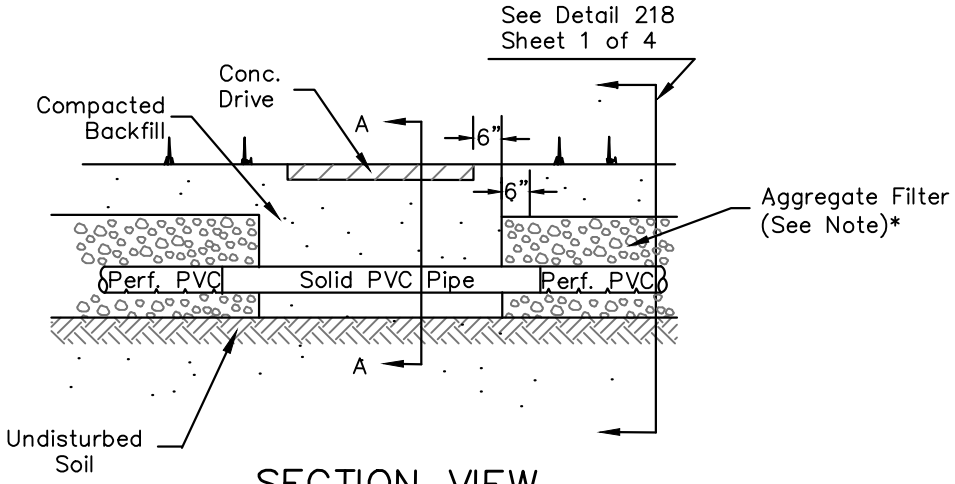


PLAN VIEW

N.T.S.

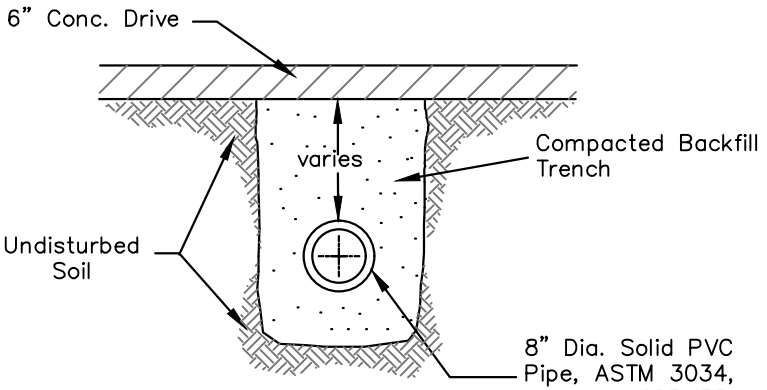
NOTE:
Saw Cut Drive if Nearest Const. Joint Over 7' from Back of Curb.

* 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 crushed gravel.



SECTION VIEW

N.T.S.



SECTION A–A

N.T.S.

6/3/15	CORRECTION TO NOTES	S.R.
DATE	REVISION DESCRIPTION	APP

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM DETAILS

UNDERDRAIN AT DRIVEWAYS

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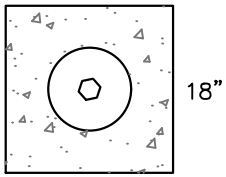
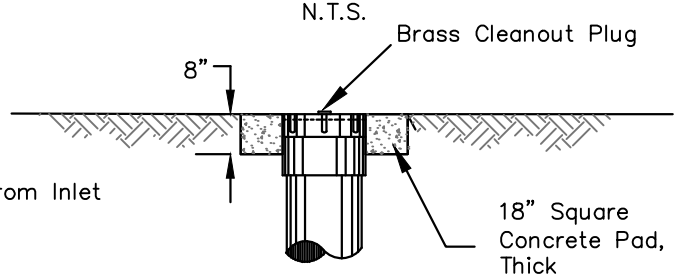


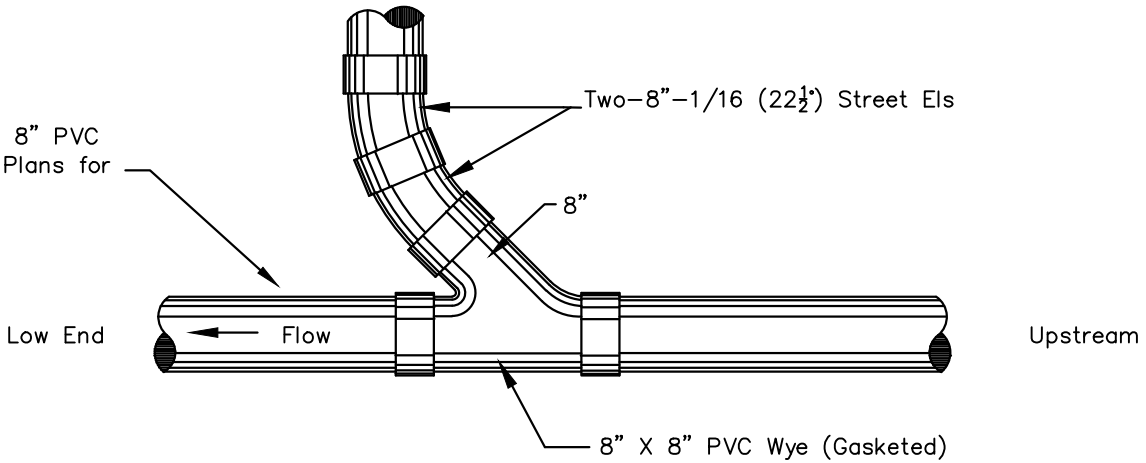
PLAN VIEW

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.

DATE	REVISION DESCRIPTION	APP
6/3/15	CORRECTION TO NOTES	S.R.

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
DETAILS

STANDARD UNDERDRAIN CLEANOUT (STORM)

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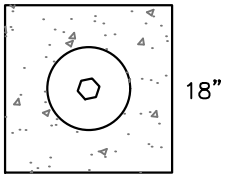
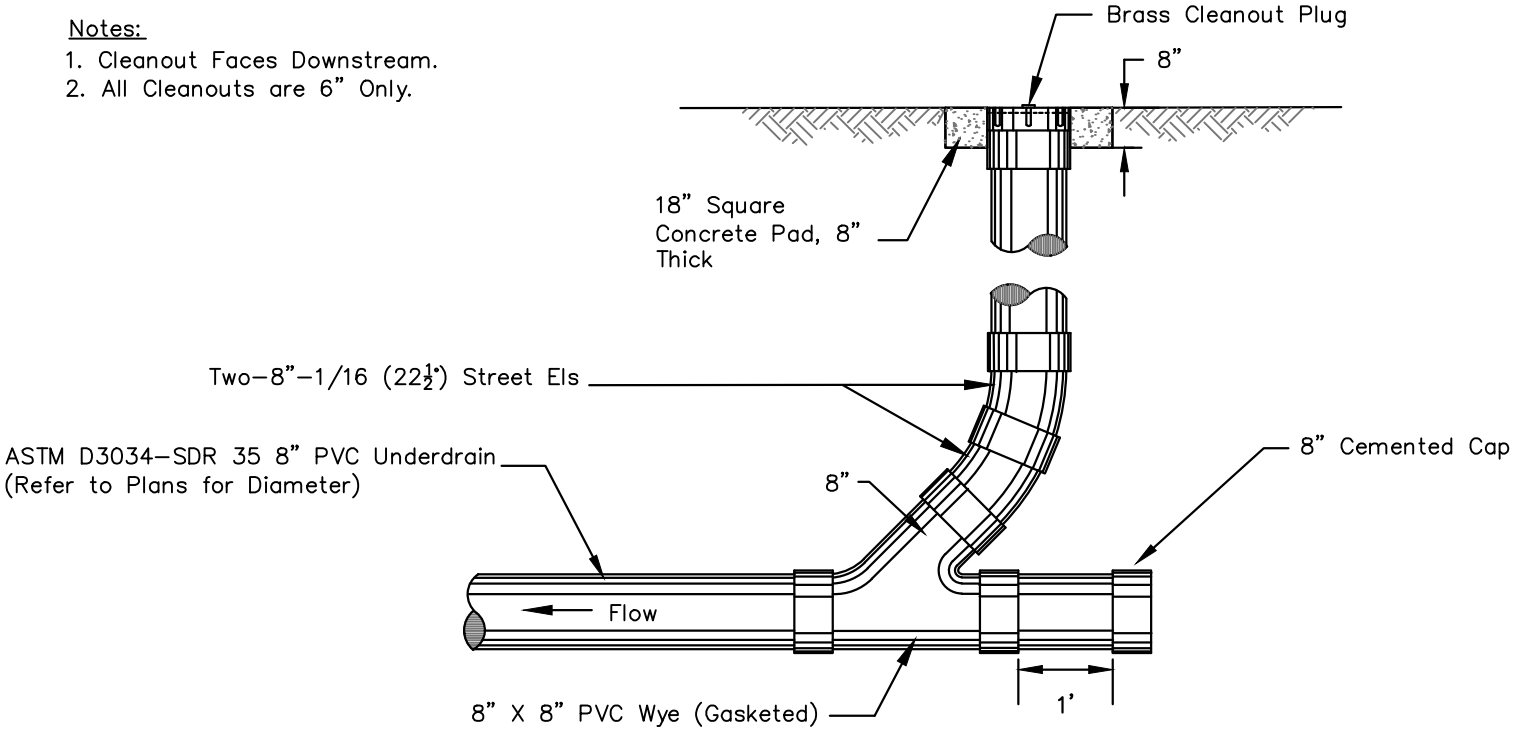


PLAN VIEW

N.T.S.

Notes:

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



SECTION VIEW

N.T.S.

DATE	REVISION DESCRIPTION	APP
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CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM
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TERMINAL END UNDERDRAIN CLEANOUT
(STORM)

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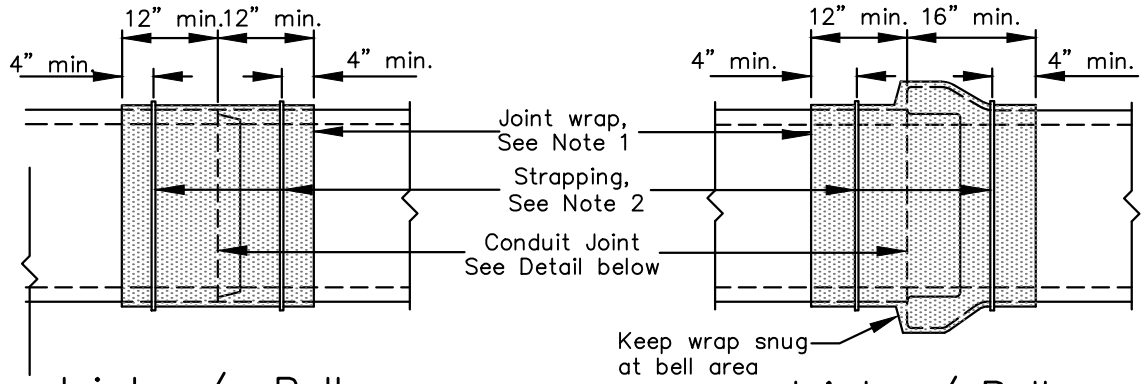
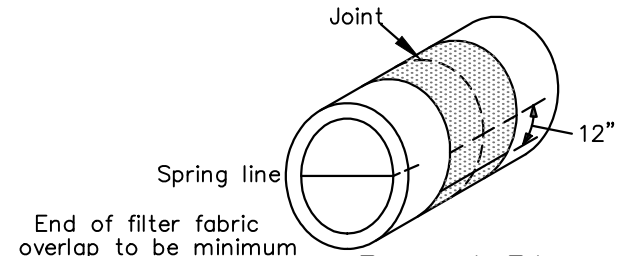
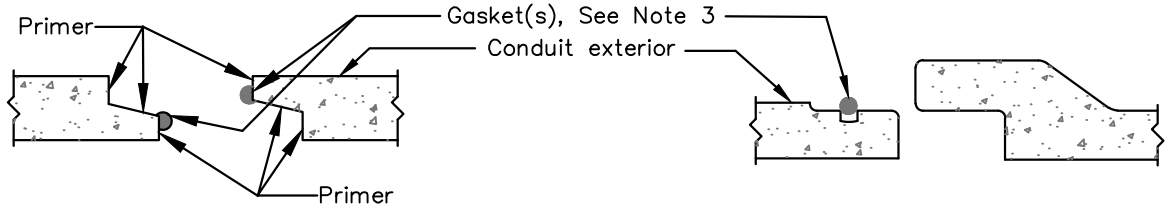


Joint w/o Bell
(Showing filter fabric)

Joint w/ Bell
(Showing filter fabric)

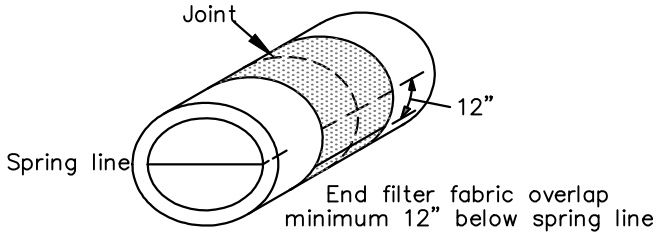


Round Pipe



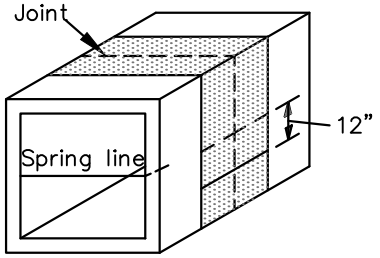
Tongue and Groove type joint with Double Gasket
(Prior to pull–up)

Bell and Spigot type joint with "O Ring" Gasket
(Prior to pull–up)



Elliptical Pipe

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.



Box Culvert

Isometric Views
(Showing filter fabric)

DATE	REVISION DESCRIPTION	APP
6/3/15	REV. NOTES	S.R.

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM DETAILS

CONDUIT JOINT WRAP DETAIL

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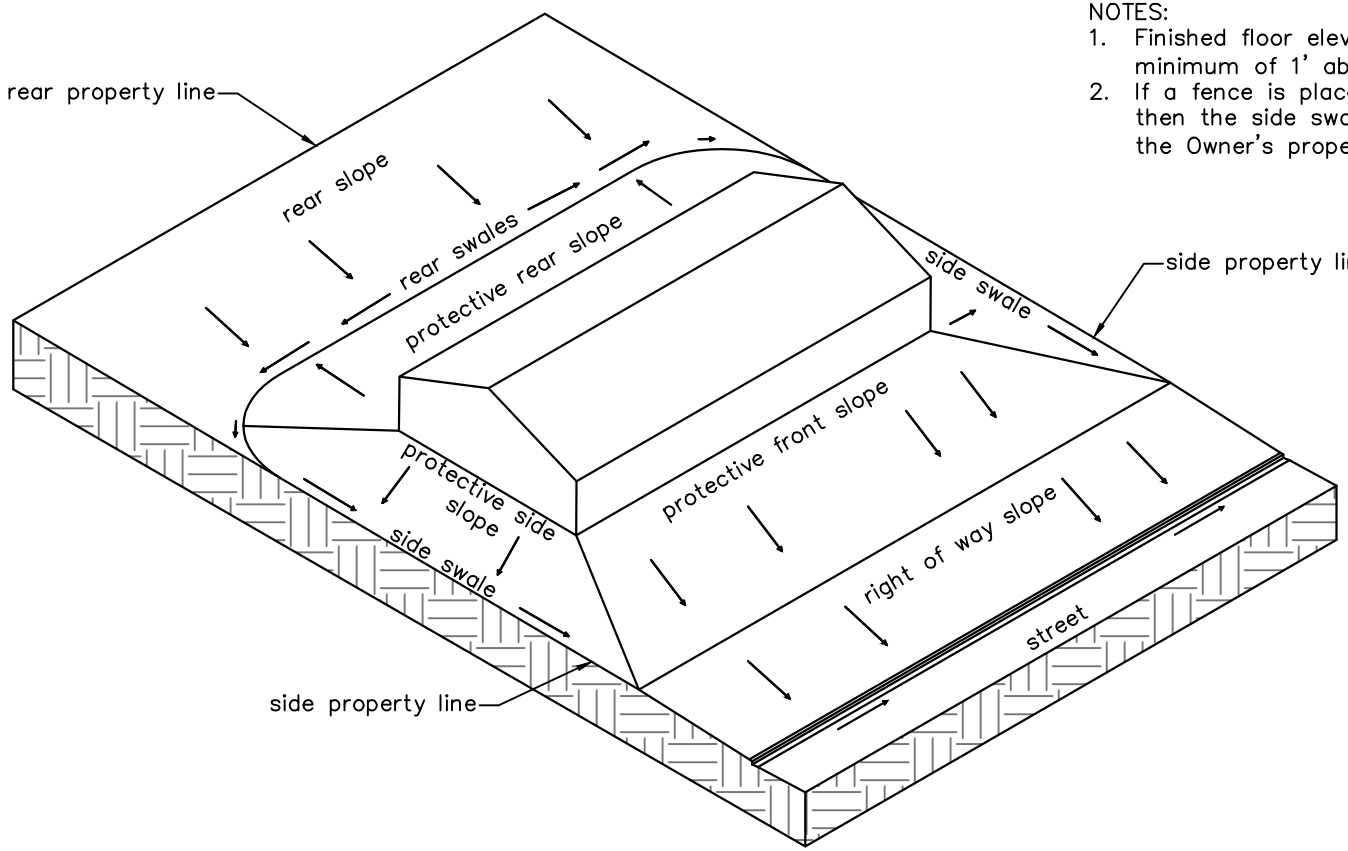
NOTES:
1. Finished floor elevation shall be a minimum of 1' above crown of road.
2. If a fence is placed on the property line, then the side swale shall be entirely on the Owner's property.



Lot Grading Type 'A'
Lot Drainage to Street

N.T.S.

DATE	REVISION DESCRIPTION	APP

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM DETAILS

LOT GRADING
TYPE 'A'

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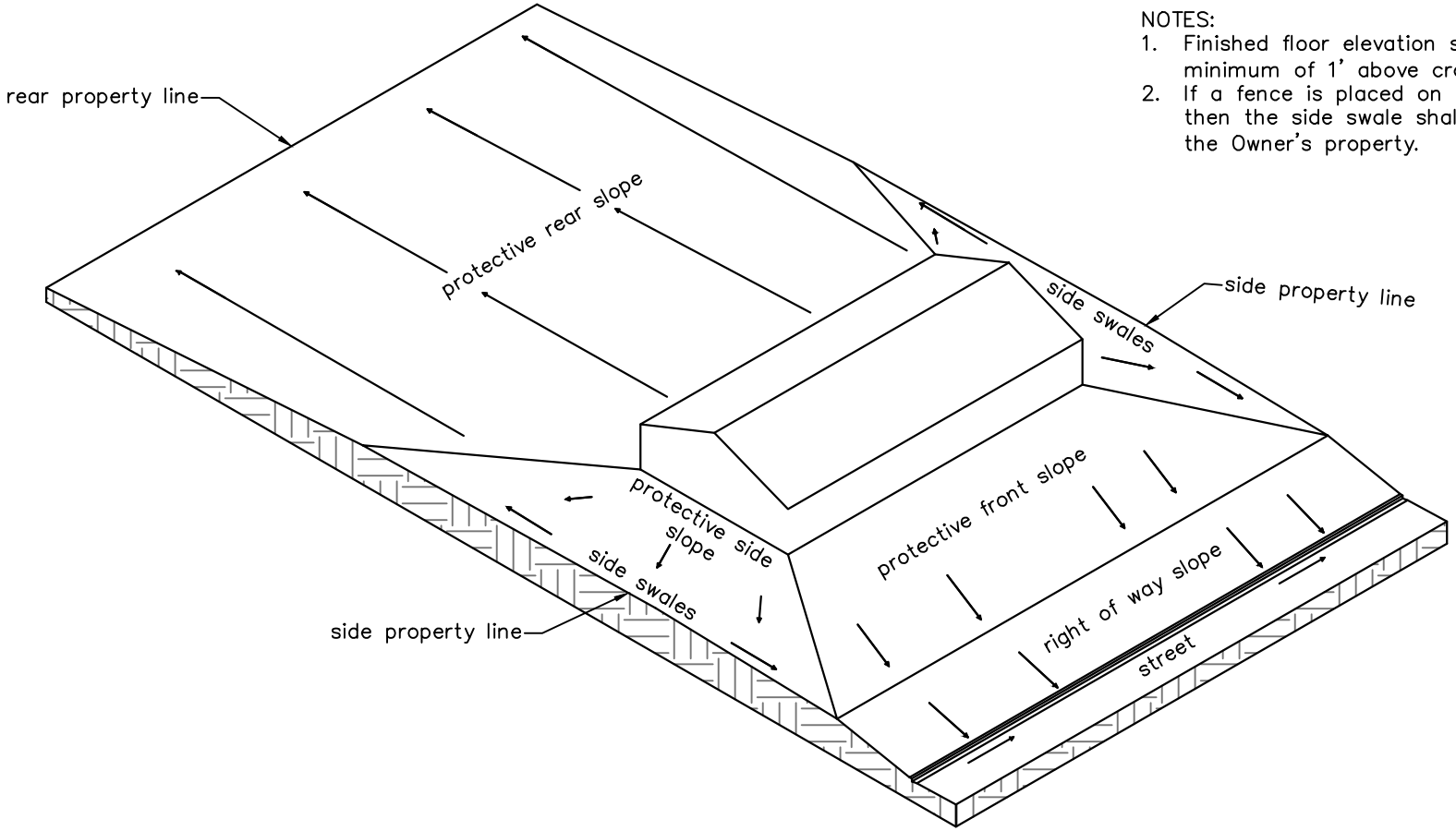
NOTES:
1. Finished floor elevation shall be a minimum of 1' above crown of road.
2. If a fence is placed on the property line, then the side swale shall be entirely on the Owner's property.



Lot Grading Type 'B'
Lot Drainage Both to Street and to Rear Lot Line

N.T.S.

DATE	REVISION DESCRIPTION	APP

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM DETAILS

LOT GRADING
TYPE 'B'

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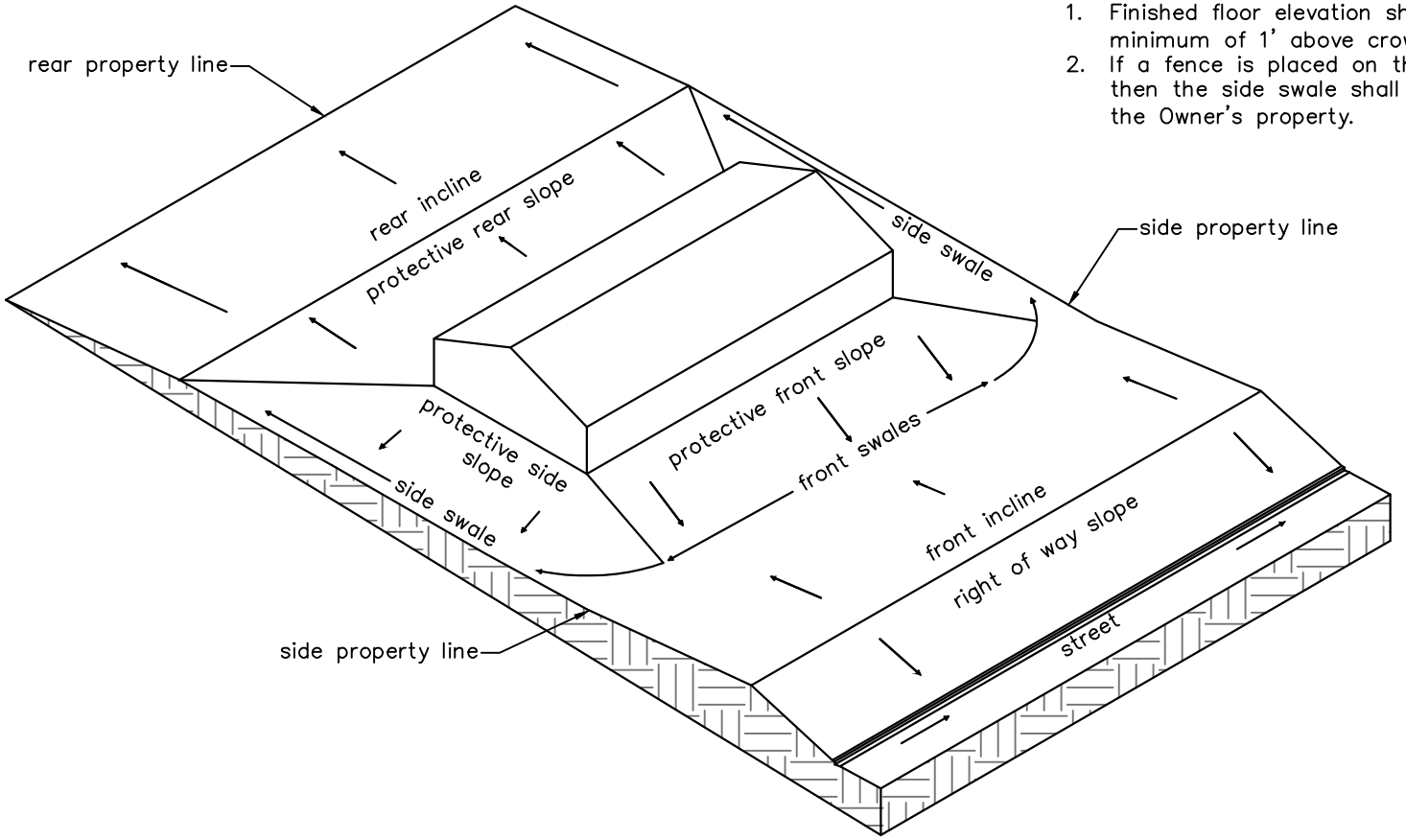
LATEST REVISION	4/21/2016

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 'C'
Lot Drainage to Rear Lot Line
N.T.S.

DATE	REVISION DESCRIPTION	APP

CITY OF CLEARWATER
ENGINEERING DEPARTMENT
STORM DETAILS

LOT GRADING
TYPE 'C'

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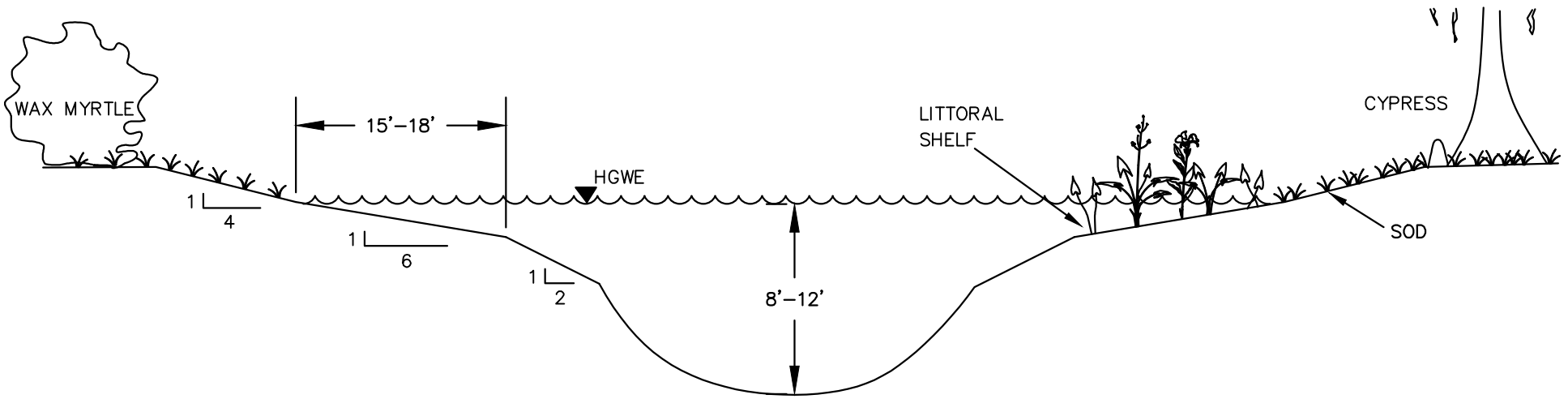
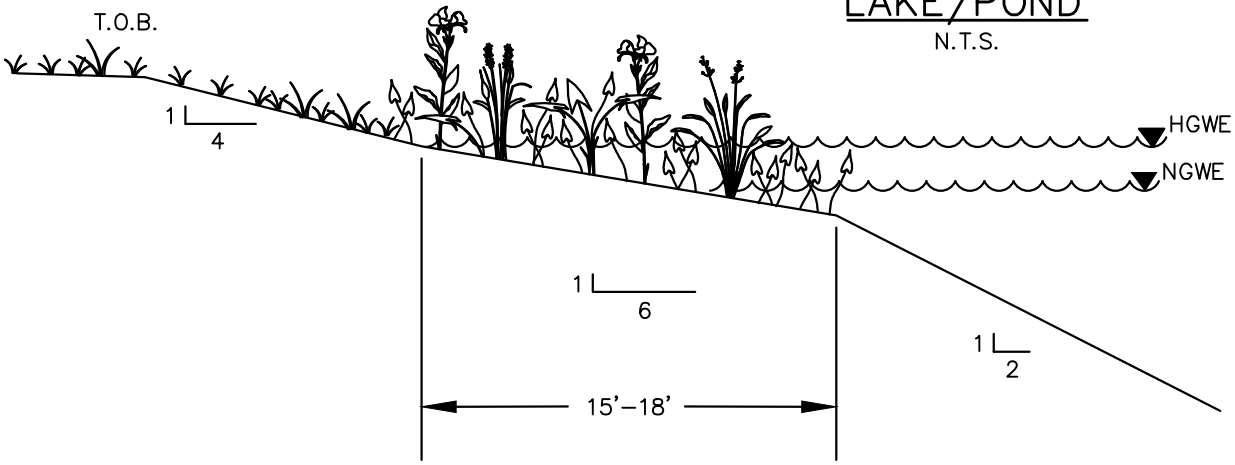


CROSS SECTION
LAKE/POND
N.T.S.



LITTORAL SHELF
N.T.S.

NOTES
1. Littoral shelf and upland areas to be vegetated per city requirements.
2. Outfall structure shall incorporate sub drain 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.

DATE	REVISION DESCRIPTION	APP
8/16/18	EDITED NOTES	J.R.
6/3/15	DELETED NOTES	S.R.

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WET DETENTION/RETENTION POND

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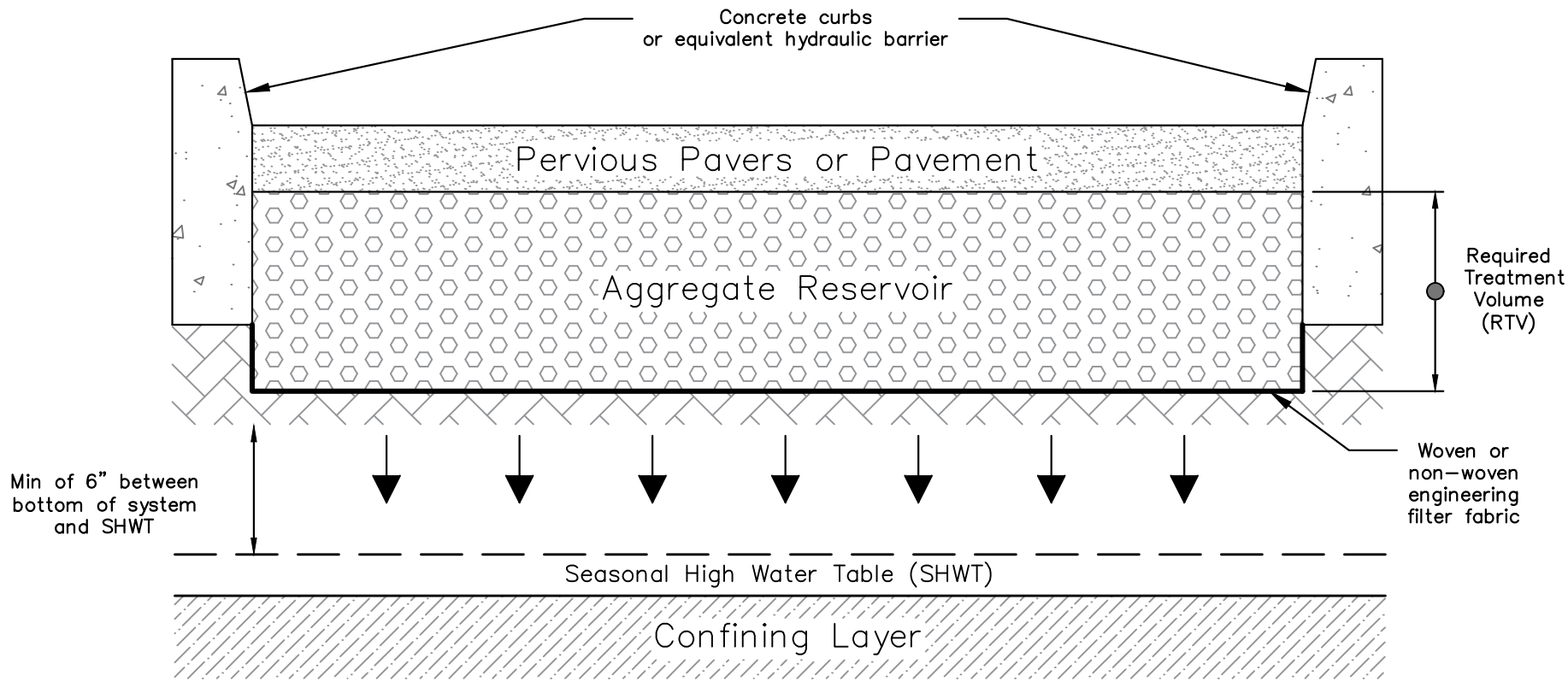

DATE	REVISION DESCRIPTION	APP

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TYPICAL PERVIOUS PAVERS OR PAVEMENT CROSS SECTION

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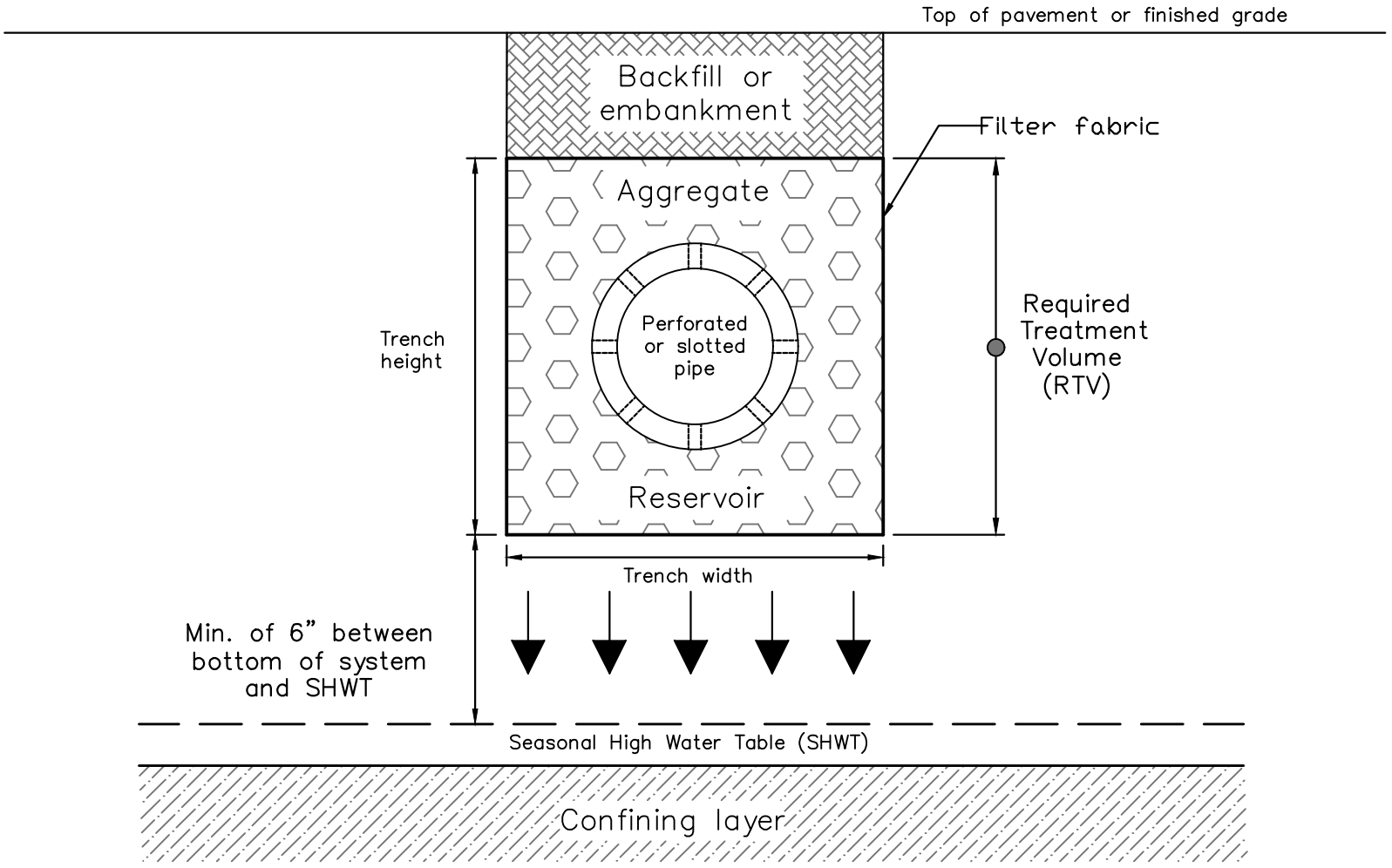

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TYPICAL EXFILTRATION TRENCH CROSS SECTION

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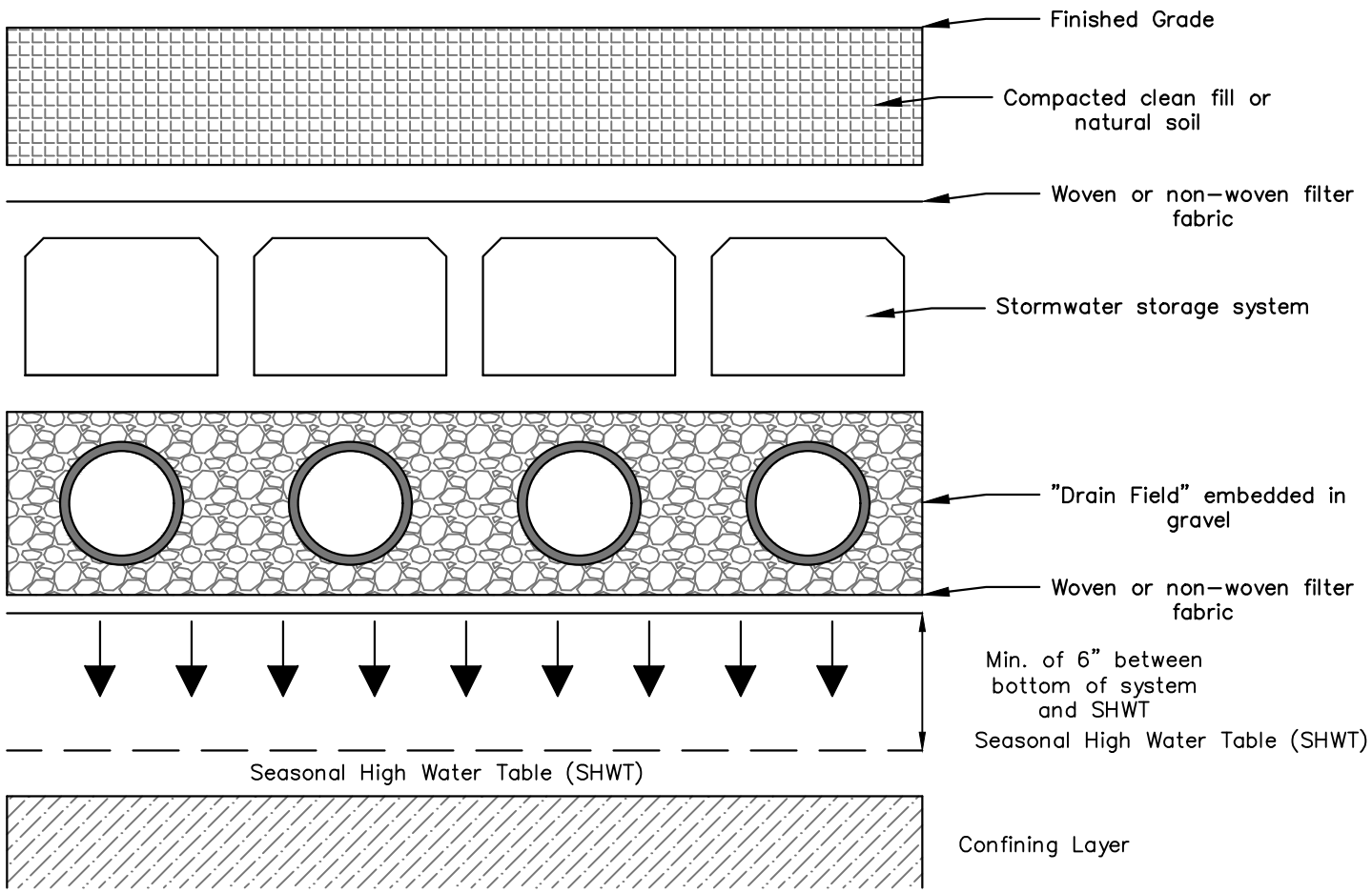

DATE	REVISION DESCRIPTION	APP

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TYPICAL UNDERGROUND RETENTION SYSTEM CROSS SECTION

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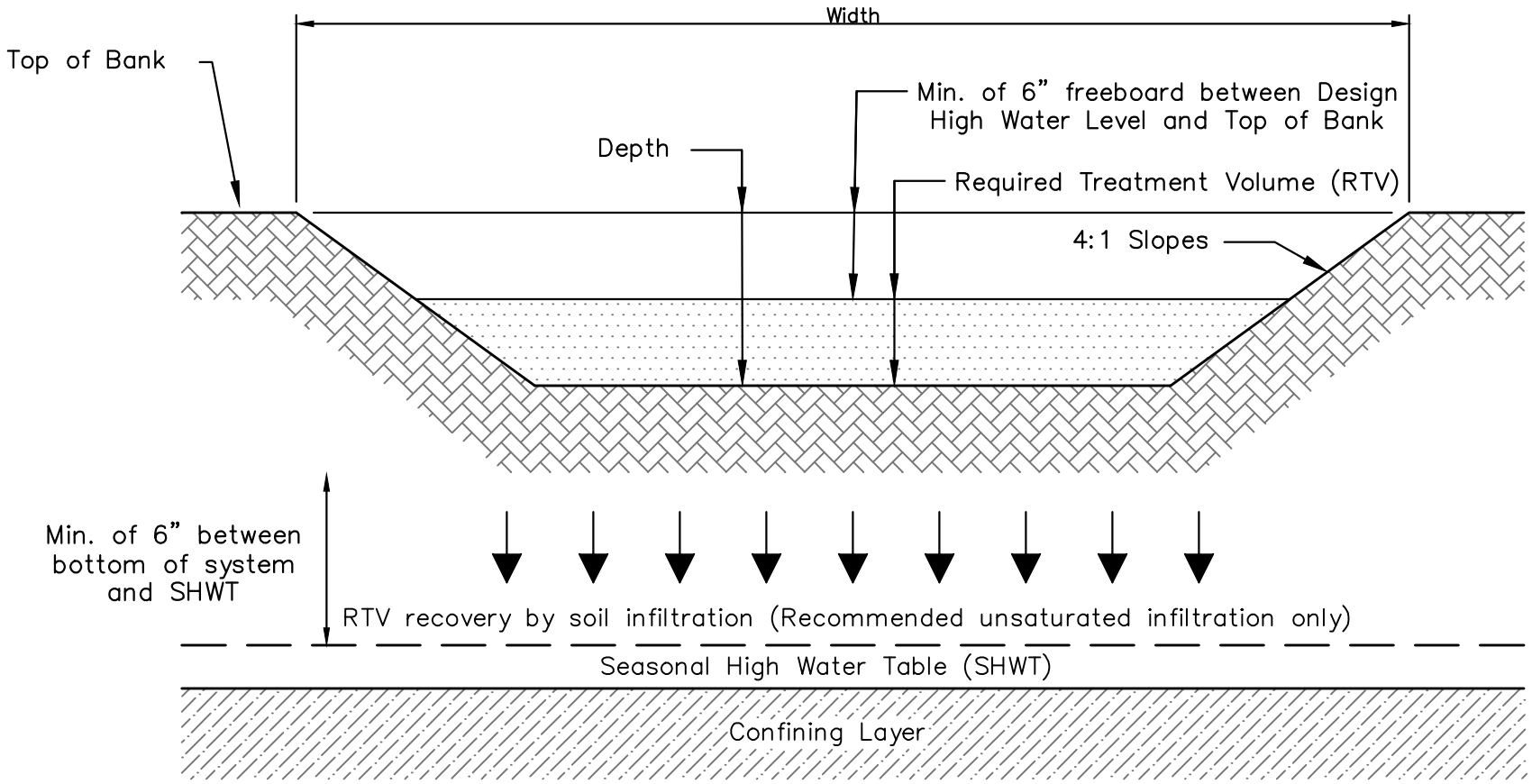

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CITY OF CLEARWATER
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TREATMENT SWALE CROSS SECTION

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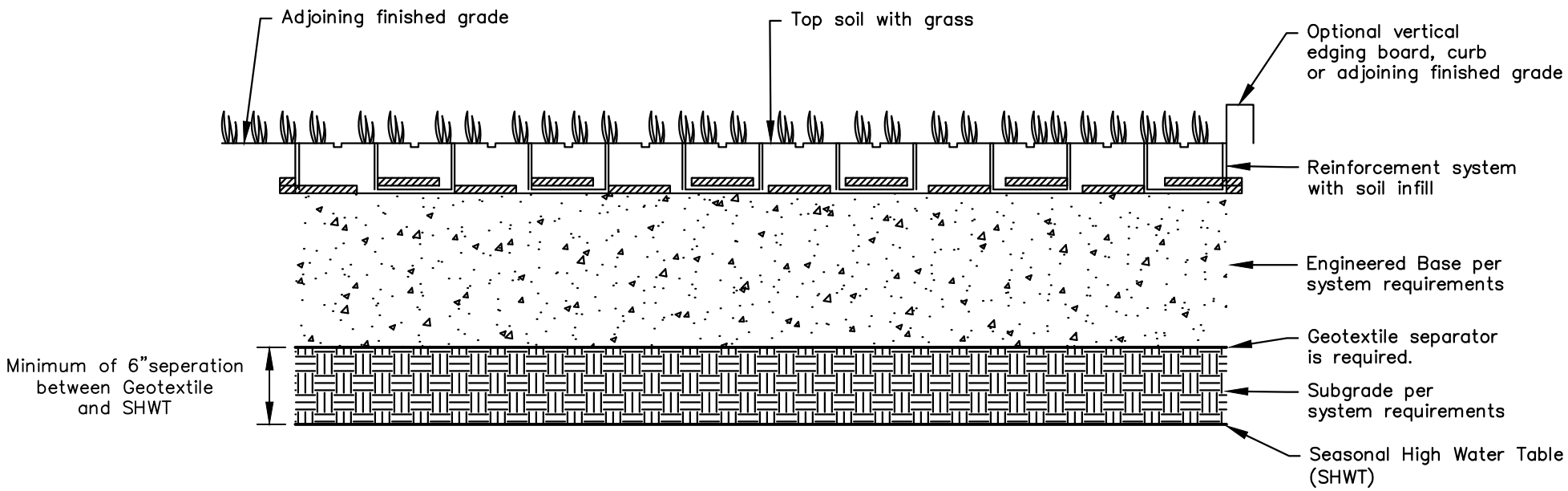

NOTES:

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.

DATE	REVISION DESCRIPTION	APP

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TYPICAL CROSS SECTION OF REINFORCED GRASS PARKING

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